Oregon
John A. Kitzhaber, MD, Governor

Department of Transportation
Office of the Director, MS 11
355 Capitol St NE
Salem, OR 97301-3871

DATE: October 5, 2012

TO: Oregon Transportation Commission

FROM: Matthew L. Garrett
Director

SUBJECT: **Consent 5 -** Adoption of the U.S. 26: Brookwood Parkway/Helvetia Road Interchange Area Management Plan

Requested Action:
Request approval to adopt the U.S. 26: Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP) and amend the 1999 Oregon Highway Plan. Oregon Transportation Commission (OTC) adoption will establish policies for the interchange areas to guide ODOT and local governments to manage the interchange facilities.

Background:
The IAMP was prepared in coordination with the City of Hillsboro and Washington County. ODOT worked with the city and county to develop the IAMP to protect the function of the interchange and identify needed improvements. The IAMP must be adopted as an amendment to the Oregon Highway Plan before the construction of improvements can commence.

A series of local ordinances have been adopted by the city and county in support of the IAMP. Washington County adopted Ordinance No. 749, that amended the Transportation Element on the Comprehensive Plan at its September 18 Board of Commissioners meeting. The City of Hillsboro's Transportation System Plan (TSP) amendment was adopted at its city council meeting on October 2.

OTC adoption of the facility plan will affirm its compatibility with local comprehensive plans and will make the local actions already taken consistent with the state transportation plan. Adoption into the state plan also helps ensure the decisions made locally be consistent with the Transportation Planning Rule, requiring local plans be consistent with the state plan. Adoption by the OTC is the complementary action to support the legal proceedings and actions that have been completed by the local agencies.

The attachments for the Oregon Transportation Commission are available on the Region 1 Project Page web site for the U.S. 26: Brookwood Parkway Project:
http://cms.oregon.gov/ODOT/HWY/REGION1/pages/us26_brookwoodpkwy/index.aspx

Attachments:

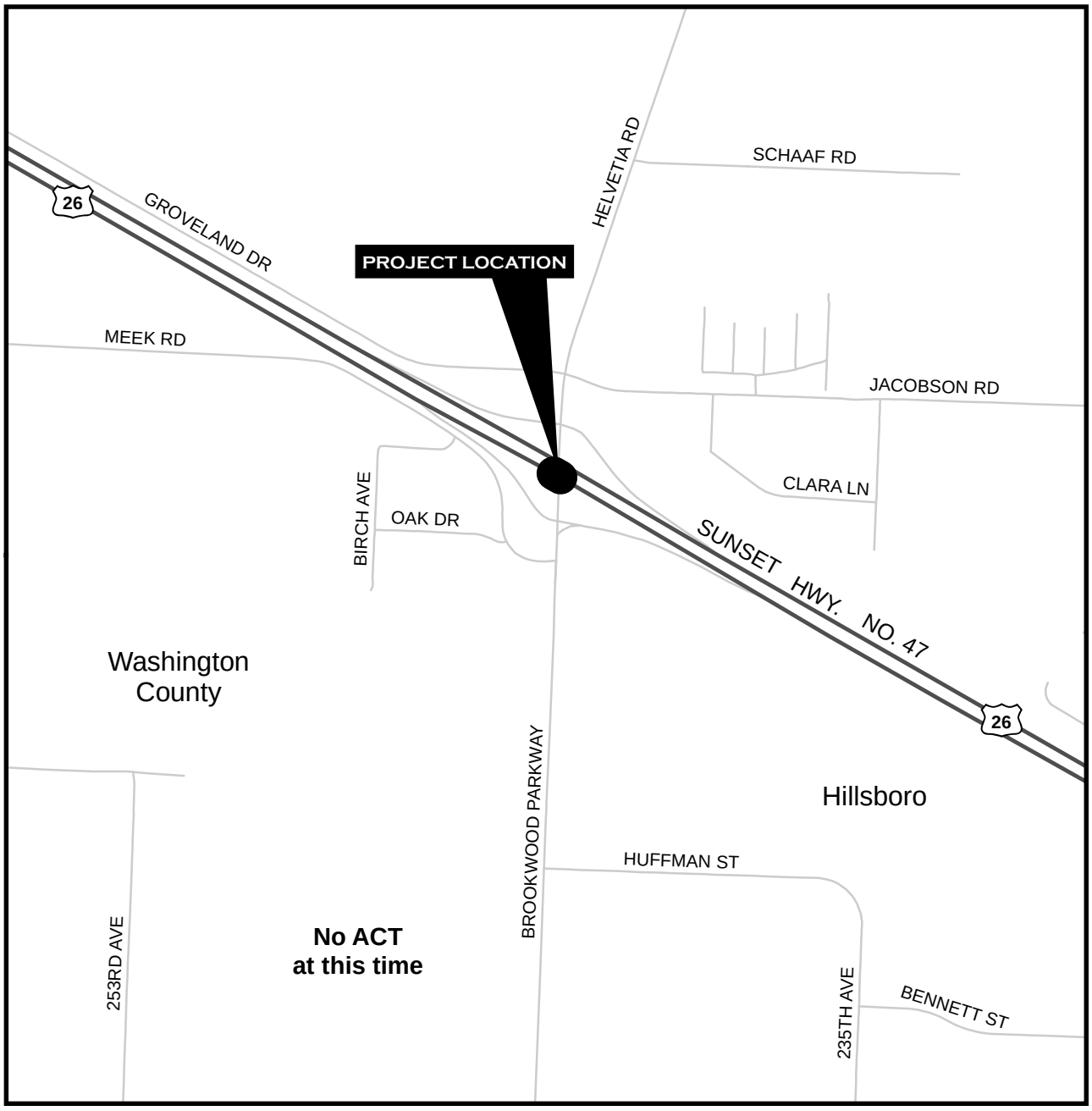
- Location and Vicinity Maps
- Project vicinity and location map
- Exhibit A: Staff Report
- Exhibit B: Findings
- Exhibit C: Interchange Area Management Plan and Appendices
- Exhibit D: Staff Contact
- Exhibit E: Memorandum of Understanding Between the State of Oregon, the City of Hillsboro and Washington County
- Exhibit F: City of Hillsboro Ordinance No. 2793
- Exhibit G: Washington County Ordinance No. 749
- Exhibit H: Public Involvement

Copies to:

Jerri Bohard	Dale Hormann	Patrick Cooney	Clyde Saiki
Paul Mather	Erik Havig	Jason Tell	Bob Cortright, DLCD

STIP PROJECT LOCATION

ODOT REGION 1



US 26: BROOKWOOD PARKWAY/ HELVETIA ROAD IAMP KEY NO. 16842

LEGEND

PROJECT LOCATION

STATE HIGHWAY CLASSIFICATION

- INTERSTATE
- STATEWIDE
- REGIONAL / DISTRICT

- REGIONAL BOUNDARY
- COUNTY BOUNDARY
- ACT BOUNDARY

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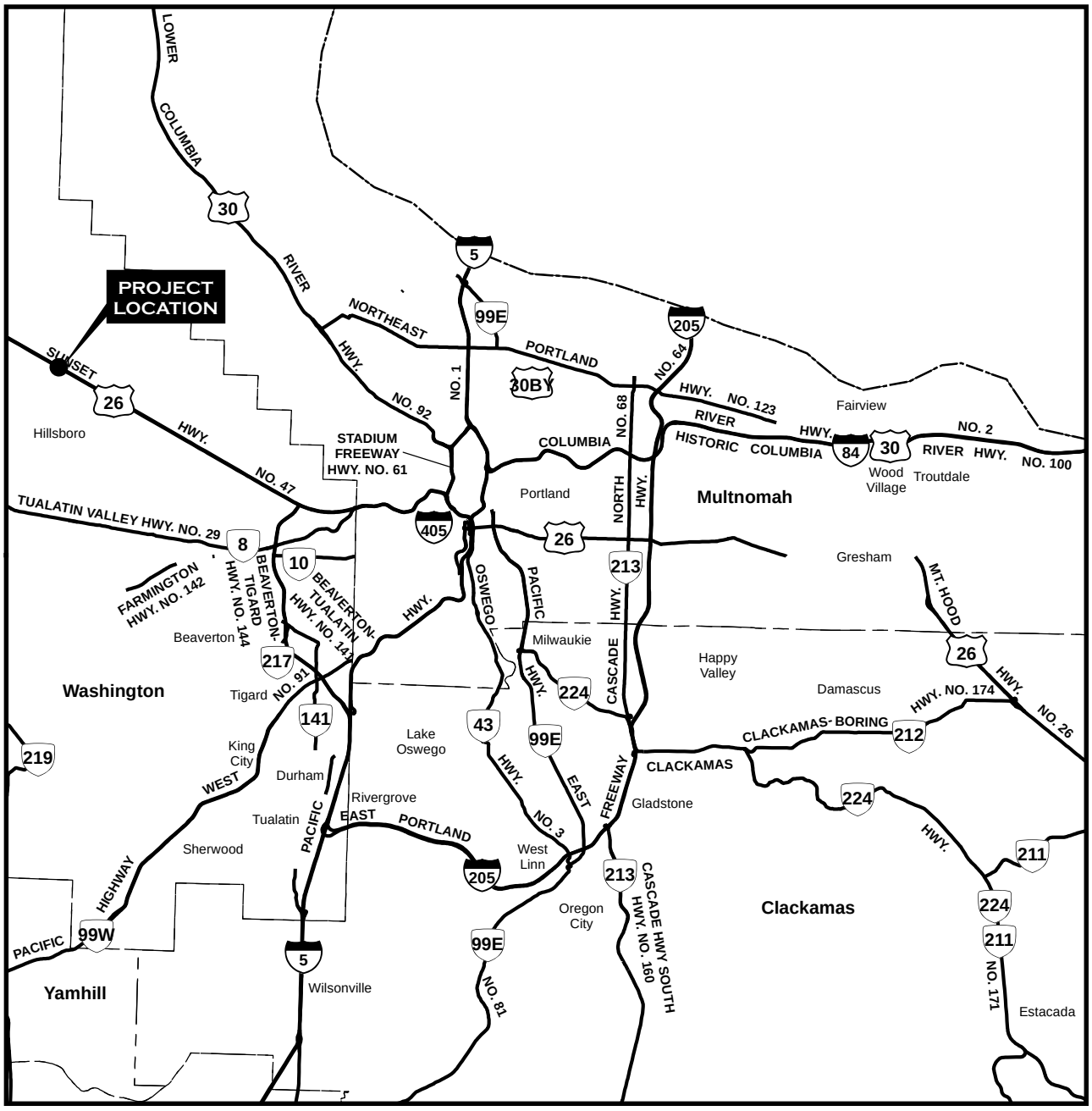
STIP PROJECT VICINITY

ODOT REGION 1



US 26: BROOKWOOD PARKWAY/ HELVETIA ROAD IAMP
KEY NO. 16842

LEGEND

- PROJECT LOCATION
- STATE HIGHWAY
- COUNTY BOUNDARY
- STATE BOUNDARY

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Exhibit A

Staff Report:

US26: Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP)

OTC Briefing
US26: Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP)
October 2012

Requested Action

Region 1 requests that the OTC adopt the US 26/Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP) to implement Policy 3C of the Oregon Highway Plan and ODOT's Access Management Rule (OAR 731-051-0155). The Washington County Board of County Commissioners adopted Ordinance 749 at their September 18, 2012 meeting the US 26: Brookwood Parkway/Helvetia Road Interchange Area Management Plan as an amendment to the 2020 Transportation Plan. City of Hillsboro will adopt Ordinance 2793 amendments to the Hillsboro Comprehensive Plan at their October 2, 2012 meeting.

With local concurrence, ODOT staff developed findings documenting the IAMP's consistency with the local plans.

Suggested Motion Language

Move to conditionally adopt the US26: Brookwood Parkway/Helvetia Road Interchange Area Management Plan as an element of the Oregon Highway Plan and adopt the findings in support of this action.
Conditions for Approval: Final adoption of the IAMP shall be conditioned to the City and County submitting the local ordinances amending their comprehensive plans and transportation plans.

Background

Oregon Department of Transportation (ODOT) is modifying the US 26: Brookwood Parkway/Helvetia Road interchange as part of the Jobs and Transportation Act (JTA) Project. Oregon Administrative Rule (OAR) 734-051 and the Oregon Highway Plan (OHP) require preparation of an Interchange Area Management Plan (IAMP) for a new interchange and recommend it for major modifications to an existing interchange. The JTA Project modifications to the interchange are costly, and the purpose of this IAMP is to protect the interests of the state, local governments, and their citizens to ensure that the interchange functions through the planning horizon year of 2035 as it is currently being designed.

US 26 is a freight route linking Portland to Washington County and the Oregon coast. It is an important transportation corridor for the regional economy and is a primary lifeline and tourist route for coastal communities. US 26 is locally and regionally

significant in moving people, goods, and services through North Hillsboro and throughout the metropolitan region and the state.

The need for transportation system improvements at, and surrounding, the US 26: Brookwood Parkway/Helvetia Road Interchange grew out of concept planning work done by the city of Hillsboro for the 249-acre Helvetia Concept Planning Area (located northeast of the Interchange) and the 534-acre Evergreen Concept Planning Area (located southwest of the Interchange). Metro brought these two areas into the Urban Growth Boundary (UGB) in 2002, and 2005, respectively. The Concept Plans identified the type of development (primarily industrial) that should occur and established the general framework for the infrastructure needed to serve these two areas. These areas will be annexed to the city before they develop or redevelop with urban uses.

The Concept Plans were adopted by the Hillsboro City Council on February 5, 2008, and were added to the Hillsboro Comprehensive Plan (Plan) as Section 24. City of Hillsboro, Evergreen Area Industrial Plan (EAIP) and Section 25. City of Hillsboro Helvetia Area Industrial Plan (HAIP). On January 17, 2012, the City amended the Plan to add a new Section 30. North Hillsboro Industrial Area Community Plan, which consolidated the EAIP and HAIP and the Shute Area Industrial Site (Section 20. Shute Road Industrial Site) into a single North Hillsboro Industrial Community Plan, and deleted Sections 20, 24 and 25.

The Brookwood interchange has been, and will continue to serve as, a major entry point to large high-tech employment centers based throughout North Hillsboro. The interchange is a critical access point, currently serving the mobility needs of 25,000 employees of the high-tech companies and expected to serve the future expansion of these high-tech companies as well as new companies that locate within North Hillsboro properties added to the regional Urban Growth Boundary (UGB) in the future. The interchange serves employee commute trips and truck freight traffic generated by raw material supply and finished product distribution associated with the major industries in North Hillsboro.

Development of the IAMP started in fall, 2010, when the city of Hillsboro and Washington County (County) entered into a Memorandum of Understanding (MOU) with ODOT on December 16, 2010. The MOU established the Oregon Jobs and Transportation Act (JTA) and IAMP terms, tasks, priorities, boundaries, phases, roles and responsibilities, and communications protocols. The JTA project is a joint planning effort between ODOT, the County and the City (Partners).

The purpose of this partnership is to document and affirm land use assumptions and to identify necessary transportation system improvements required to maintain acceptable levels of transportation mobility. This includes improvements at the interchange, as well as additional infrastructure improvements surrounding and supporting the interchange which will preserve the state's investments for their intended purpose.

On October 20, 2011, the Metro Council approved modest expansions to the region's UGB in four areas. One of the four areas is a 330-acre area north of Hillsboro, in the vicinity of the US 26/Brookwood Parkway/Helvetia Road interchange, for the purposes of attracting future large-site industrial employers. The 330-acre expansion in North Hillsboro, located southwest of the interchange, will add additional traffic at the interchange and has been considered in the IAMP analysis.

Improvements to the Interchange itself are planned to commence construction in 2013. The improvements are funded with $45 million dollars provided by the JTA enacted by the 2009 Oregon Legislature. Under agreement with the Oregon Department of Transportation (ODOT), if the Interchange costs are less than $45 million, remaining funds would be available for priority projects identified in the IAMP (which occur on both Washington County and City roads).

Problem Statement

The US 26: Brookwood Parkway/Helvetia Road interchange is configured as a standard diamond with traffic signals at both ramp junctions. The interchange is currently approaching or exceeding the mobility standards identified in the OHP for this facility. The heavy westbound off-ramp traffic during the AM peak hour heading southbound and the corresponding northbound-to-eastbound movement in the PM peak hour are of primary concern. These heavy flows have a detrimental effect on traffic operations on the US 26 mainline, the surface arterial roadways near the interchange, and the expansion of current and future businesses (and jobs) in the surrounding area that depend on adequate interchange traffic capacity.

Local road connections to Brookwood Parkway and Helvetia Road near the interchange do not meet OHP access spacing standards, and the proximity of the local road connections to the interchange make local road access difficult and contribute to traffic congestion at and near the interchange during peak travel times. Traffic at the US 26: Brookwood Parkway/Helvetia Road interchange is projected to increase as new industrial development is attracted to North Hillsboro.

Goals and Objectives

The IAMP process is intended to protect the long-term function and safety of interchanges. As stated in Policy 3C of the OHP, "it is the policy of the State of Oregon to plan for and manage grade-separated interchange areas to ensure safe and efficient operation between connecting roadways."

Coordination with Local Jurisdictions

JTA Project

The Oregon JTA of 2009 appropriated $45,000,000 for ODOT to design and construct needed improvements to the interchange to address existing operation and safety issues and to address anticipated future travel demand in North Hillsboro. The JTA-funded interchange improvement project includes:

- Design and construction of a westbound-to-southbound loop ramp on US 26 at Brookwood Parkway;
- Design and reconstruction of the westbound entrance ramp to US 26;
- Design and construction of intersection and storage improvements for the US 26 eastbound entrance ramp;
- Design and construction of improved bicycle and pedestrian facilities and an additional travel lane southbound across the Brookwood/Helvetia overcrossing of US 26; and
- Allocation of excess JTA funding to Washington County and the City of Hillsboro to design and construct local road improvements in the immediate vicinity to support access to and from the interchange.

ODOT, Washington County, City of Hillsboro Coordination

ODOT, Washington County, and the City of Hillsboro formed a cooperative partnership to guide the preparation of the IAMP. The formation of this interagency partnership included the development and approval of a Memorandum of Understanding and a Partnering Agreement detailed below.

Memorandum of Understanding

The project partners are ODOT Region 1, the City of Hillsboro, and Washington County (the Partners). The Partners developed a Memorandum of Understanding (MOU—August 5, 2010) to jointly agree on the need to address necessary improvements to the interchange itself within the proposed JTA Project budget. The MOU memorializes the intentions of the Partners for their collaborative work on the JTA Project. The MOU identifies needed improvements that were developed through previous planning work conducted by the City of Hillsboro, as well as traffic analysis of the interchange and the other connected roadways. The MOU states that the Partners would participate jointly in the planning, the environmental permitting process, construction oversight for the project improvements, and the development of the IAMP, before ODOT transfers money to the city or county for associated local street system improvements in the interchange vicinity.

Partnering Agreement

The Partners signed a Partnering Agreement (PA) on December 16, 2010. It establishes the JTA and IAMP terms, tasks, priorities, boundaries, phases, roles and responsibilities, and communication protocols.

IAMP Goals and Priorities

The goals state the intentions of the Partners for operations in the management area (defined below). Based on the purpose and the problem statement, the goals of the IAMP are to:

- Support the ongoing and future City of Hillsboro and Washington County transportation, land use, and economic development planning efforts in and around the study area; and

- Protect the future function of the interchange.

The IAMP priorities include safety and capacity improvements that:

- Maintain or improve safety and operations at the US 26 interchange, and at other facilities in the vicinity of the interchange area;

- Identify and address the interchange operation needs associated with current and future industrial land designated in the existing adopted comprehensive plan, to the extent feasible;

- Develop a local street network that provides for local connectivity and helps minimize the need for local travel using or traveling through the interchange; and

- Identify facilities for adequate bicycle and pedestrian circulation in the area.

Management Measures

Management actions, as applied to the US 26: Brookwood Parkway/Helvetia Road Interchange Area Management Plan are intended to preserve the capacity of an interchange for as long as possible. The primary function of the US 26: Brookwood Parkway/Helvetia Road interchange is to facilitate statewide inter-urban and inter-regional travel to/from the US 26 corridor. A secondary function is to provide west-south connectivity across US 26 for the City of Hillsboro and the surrounding rural land uses. The US 26: Brookwood Parkway/Helvetia Road interchange is not intended to serve increased retail or highway-oriented traveler services other than what is currently provided for by existing Washington County and Hillsboro Development Codes.

Access Management Plan

ODOT has authority over its state highway facilities and therefore can purchase access control on state highways. ODOT also has the authority to purchase access rights on local roadways within the influence area of intersections or interchanges of highways if

it can demonstrate that access to these roadways creates or may result in an adverse effect on the state highway. In addition, local government has authority to manage access on its local roadways. An access management strategy is being prepared for the JTA Project that identifies short-term access management measures for each approach that will be implemented during the construction phases of the JTA Project.

The short-term access management measures to be addressed as part of the JTA-funded interchange improvement project include:

- **Jacobson Road:** Closure of the existing roadway connection to Helvetia Road and relocation of the existing connection farther north away from the interchange. This will be constructed as a full intersection as part of the JTA Project. The full intersection will change to a right-in/right-out only when Schaaf Road is constructed to a three-lane facility and Jacobson Road is connected to Schaaf Road (**Project 11**).
- **Meek Road:** Closure of the existing roadway connection to Brookwood Parkway with concurrent new extension of 253rd Avenue from Evergreen Road to Meek Road. The driveway across from Meek Road on Brookwood Parkway will be moved to the south along the property line.
- **Groveland Drive:** Closure of the existing Groveland Drive connection to Helvetia Road north of the interchange and relocation of the existing connection across from Schaaf Road to the north.

Adoption, Implementation, Monitoring and Updates

The final section of this IAMP describes the responsibilities of the City of Hillsboro, Washington County and ODOT, and modifications to state and local plans and policies that are required for implementation of the IAMP. Implementation requirements include adoption of the IAMP as a facility plan in the Oregon Highway Plan; Washington County has adopted Ordinance No. 749 at their September 19, 2012 meeting the US 26: Brookwood Parkway/Helvetia Road Interchange Area Management Plan as a amending the 2020 Transportation Plan Element of the Comprehensive Plan. Under HCP 3-12 North Hillsboro TSP Amendments approved the amends to the Hillsboro Comprehensive Plan, Ordinance No.2793 at their October 16, 2012 meeting.

ODOT Actions

Project Construction and Access Management

Develop needed interchange and roadway improvements. This work is underway as the US 26: Brookwood Parkway/Helvetia Road interchange is currently being designed, with construction planned for 2012-2013.

Policy Actions

Adopt the IAMP.

City of Hillsboro Actions

Project Construction and Access Management

The City of Hillsboro will participate in the design and construction of the US 26: Brookwood Parkway/Helvetia Road interchange that is currently underway and outlined in the cooperative improvement agreement.

Policy Actions

Implementation of the local improvement projects will require the City of Hillsboro to amend the TSP.

Brookwood Parkway (projects #3 and #5). The new interchange loop ramp requires three lanes southbound to accommodate the amount of traffic expected to use the interchange in the AM to access industrial lands. Three lanes northbound will provide storage for vehicles entering US 26 eastbound in the PM.

253rd Avenue (project #1). 253rd Avenue is required to provide an alternate route once Meek Road is cut off from Brookwood Parkway due to interchange spacing standards and safety concerns. It will also provide access to industrial lands and a parallel route to Brookwood Parkway. (Part of this is outside of the current UGB but within the 330-acre expansion area.)

Huffman Street East of 253rd Avenue (project #4). Huffman Street is required to access undeveloped industrial land within the UGB and provide a parallel route to Evergreen Parkway. Five lanes will be needed on Huffman Street between Brookwood Parkway and 253rd Avenue to accommodate traffic accessing the industrial lands while preserving capacity for through movements.

Huffman Street West of 253rd Avenue (project #7). Huffman Street west of 253rd Avenue is needed to access industrial lands and provide a parallel route to Evergreen Parkway.

264th Avenue (project #8). 264th Avenue is needed to provide a parallel local route to Jackson School Road and to access industrial lands. (Part of this is outside of the current UGB but within the 330-acre expansion area.)

New Collector (project #11). A new collector street is needed to connect Jacobson Road to Schaaf Road.

Schaaf Road (project #12). Schaaf Road east of Helvetia Road is needed to access industrial lands and provide a parallel route to Jacobson Road.

The City of Hillsboro will continue to coordinate with ODOT and Washington County in evaluating land use actions (including amendments to the comprehensive plan, TSP, and development code, the UGB expansion, and transportation improvements) that could affect the function of the interchange in order to ensure that coordination is timely and that actions and improvements are consistent with the defined function of the IAMP.

Washington County Action

Project Construction and Access Management

The Washington County will participate in the design and construction of the US 26: Brookwood Parkway/Helvetia Road interchange that is currently underway and outlined in the cooperative improvement agreement.

Policy Actions

Implementation of the local improvement projects shown on **Figure 12** will require Washington County and the City of Hillsboro to amend their TSPs.

Brookwood Parkway (projects #3 and #5). The TSP lists the roadway as four to five lanes and classifies it as an arterial, but the proposed improvement is for six lanes. The new interchange loop ramp requires three lanes southbound to accommodate the amount of traffic expected to use the interchange in the AM to access industrial lands. Three lanes northbound will provide storage for vehicles entering US 26 eastbound in the PM.

Projects listed above under City of Hillsboro (projects #1, 4, 7, 8, 11, and 12).

Groveland Drive realignment (project #2). Groveland Drive is located outside the UGB and is to be reconnected to Helvetia Road.

Washington County will continue to coordinate with ODOT and the City of Hillsboro in evaluating land use actions (including amendments to the comprehensive plan, TSP, and development code, and transportation improvements) that could affect the function of the interchange in order to ensure that coordination is timely and that actions and improvements are consistent with the defined function of the IAMP.

Agencies Coordination

- The City of Hillsboro and Washington County will coordinate with ODOT prior to amending its comprehensive plan (including the transportation plan), land development ordinances, or urban growth boundary, or proposing transportation improvements that could affect the function of the interchange. The Washington County will ensure that any such amendments are consistent with the function of the interchange as defined in the IAMP.
- If future circumstances in the IAMP management area result in the need for changes to the IAMP, the City of Hillsboro, Washington County and ODOT shall jointly prepare amendments to the IAMP management actions and an accompanying funding plan to implement those actions.

Monitoring and Updates

This section discusses the need to update the IAMP, and those changes that may trigger an update over time. Conditions that would trigger such an update:

Future Interchange Design and Land Use Changes

- If an alternative interchange design is proposed during design of the JTA Project, additional traffic work would be needed to amend the IAMP. Additional measures would need to be considered, and city and county amendments may be needed.

- If, in the future, the existing land use designations are changed such that they would impact the operation and safety of the interchange, ODOT, the City of Hillsboro, and Washington County shall jointly prepare amendments to the IAMP management actions and prepare an accompanying funding plan to implement those actions.

Public Involvement

Two public open houses were held in the city of Hillsboro. The open houses included graphic presentations and discussion to solicit public input. The public open houses were advertised on the ODOT Region 1 website, and through the local newspaper.

Summary of Draft Findings

ODOT's State Agency Coordination Agreement requires that the OTC adopt findings of fact when adopting facility plans (OAR 731-015-0065). Pursuant to these requirements, ODOT has developed findings to support the OTC adoption of the US 26: Brookwood Parkway/Helvetia Road IAMP. For all applicable policies, the IAMP has been found to be compatible with adopted state and local policies.

- Exhibit B Findings of Compliance for the IAMP is attached and address compliance with state and local plans, policies, and ordinances/statutes/rules.

Exhibit B

US26: Brookwood Parkway/Helvetia Road Interchange Area Management Plan

Findings and Compliance with State, Local, and Regional Plans, Policies, Provisions, and Regulations

August 2012

Findings and Compliance

This appendix presents relevant state, local, and regional plans and policies, with information supporting the Brookwood Parkway/Helvetia Road IAMP's compliance. In reviewing these findings, it is important to recall that the interchange will be built as part of the Brookwood Parkway Job Transportation Act (JTA) project, which is still in the planning process. Therefore, these findings will refer to activities performed and information gathered as a part of the JTA process, including pending or future actions meant to achieve compliance.

Oregon Statewide Planning Goals and Guidelines

Since 1973, Oregon has maintained a strong statewide program for land use planning. The foundation of that program is a set of 19 statewide planning goals. Most of the goals are accompanied by guidelines, which are suggestions about how a goal may be applied. The goals express the state's policies on land use and related topics, such as citizen involvement, housing, and natural resources. Oregon's statewide goals are achieved through local comprehensive planning. State law requires each city and county to adopt a comprehensive plan, of which transportation system plans must be made a part, and the zoning and land-division ordinances needed to put the plan into effect. The local comprehensive plans must be consistent with the Statewide Planning Goals. When the state's Land Conservation and Development Commission (LCDC) officially approve a local government's plan, the plan is said to be acknowledged. It then becomes the controlling document for land use in the area covered by that plan. Oregon´s planning laws strongly emphasize coordination—keeping plans and programs consistent with each other, with the goals, and with acknowledged local plans. The goals that are most pertinent to transportation system planning are described below.

Statewide Planning Goal 1 (Citizen Involvement)

Goal 1, Citizen Involvement, ensures the opportunity for all citizens to be involved in all phases of the planning process. The citizen involvement program shall be appropriate to the scale of the planning effort. The program shall provide for continuity of citizen participation and for information that enables citizens to identify and understand the issues.

Finding of Consistency: The IAMP will update the transportation plans for the City of Hillsboro and Washington County. Therefore, the planning process requires citizen involvement consistent with Goal 1. Pages 2 through 5 of the IAMP detail the Public Involvement process for the project. Project committees for the IAMP guided the process and provided important policy, community, and technical feedback throughout the project. Interviews, public meetings, and briefings were held with neighbors, business interests, and local community organizations. Informational materials—newsletters, the project website, and a press release—provided project updates to the general public.

The Project Advisory Committee comprised technical staff from partner jurisdictions and community stakeholder representatives. Members were strategically selected to represent the interests of all partners in the IAMP and to provide a venue for representatives of the public to follow and contribute to the plan's development. PAC members included one representative each from the Helvetia Community Association, Meek Neighborhood, Hillsboro Chamber of Commerce, Brookwood area bicyclists, Jacobson Road (Pac Trust), City of Hillsboro, and Washington County, and the ODOT project manager. The purpose of the committee was to ensure that technically viable solutions are also

responsive to community needs. PAC members, project team members, and members of the public attended the PAC meetings.

Two open houses were held to share information and invite feedback from the general public. The first was held January 17, 2012 at Liberty High School in Hillsboro, Oregon. Forty-nine (49) people signed in to the event. The second event was held in June 25, 2012 at the city of Hillsboro Civic Center. The Open House immediately followed the final Project Advisory Committee (PAC) meeting. Twenty three (23) people signed in, however some attendees stayed for the open house after participating at the PAC meeting. Information handouts and comment cards were made available. Feedback received was recorded in an open house summary and shared with the PAC.

Two project newsletters provided project updates and an invitation to the two open houses. Each newsletter was mailed to approximately 3,100 addresses in an area surrounding the interchange and posted on the project website approximately two weeks before each open house. Newsletters included names, titles and contact information for project staff. In addition to the project newsletters, email notifications were sent to approximately 200 addresses for the open houses.

A project website was developed and made publicly available early in the process. The site included a project description, maps, project schedule, open house materials, and PAC materials. The project website also advertised the open houses on its home page. The draft IAMP was made available for public review and comment for a 30-day period in July to September 2012 on the Brookwood IAMP website.

http://cms.oregon.gov/ODOT/HWY/REGION1/pages/us26_brookwoodpkwy/index.aspx

A press release was sent to media contacts through ODOT's Region 1 office before each event. The Hillsboro Argus announced the meeting.

www.oregonlive.com/argus/index.ssf/2012/01/us_highway_26_interchange_open.html

Therefore, the IAMP is consistent with Goal 1.

Statewide Planning Goal 2 (Land Use Planning)

Goal 2 requires that city, county, state, and federal agency and special district plans and actions related to land use be "consistent with the comprehensive plans of cities and counties and regional plans adopted under Oregon Revised Statutes (ORS) Chapter 268." Goal 2 also contains standards for taking exceptions to statewide goals. An exception may be taken when a statewide goal cannot or should not be applied to a particular area or situation.

Land use decisions and actions must be supported by an "adequate factual base." Evidence must be provided that a reasonable person would find sufficient to support a finding of fact that a land use action complies with the applicable review standards.

Finding of Consistency: The IAMP's consistency with the comprehensive plans and other adopted land use and transportation plans for Metro, the City of Hillsboro, and Washington County is demonstrated below under the respective document headings. The IAMP was prepared in conjunction with ODOT, the

City of Hillsboro (City), and Washington County (County). Further coordination efforts are documented on pages 2 through 3 of the IAMP.

The purpose of the IAMP is to:

Support the US 26: Brookwood Parkway/Helvetia Interchange JTA Project

Support the ongoing and future City of Hillsboro and Washington County transportation, land use, and economic development planning efforts in and around the study area described below (North Hillsboro); and

Protect the future function of the interchange.

To achieve the purpose of the IAMP, technical research was conducted on existing and planned land uses, traffic, and natural resources within the IAMP Study Area. The following technical memoranda provide the framework of "adequate factual base" consistent with Goal 2:

- Technical Memorandum #1: IAMP Definition and Background, which includes Purpose and Intent, Problem Statement, Interchange Function, Goals and Objectives, and Management Area.
- Technical Memorandum #2: Identifies existing land use, transportation, and natural and historic resources within the IAMP Study Area.
- Technical Memorandum #3: Develops 2035 baseline (no-build) land use and traffic volume forecasts and analyzes traffic operations.
- Technical Memorandum #4: Develops the 2035 build transportation analysis for the future transportation network, traffic volumes, traffic operations, intersection operations, freeway operations, queuing, and safety in the IAMP Study Area.

Pertinent sections of Technical Memorandums #2, #3, and #4 are incorporated into the IAMP. This appendix to the IAMP documents compatibility and consistency with applicable standards. Therefore, the IAMP is consistent with Statewide Planning Goal 2 (Land Use Planning).

The 2035 build analysis for the future transportation network demonstrates that the proposed improvements and other management actions for the interchange are expected to result in levels of service that meet standards and preserve the function of the interchange, as well as planned land uses. Therefore, the IAMP is consistent with Goal 2.

Statewide Planning Goal 3 (Agricultural Lands)

Goal 3 is to preserve and maintain agricultural lands. Agricultural lands shall be preserved and maintained for farm use, consistent with existing and future needs for agricultural products, forest and open space and with the state's agricultural land use policy expressed in ORS 215.243 and 215.700.

Finding of Consistency: The IAMP Study Area represents the western developed edge of the Portland Metropolitan area, with large areas of farmland mostly to the northwest, and is adjacent to industrial areas and residential development to the south and east. The interchange is partially within and partially outside of the Portland Metropolitan UGB. Some of the area within the IAMP Study Area and within the

Metro UGB is expected to be developed with urban land uses during the planning horizon (year 2035). Those areas outside the Metro UGB will remain designated for rural uses as expressed in *ORS 215.243 and 215.700*.

The IAMP sought to avoid and minimize impacts to agricultural lands in the rural areas in Washington County. One of the IAMP Tier 1 projects, NW Groveland Drive Realignment, is identified as passing through agricultural lands. The purpose of this improvement project is to maintain the NW Groveland Drive connection from Helvetia Road that will be lost as part of the interchange improvements. The realignment of NW Groveland Drive is designed to connect to Helvetia Road at its proposed location to comply with ODOT access spacing standards. Certain transportation improvements including realignments of existing rural roads are conditionally allowed on rural lands under OAR 660-012-0065 without a goal exception. See Transportation Planning Rule (TPR) section on page 17 for goal exception discussion.

The proposed IAMP local street improvements are conceptual and will require Washington County to develop and construct the rural road. The IAMP relies on the County's Rural/Natural Plan to ensure that development will not adversely affect the surrounding agricultural and forest activities. The Gloveland Drive realignment is located in Washington County designated EFU Farm Use zone which is an exclusive farm use zone The preferred alternative concept must be consistent with the requirements of ORS 215.283 and 215.296.

The purpose of the realignment is not to shorten travel times or provide additional capacity or other advantages that might induce land use development pressures on agricultural lands. The improvement of service levels on the local road network will enhance the ability of farm operators to move equipment along those roadways.

The proposed realignment will not result in following farm and forest impacts:

- Fragmentation. The proposed realignment will require a strip of land adjacent to the existing white oak grove and wetland. No parcel fragmentation will occur as a result of the proposed IAMP interchange concept.

- Access and Maneuverability. The proposed realignment will allow the surrounding farms to continue to access their fields for county roads. This will not result in any equipment maneuverability issues or significant out-of-direction travel for farm activities in the vicinity of the interchange. The proposed realignment will not create farm parcels that can not be economically farmed.

- Removal of farm/forest land. The proposed realignment will not significantly reduce the amount of farm/forest land there will be no significant change to farm practices or cost associated with the acquisition of the land.

The NW Groveland Drive Realignment improvement project is consistent with this definition. Washington County will require a land use permit approval for the realignment in which the applicant will be required to demonstrate that there will be no significant changes to farm practices nor significant increases in farm costs as a result of the realignment (per ORS 215.213 (2) or (11) or 215.283 (2) or (4).

See additional findings under OAR 660, Division 12 Transportation Planning Rule and Statewide Planning Goal 12 (Transportation).

As such, the IAMP has adequately addressed Goal 3, Agricultural Lands.

Statewide Planning Goal 5 (Open Spaces, Scenic and Historic Areas and Natural Resources)

Goal 4 is to protect natural resources and conserve scenic and historic areas and open spaces. Local governments shall adopt programs that will protect natural resources and conserve scenic, historic, and open spaces for present and future generations. These resources promote a healthy environment and natural landscape that contributes to Oregon's livability.

Finding of Consistency: The IAMP sought to avoid and minimize impacts to natural resources lands in the rural areas in Washington County. The wetland/oak woodland adjacent to Helvetia Road was indentified as potential natural, scenic and historic areas to be avoided. The Groveland Drive realignment sought to avoid the impacts to this area and recommended an alignment out of the wetland/oak woodland area to reconnect the road to Helvetia Road. Therefore, the IAMP is consistent with Goal 5.

Statewide Planning Goal 9 (Economic Development)

This goal requires that local comprehensive plans and policies contribute to a stable and healthy economy in all regions of the state.

Finding of Consistency: The Brookwood Parkway interchange provides a vital function in supporting local and regional economic development goals and plans. The interchange serves employee commute trips and truck freight traffic generated by raw material supply and finished product distribution associated with the major industries in North Hillsboro. The IAMP was developed jointly with ODOT, city of Hillsboro and Washington County to ensure that transportation improvements will be available to support the planned employment uses in the urban areas of the city and the rural farming activities in Washington County that are consistent with the County and City's economic development goals. Therefore, the IAMP is consistent with Goal 9.

Statewide Planning Goal 10 (Housing)

Goal 10 Housing is to provide for the housing needs of the citizens of the state. Buildable lands for residential use shall be inventoried and plans shall encourage the availability of adequate numbers of needed housing units at price range and rent levels which are commensurate with the financial capabilities of Oregon households and allow for flexibility of housing location, type and density.

Finding of Consistency: The IAMP analysis using Metro 2035 population forecast and 2035 traffic projections, indicated the new interchange will operate at acceptable mobility levels. The Metro population and housing forecasts establishes the region housing needs and the City's Comprehensive Plan determines the location and density of the city's housing needs. No actions are required to comply with the region or city's housing policies. The improvements identified are able to accommodate the planned residential growth in the area and still meet ODOT mobility standards. Therefore, the IAMP is consistent with Goal 10.

Statewide Planning Goal 11 (Public Facilities and Services)

Cities and counties shall plan and develop a timely, orderly and efficient arrangement of public facilities and services to serve as a framework for urban and rural development. The goal requires that urban and rural development be "guided and supported by types and levels of urban and rural public facilities and services appropriate for, but limited to, the needs and requirements of the urban, urbanizable and rural areas to be served."

Finding of Consistency: Transportation facilities are considered a primary type of public facility. The Brookwood IAMP documents the current and future transportation needs of the urban and rural areas in the vicinity of the Brookwood Parkway interchange. The IAMP contains policies that will guide growth within the vicinity of the interchange to ensure that development takes place at a rate and density that is compatible with the capacity of the interchange. In terms of other, non-transportation public facilities, the IAMP does not result in any land use changes. No impact on public facilities is expected because no intensification of land use is created as a result of improvements recommended in the IAMP. The IAMP is consistent with the proposed land uses and public facilities of the urban and rural areas surrounding the interchange. Therefore, the IAMP is consistent with Statewide Planning Goal 11 (Public Facilities and Services).

Statewide Planning Goal 12 (Transportation)

Goal 12 requires cities, counties, metropolitan planning organizations, and ODOT to provide and encourage a "safe, convenient and economic transportation system." This is accomplished through development of Transportation System Plans based on inventories of local, regional and state transportation needs. Goal 12 is implemented through OAR 660, Division 12, also known as the Transportation Planning Rule (TPR). The TPR contains numerous requirements governing transportation planning and project development. (See the OAR 660, Division 12 section of this document for findings of compliance with the TPR.)

Finding of Consistency: The purpose of the Brookwood Parkway/Helvetia Road IAMP is to protect the function of the interchange and its ability to serve future transportation demands, thereby preserving the state's investment in the facility. The IAMP contains a discussion of the transportation analysis that was conducted in order to determine future demand, available capacity, deficiencies, and necessary improvements for this interchange area. The analysis demonstrates that the planned transportation facility will be adequate to safely and efficiently serve trips generated by future land uses for a period of at least 20 years.

To implement the IAMP, the City HCP-3-12: North Hillsboro TSP Amendment (Ordinance # 2793) will amend the Hillsboro Comprehensive Plan specifically to the TSP to reclassify and update information for transportation improvements within the IAMP area to be consistent with the IAMP. Refer to Attachment A-2. Washington County Ordinance # 749 amends the Transportation Plan Element of the Comprehensive Plan relating to the IAMP. Refer to Attachment A-1.

By providing for safe and efficient operations of the interchange and local road network that accommodates existing and planned land uses and through amending the transportation plans of Hillsboro and Washington County, the IAMP is consistent with Goal 12.

See additional findings under OAR 660, Division 12 Transportation Planning Rule and Statewide Planning Goal 3 (Agricultural Lands) and Statewide Planning Goal 12 (Transportation).

Statewide Planning Goal 14 (Urbanization), and OAR 660, Divisions 14 and 22

This goal requires cities to estimate future growth and needs for land and then plan and zone enough land to meet those needs. Goal 14 requires an orderly and efficient transition from rural to urban land use by establishing UGBs and unincorporated communities to separate urbanizable land from rural land.

Finding of Consistency: The IAMP Study Area is partially within the Portland Metro UGB. The IAMP documents the existing and planned land use designations and identifies future transportation needs based on these designations and the associated land use regulations. The IAMP model determined needed improvements to support future land uses by assuming that existing and planned land uses would not change, and the uses allowed by the zoning would stay the same. Since provisions of the Hillsboro Comprehensive Plan and Washington County Comprehensive Framework Plan, West Union Community Plan, and Rural/Natural Resource Plan, and the city and county zoning and subdivision ordinances are adopted by reference into the IAMP, ODOT has the ability to review and weigh in on proposed amendments to plans and codes, before their adoption by the City of Hillsboro and Washington County, to ensure that any changes to these land use controls would avoid development that would jeopardize the achievement of the goal and objectives of the IAMP. Therefore, the IAMP is consistent with Goal 14.

Other Statewide Goals:

These goals were determined not to be applicable to the development of the IAMP. The IAMP does not have an effect on the following goals:

Goal 4 Forest Lands

Goal 6 Air, Water and Land Resources Quality

Goal 7 Areas Subject To Natural Disasters and Hazards

Goal 8 Recreation Needs

Goal 13 Energy

Goal 15 Willamette Greenway

Goal 16 Estuarine Resources

Goal 17 Coastal Shorelands

Goal 18 Beaches and Dunes

Goal 19 Ocean Resources

Oregon Transportation Plan

The Oregon Transportation Plan (OTP) is the state's long-range multimodal transportation plan. The OTP considers all modes of Oregon's transportation system as a single system. The current OTP assesses state, regional, and local public and private transportation facilities through 2030. The OTP establishes goals, policies, strategies, and initiatives that address the core challenges and opportunities facing Oregon. It also provides the framework for prioritizing transportation improvements based on varied future revenue conditions.

Finding of Consistency:

An IAMP must be consistent with the applicable OTP goals and policies. The applicable policies are listed below, followed by a finding for consistency.

Policy 1.3 – Relationship of Interurban and Urban Mobility

US 26 is a freight route linking Portland to Washington County and the Oregon coast. The Brookwood Parkway interchange on US 26 serves as a major entry point to large high-tech employment centers based throughout North Hillsboro. The interchange serves employee commute trips and truck freight traffic generated by raw material supply and finished product distribution associated with the major industries in North Hillsboro. The interchange is currently approaching or exceeding the mobility standards identified in the OHP for this facility. The heavy traffic has a detrimental effect on traffic operations on the US 26 mainline, the surface arterial roadways near the interchange, and the expansion of current and future businesses (and jobs) in the surrounding area.

The IAMP complies with the policy to minimize adverse effects on urban land use and travel patterns and provide for efficient long distance travel by correcting the current and projected deficiencies. The improvements on the interchange ramps, and the intersection and storage improvements will protect the future functioning of the interchange. Improved bicycle and pedestrian facilities and a new SB travel lane will improve safety and urban mobility. Implementing the IAMP ramp changes will allow the facility to operate at levels consistent with the mobility standard for the 2035 planning year and beyond. Therefore, the IAMP is consistent with this policy.

Policy 2.1 – Capacity and Operational Efficiency

The project was developed in response to safety, capacity, and operational efficiency issues, as documented in Technical Memorandum #2: Existing Conditions Analysis. Those issues, briefly characterized under the response to Policy 1.3 concern the declining function of the interchange, which is currently approaching or exceeding the mobility standards identified in the OHP. The capacity and operational efficiency improvements that will result from the IAMP's implementation will benefit all users of the interchange and US 26 by adding capacity to meet projected long-term development, and improve safety for the movement of goods and people across US 26. Therefore, the IAMP is consistent with this policy.

Policy 2.2 – Management of Assets

The policy calls for managing transportation assets to extend their life and reduce maintenance costs. The Oregon JTA of 2009 appropriated $45,000,000 for ODOT to design and construct needed

improvements to the interchange to address existing operation and safety issues and to address anticipated future travel demand in North Hillsboro. The stated purpose of the IAMP is to maximize the operational life of the interchange and, consequently, protect the State of Oregon's investment in the facility. The IAMP includes management actions identified for ODOT, Washington County, and the City of Hillsboro to protect the long-term system capacity of the interchange through ongoing management of the roads and facilities that are integral to its function. Further, the three partners signed a Memorandum of Understanding (MOU) that memorializes the intentions of the Partners for their collaborative work on the JTA Project. Therefore, the IAMP is consistent with this policy.

Policy 3.1 – An Integrated and Efficient Freight System

The primary function of the US 26/Brookwood Parkway/Helvetia Road interchange is to provide employee vehicle and bicycle commute trips and truck freight traffic access to existing and future large high-tech employment centers based throughout North Hillsboro. The interchange improvements will increase efficiency and reliability for freight accessing nearby industrial businesses through the interchange and local street improvements. Therefore, the IAMP is consistent with this policy.

Policy 3.2 – Moving People to Support Economic Vitality

This policy supports an integrated system of transportation facilities, services and information so that intrastate, interstate and international travelers can travel easily for business and recreation. The IAMP will improve multi-modal mobility on the interchange and in the Interchange Management Area, by improving roadway, bicycle, and pedestrians connections to commerce and employment. Therefore, the IAMP is consistent with this policy.

Policy 4.1 – Environmentally Responsible Transportation System

This policy provides for a transportation system that encourages conservation and protection of natural resources. Technical Memorandum #2 identified environmental resources in the IAMP Study Area, including wetlands, Goal 5 Resources, hazardous materials, and cultural resources. Mitigation for any impacts to these resources will meet local, state, and federal standards when each individual improvement project is being developed. Therefore, the IAMP is consistent with this policy.

Policy 4.3 – Creating Communities

Creating communities is about compact communities and neighborhoods that integrate residential, commercial and employment land uses to help make shorter trips, transit, walking and bicycling feasible. The IAMP supports the integration of land uses because the interchange provides access primarily to industrial and secondarily to residential uses. Bicycle and pedestrian facilities were integrated into all but one of the improvement projects (the project that is identified as a rural collector). The local street improvements will provide safer and more connective bicycle and pedestrian facilities in the Interchange Management Area, thus providing increased accessibility to goods and services. Therefore, the IAMP is consistent with this policy.

Policy 5.1 – Safety and Security

The IAMP sets a goal of ensuring safe and efficient operations between connecting roadways and protecting the function, operations, and safety of the interchange. The IAMP addresses safety concerns

through the closing and realigning of streets that currently connect to Brookwood Parkway near the interchange. The access of Meek Road to Brookwood Parkway will be closed. NW 253rd Avenue will provide an alternate route for residents in the area and provide access to industrial lands and a parallel route to Brookwood Parkway. (Part of NW 253rd is outside of the current UGB but within the Urban Reserve area.) Additionally, the NW Groveland Drive Realignment (project 2) will meet spacing standards and will address spacing concerns related to the current location of NW Groveland Drive's intersection with Helvetia Rd near the interchange. Therefore, the IAMP is consistent with this policy.

Policy 7.1 – A Coordinated Transportation System

One of the stated goals of the IAMP was to support the ongoing and future City of Hillsboro and Washington County transportation, land use and economic development planning efforts in and around the study area. As described earlier in these findings (see response to Statewide Planning Goal 2, Land Use Planning), development of this IAMP involved ongoing collaboration with the City of Hillsboro and Washington County with regard to their planning efforts for the area. The MOU spells out the nature of the agencies' collaboration on the JTA and IAMP. The project team for the IAMP comprised lead staff from ODOT, Washington County, City of Hillsboro, and the consultant team. The Project Advisory Committee (PAC) was created to guide the IAMP process and provide important policy, community and technical feedback through the project. The PAC was comprised of technical staff from partner jurisdictions and community stakeholder representatives. The IAMP's local access and circulation projects were developed in consideration of the projects identified in the County's and City's TSPs and community plans. The IAMP was developed to safely accommodate freight traffic and provide for pedestrian and bicycle facilities and increased connectivity in the area. The IAMP also provides for three tiers of projects to allow for the future construction of the local streets identified in the North Hillsboro Industrial Area Community Plan. Therefore, the IAMP is consistent with this policy.

Policy 7.3 – Public Involvement and Consultation

The response to Statewide Planning Goal 1 (Citizen Involvement), above, documents Public Involvement for the project. In addition, comments from the public have been responded to and, where applicable, incorporated into project deliverables, as documented in the Responses to Comments table found on the project website.

(http://www.oregon.gov/ODOT/HWY/REGION1/US26_brookwoodpkwy/)

Policy 7.4 – Environmental Justice

The IAMP process included public meetings held at times when stakeholders and community members could attend. A description of the public involvement program is contained in the IAMP starting on page 4. The IAMP had four PAC meetings and two Open Houses that were located the city of Hillsboro. The agendas of each PAC meeting and Open House provided opportunities for public comments. The PAC and Open House agendas and project information was posted to the project web site to provide all members of the community, including diverse populations such people with lower incomes and disabilities to participate in the process. Therefore, the IAMP is consistent with this policy.

Oregon Highway Plan (2011)

The 2011 OHP establishes policies and investment strategies for Oregon's state highway system over a 20-year period and refines the goals and policies found in the OTP. Policies in the OHP emphasize the efficient management of the highway system to increase safety and to extend highway capacity, partnerships with other agencies and local governments, and the use of new techniques to improve road safety and capacity. These policies also link land use and transportation, set standards for highway performance and access management, and emphasize the relationship between state highways and local road, bicycle, pedestrian, transit, rail, and air systems.

OAR 734-051-0155 requires IAMPs to be consistent with the OHP. Consistency with applicable OHP goals are addressed below:

Goal 1 – System Definition

Policy 1B (Land Use and Transportation) recognizes the need for coordination between state and local jurisdictions.

Finding of Consistency: As described under the finding for Policy 7.1 of the OTP, coordination with local jurisdictions occurred throughout the preparation of the IAMP via the project team and PAC. Members included representatives from ODOT, the City of Hillsboro, and Washington County. Pages 2 through 6 of the IAMP further documents the decision making and public involvement related to planning for the US 26: Brookwood Parkway/Helvetia Road Interchange. Therefore, the IAMP is consistent with this policy.

Goal 2 – System Management

Policy 2B (Off–System Improvements) helps local jurisdictions adopt land use and access management policies.

Finding of Consistency: Chapter 4 of the IAMP contains the management actions. The adoption of the IAMP will enable the partner agencies to comply with applicable agency planning requirements and provide for the future planning, development, and management of transportation system within the IAMP Study Area. The IAMP will be used by ODOT as a planning tool to guide the future planning and management of the interchange that connects to the County and City street systems. The IAMP will be utilized by Washington County and the City of Hillsboro to guide the management and improvements to the local road network in the IAMP Management Area. Specific IAMP implementation actions are detailed below for each partner agency.

The IAMP identifies management actions for both the City and the County. The City of Hillsboro will continue to coordinate with ODOT and Washington County in evaluating land use actions (including amendments to the comprehensive plan, TSP, and development code, the UGB expansion, and transportation improvements) that could affect the function of the interchange, in order to ensure that coordination is timely and that actions and improvements are consistent with the defined function of the IAMP. Therefore, the IAMP is consistent with this policy.

Goal 3 – Access Management

Policy 3A (Classification and Spacing Standards) sets access spacing standards for driveways and approaches to the state highway system.

Policy 3C (Interchange Access Management Areas) sets policy for managing interchange areas by developing an IAMP that identifies and addresses current interchange deficiencies and short, medium and long term solutions.

Policy 3D (Deviations) establishes general policies and procedures for deviations from adopted access management standards and policies.

Finding of Consistency: The Oregon JTA of 2009 appropriated $45,000,000 for ODOT to design and construct needed improvements to the interchange to address existing operation and safety issues and to address anticipated future travel demand in North Hillsboro. An access management strategy is being prepared for the JTA Project that identifies short-term access management measures for each approach that will be implemented during the construction phases of the JTA Project.

To meet access spacing standards, NW Jacobson Road will be widened/realigned to the north to improve access spacing between the new JTA interchange and Jacobson Road. In addition, safety concerns near the new US 26/Brookwood Parkway/Helvetia Road Interchange will require closing the Meek Road access to Brookwood Parkway and realigning NW Groveland Drive to the north, so that it will access Helvetia Road across from Schaaf Road.

The IAMP Problem Statement on page 1 of the IAMP summarizes the existing deficiency and is corroborated by the traffic analysis in Chapter 2, Existing Conditions, of the IAMP. Short-, medium-, and long-term solutions are presented in the IAMP in Table 6, Proposed IAMP Improvement Projects. Deviation requests will follow established general policies and procedures.

The Oregon Department of Transportation State Agency Coordination Program (Oregon Administrative Rule Chapter 731, Division 15)

This section of the findings addresses compliance with applicable provisions of the Oregon Department of Transportation's (ODOT's) State Agency Coordination Program, which is Division 15 of Oregon Administrative Rule (OAR) Chapter 731. The purpose of ODOT's State Agency Coordination Program is to ensure that ODOT plans and projects "are carried out in compliance with the statewide planning goals and in a manner compatible with acknowledged comprehensive plans."[1] The provisions of ODOT's State Agency Coordination Program below apply to the Facility Plan for the Brookwood Parkway/Helvetia Road Interchange Area Management Plan.

ODOT adopted its State Agency Coordination Program to comply with Division 30 of OAR Chapter 660, issued by the Oregon Land Conservation and Development Commission (LCDC). Division 30 of OAR Chapter 660 implements LCDC's statutory duty to "coordinate planning efforts of state agencies to assure compliance with goals and compatibility with city and county comprehensive plans." The section of these findings entitled "below, further addresses the requirements of Division 30 of OAR Chapter 660.

[1] Oregon Administrative Rule (OAR) 731-015-0005.

OAR 731-015-0065, Coordination Procedures for Adopting Final Facility Plans

OAR 731-015-0065 regulates ODOT procedure for adopting facility plans. An IAMP is a facility plan. The procedure outlined in OAR 731-015-0065 requires that ODOT coordinate with LCDC and local government agencies during development of the facility plan, and provide a draft of the plan to affected cities, counties, and other agencies for comment. The facility plan must be consistent with statewide planning goals and local comprehensive plan policies, and findings of compatibility must be presented to the OTC for facility plan adoption.

Finding of Consistency: The IAMP is the result of a collaborative planning effort between ODOT, the City, and the County. Findings addressing statewide goals and requirements, as well as local plan policies, are included herein. Findings of compliance with statewide planning goals and local comprehensive plans will be included in the OTC adoption materials.

ODOT Administrative Rules on Highway Approaches Highway Approaches, Access Control, and Spacing Standards (OAR Chapter 734, Division 51)

The purpose of OAR 734-051 is to "…establishes procedures, standards, and approval criteria used by the department to govern highway approaches, access control, spacing standards, and restriction of turning movements in compliance with statewide planning goals and in a manner compatible with acknowledged comprehensive plans and consistent with Oregon Revised Statutes (ORS), Oregon Administrative Rules (OAR), and the Oregon Highway Plan (OHP)."

OAR Chapter 734, Division 51 was last updated on May 3, 2012. The update identifies IAMP criteria in section 734-051-7010, Access Management Plans and Interchange Area Management Plans, which are addressed below:

> *(7) Interchange Area Management Plan Criteria. An interchange area management plan must comply with the following criteria, unless the plan documents why compliance with a criterion is not applicable:*
>
> *(a) Be developed no later than the time an interchange is designed or is being redesigned.*

Finding of Consistency: The IAMP was completed in tandem with the interchange design as part of the JTA project.

> *(b) Identify opportunities to improve operations and safety in conjunction with roadway projects and property development or redevelopment and adopt policies, provisions, and development standards to capture those opportunities.*

Finding of Consistency: The local street circulation improvement projects were designed to serve anticipated future property development, primarily industrial development. The improvements are described in the IAMP in the section Prioritized Transportation and Circulation Improvement Projects,

starting on page 29. Projects are listed in Table 8 will be adopted into the City's and County's TSPs as applicable.

(c) Include short, medium, and long-range actions to improve operations and safety within the designated study area.

Finding of Consistency: Table 8, Proposed IAMP Improvement Projects, in the IAMP lists the improvement projects identified to improve operations and safety within the Interchange Management Area. The projects are prioritized in tiers. Although the tiers are not directly attributed to short-, medium-, and long-range actions, the implication is that the Tier 1 projects will be the first projects constructed as funding is identified.

(d) Consider current and future traffic volumes and flows, roadway geometry, traffic control devices, current and planned land uses and zoning, and the location of all current and planned approaches.

Finding of Consistency: Technical Memorandums #2 through #4 studied current and future traffic and land use characteristics, which were used for development of the IAMP. These studies are summarized in Chapters 2 and 3 of the IAMP, and the technical memorandums are appended to the IAMP.

(e) Provide adequate assurance of the safe operation of the facility through the design traffic forecast period, typically twenty (20) years.

Finding of Consistency: The design traffic forecast period used for development of the IAMP is 2035 (or 23 years from the IAMP completion). The 2035 Build condition shows improvement from the Baseline condition. For the Interchange Management Area, the JTA and Brookwood Parkway improvements would improve intersection operations near US 26. The Brookwood Interchange ramp terminals would not impact US 26 operations as they are forecast to impact under the Baseline scenario. All intersections analyzed within the Interchange Management Area are forecast to meet operational standards with the exception of Helvetia Road at Jacobson Road during the PM peak hour.

(f) Consider existing and proposed uses of all the property within the designated study area consistent with its comprehensive plan designations and zoning.

Finding of Consistency: Existing and proposed uses were considered, as documented in the IAMP sections 2 and 3 and Technical Memorandums #2 through #4. Currently, the IAMP Study Area represents the urbanized edge of the Portland Metropolitan area, with areas of industrial uses to the south and east and large areas of agricultural and rural uses to the west and north. Some of the land within the IAMP Study Area and within the Metro UGB is expected to be developed with urban land uses during the planning horizon, as determined by the City of Hillsboro. Those areas outside the Metro UGB will remain designated for rural uses. After adoption of the IAMP, the City of Hillsboro plans to start the planning process required by Metro's Urban Growth Management Functional Plan Title 11: Planning for New Urban Areas (Metro Code section 3.07) to allow for the future planning and development of the 358.89-acre land area in the southwest quadrant of the management area that was added to the Metro UGB in 2011. The City of Hillsboro will annex the land areas within the UGB for future industrial land uses.

(g) Be consistent with any applicable access management plan, corridor plan or other facility plan adopted by the commission.

Finding of Consistency: Additional facility plans, such as an access management plan, will be completed after the IAMP. There are no other applicable facility plans that apply to the interchange.

(h) Include policies, provisions and standards from local comprehensive plans, transportation system plans, and land use and subdivision codes that are relied upon for consistency and that are relied upon to implement the interchange area management plan.

Finding of Consistency: Policies, provisions, and standards from local comprehensive plans, transportation system plans, and land use and subdivision codes that are relied upon for consistency and provisions that are specifically relied upon to implement the IAMP are included in Regional Plans, Local Plans and Policies sections..

Transportation Planning Rule

This section of the findings addresses compliance with applicable provisions of Section 0030 of Division 12, Chapter 660 (OAR 660-012-0030) of the Oregon Administrative Rules, known as the Transportation Planning Rule (TPR). The TPR implements Statewide Planning Goal 12, Transportation. Pursuant to ODOT's State Agency Coordination Program (addressed beginning on page 14), provisions of OAR 660-012-0030 apply to the IAMP. For the reasons stated below, neither Goal 12, itself, nor any sections of the administrative rules that implement Goal 12 other than OAR 660-012-0030, nor any other of the Statewide Planning Goals, apply to the IAMP.

OAR 660, Division 12, Transportation Planning Rule

The purpose of the TPR is "to implement Statewide Planning Goal 12 (Transportation) and promote the development of safe, convenient and economic transportation systems that are designed to reduce reliance on the automobile so that the air pollution, traffic and other livability problems faced by urban areas in other parts of the country might be avoided." A major purpose of the Transportation Planning Rule (TPR) is to promote more careful coordination of land use and transportation planning, to ensure that planned land uses are supported by and consistent with planned transportation facilities and improvements. The TPR references OAR 731, Division 15 for ODOT coordination procedures for adopting facility plans and plans for Class 1 and 3 projects.

Section 660-012-0005 through 660-012-0050.

These sections of the TPR contain policies for preparing and implementing a transportation system plan. The TPR requirement that local governments adopt consistent land use regulations "to protect transportation facilities, corridors and sites for their identified functions" (OAR 660-012-0045(2)) is achieved through a variety of measures, including:

- *Access control measures that are consistent with the functional classification of roads and consistent with limiting development on rural lands to rural uses and densities;*
- *Standards to protect future operations of roads;*

- *A process for coordinated review of future land use decisions affecting transportation facilities, corridors or sites;*

- *A process to apply conditions to development proposals in order to minimize impacts and protect transportation facilities, corridors or sites;*

- *Regulations to provide notice to ODOT of land use applications that require public hearings, involve land divisions, or affect private access to roads; and*

- *Regulations ensuring that amendments to land use designations, densities, and design standards are consistent with the functions, capacities, and performance standards of facilities identified in the TSP. See also OAR 660-012-0060.*

Finding of Consistency: The IAMP documents existing and future conditions for the Interchange Management Area and IAMP Study Area in sections 2 and 3, respectively. The most salient changes expected are build out of the newly-created industrial lands in Hillsboro's expanded UGB. Traffic analysis of future planned growth showed significant deficiencies at many intersections without changes to the interchange. Current problems and the demands from future planned land uses were considered in the design of the interchange in order to ensure its ability to function adequately and to ensure the local network continues to function at level of service standards.

The IAMP "Implementation" chapter outlines the amendments necessary to make the IAMP and the City's and County's TSPs consistent. Attachment A of this document outlines the City of Hillsboro Comprehensive Plan, TSP, and zoning and subdivision ordinances, and the Washington County Comprehensive Framework Plan, Community Plans, 2035 TSP, and Community Development Code that that the IAMP relies on for implementation.

An access management strategy is being prepared for the JTA Project that identifies short-term access management measures for each approach that will be implemented during the construction phases of the JTA Project.

The IAMP assumes that, within the IAMP Management Area, the City of Hillsboro and Washington County will maintain their respective land use designations, plan and code amendment processes; requirements for traffic impact studies; and processes to notify ODOT regarding land use actions that may affect state transportation facilities.

Since provisions of the Hillsboro Comprehensive Plan and Washington County Comprehensive Framework Plan, West Union Community Plan, and Rural/Natural Resource Plan, and the city and county zoning and subdivision ordinances are adopted by reference into the IAMP, ODOT has the ability to review and weigh in on proposed amendments to plans and codes, before their adoption by the City of Hillsboro and Washington County, to ensure that any changes to these land use controls would avoid development that would jeopardize the achievement of the goal and objectives of the IAMP.

For additional findings on local compliance see Local Plans and Policies section for Washington County and the City of Hillsboro.

Section 660-012-0055 – Timing of Adoption and Update of Transportation System Plans

Part 5 of this section requires cities and counties to update their TSPs and implementing measures when a refinement plan has been completed.

Finding of Consistency: The City HCP-3-12: North Hillsboro TSP Amendment (Ordinance # 2793) will amend the Hillsboro Comprehensive Plan specifically to the TSP to reclassify and update information for transportation improvements within the IAMP area to be consistent with the IAMP. Refer to Attachment A-2.

Washington County Ordinance # 749 amends the Transportation Plan Element of the Comprehensive Plan relating to the IAMP. Refer to Attachment A-1.

For additional findings on local compliance see Local Plans and Policies section for Washington County and the City of Hillsboro.

Section 660-012-0065 – Transportation Improvements on Rural Lands

This rule identifies transportation facilities, services and improvements which may be permitted on rural lands consistent with Goals 3, 4, 11, and 14 without a goal exception. Section 2 (f) states:

"Realignment" means rebuilding an existing roadway on a new alignment where the new centerline shifts outside the existing right of way, and where the existing road surface is either removed, maintained as an access road or maintained as a connection between the realigned roadway and a road that intersects the original alignment. The realignment shall maintain the function of the existing road segment being realigned as specified in the acknowledged comprehensive plan"

Finding of Consistency: The IAMP calls for the realignment of Groveland Drive an existing rural road in the County's EFU zoning designation. The IAMP is a planning level document that designates local transportation system to support the long-term function of the interchange. The recommendation to realign Groveland Drive is to support the access management of local road at the interchange. The recommended realignment suggests the reconnection of the existing rural road network at a logical location. At the time of project development for the realignment, Washington County will be required to develop the location and justification for the rural road. Because Gloveland Drive is a County rural local road it does not require an amendment to the Transportation Plan. The Washington County's Community Development Code Article 7 requirements will apply to the realignment project.

Section 5 states:

"For transportation uses or improvements listed in subsections (3)(d) to (g) and (o) of this rule within an exclusive farm use (EFU) or forest zone, a jurisdiction shall, in addition to demonstrating compliance with the requirements of ORS 215.296:

(a) Identify reasonable build design alternatives, such as alternative alignments, that are safe and can be constructed at a reasonable cost, not considering raw land costs, with available technology. The jurisdiction need not consider alternatives that are inconsistent with applicable standards or not approved by a registered professional engineer;

(b) Assess the effects of the identified alternatives on farm and forest practices, considering impacts to farm and forest lands, structures and facilities, considering the effects of traffic on the

movement of farm and forest vehicles and equipment and considering the effects of access to parcels created on farm and forest lands; and

(c) Select from the identified alternatives, the one, or combination of identified alternatives that has the least impact on lands in the immediate vicinity devoted to farm or forest use.

Finding of Consistency: The JTA interchange's westbound exit loop ramp will require the closing of the existing Groveland Drive connection to Helvetia Road. Groveland Drive needs to be realigned to improve safety and meet access spacing standards. The IAMP was jointly developed by ODOT, City of Hillsboro and Washington County. ODOT, Washington County, and the City of Hillsboro explored a wide range of options to reconnect or reroute Groveland Drive (see Table 9). Using engineering judgment and public comments the following options were analyzed and rejected.

Table 9. Groveland Drive Realignment Options Considered and Rejected

Options	Property Impacts	Environmental Impacts	Comments
Permanently Close	No property impacts	No environmental impacts	Rejected because of out-of-direction travel and impact to property owners of permanently routing trips on a substandard rural road, including the Rice Rock Museum.
Tunnel	Limited property impacts	Potential environmental and engineering issues	Rejected because of the major engineering impacts and cost factors.
Roundabout	Major property impacts	Major environmental impacts	Rejected because of the major environmental impacts to the oak grove and traffic operations impacts to the interchange.
Realign through the Oak Grove Area	Major property impacts	Major environmental impacts	Rejected because of the major property and environmental impacts to the oak grove.

After the evaluation and consultation, it was determined that the reconnection of Groveland Drive to Helvetia Road was needed to provide access to the surrounding existing rural uses. The realignment is a safe and reasonable reconnection of the existing rural road to Helvetia Road. The impacts to farm uses and environmental features are minimal. The realignment of the rural road will follow the Washington County policies and requirements for realignment of an existing rural road in farm land.

See additional findings under Statewide Planning Goal 3 (Agricultural Lands) and Statewide Planning Goal 12 (Transportation).

The IAMP is consistent with the TPR.

Regional Plans and Policies

Metro Region 2040 Growth Concept

The Region 2040 Growth Concept, a long-range regional plan originally adopted in December of 1995 and periodically amended, provides visionary guidance through land use and transportation policies that will allow Metro and the metropolitan area cities and counties to manage growth, protect natural resources, and make improvements to facilities and infrastructure while maintaining the region's quality of life.

Finding of Compatibility: The 2040 Concept Plan Map (dated January 1, 2011) identifies the eastern portion of the IAMP Study Area, which is within the current UGB, as mostly "employment land" with areas designated "neighborhood" closer to Cornelius Pass Road.

Employment lands are typically considered industrial areas and are described as the following in the Region 2040 Growth Concept:

Serving as hubs for regional commerce, industrial land and freight facilities for truck, marine, air and rail cargo provide the ability to generate and move goods in and out of the region. Access to these areas is centered on rail, the regional freeway system and key roadway connections. Keeping these connections strong is critical to maintaining a healthy regional economy.

The third goal of the IAMP, as referenced in Technical Memorandum #1, is to "accommodate planned growth that depends on the interchange," which is consistent with the Region 2040 Growth Concept employment industrial areas designation.

The IAMP includes improvement projects that will serve as key roadway connections to the regional transportation network to accommodate the planned industrial growth in the area and to protect the function of the interchange in support of efficient freight movement through the region. The IAMP is consistent with the 2040 Growth Concept.

Metro Urban Growth Management Functional Plan (UGMFP)

The UGMFP (the Functional Plan) implements the Region 2040 Growth Concept and the Regional Framework Plan (a general, regional land use planning policy document that establishes a framework for planning in the region by linking land use and transportation plans). The Functional Plan requires cities and counties to designate boundaries for the 2040 Growth Concept Design Types, including the Portland Central City, Regional Centers, Town Centers, and Station Communities.

The purpose of the Functional Plan is to implement the Regional Urban Growth Goals and Objectives (RUGGO) adopted by the Metro Council, including the Metro Region 2040 Growth Concept and the Regional Framework Plan.

Finding of Compatibility: The three sections of the UGMFP most relevant to the US 26/Brookwood Parkway/Helvetia Road IAMP are: (1) Title 11: Planning for New Urban Areas, (2) Title 4: Industrial and Other Employment Areas, and (3) Title 3: Water Quality and Flood Management.

According to the March 17, 2011 Metro reserves map, the southwest quadrant of the US 26/Brookwood Parkway/Helvetia Road IAMP Study Area is designated as an urban reserve. A portion of the northwest quadrant is shown as an undesignated reserve area (8B-urban). Title 11: Planning for New Urban Areas, details the components of a concept plan that local governments are required to prepare prior to adding an urban reserve to the UGB.

Metro requires that, before adding land into the UGB, the local jurisdiction must provide documentation that the comprehensive plan amendment is consistent with all applicable titles of the Functional Plan. The City of Hillsboro completed Concept Plans for the Evergreen, Shute Road, and Helvetia areas following their addition to the UGB in 2002 and 2005, as required under Metro's Title 11. Since completing the concept planning analysis, the City of Hillsboro has annexed the entire Shute Road concept planning area and portions of the Helvetia concept planning area. The highly parcelized Evergreen concept planning area remains outside the Hillsboro city limits. Planning efforts and urban reserves allotments are discussed further under Section 3, Ongoing Planning Efforts, below. The transportation and circulation improvement projects in the IAMP are consistent with Title 11: Planning for New Urban Areas because they provide the framework for an improved road network to support development.

Title 4: Industrial and Other Employment Areas of the Functional Plan establishes the regulatory framework for protecting regionally significant industrial areas (RSIAs). These areas are near the region's most significant transportation facilities, including US 26 in Hillsboro. Local jurisdictions implement the RSIA designation through zoning and special plan designations that limit land division of parcels of more than 50 acres in order to preserve large parcels for future industrial development. In some circumstances, larger parcels may be subdivided if the city has developed and adopted a master plan for the area, allowing clustering of similar industries to operate more productively than if they were in dispersed locations. Title 4 is an important component of the ongoing urban/rural reserves discussion (please see Section 3, Ongoing Planning Efforts). As areas are added to the UGB, Metro and local jurisdictions will be required to identify RSIAs and implement regulatory measures to ensure that those areas are protected for future industrial development. The proposed improvement projects in the IAMP are consistent with Title 4, because they are intended to support the planned industrial development in the area

Title 3: Water Quality and Flood Management protects designated Water Quality and Flood Management Areas by limiting or mitigating the impact of development activities on those areas. Best Management Practices and mitigation will limit the impact of development on water quality and flood management, and meet all local and federal regulations when each individual improvement project is being developed.

The IAMP is consistent with these documents.

Metro Regional Transportation Plan (RTP)

On June 10, 2010, Metro's Joint Policy Advisory Committee on Transportation (JPACT) and the Metro Council approved the 2035 RTP for the purpose of completing a federal- and state-required air quality conformity analysis of the proposed system. The RTP introduces the concept of organizing the region's multimodal transportation improvements by mobility corridors. The regional mobility corridor framework calls for consideration of multiple facilities, modes, and land use when identifying needs and the most effective mix of land use and transportation solutions to improve mobility within a specific corridor area.

Finding of Compatibility: The IAMP is in Mobility Corridor 22 – Highway 217 to North Plains. The interchange improvements (JTA project) and IAMP are listed as a five- to ten-year investment strategy.

The RTP identifies the overall function of the corridor as:

2040 Access: Connects the Central City to Hillsboro regional central the Sunset industrial area and provides regional access to Hillsboro Airport, Portland Community College (Rock Creek Campus), and the Oregon Graduate Institute.

Freight Mobility: Provides air freight access for west side industrial areas, and statewide access to marine and rail facilities.

Statewide Travel: Serves as a western gateway to the region, and provides access to Central City interstate hub and travel to the northern Oregon coast.

The IAMP incorporates the RTP Corridor Function in its statement of interchange function, as follows:

The primary function of the US 26/Brookwood Parkway/Helvetia Road Interchange is to provide employee vehicle and bicycle commute trips and truck freight traffic access to existing and future large high-technology employment centers based throughout North Hillsboro. The secondary function is to provide access to the residences in the unincorporated community surrounding the interchange.

According to Figure 2-22 of the RTP, there is a designated Community Bikeway loop formed by NW West Union Road, NW Cornelius Pass Road, NW Brookwood Parkway, and NW Evergreen Parkway. NW Evergreen Parkway is a designated Community Bikeway throughout its length. Community Bikeways provide for travel to and within other 2040 Target Areas or areas identified for development as part of the 2040 Growth Concept. US 26 west of NW Brookwood Parkway is a designated Regional Bikeway. These routes also provide access to regional attractions, such as schools and parks, and connect neighborhoods to the rest of the regional bicycle network.

The IAMP is listed as a five- to ten-year investment strategy, and therefore completion of the IAMP is consistent with and implements the RTP. All but one of the improvement projects include bicycle lanes that will be constructed to applicable standards to the maximum extent practicable. All but four of the improvement projects (which are new proposed streets) in the IAMP are included in the Metro 2035 RTP (Proposed IAMP Improvement Projects 2, 4, 8, and 11, see Table 8 in IAMP).

The IAMP is consistent with the RTP.

Metro Regional Transportation Functional Plan

The Regional Transportation Functional Plan (RTFP) implements the Goals and Objectives in section 2.3 of the Regional Transportation Plan (RTP). Cities and counties in the region implement the Goals and Objectives in their comprehensive plans, TSPs, other land use regulations, and transportation project development.

Finding of Compatibility: Development of the improvement projects will be done so in accordance with the local jurisdiction's standards, which integrate RTFP standards. The IAMP is consistent with the TPR.

Local Plans and Policies

Washington County 2020 Transportation Plan

The Washington County 2020 Transportation Plan (2020 TP) addresses provisions of the RTP and the state TPR. The 2020 TP classifies existing and future roads and streets and addresses transit, pedestrian, and bicycle transportation issues. The local street system is designated on the community plans and the Rural/Natural Resource Plan, which are best suited for addressing the local street system. Many provisions of the 2020 TP are implemented by the community plans, the Rural/Natural Resource Plan, and the Community Development Code.

Finding of Compatibility: The 2020 TP consists of 23 elements. The Roadway, Bicycle and Pedestrian, and Roadway Freight Elements are the most applicable elements to planning for the interchange.

The IAMP is consistent because it provides the framework for a more interconnected roadway system in the IAMP Study Area to meet the future needs of the area, based on anticipated land use development. Bicycle and pedestrian facilities are incorporated into all of the improvement projects except one to create a more multimodal and safer environment for bicyclists and pedestrians. The suggested improvements were designed to meet operational standards and meet the expected needs of future industrial development in the area, and the needs of the residents who live and work in the area.

The interchange improvements are consistent with the 2020 TP except for:

NW Brookwood Parkway (Proposed IAMP Improvement Projects #3 and #5, see Table 8 in the IAMP). The 2020 TP lists the roadway as four to five lanes and classifies it as an arterial, but the proposed improvement is for six lanes. The new interchange loop ramp requires three lanes southbound to accommodate the amount of traffic expected to use the interchange in the AM and to access industrial lands. Three lanes northbound will provide storage for vehicles entering the highway in the PM.

Additionally, there are projects that need to be included in the TSP:

NW 253rd Avenue (Proposed IAMP Improvement Project #1, see Table 8 in the IAMP). NW 253rd Avenue is required to provide an alternate route once Meek Road is cut off from Brookwood Parkway to meet interchange spacing standards and resolve safety concerns. NW 253rd Avenue will also provide access to industrial lands and a parallel route to Brookwood Parkway

NW Huffman Street East of NW 253rd Avenue (Proposed IAMP Improvement Project #4, see Table 8 in IAMP). Huffman Street is required to access undeveloped industrial land within the UGB and provide a parallel route to Evergreen Parkway. Five lanes will be needed at the Huffman Street/Brookwood Parkway intersection to accommodate traffic accessing the industrial lands while preserving capacity for through movements.

NW Huffman Street West of NW 253rd Avenue (Proposed IAMP Improvement Project #7, see Table 8 in IAMP). Huffman Street west of NW 253rd Avenue is needed to access industrial lands and provide a parallel route to Evergreen Parkway.

NW 264th Avenue (Proposed IAMP Improvement Project #8, see Table 8 in IAMP). NW 264th Avenue is needed to provide a parallel local route to Jackson School Road and to access industrial lands (part of this is outside of the current UGB but within the 330-acre expansion area).

NW Schaaf Road (Proposed IAMP Improvement Project #12, see Table 8 in IAMP). Schaaf Road west of Helvetia Road is needed to access industrial lands and provide a parallel route to Jacobson Road.

Washington County will adopt the IAMP as a refinement plan to its 2020 TP. Washington County will continue to coordinate with ODOT and the City of Hillsboro in evaluating amendments that could affect the function of the interchange in order to ensure that coordination is timely and that actions and improvements are consistent with the defined function of the IAMP.

Washington County Comprehensive Framework Plan for the Urban Area

The Comprehensive Framework Plan for the Urban Area (Framework Plan) contains specific standards designed to regulate the growth and development of unincorporated properties inside the Regional Urban Growth Boundary and the UGBs of Banks, Gaston, and North Plains. The overall goal of the countywide development concept is:

> *… to create a series of distinct, balanced, relatively self-sufficient and diverse communities throughout the urban portion of Washington County. Employment centers (e.g., distribution services and industries and offices) will be located in accord with market, transportation and environmental considerations in order to reduce impacts on residential areas and community.*

This includes "a variety of transportation modes ranging from pedestrian movement to transit corridors [that] should provide for intra-community and inter-community movement of people, goods and services."

Finding of Compatibility: The IAMP is compatible with the overall goal of the Framework Plan. The IAMP supports industrial development in an area that has access to the regional transportation network and limits the impacts to residential areas. The improvements will also provide for increased multimodal options by providing sidewalks and bicycle lanes. The IAMP is consistent with the Framework Plan.

Washington County Community Plans

Adopted Community Plans are the legally binding statements of county policy within the boundaries of the particular community planning area.

West Union Community Plan

The West Union Community Plan applies to the area adjacent to and north of US 26, west of Cornelius Pass Road to the UGB, and represents the northeast portion of the IAMP Study Area. The entire West Union Community Plan area is within the IAMP Study Area. It consists of four subareas within West Union (Five Oaks, Jacobson, Cornelius Pass, and Helvetia). All four subareas have the Special Industrial District Overlay (described further in this document). According to the West Union Community Plan, the characterization of land use in the West Union planning area "is that of an employment center which will likely consist of a combination of industrial uses. As a result of transportation services available to the West Union area, the relationship between transportation costs and industrial location, and the cost of transporting service personnel, equipment and supplies within a region, it is likely that the clustering of interdependent industries will occur in West Union. This will foster the location of industrial neighbors whose operations are compatible, thus furthering the employment center concept."

Some of the basic objectives of the West Union Community Plan are:

to improve access to the industrial area and to minimize traffic impacts on surrounding residential areas;

to ensure access to West Union shall not require through travel on neighborhood streets and shall minimize travel on streets adjacent to residential areas; new access onto Arterials and Collectors shall be limited; and

and to require shared or consolidated access prior to the issuance of a development permit for land divisions or structures located adjacent to these facilities, unless demonstrated to be infeasible.

During the development review process, new development must identify any potential traffic impacts to the surrounding roadway system and recommend steps to mitigate these impacts, as provided for by the Washington County Community Development Code.

The West Union Community Plan assumes eventual development of all pedestrian and bicycle facilities identified in the Washington County 2020 Transportation Plan. Generally speaking, the transportation plan calls for bikeways along all Arterial and Collector roads in the area, as well as along major streams and in power line easements. A system of multiple-purpose pedestrian/bicycle pathways will be instituted to allow access through the development, and to link buildings to each other, to off-street parking areas, and to any proposed transit stops. This system will connect to the bicycle pathways along West Union and Cornelius Pass Roads, as proposed by the Washington County 2020 Transportation Plan. Adequate parking facilities for bicycles and curb cut ramps at street crossings will be included in the design of all new development. The timing of pathway development will be determined by the availability of resources.

Each subarea has its own identified opportunities and constraints and designations within the overall objectives of the West Union Community Plan. The Helvetia subarea, because it was the area most recently adopted into the UGB as an Urban Reserve (there are additional areas within the IAMP Study Area awaiting adoption into the UGB), has more specific development criteria.

Helvetia Subarea

This area consists of several parcels located at the southeast corner of Helvetia and West Union Roads and encompasses approximately 250 acres. These properties were added to the UGB by Metro Ordinance 04-1040B, adopted on June 24, 2004. Metro designated the area as a Regionally Significant Industrial Area (RSIA) on the 2040 Growth Concept Plan. The area is designated Future Development - 20 Acre (FD-20) District on the West Union Community Plan and the FD-20 designation will be maintained until the property is annexed to the City of Hillsboro and rezoned.

East Hillsboro Community Plan

A portion of the IAMP Study Area west of Cornelius Pass Road and south of US 26, to the UGB, is in the East Hillsboro Community Plan area. The East Hillsboro Area is within the Hillsboro UGB. In the East Hillsboro Community Plan area, properties that have been annexed to the City of Hillsboro are regulated by the City of Hillsboro. Properties that have not been annexed to the City of Hillsboro are regulated by Washington County. However, general planning for the area is through a joint planning process between Washington County and the City of Hillsboro.

Some of the general Design Guidelines of the East Hillsboro Community Plan applicable to planning for the IAMP are:

Washington County will emphasize non-auto (transit, bicycle, and pedestrian) measures as an interim solution to circulation issues. These measures will be used to facilitate access to transit centers.

New development will, when determined appropriate through the development review process, dedicate right-of-way for road extensions and alignments indicated on the Washington County 2020 Transportation Plan or the Hillsboro Transportation Plan. New development will also be subject to conditions set forth in the County's growth management policies during the development review process.

The portion of the IAMP Study Area within the East Hillsboro Planning Area is in the Evergreen Road Subarea.

Evergreen Road Subarea

This area encompasses approximately 539 acres located on the north side of Evergreen Road and generally west of Shute Road and east of Jackson School Road. This property was added to the UGB by Metro Ordinance 05-1070A adopted November 17, 2005. On the 2040 Growth Concept Plan, Metro designated the eastern half of the area (Area of Special Concern 6) as a Regionally Significant Industrial Area (RSIA) and the remaining area (Area of Special Concern 7) as Industrial land. The area is designated Future Development - 20 Acres (FD-20) on the East Hillsboro Community Plan. Once properties within the subarea have been annexed to the City of Hillsboro, they are regulated by the Hillsboro Comprehensive Plan and its implementing ordinances.

The Washington County Department of Land Use and Transportation Annual Work Program outlines tasks necessary to keep the County Comprehensive Plan in conformance with regional, state, and federal law. There are two application deadlines each year, February 15 and August 15. Complete applications received by February 15 will be placed on the Planning Commission's summer hearing schedule; those received by August 15 usually are scheduled for a fall or winter hearing. An application cannot be scheduled for a hearing until it is deemed complete and accepted by the County. Each year after considering plan upkeep requirements and issue topics, the Long Range Planning Division prepares a draft work program for approval by the Board of Commissioners. The draft work program describes and prioritizes potential planning projects and land use ordinances. When there are a number of large planning tasks to be addressed, staff will prepare a multi-year work program. The draft work program is then distributed to the Planning Commission, Citizen Participation Organizations, Committee for Citizen Involvement, and other interested parties for consideration and comments. Staff may prepare an issue paper about a subject when the Board of Commissioners asks for additional information before making a decision about the work program. It is also posted on the division's Web page. After considering available staff resources and public comments, a final work program is approved by the Board of Commissioners.

Finding of Compatibility: The IAMP is compatible with the West Union and East Hillsboro Community Plans because it improves access to industrial areas by providing for improvements and the development of new streets, and identifies bicycle and pedestrian facilities on Arterials and Collectors (except for one Rural Collector). In general, the IAMP was developed to be consistent with applicable Washington County Community Plans.

Washington County Rural/Natural Resource Plan

The Rural/Natural Resource Plan addresses all properties outside of an urban growth boundary. The Rural/Natural Resource Plan applies to the western portion of the IAMP Study Area.

The Rural/Natural Resource element of the Washington County Comprehensive Plan provides the framework for guiding future land use decisions in Washington County in areas outside of the established UGBs.

There are nine land use designations in this plan element for lands that make up the areas of Washington County outside the acknowledged UGBs. The IAMP Study Area contains two of those nine designations, one of which is a resource designations (Exclusive Farm Use and the other a "Rural Development" designation (Agriculture and Forest-5). An exception to LCDC Goals 3 and 4, utilizing the Exception Process specified in Goal 2, has been established for those lands designated for rural development.

Finding of Compatibility: According to the Rural/Natural Resource Land Use Designation Map, most of the IAMP Study Area outside of the UGB is currently designated as Exclusive Farm Use (EFU), which is intended to preserve existing agricultural lands and prohibit land uses that are not compatible with agricultural practices. There are a few parcels zoned Agriculture and Forest -5 (AF-5) in the southern portion of the IAMP Study Area that allow for rural residential uses.

The Significant Natural Resource Map Number 4 (http://www.co.washington.or.us/LUT/Divisions/LongRangePlanning/upload/RNRP-SIGMAP4.pdf) shows Water Areas, Wetlands, and Fish and Wildlife Habitat designation for Waibel Gulch, which parallels NW Helvetia Road and crosses Meek Road, and a Water Areas and Wetland designation for a wider portion adjacent to Waibel Creek north of US 26. There is also a Water Areas, Wetlands, and Fish and Wildlife Habitat designation for a tributary to Waibel Gulch that crosses under NW Brookwood Parkway just south of the interchange.

The IAMP is consistent with the Washington County Rural/Natural Resource Plan because it adopts the plan by reference into the IAMP. In addition, the IAMP and the projected improved function of the interchange is based on continuance of the current and planned land uses under existing and planned designations.

Therefore, the IAMP is consistent with the Rural/Natural Resource Plan.

Washington County Community Development Code

The purpose of the Washington County Community Development Code is to implement the Washington County Comprehensive Plan through the adoption and coordination of planning and development regulations that provide for the health, safety, and general welfare of the citizens of Washington County.

Finding of Compatibility: Lots within the UGB under Washington County jurisdiction (primarily in the Helvetia and Evergreen subareas) are zoned Future Development - 20 Acres (FD-20), except for a couple of small parcels along NW Cornelius Pass Road that are zoned Special Industrial Overlay District (SID). The FD-20 District encourages and retains limited interim uses until the urban comprehensive planning for future urban development of areas brought within the UGB after 1998 is completed. The Special

Industrial Overlay District has provisions designed to establish development opportunities for industrial uses which may require large sites as well as for small and medium size industrial uses which desire to locate in proximity to large single user industrial uses.

Outside the UGB, lots within the IAMP Study Area are zoned primarily Exclusive Farm Use (EFU) District, with some areas of Agriculture and Forest (AF-20) District adjacent to the southwest corner of the interchange and along NW Evergreen Road. There are also seven lots zoned Agriculture and Forest (AF-5) District between NW Meek Road and NW Evergreen Road in the IAMP Study Area.

As described in the Rural/Natural Resource Plan section above, there are natural resource overlay areas within the IAMP Study Area.

The provisions in Sections 308 (FD-20), 340 (EFU), 348 (AF-5), 377 (SID), and , Article 7 of the Community Development Code (CDC) will apply to many of the road projects contained in the IAMP. Application of the CDC to development of those projects will ensure that land uses and natural resources are protected at the local level. Section 422, Significant Natural Resources, and Section 421, Floodplain and Drainage Hazard Area Development, only apply to these resources when they are impacted by projects other than transportation projects.

The IAMP is consistent with the Washington County Rural/Natural Resource Plan because it adopts the plan by reference into the IAMP. In addition, the IAMP and the projected improved function of the interchange is based on continuance of the current and planned land uses under existing and planned designations.

City of Hillsboro Transportation System Plan (Update)

The TSP for the City of Hillsboro was adopted in 1999. The TSP provides specific information regarding transportation needs to guide future transportation investment in the City of Hillsboro. The TSP update (2020 planning horizon) includes additional key intersections, recently annexed land and neighborhoods within the Hillsboro School District boundaries, and recently completed transportation projects.

Finding of Compatibility: The IAMP is consistent with the maps on Figures 1-2, 1-3, and 1-5 of the City of Hillsboro TSP.

Figure 1-2, Pedestrian Master Plan, identifies Planned Sidewalks on Arterials, Collectors, and Neighborhood Routes on NW Evergreen Road west of NW Shute Road, NW Jacobson Road, and NW Meek Road.

Sidewalks are included on all proposed improvement projects in the IAMP Study Area except for NW Groveland Drive, which is a Rural Collector.

Figure 1-3, Bicycle Master Plan, identifies planned bike lanes from NW Shute Road over US 26 to Helvetia Road, and on NW Jacobson and NW West Union with connections outside of the UGB. A Bicycle Way is indicated for NW Rock Creek and NW Wagon Way.

Bicycle lanes are included on all proposed improvement projects in the IAMP Study Area except for NW Groveland Drive, which is a Rural Collector.

Figure 1-5, Street Improvement Plan, identifies street widening (to five lanes) on SW Evergreen Road west from NW Shute Road, on NW Cornelius Pass Road north of the interchange (to five lanes), and to three lanes on NW Jacobson Road. Proposed streets shown on the figure include NW 229th (three lanes) and NW Huffman Street west to outside of the UGB.

The improvement projects for the IAMP include an area consistent with the street improvements identified above for NW Huffman Street and NW Jacobson Road. The NW Cornelius Pass Road and NW Evergreen Road projects are outside of the IAMP Management Area, and their circulation isn't directly impacted by the interchange project. Therefore, they aren't included as IAMP projects. However, this does not preclude their improvements.

Other Potential Future Connections/Realignments:

2. Extensions of NW Huffman Street and NW Dawson Creek Drive into NW 253rd Avenue – Part of the Shute Road Concept Plan, these road extensions are intended to provide access to the newly added 203-acre Shute Road Special Development District.

3. NW Jacobson Road Realignment to NW Helvetia Road – The realignment north of the US 26/Shute Road interchange is intended to accommodate potential increased right-of-way necessary for interchange improvements.

Both these projects are included in the IAMP (Proposed IAMP projects 4 and 9).

Figure 1-8, Traffic Signal Master Plan, shows planned signals at NW Huffman Street and NW Brookwood Parkway and NW Helvetia Road and NW Schaaf Road.

These projects are not included in the IAMP but the IAMP projects are not inconsistent with them nor are they precluded by the IAMP from being developed.

Figure 1-4, Transit Master Plan, shows RTP designation as community bus service on NW Shute, NW Jacobson, NW Evergreen, and NW Cornelius Pass Roads.

Bus service is not included in the IAMP; however, the IAMP's local improvements will benefit all modes of travel, including bus service.

The RTP also identified several roadways within Hillsboro for regional bus service, including NW 185th Avenue, NW Cornell Road, NW Evergreen Road, NW 229th/231st/234th Avenue, and Baseline Road. High-quality regional transit service on corridors can link many high employment, regional center, and town center areas.

Bus service is not included in the IAMP; however, the IAMP's local improvements will benefit all modes of travel, including bus service.

The TSP designates the Meek Road Special Study Area, which is consistent with the Washington County 2020 TP as the following:

The Meek Road Study Area. Concerns exist regarding the proximity of the intersection of Meek Road and Shute Road to the interchange at US 26 and Shute Road. Washington County has designated this as a study area in order to evaluate options for moving the intersection of Meek Road further south.

However, reorienting the roadway to the south would place it within the Shute Road Site Special Development District. The 203 acre site, located at the intersection of Evergreen Road and Shute Road, was added to the urban growth boundary for the purpose of providing large lots for high tech industrial development. Meek Road, situated immediately north of the new district, will be influenced by future development within the Shute Road site. The Conceptual Transportation Plan for Shute Road, drafted by Group MacKenzie, suggests that additional analysis would be required with regards to Meek Road to determine any relocation of Meek Road or re-routing of traffic.

To meet access spacing standards and alleviate safety concerns, the Meek Road connection to Brookwood Parkway will be closed. A new connection from extended NW 253rd Avenue to Meek Road will allow access and connections from Meek Road to the south.

The City of Hillsboro will adopt the IAMP as a refinement plan to its TSP. Implementation of the local improvement projects shown on Figure 8 in the IAMP will require the City of Hillsboro to amend the TSP. The local improvement projects that the City will need to adopt are:

NW 253rd Avenue (Proposed IAMP Improvement Project #1). NW 253rd Avenue is required to provide an alternate route once Meek Road is cut off from Brookwood Parkway to meet interchange spacing standards and address safety concerns. It will also provide access to industrial lands and a parallel route to Brookwood Parkway (part of this is outside of the current UGB but within the 330-acre expansion area).

NW Huffman Street East of NW 253rd Avenue (Proposed IAMP Improvement Project #4). Huffman Street is required to access undeveloped industrial land within the UGB and provide a parallel route to Evergreen Parkway. Five lanes will be needed at the Huffman Street/Brookwood Parkway intersection to accommodate traffic accessing the industrial lands while preserving capacity for through movements.

NW Huffman Street West of NW 253rd Avenue (Proposed IAMP Improvement Project #7). Huffman Street west of NW 253rd Avenue is needed to access industrial lands and provide a parallel route to Evergreen Parkway.

NW 264th Avenue (Proposed IAMP Improvement Project #8). NW 264th Avenue is needed to provide a parallel local route to Jackson School Road and to access industrial lands (part of this is outside of the current UGB but within the 330-acre expansion area).

NW Schaaf Road (Proposed IAMP Improvement Project #12). Schaaf Road west of Helvetia Road is needed to access industrial lands and provide a parallel route to Jacobson Road.

Four new extensions of roadways (NW 253rd NW Huffman West of NW 253rd, NW 264th and Schaaf), are included that are outside the existing city limits, but within the new UGB expansion area. Washington County lists all four proposed roadways as Collectors in its TSP.

The City of Hillsboro will continue to coordinate with ODOT and Washington County in evaluating land use actions (including amendments to the comprehensive plan, TSP, and development code, the UGB expansion and transportation improvements) that could affect the function of the interchange in order to ensure that coordination is timely and that actions and improvements are consistent with the defined function of the IAMP.

City of Hillsboro Comprehensive Plan

The City of Hillsboro Comprehensive Plan was passed by the Hillsboro City Council and approved by the mayor on April 5, 1977, and has been amended through June 2010. The Comprehensive Plan provides goals, policies, and implementation measures for 29 different sections to guide growth and development for the City of Hillsboro. It includes area-specific Community Plans that establish coordinated policies and development guidelines within specific areas of the City of Hillsboro.

There are three Community Plans that apply to the IAMP Study Area: Section 20 Shute Road Industrial Site, Section 24 Evergreen Area Industrial Plan, and Section 25 Helvetia Area Industrial Plan. However, these Community Plans are currently being consolidated and are intended to be replaced by the Section 30 North Hillsboro Industrial Area Community Plan.

Comprehensive Plan Map Designations for the IAMP Study Area are almost entirely for industrial uses. However, there is a band of area designated Floodplain starting at NW Century Drive, crossing under US 26, and then continuing to NW Brookwood just south of the interchange.

Finding of Compatibility: The IAMP was developed to be consistent with the City of Hillsboro Comprehensive and Community Plans, including the North Hillsboro Industrial Community Plan. Specifically, the IAMP includes Proposed IAMP Improvement Project projects 5, 7, 1, 9, and 12 (listed in Table 8 of the IAMP), which are also projects identified in the North Industrial Community Plan. Policies from the Comprehensive Plan relied on to implement the IAMP.

City of Hillsboro Zoning Ordinance

The purpose of the City of Hillsboro Zoning Ordinance is to encourage the most appropriate use of land. Zoning for the IAMP Study Area within City of Hillsboro jurisdiction include the following specialized industrial zones: Industrial Park (M-P), Helvetia and Evergreen Area Special Industrial Districts (HSID and ESID), and several overlays for industrial development for large lots, Shute Road area, (SSID, SID M-P), for Planned Unit Development, and for natural resources (SNRO, RFD).

Finding of Compatibility: .The IAMP is consistent with the City of Hillsboro Development Code because it adopts the plan by reference into the IAMP. In addition, the IAMP and the projected improved function of the interchange is based on continuance of the current and planned land uses under existing and planned designations.

US26: Brookwood Parkway/Helvetia Road Interchange Area Management Plan

Attachment A-1

Washington County, Ordinance 749 and Staff Report (pending adoption in September 2012)

August 2012

Continued from August 7, 2012

AGENDA

WASHINGTON COUNTY BOARD OF COMMISSIONERS

Agenda Category:	Public Hearing – Third Reading and Third Public Hearing Land Use and Transportation; County Counsel (CPO 7, 8, 9)
Agenda Title:	**PROPOSED A-ENGROSSED ORDINANCE NO. 749 – AN ORDINANCE AMENDING THE TRANSPORTATION PLAN ELEMENT OF THE COMPREHENSIVE PLAN RELATING TO THE BROOKWOOD PARKWAY INTERCHANGE AREA MANAGEMENT PLAN**
Presented by:	Andrew Singelakis, Director of Land Use and Transportation Alan Rappleyea, County Counsel

SUMMARY:

Ordinance No. 749 amends the Washington County Transportation Plan to add some new roadways and modify the functional classification and number of lanes of some existing roadways consistent with the U.S. 26 – Brookwood Parkway/Helvetia Road Interchange Area Management Plan. The ordinance is posted on the county's land use ordinance web page at the following link:

http://www.co.washington.or.us/LUT/Divisions/LongRangePlanning/2012-land-use-ordinances.cfm

The Board conducted public hearings for this ordinance on July 24 and August 7, 2012. On August 7, the Board ordered engrossment of Ordinance No. 749 to include the 7-lane Cornelius Pass Road request by the City of Hillsboro. The hearing was continued to August 28, 2012 for the first required public hearing for the engrossed ordinance.

The staff report for the August 28 hearing will be posted on the above land use ordinance web page prior to the hearing and copies of the report will also be available at the Clerk's desk.

- Consistent with Board policy, testimony about the ordinance is limited to three minutes for individuals and twelve minutes for a representative of a group.

DEPARTMENT'S REQUESTED ACTION:

Read A-Engrossed Ordinance No. 749 by title only and conduct the third public hearing. At the conclusion of the hearing, continue the public hearing to September 18, 2012 as required by Chapter X of the County Charter.

COUNTY ADMINISTRATOR'S RECOMMENDATION:

I concur with the requested action.

Agenda Item No.	**3.a.**
Date:	08/28/12

WASHINGTON COUNTY
OREGON

August 17, 2012

To: Citizen Participation Organizations and Interested Parties

From: Andy Back, Interim Long Range Planning Manager
Department of Land Use & Transportation

Subject: **PROPOSED A-ENGROSSED ORDINANCE NO. 749**

On May 14, 2012, you were notified about initial public hearings before the Planning Commission and the Board of County Commissioners (Board) on proposed Land Use Ordinance No. 749. On June 20, and July 11, 2012 the Planning Commission conducted public hearings on Ordinance 749 and forwarded a recommendation to the Board for approval of Ordinance 749. On July 24 and August 7, 2012 the Board conducted public hearings on Ordinance No. 749, and ordered substantive amendments to this ordinance. These changes have been incorporated into proposed **A-Engrossed Ordinance No. 749** and are summarized below. As required by Chapter X of the County Charter, the Board has directed staff to prepare and provide you with notice of these amendments.

Enclosed for your information is a copy of proposed **A-Engrossed Ordinance No. 749**. Listed below is a description of the ordinance, upcoming hearing dates, and other relevant information. If you have any questions about the ordinance, or if you would like additional information, please contact the Long Range Planning Division.

Ordinance Purpose and Summary

Proposed A-Engrossed Ordinance No. 749 amends the Washington County Transportation Plan to incorporate elements of the U.S. 26-Brookwood Parkway/Helvetia Road Interchange Area Management Plan, and amends the lane number map for Cornelius Pass Road.

Who Is Affected

Residents in the vicinity of the U.S. 26-Brookwood Parkway/Helvetia Road Interchange, and along Cornelius Pass Road between U.S. 26 and Cornell Road.

What Land is Affected

Property in the vicinity of the U.S. 26-Brookwood Parkway/Helvetia Road Interchange, and along Cornelius Pass Road between U.S. 26 and Cornell Road.

Original Ordinance No. 749 Provisions

As originally filed, Ordinance No. 749 proposed the following amendments to the Washington County 2020 Transportation Plan:

- Adds some new roadways and modifies the functional classification and number of lanes of some existing roadways consistent with the U.S. 26-Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP). See ODOT Region 1 website for IAMP overview: http://www.oregon.gov/ODOT/HWY/REGION1/US26_brookwoodpkwy/index.shtml#iamppac

- Limits transportation system changes to roadways within the Urban Growth Boundary (UGB) as it existed before Metro's decision to expand the UGB in October 2011 (Metro Ordinance 11-1264 B).

- Adds or modifies strategy statements in Washington County Transportation Plan Policy 10 - Functional Classification Policy and Policy 19 – Transportation Planning Coordination and Public Involvement Policy to describe and enable implementation of the IAMP.

Proposed A-Engrossed Ordinance No. 749 Provisions

Proposed **A-Engrossed Ordinance No. 749** incorporates all of the above-described amendments, plus the following proposed amendment:

- The lane number designation for Cornelius Pass Road between U.S. 26 and Cornell Road will be changed from 5-lanes to 7-lanes.

Public Hearings
Time and Place

Board of County Commissioners	Board of County Commissioners
6:30 pm	10:00 am
August 28, 2012	September 18, 2012

Hearings will be held in the Shirley Huffman Auditorium in the Public Services Building, 155 North 1st Avenue, Hillsboro, Oregon.

On September 18, 2012, the Board of County Commissioners (Board) may choose to adopt the ordinance, make changes to it, continue the hearing to a future date, or reject the ordinance. If it is adopted, it would become effective on October 18, 2012.

How to Submit Comments

Submit oral or written testimony to the Board at one of the public hearings. Written testimony may be mailed or faxed to the Board in advance of the public hearings in care of the Long Range Planning Division. **We are unable to accept e-mail as public testimony.**

Washington County, Long Range Planning Division
155 N. 1st Ave., Suite 350-14, Hillsboro, OR 97124-3072
Fax: 503-846-4412

Staff Contact

Steve L. Kelley, Senior Planner
155 North 1st Ave., Suite 350-14, Hillsboro, OR 97124-3072
Telephone: 503-846-3764 Fax: 503-846-4412
e-mail: SteveL_Kelley@co.washington.or.us

Proposed Ordinance is available at the following locations:

- Washington County Department of Land Use & Transportation
  Long Range Planning Division, 155 North 1st Ave.
  Hillsboro, OR 97124-3072 Telephone: 503-846-3519
  http://www.co.washington.or.us/LUT/Divisions/LongRangePlanning/2012-land-use-ordinances.cfm
- Cedar Mill Community Library and Tigard Public Library
- Citizen Participation Organizations (CPOs); Call 503-821-1128 for a directory of CPOs.

FILED

AUG 1 0 2012

Washington County
County Clerk

BEFORE THE BOARD OF COUNTY COMMISSIONERS

FOR WASHINGTON COUNTY, OREGON

A-ENGROSSED ORDINANCE 749	An Ordinance Amending the Transportation Plan Element of the Comprehensive Plan Relating to the Brookwood Parkway Interchange Area Management Plan

The Board of County Commissioners of Washington County, Oregon, ordains as follows:

SECTION 1.

A. The Board of County Commissioners of Washington County, Oregon, recognizes that the Transportation Plan Element of the Comprehensive Plan (Volume XV) was adopted on October 25, 1988, by way of Ordinance Nos. 332 and 333, with portions subsequently amended by Ordinance Nos. 343, 382, 409, 419, 426, 432, 450, 463, 470, 471, 473, 474, 480, 483-485, 493, 494, 503, 515, 526, 537, 542, 546, 552, 556, 588, 601, 609, 611, 626, 627, 631, 642, 649, 663, 674, 683, 712, 713, 717, 718, 730, 739, and 744.

B. Subsequent ongoing planning efforts of the County indicate a need for changes to the Transportation Plan to incorporate provisions of the U.S. 26 – Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP). The Board recognizes that the U.S. 26 – Brookwood interchange is slated for improvement beginning in 2013 and, as a result, coordinated development of the local transportation system identified in the IAMP is important in order to ensure sufficient capacity and safe operations due to increased future use. Certain changes to the Washington County Lane Numbers map are necessary to ensure consistency with planning efforts undertaken by other jurisdictions included in the IAMP. The Board takes note that such changes

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are necessary for the benefit of the health, safety, and general welfare of the residents of Washington County, Oregon.

C. Under the provisions of Washington County Charter Chapter X, the Department of Land Use and Transportation has carried out its responsibilities, including preparation of notices, and the County Planning Commission has conducted public hearings on the proposed amendments and has submitted its recommendations to the Board. The Board finds that this Ordinance is based on that recommendation and any modifications made by the Board, as a result of the public hearings process.

D. The Board finds and takes public notice that it is in receipt of all matters and information necessary to consider this Ordinance in an adequate manner, and that this Ordinance complies with the Statewide Planning Goals, the Metro Urban Growth Management Functional Plan, and the standards for legislative plan adoption, as set forth in Chapters 197 and 215 of the Oregon Revised Statutes, the Washington County Charter, and the Washington County Development Code.

SECTION 2.

The following exhibits, attached and incorporated herein by reference, are hereby adopted as amendments to the Transportation Plan:

(A) Exhibit 1: Figure 4C – Washington County Functional Classification System map, is amended to add or modify the functional classification of transportation facilities consistent with the IAMP;

(B) Exhibit 2 (2 pages): Figure 5 – Washington County Lane Numbers map, is amended to add or modify the number of lanes on transportation facilities consistent with the

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IAMP;

(C) Exhibit 3: Policy 10.0 – Functional Classification Policy, is amended to add a strategy to describe and enable implementation of the U.S. 26 – Brookwood Parkway/Helvetia Road Interchange Area Management Plan; and

(D) Exhibit 4: Policy 19.0 – Transportation Planning Coordination and Public Involvement Policy, is amended to integrate the U.S. 26 – Brookwood Parkway/Helvetia Road Interchange Area Management Plan with the Transportation Plan.

SECTION 3.

All other Comprehensive Plan provisions that have been adopted by prior ordinance, which are not expressly amended or repealed herein, shall remain in full force and effect.

SECTION 4.

All applications received prior to the effective date shall be processed in accordance with ORS 215.427.

SECTION 5.

If any portion of this Ordinance, including the exhibits, shall for any reason be held invalid or unconstitutional by a body of competent jurisdiction, the remainder shall not be affected thereby and shall remain in full force and effect, and any provision of a prior land use ordinance amended or repealed by the stricken portion of this Ordinance shall be revived and again be considered in full force and effect.

SECTION 6.

The Office of County Counsel and Department of Land Use and Transportation are

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authorized to prepare planning documents to reflect the changes adopted under Section 2 of this Ordinance, including deleting and adding textual material and maps, renumbering pages or sections, and making any technical changes not affecting the substance of these amendments as necessary to conform to the Washington County Comprehensive Plan format.

SECTION 7.

This Ordinance shall take effect thirty (30) days after adoption.

ENACTED this _____ day of_____, 2012, being the _____ reading and _____ public hearing before the Board of County Commissioners of Washington County, Oregon.

BOARD OF COUNTY COMMISSIONERS
FOR WASHINGTON COUNTY, OREGON

_____
CHAIRMAN

_____
RECORDING SECRETARY

READING	PUBLIC HEARING
First _____	First _____
Second _____	Second _____
Third _____	Third _____
Fourth _____	Fourth _____
Fifth _____	Fifth _____
VOTE: *Aye:* _____	*Nay:* _____

Recording Secretary: _____ Date: _____

WASHINGTON COUNTY COUNSEL
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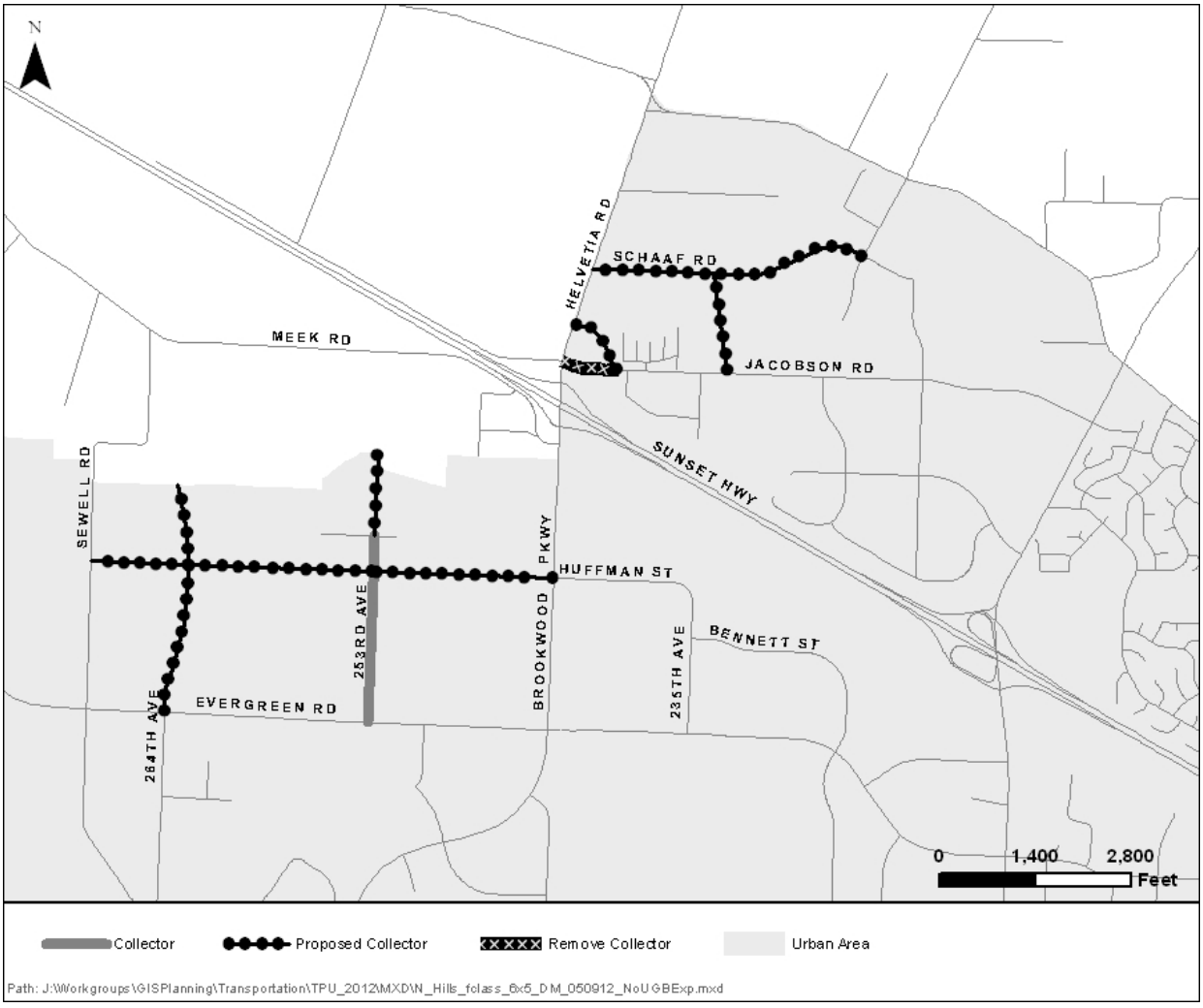
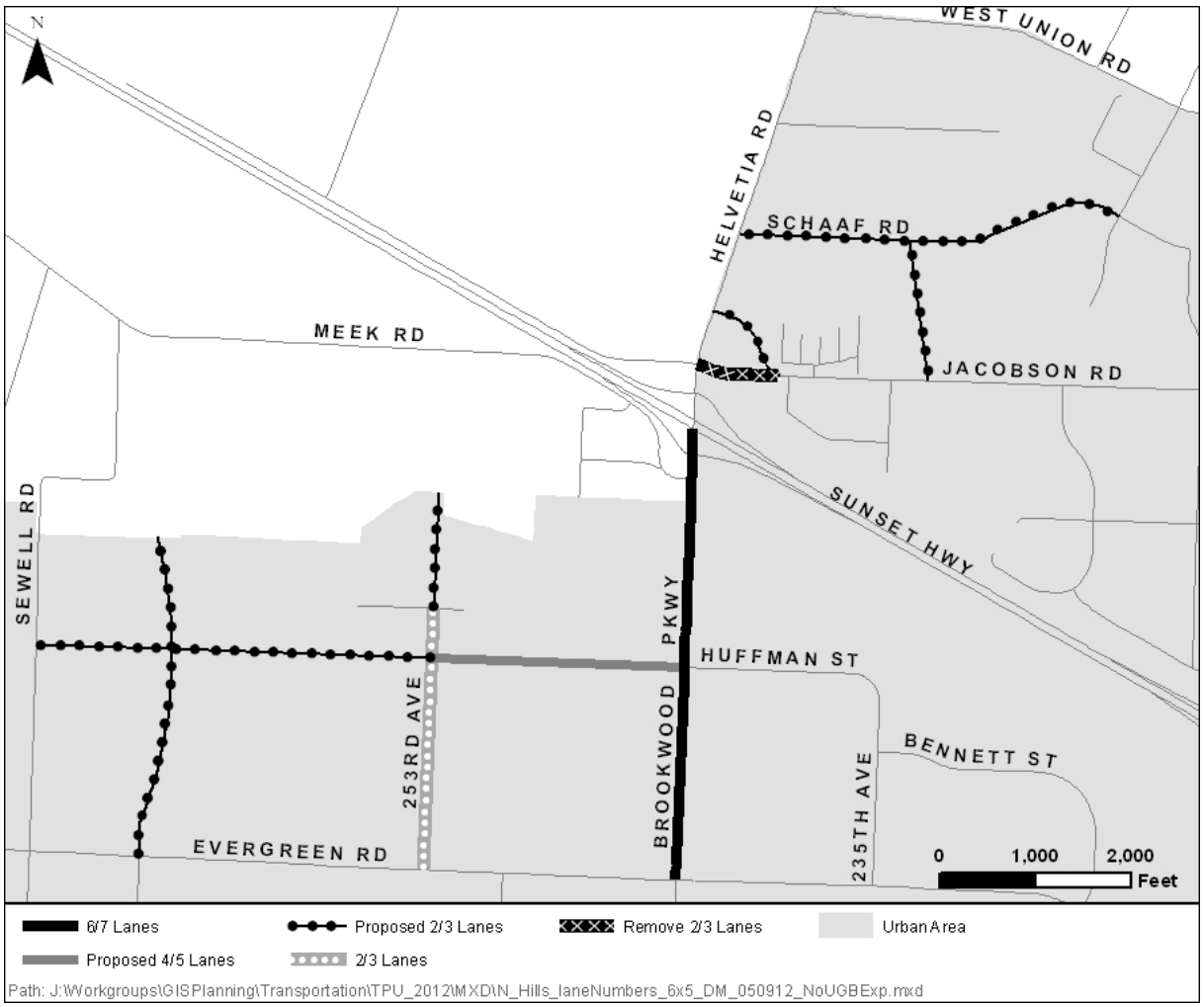
HILLSBORO, OR 97124-3072
PHONE (503) 846-8747 - FAX (503) 846-8636

Figure 4C – Washington County Functional Classification System map, is amended as follows:



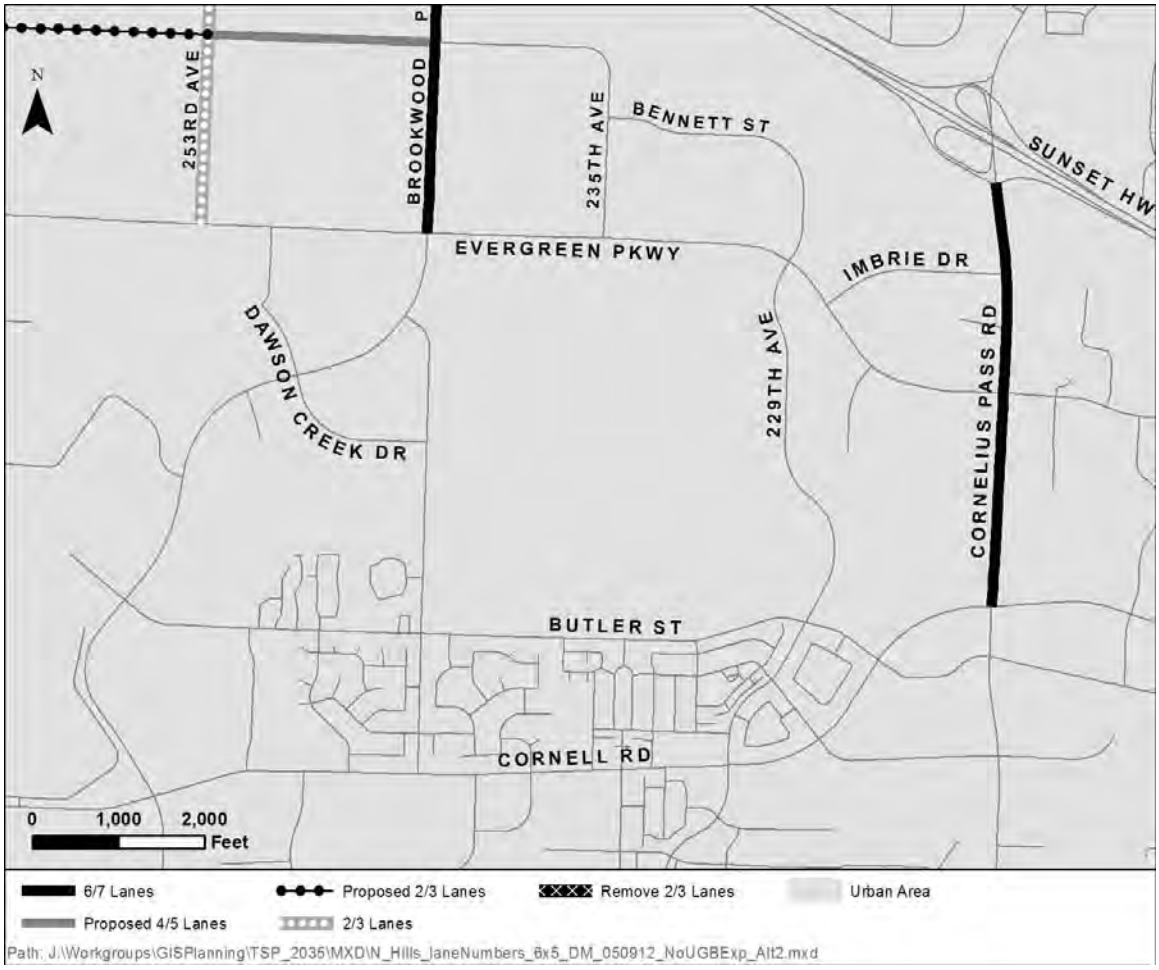
abcdef Proposed additions
~~abcdef~~ Proposed deletions

Figure 5 – Washington County Lane Numbers map, is amended as follows:



abcdef Proposed additions
~~abcdef~~ Proposed deletions

Figure 5 – Washington County Lane Numbers map, is amended as follows:



abcdef Proposed additions
~~abcdef~~ Proposed deletions

Policy 10.0 – Functional Classification Policy is amended as follows:

10.11 The Oregon Department of Transportation (ODOT), the City of Hillsboro and Washington County have developed and adopted an Interchange Area Management Plan (IAMP) for the U.S. 26 - Brookwood Parkway/Helvetia Road Interchange. This interchange, a locally and regionally significant facility, is slated for improvement with funds provided by the state Jobs and Transportation Act. Among its functions is to serve as a primary entry point to regionally-significant high-tech employment centers south of the interchange. The IAMP defines improvements to the local transportation system in the vicinity of the interchange that are necessary to ensure the intended purpose and function of the interchange are maintained and sufficient to ensure safe operations through the year 2035. IAMP elements should be incorporated into the Washington County Transportation Plan, as appropriate.

10.~~11~~12 The Transportation Plan also identifies several specific study areas where the function or alignment of the facility has not been determined. These study areas are described below and shown on the Study Area Map.

Meek Road - Realignment at Brookwood Parkway~~Shute Road~~:
There has been concern regarding the proximity of the intersection at Meek Rd and Brookwood Parkway~~Shute Rd~~ to the interchange at US 26 and Brookwood Parkway~~Shute Rd~~. This ~~study will evaluate options for moving the intersection of Meek further south~~issue has been evaluated and a proposed solution identified through development of the U.S. 26 – Brookwood Parkway/Helvetia Road Interchange Area Management Plan that was developed in conjunction with plans for improvements to the interchange itself.

abcdef Proposed additions
~~abcdef~~ Proposed deletions

Policy 19.0 – Transportation Planning Coordination and Public Involvement Policy, is amended as follows:

19.15 Integrate the U.S. 26 -- Brookwood Parkway/Helvetia Road Interchange Area Management Plan with the Washington County Transportation Plan and carry out its applicable provisions as part of transportation plan implementation.

abcdef Proposed additions
~~abcdef~~ Proposed deletions

Continued from August 7, 2012

AGENDA

WASHINGTON COUNTY BOARD OF COMMISSIONERS

Agenda Category:	Public Hearing – Third Reading and Third Public Hearing Land Use & Transportation; County Counsel (CPO 7)
Agenda Title:	**PROPOSED A-ENGROSSED ORDINANCE NO. 749 – AN ORDINANCE AMENDING THE TRANSPORTATION PLAN ELEMENT OF THE COMPREHENSIVE PLAN RELATING TO THE BROOKWOOD PARKWAY INTERCHANGE AREA MANAGEMENT PLAN**
Presented by:	Andrew Singelakis, Director, Land Use & Transportation Alan Rappleyea, County Counsel

SUMMARY:

Ordinance No. 749 amends the Washington County Transportation Plan to add some new roadways and modify the functional classification and number of lanes of some existing roadways consistent with the U.S. 26 – Brookwood Parkway/Helvetia Road Interchange Area Management Plan. The ordinance is posted on the county's land use ordinance web page at the following link:

http://www.co.washington.or.us/LUT/Divisions/LongRangePlanning/2012-land-use-ordinances.cfm

The Board conducted public hearings for this ordinance on July 24 and August 7, 2012. On August 7, the Board ordered engrossment of Ordinance No. 749 to include the 7-lane Cornelius Pass Road request by the City of Hillsboro. The hearing was continued to August 28, 2012 for the first required public hearing for the engrossed ordinance.

The staff report for the August 28 hearing will be posted on the above land use ordinance web page prior to the hearing and copies of the report will also be available at the Clerk's desk.

- Consistent with Board policy, testimony about the ordinance is limited to three minutes for individuals and twelve minutes for a representative of a group.

DEPARTMENT'S REQUESTED ACTION:

Read A-Engrossed Ordinance No. 749 by title only and conduct the third public hearing. At the conclusion of the hearing, continue the public hearing to September 18, 2012 as required by Chapter X of the County Charter.

COUNTY ADMINISTRATOR'S RECOMMENDATION:

Agenda Item No.	
Date:	08/28/12

WASHINGTON COUNTY
OREGON

August 17, 2012

To: Washington County Board of Commissioners

From: Andy Back, Interim Long Range Planning Manager
Department of Land Use & Transportation

Subject: **PROPOSED A-ENGROSSED ORDINANCE NO. 749**

STAFF REPORT

For the August 28, 2012 Board of Commissioners Hearing
(The public hearing will begin no sooner than 6:30 p.m.)

I. STAFF RECOMMENDATION

Conduct the public hearing for A-Engrossed Ordinance No. 749. At the conclusion of public testimony continue the hearing to September 18 for final Board action.

II. BACKGROUND

The Board of County Commissioners' hearing on Ordinance No. 749 was conducted over the course of two meeting dates: July 24 and August 7. At the August 7 hearing, the Board directed engrossment of Ordinance No. 749 and scheduled two subsequent hearing dates to consider A-Engrossed Ordinance No. 749, as required by Chapter X of the County Charter. The Board also directed staff to provide notice of the changes and the hearings, also as outlined in County Charter Chapter X.

Staff has prepared and mailed Individual Notice No. 2012-11, describing the changes to Ordinance No. 749 and the two hearing dates, as required by Chapter X. This notice was mailed to interested parties and individuals on the General Notification List on August 17, 2012. Copies of the engrossed ordinance were mailed to the CPOs, and notices of the engrossed ordinance were mailed to cities, special service districts, CPOs and Metro, and were posted on the Planning Division's Land Use ordinance website.

A copy of A-Engrossed Ordinance No. 749 and the engrossment notices are included in your materials for the August 28, 2012 meeting.

III. ORDINANCE AMENDMENTS

The change directed with engrossment was to amend the Transportation System Plan lane number map for Cornelius Pass Road. The amendment would change the plan designation for Cornelius Pass Road between Highway 26 and Cornell Road from the current 5-lane designation to the proposed 7-lane designation.

IV. INTERCHANGE AREA MANAGEMENT PLAN ISSUES

At the August 7, 2012 the Board deliberated and discussed issues regarding the Interchange Area Management Plan (IAMP). The discussion focused on West Union Road, and traffic growth between Helvetica Road and Cornelius Pass Road. Additional traffic growth is to be expected, West Union Road is designated as an arterial in the transportation system plan.

As defined through the IAMP, the City of Hillsboro collector system is being planned and developed to limit the inter-urban traffic along West Union Road. The IAMP anticipates completion of both the Century Blvd. overcrossing and a Schaaf Road improvement as the area develops. These road improvements must wait until development and traffic warrant the need for the road improvements and funding is available and approved.

A significant amount of concern has been expressed regarding the IAMP proposed access changes at the intersection of Jacobson Road and Helvetia Road. Changing the access to Jacobson Road to Right-In / Right-Out is an operational improvement proposed by the IAMP. This access improvement would be considered after completion of the Schaaf Road and Century Blvd. improvements. The Jacobson Road to Right-In / Right-Out operational improvement is proposed to address the expected increase in traffic volumes in the area, due to the expected industrial growth.

A project development level decision to adjust access to Jacobson Road would be an operational change, and as such it is not being contemplated by the Transportation Plan amendments proposed in this ordinance. Additional study of the project specifics, a review of the operational and safety needs, and the allocation of funding, will be necessary before the Right-In / Right-Out improvement could be authorized and the project completed. Staff believes the decision to implement this proposal as a project and convert Jacobson Road to Right-In / Right-Out will likely be made at some point in the future. Such a decision will be based on safety and traffic concerns as the area develops, and after the other higher priority IAMP-related improvements have been completed.

V. CORNELIUS PASS ROAD ISSUES

At the August 7, 2012 meeting, the Board deliberated and discussed the City of Hillsboro request to change the transportation plan designation of Cornelius Pass Road between Highway 26 and Cornell from 5-lanes to 7-lanes. At the conclusion of the public hearing and deliberations, the Board authorized engrossment of the ordinance to include the changed designation for Cornelius

Pass Road. The engrossment resulted in adding page 2 to ordinance exhibit 2, which illustrates the plan designation change for Cornelius Pass Road from 5-lanes to 7-lanes.

Additional information regarding the proposed change was made available in the staff report for August 7, 2012 as well as in the issue paper, *Changing Cornelius Pass Road to a 7-lane cross section*, dated July 22, 2012. The City of Hillsboro provided an overview of the proposal during the August 7 public hearing.

VI. SUMMARY OF STAFF RECOMMENDATION

Conduct the public hearing for A-Engrossed Ordinance No. 749. At the conclusion of public testimony continue the hearing to September 18 for final Board action.

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WASHINGTON COUNTY
OREGON

June 20, 2012

To: Washington County Planning Commission

From: Andy Back, Interim Long Range Planning Manager

Subject: Ordinance No. 749: Concerning Adoption of the U.S. 26 – Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP)

I. STAFF RECOMMENDATION:

Staff recommends that the Planning Commission hold the public hearing, consider testimony, then either 1) allow for further consideration by continuing the hearing until its July 11 meeting, or 2) forward the Ordinance to the Board of County Commissioners for a public hearing and consideration at its July 24 meeting.

II. OVERVIEW:

Ordinance No. 749 is intended to add to the Washington County transportation plan some new streets and modify plans for some existing streets identified in the U.S. 26 –Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP). The Ordinance also would incorporate strategies in the plan calling for implementation of the IAMP.

ODOT's initial deadline for local adoption of the IAMP was mid-September, 2012, at the time the Ordinance was filed.

For reasons more fully described later in this staff report, Ordinance No. 749 was developed and filed with two issues still outstanding:

- IAMP recommendations had not been finalized by May 11, the date the Ordinance needed to be filed in order to meet ODOT's IAMP adoption deadline;
- The status of the Urban Growth Boundary (UGB) expansion area endorsed by Metro in October 2011 and located within the study area remained uncertain.

To address the potential need for changes associated with the resolution of these uncertainties, the Ordinance review and adoption process allows for modifications to Ordinance 749 at a later date. The Ordinance itself includes only portions of roadway modifications and/or new roadways proposed by the draft IAMP that are located within the UGB but not within the previously mentioned UGB expansion area endorsed by Metro. Reasons for this are more fully explained later in the staff report.

Department of Land Use & Transportation • Long Range Planning Division
155 N. First Avenue, Suite 350-14, Hillsboro, OR 97124-3072
phone: (503) 846-3519 • fax: (503) 846-4412

III. BACKGROUND:

Improvements to the U.S. 26 –Brookwood Parkway/Helvetia Road Interchange (Interchange) itself are planned for construction beginning in 2013. The improvements are funded with $45 million provided by the Jobs and Transportation Act (JTA) enacted by the 2009 Oregon Legislature. Under agreement with ODOT, if the Interchange costs less than $45 million, remaining funds would be available for priority projects identified in the IAMP.

The need for an interchange improvement initially grew out of Concept Planning work done by the city of Hillsboro for the 249-acre Helvetia Concept Planning Area (located northeast of the Interchange) and the 534-acre Evergreen Concept Planning Area (located southwest of the Interchange). Metro brought these two areas into the UGB in 2002 and 2005, respectively. The city developed Concept Plans for the two areas that identified the type of development that should occur and a general infrastructure framework necessary to serve it. The concept plans were completed in February 2008. These areas will be annexed by the city before they develop or redevelop with urban uses.

When an interchange is to be built or significantly improved, Oregon Administrative Rules (OAR 734-051) require IAMPs to be developed and adopted by affected local governments before the Oregon Transportation Commission (OTC) releases interchange construction funds. IAMPs are intended to identify transportation system facilities and improvements in the vicinity of an interchange that are needed to adequately support its operation over time.

Development of this IAMP started in Fall, 2010, with the first Project Advisory Committee meeting in May, 2011. The fourth and final Project Advisory Committee meeting on this IAMP is scheduled for June 25, 2012. ODOT anticipates having the final IAMP recommendations completed shortly thereafter.

Analysis completed during IAMP development shows that the Interchange is approaching or exceeding Oregon Highway Plan (OHP) mobility standards. The heavy westbound off-ramp traffic during the AM peak hour heading southbound and the corresponding northbound-to-eastbound movement in the PM peak hour currently have a detrimental effect on traffic operations on the US 26 mainline, the surface arterial roadways near the interchange, and the expansion of current and future businesses (and jobs) in the surrounding area that depend on adequate interchange traffic capacity. In addition, roadway connections to Brookwood Parkway and Helvetia Road near the interchange do not meet OHP access spacing standards, making access difficult and potentially unsafe, and contributing to traffic congestion at and near the interchange during peak travel times.

Additional traffic associated with new industrial development attracted to North Hillsboro also is expected. The approximately 330-acre UGB expansion area in the IAMP study area is intended to help attract future large-site industrial employers to the region.

IAMP Public Involvement:
A Project Advisory Committee (PAC) was created to guide the IAMP process and provide important policy, community and technical feedback. The PAC included one representative each from the Helvetia Community Association, Meek Neighborhood, Hillsboro Chamber of Commerce, Brookwood area bicyclists, Jacobson Road (Pac Trust), City of Hillsboro, and Washington County, and the ODOT project manager. Project team members and members of the public also attended the PAC meetings.

Residents of the area received project updates and an invitation to the two project open houses through two project newsletters, the project website, and area media. Each newsletter was mailed to approximately 3,100 addresses in the interchange area and posted on the website approximately two weeks before each open house. E-mail notifications of the open houses also were sent (200 addresses for the first open house), primarily to individuals who had expressed interest in the project, legislators, emergency service providers, local businesses, organizations, and members of the PAC.

One of the open houses was held on January 17, 2012 at Liberty High School in Hillsboro, Oregon (49 attended); the second is scheduled from 5-7 PM on June 25, 2012 at the Hillsboro Civic Center. Comment forms made available at each open house provide the primarily tool for recording feedback received.

Ordinance No. 749 Notification:
Ordinance No. 749 and an accompanying summary were mailed to Citizen Participation Organizations (CPOs) and interested parties on May 21, 2012. Individual Notice 2012-5 describing proposed Ordinance No. 749 was mailed to 252 people on the General Notification List on June 6, 2012. A copy of this notice was also mailed to the Planning Commission at that time. A display advertisement regarding the proposed ordinance was published in the Washington County Weekly section of *The Oregonian* on June 9, 2012 and in the *Hillsboro Argus* on June 8, 2012.

IV. ANALYSIS:

The IAMP:
The IAMP is being developed by the Oregon Department of Transportation (ODOT) in partnership with the City of Hillsboro and Washington County. Roadway system improvements proposed in the IAMP are described in Attachment A. The tiers into which projects are organized in Attachment A show their relative priorities as defined during IAMP development.

The city of Hillsboro and Washington County transportation plans need to be modified to allow the recommended improvements that are not on currently planned roadways. The following facilities would need to be added to the Washington County transportation plan:

- NW 253rd Avenue from NW Evergreen Parkway to NW Meek Road – (Project 1 on Attachment A),
- NW Huffman Street from NW Brookwood Parkway west to NW Sewell Road – (Projects 4 and 7)

- NW 264th Avenue from NW Evergreen Parkway to NW Meek Road – (Project 8)
- New Connector from NW Jacobson to NW Schaaf Road – (Project 11)
- NW Schaaf Road east from NW Helvetia Road to NW Century Drive -- (Project 12)

Some facilities already in the Washington County transportation plan would need to be modified:

- Northwest Brookwood Parkway from NW Evergreen Parkway to the Interchange (Projects 3 and 5) would increase to six travel lanes from four (a 7-lane designation in the Transportation Plan; it is currently designated in the Plan for 5-lanes), and
- NW Helvetia Road from the westbound Interchange on-ramp north to NW Schaaf Road transitions from the six-lanes at the overcrossing to three lanes at NW Schaaf Road and should be designated as 4/5 lanes on the Plan (Project 13).

Other facilities need to be realigned to relocate access to NW Helvetia Road:

- NW Jacobson just east of NW Helvetia Road would be realigned to move its intersection with Helvetia to the north, as indicated (Project 9, west end);
- NW Groveland Drive just west of NW Helvetia Road would be realigned to move its intersection with NW Helvetia further to the north, as indicated (Project 2). (This realignment does not require an amendment to the Transportation Plan. (see OAR 660-012-0065 (2) (f)).

Most of the roadways identified above are now or ultimately will be under jurisdiction of the city of Hillsboro, since the land they are on either is in the city now or must be annexed by the city before it is developed. Remaining under County jurisdiction would be NW Groveland Drive, a rural local road that remains outside the UGB, and NW Brookwood Parkway/NW Helvetia Road, an arterial that is on the Countywide Road System and over which the county plans to retain jurisdiction.

The additional northbound lane on NW Brookwood Parkway is necessary in 2035 to accommodate PM peak hour traffic waiting to move eastbound on U.S. 26, the queue for which, with the additional lane, is anticipated to extend south past the existing Genentech access, located approximately 1000 feet north of Evergreen. The additional southbound lane is necessary to accommodate AM peak hour traffic volumes southbound on NW Brookwood Parkway north of NW Huffman Street, to prevent queues from extending to the U.S. 26 eastbound off-ramp onto NW Brookwood. Also, peak hour traffic volumes on NW Brookwood Parkway are such that they require the majority of green-time at intersections between the Interchange and NW Evergreen Parkway, resulting in extended queues on intersecting streets during these periods.

Facilities for bicycles and pedestrians are proposed to be included on all collector and arterial roadways, consistent with facility and design standards. Alternatives to standard designs contained in the recently developed Washington County Bicycle Design Tool Kit will be considered on Washington County facilities during the project development process.

Ordinance No. 749:
As noted earlier, the timing and content of Ordinance No. 749 are influenced by ODOT's IAMP schedule (adoption by mid-September, 2012), time required for the Ordinance itself (file by May 11, 2012 to meet ODOT's IAMP deadline), and continuing uncertainty associated with status of inclusion of the Metro-endorsed UGB expansion area in which portions of some IAMP projects are located.

The Ordinance itself proposes only facilities within the existing UGB. Attachment B shows the UGB expansion area and changes to the Transportation Plan Functional Classification and Lane Numbers Maps called for the in the IAMP, and which would have been included in the Ordinance had the UGB decision been final.

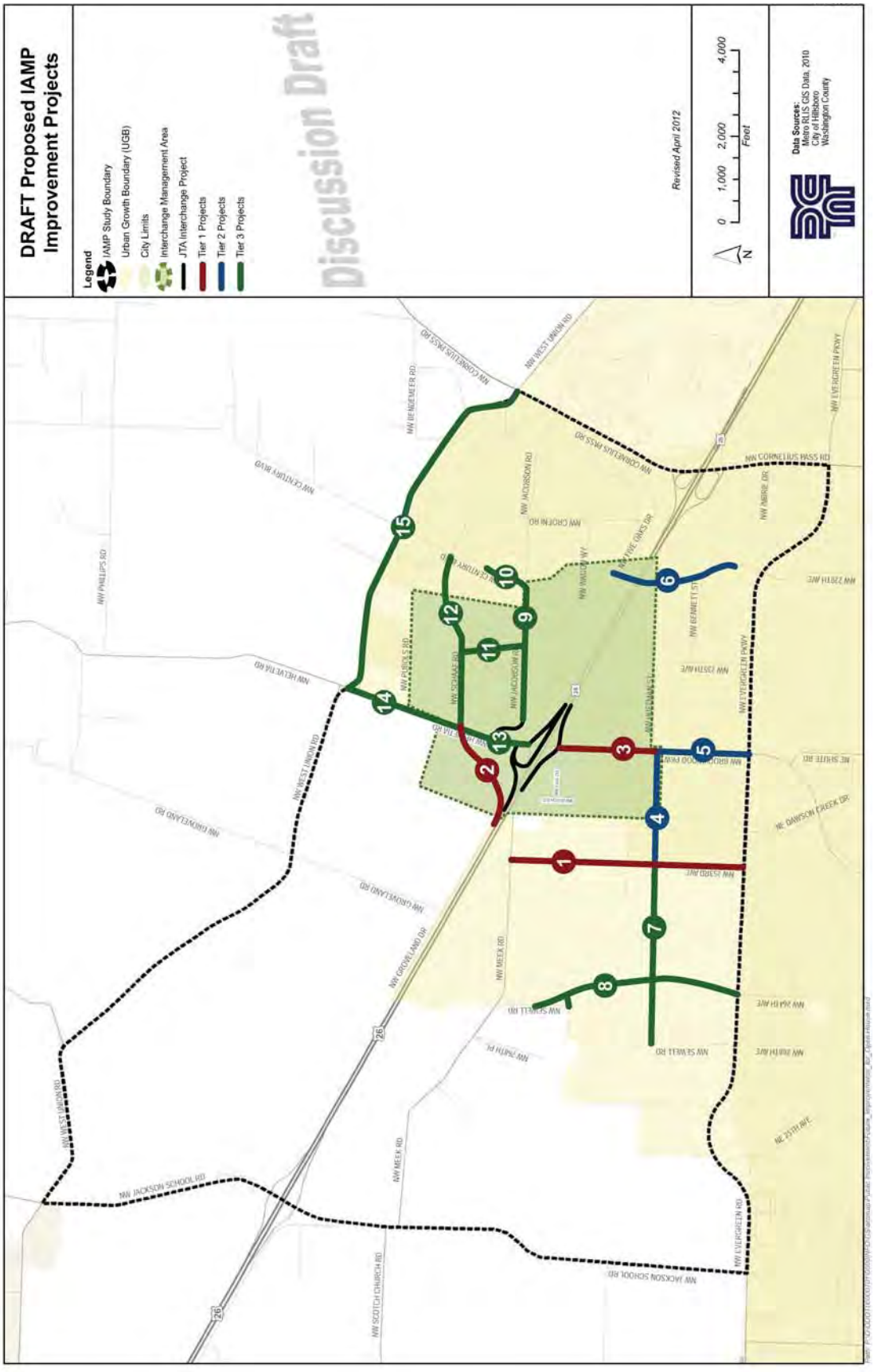
While Metro endorsed inclusion of the expansion area within the UGB as part of its regional decision in October, 2011, Metro's action has not been formally acknowledged by the Land Conservation and Development Commission (LCDC). LCDC considered the matter during its May 10 and 11, 2012 meeting and public hearing but continued it until its June 14, 2012 meeting for further consideration and action. Once LCDC has acted it must issue a final order. A 60-day appeals period begins once the final order is issued.

Given UGB expansion area status, staff determined that only portions of IAMP facilities within the UGB should be included in this ordinance for the following reasons:

- Including roadway extensions outside the urban area would require the county to seek a goals exception for these portions of proposed facilities;
- Developing justification for a goals exception, which may be difficult to get, can be an onerous and time consuming process;
- Timing of roadway project construction is likely to be generally linked to industrial development in the expansion area, which could not occur until area is formally included within the UGB anyway; and
- The Ordinance review and adoption process and schedule provide an opportunity to amend the Ordinance to accommodate proposed changes, should they be warranted based on the resolution of some of these uncertainties. As scheduled, the opportunity to modify the Ordinance occurs in early August. This could be extended a month or so if ODOT determines the IAMP adoption deadline is sufficiently flexible, as appears may be the case as this staff report is being written.

Information on U.S. 26 – Brookwood Parkway/Helvetia Road IAM Plan may be viewed at: http://www.oregon.gov/ODOT/HWY/REGION1/pages/us26_brookwoodpkwy/index.aspx and on Ordinance No. 749 at: http://www.co.washington.or.us/LUT/Divisions/LongRangePlanning/2012-land-use-ordinances.cfm .

Attachments:
A -- Proposed IAMP Improvement Projects Map and List
B – Plan changes for IAMP-Recommended Project Elements in proposed UGB Expansion Area


DRAFT Proposed IAMP Improvement Projects
Legend
IAMP Study Boundary
Urban Growth Boundary (UGB)
City Limits
Interchange Management Area
JTA Interchange Project
Tier 1 Projects
Tier 2 Projects
Tier 3 Projects
Discussion Draft
Revised April 2012
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Feet
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Data Sources:
Metro RLIS GIS Data, 2010
City of Hillsboro
Washington County
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NW WEST UNION RD
NW JACKSON SCHOOL RD
NW MEEK RD
NW GROVELAND DR
NW SCHMELL RD
NW 25TH AVE
NW 24TH AVE
NW 20TH AVE
NE DAWSON CREEK DR
NW EVERGREEN PKWY
NW 229TH AVE
NW 235TH AVE
NE SHUTE RD
NW HELVETIA RD
NW PHILLIPS RD
NW CENTURY BLVD
NW JACOBSON RD
NW CHOCTAW DR
NW PUBLIC RD
NW BERNET ST
NW ABBEY DR
NW SCHOOL HOUSE LN
NW SCOTCH CHURCH RD
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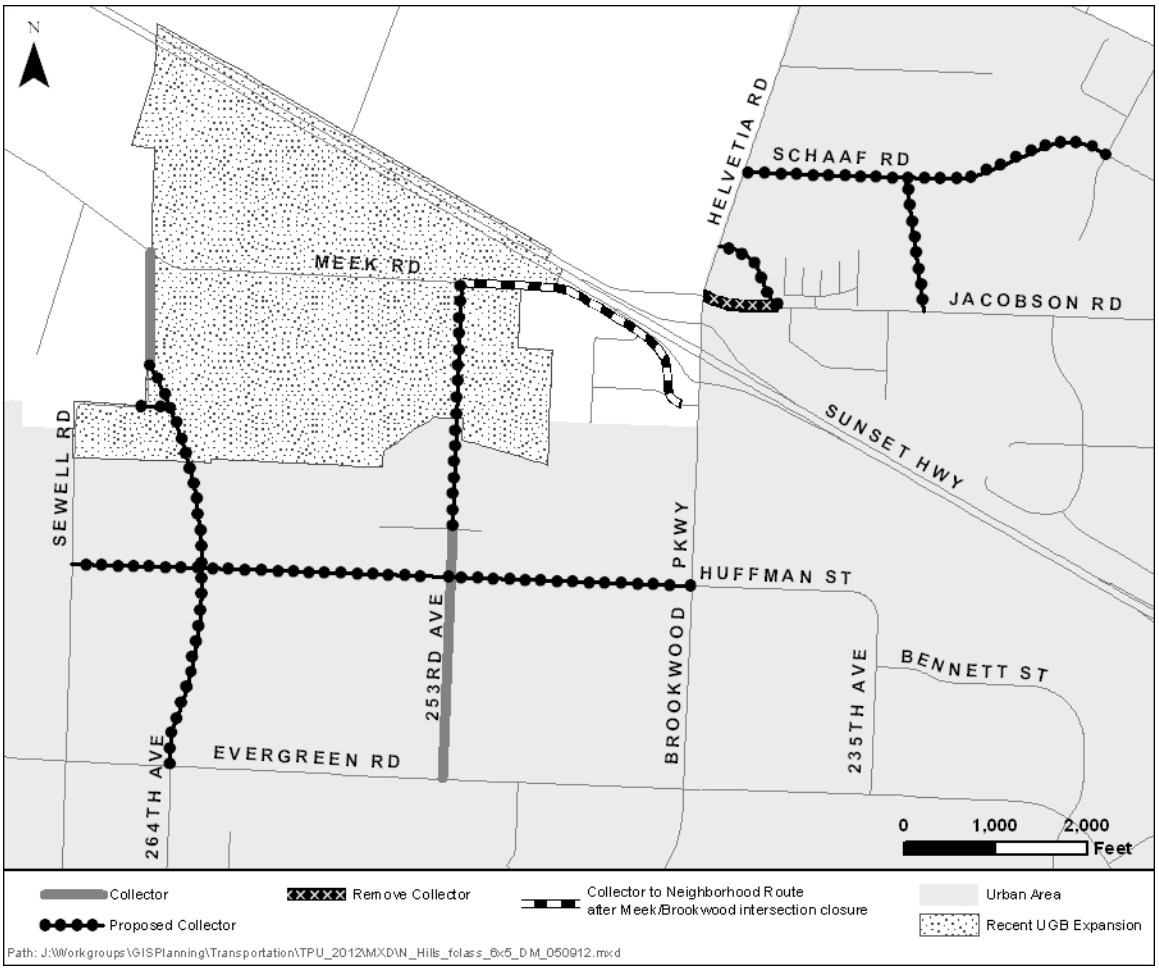
U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

Proposed IAMP Improvement Projects

	Map #	Project Name	Project Location	Project Description
Tier 1 Projects	1	NW 253rd Avenue	NW Evergreen Road to NW Meek Road	Build 3 lanes with bike lanes and sidewalks
	2	NW Groveland Drive Realignment	NW Helvetia Road to NW Groveland Drive	Construct 2-lane rural connector
	3	NW Brookwood Parkway	NW Huffman Street to US 26 eastbound ramp terminal	Widen to 3-lanes northbound and 3 lanes southbound and construct with bike lanes and sidewalks
Tier 2 Projects	4	NW Huffman Street	NW Brookwood Parkway to NW 253rd Avenue	Build 3/5-lanes with bike lanes and sidewalks
	5	NW Brookwood Parkway	NW Evergreen Parkway to NW Huffman Street	Widen to 3-lanes northbound and 3-lanes southbound and construct with bike lanes and sidewalks
	6	NW 231st/NW Century Boulevard	NW Bennett to NW West Union	Construct 2/3-lanes US 26 Overpass, connect existing segments
Tier 3 Projects	7	NW Huffman Street	NW 253rd Avenue to NW Sewell Road	Build 3-lanes with bike lanes and sidewalks
	8	NW 264th Ave	NW Evergreen Road to NW Meek Road	Build 3-lanes with bike lanes and sidewalks
	9	NW Jacobson Road	NW Jacobson Road at NW Helvetia Road	Widen and add bike and pedestrian facilities
	10	NW Century Boulevard	NW Jacobson Road and NW Century Boulevard	Construct 3-lane roadway with bike lanes and sidewalk
	11	NW Jacobson Road to NW Schaaf Road	NW Jacobson Road to NW Schaaf Road	Construct 3-lane roadway with bike lanes and sidewalks
	12	NW Schaaf Road	NW Helvetia Road to NW Century Road	Construct 3-lane roadway with bike lanes and sidewalks
	13	NW Helvetia Road	US 26 westbound ramp terminal to NW Schaaf Road	Construct 3/5-lane roadway with bike lanes and sidewalks
	14	NW Helvetia Road	NW Schaaf Road to NW West Union Road	Construct 3-lane roadway with bike lanes and sidewalks
	15	NW West Union Road	NW Helvetia Road to NW Cornelius Pass Road	Construct 3-lane roadway with bike lanes and sidewalks

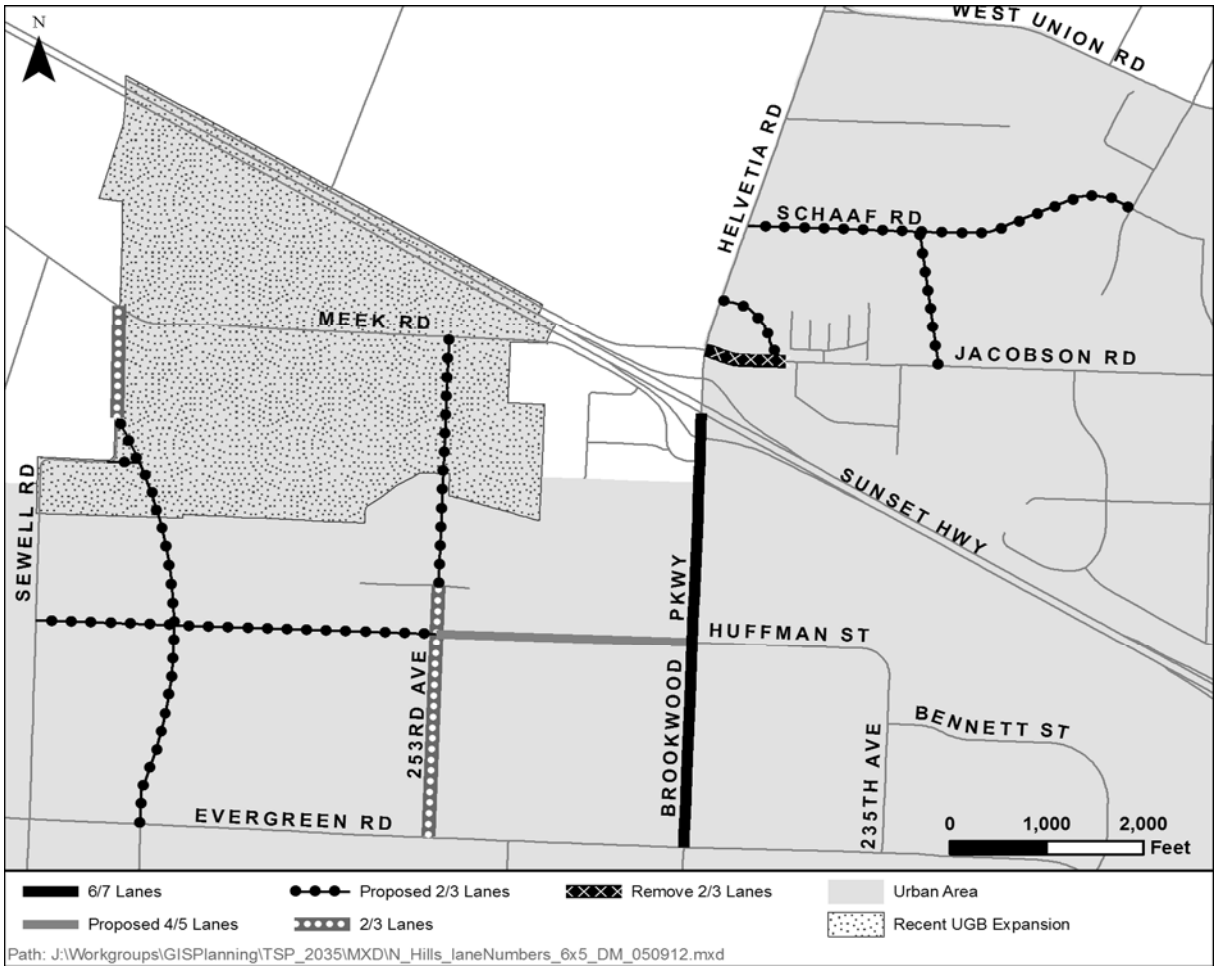
Washington County Oregon · Oregon Department of Transportation · City of Hillsboro

Washington County Transportation Plan Figure 4C – Functional Classification System map: Modifications that would be proposed in Ordinance 749 if the decision to include the UGB expansion area referenced in the June 20, 2012 Planning Commission staff report was final.



abcdef Proposed additions
~~abcdef~~ Proposed deletions

Washington County Transportation Plan, Figure 5 – Lane Numbers map: Modifications that would be proposed in Ordinance 749 if the decision to include the UGB expansion area referenced in the June 20, 2012 Planning Commission staff report was final.



abcdef Proposed additions
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US26: Brookwood Parkway/Helvetia Road Interchange Area Management Plan

Attachment A-2

City of Hillsboro, Ordinance 2793 and Staff Report (pending adoption in October 2012)

August 2012

August 2, 2012

TO: Hillsboro Planning Commission

FROM: Hillsboro Planning Department

RE: Initiation of Proposed Comprehensive Plan Amendments to the Transportation System Plan for the North Hillsboro Industrial Area

REQUEST

The Planning Department requests that the Planning Commission adopt the attached draft Order initiating amendments to the Hillsboro Comprehensive Plan and Transportation System Plan to implement transportation improvements for the North Hillsboro Industrial Area (North Hillsboro). There are two transportation system project areas for North Hillsboro as follows:

The first project area involves the transportation system surrounding and supporting the US 26 Interchange with NW Brookwood Parkway-NW Helvetia Road. Transportation system improvements for this project are encompassed in ODOT's Interchange Area Management Plan (IAMP).

Recommended transportation system improvements for the second project area have been identified through traffic studies prepared for recent industrial and commercial expansion projects in the corridor, as well as travel forecasting analysis prepared by City staff. These improvements affect NW Cornelius Pass Road, NW Evergreen Parkway and NW Imbrie Drive.

The proposed text and map amendments to the Hillsboro Comprehensive Plan (HCP) Ordinance, No. 2793, as amended, and the City of Hillsboro Transportation System Plan Update, January 2004 (TSP), would reclassify or create new alignments for roadways located within North Hillsboro and make revisions to the TSP's project lists for motor vehicles, bicycles and pedestrians to add the transportation improvements.

BACKGROUND

Brookwood-Helvetia/US 26 Interchange Area Management Plan:

The need for transportation system improvements at, and surrounding, the NW Brookwood Parkway-NW Helvetia Road/US 26 Interchange grew out of concept planning work done by the city of Hillsboro for the 249-acre Helvetia Concept Planning Area (located northeast of the Interchange) and the 534-acre Evergreen Concept Planning Area (located southwest of the Interchange). Metro brought these two areas into the Urban Growth Boundary (UGB) in 2002, and 2005, respectively. The Concept Plans identified the type of development (primarily industrial) that should occur and established the general framework for the infrastructure needed to serve these two areas. These areas will be annexed to the city before they develop or redevelop with urban uses.

The Concept Plans were adopted by the Hillsboro City Council on February 5, 2008, and were added to the Hillsboro Comprehensive Plan (Plan) as Section 24. City of Hillsboro, Evergreen Area Industrial Plan (EAIP) and Section 25. City of Hillsboro Helvetia Area Industrial Plan (HAIP). On January 17, 2012, the City amended the Plan to add a new Section 30. North Hillsboro Industrial Area Community Plan, which consolidated the EAIP and HAIP and the Shute Area Industrial Site (Section 20. Shute Road Industrial Site) into a single North Hillsboro Industrial Community Plan, and deleted Sections 20, 24 and 25.

Development of the IAMP started in fall, 2010, when the city of Hillsboro and Washington County (County) entered into a Memorandum of Understanding (MOU) with ODOT on December 16, 2010. The MOU established the Oregon Jobs and Transportation Act (JTA) and IAMP terms, tasks, priorities, boundaries, phases, roles and responsibilities, and communications protocols. The JTA project is a joint planning effort between ODOT, the County and the City (Partners).

The purpose of this partnership is to document and affirm land use assumptions and to identify necessary transportation system improvements required to maintain acceptable levels of transportation mobility. This includes improvements at the interchange, as well as additional infrastructure improvements surrounding and supporting the interchange which will preserve the state's investments for their intended purpose.

On October 20, 2011, the Metro Council approved modest expansions to the region's UGB in four areas. One of the four areas is a 330-acre area north of Hillsboro, in the vicinity of the US 26/Brookwood Parkway/Helvetia Road interchange, for the purposes of attracting future large-site industrial employers. The 330-acre expansion in North Hillsboro, located southwest of the interchange, will add additional traffic at the interchange and has been considered in the IAMP analysis.

Improvements to the Interchange itself are planned to commence construction in 2013. The improvements are funded with $45 million dollars provided by the JTA enacted by the 2009 Oregon Legislature. Under agreement with the Oregon Department of Transportation (ODOT), if the Interchange costs are less than $45 million, remaining funds would be available for priority projects identified in the IAMP (which occur on both Washington County and City roads).

NW Evergreen Parkway-NW Imbrie Drive–NW Cornelius Pass Road TSP Amendments:

The recommended transportation system improvements for the second project area for North Hillsboro are in response to anticipated development expansion on the Intel Ronler Acres Campus, and on adjacent industrial green field sites, and are based upon traffic impact studies received over the past 18 months from Intel Corporation's traffic consultant, Group Mackenzie, as well as supplemental transportation studies completed by City of Hillsboro transportation planning division staff. There are two projects that make up these recommended transportation improvements, as follows:

The first project results from an initial draft traffic study for the Intel Ronler Acres Campus D1X Fabrication Plant expansion and focuses on recommended intersection improvements at NW Evergreen Parkway with NW 229th Avenue and NW Imbrie Drive. Its focus is the development of future side-by-side double left turns on NW Evergreen Parkway between NW 229th Avenue and NW Imbrie Drive.

The second project is based upon technical analyses prepared by Group Mackenzie in June 2012, supplemented by technical analyses prepared by City of Hillsboro Transportation Planning Division staff and their consultants, David Evans & Associates. These studies recommend consideration of TSP amendments to expand capacity on NW Cornelius Pass Road through the addition of a third northbound and third southbound travel lane extending from NW Cornell Road to the US 26 Eastbound onramp. Left turn lane improvements to Evergreen Parkway between NW 229th Avenue and NW Imbrie Drive, specifically widening to provide double left turn lanes in each direction in this tightly spaced offset of intersections, would necessitate widening NW Imbrie Drive with a second eastbound lane between NW Evergreen Parkway and approximately the Fred Meyer's traffic signal where a second eastbound lane exists.

The city of Hillsboro will hold an open house on August 16, 2012 to engage the community for feedback on the transportation improvements for this project area. If needed, a second open house would be scheduled before September 12, 2012. As these amendments affect the commuting public traveling to and from employment located in North Hillsboro, via NW 229th Avenue/NW Cornelius Pass Road/NW Evergreen Parkway, and residents that live in North Hillsboro near the Intel Ronler Acres Campus, public notice of the proposed open house will be given in the local newspaper and posted on the City's website, as well as distributed in a mailing to property owners extending from NW 206th/NW John Olsen Avenue to the east, SE Imlay Avenue/NE 53rd Avenue/NE Elam Young Parkway (west)/NE Shute Road to the west, TV Highway to the south, and US 26 to the north.

COMPREHENSIVE PLAN AMENDMENT PROCEDURES

To amend the TSP, the City is required to conduct the Major Plan Amendment process, as the proposed amendments refine both Plan text and maps that have an operative effect over a large geographic area and is likely to have significant environmental, energy, economic and social consequences. Major plan amendments include amendments that incorporate portions of public facility plans as part of the Comprehensive Plan in accordance with state statute and regulations implementing Statewide Planning Goal 11. The Transportation System Plan is a public facility plan as it contains maps, policies and recommendations relating to public facilities and establishes jurisdictional responsibilities, project timing or financing for public facilities or services.

Comprehensive Plan Section 1(III) requires plan revisions and major plan amendments be processed as legislative procedures, and Section 1(III) (A) requires that Planning Department follow the public involvement processes as outlined in Sections (III) (A)(1) through (A) (5) for each proposed plan revision or major plan amendment.

These public involvement processes including establishing a public involvement program with the advice and assistance of the Citizen Involvement Advisory Committee (CIAC) which provides for public involvement and input into the proposed revision or amendment which complies with Planning Goal 1 requirements. On June 25, 2012, the CIAC approved the Public Involvement Plan (PIP) for the North Hillsboro TSP Amendments.

After completion of the tasks set forth in Sections (III) (A)(1) through (A) (5), a Planning Commission public hearing on a plan revision or major plan amendment shall be conducted. But before the public hearing can be held, the Planning Commission needs to initiate the plan revision or major plan amendment to the text and maps of the Comprehensive Plan by order whenever a need for a revision is documented.

Should the Planning Commission choose to initiate the proposed major plan amendment, staff will schedule a public hearing before the Planning Commission for a future date and public notice for the public hearing shall be published in a newspaper of general circulation (Hillsboro Argus) in the City a minimum of 20 days prior to the date of the initial public hearing, in accordance with the notification requirements contained in Plan Section (III)(A)(6).

At the public hearing the Commission will receive a staff report and any public testimony on the proposed amendment. At the conclusion of the hearing the Commission will render a decision on whether to recommend denial, approval or approval with modifications of the plan revision or major plan amendment to the City Council.

The City Council shall hold a hearing during its consideration of a plan revision and may hold a public hearing on any major plan amendment. After consideration of the plan revision or major plan amendment, the City Council may adopt or deny the land use decision on the plan revision or major plan amendment. The final City Council decision on a plan revision or major plan amendment may be appealed in accordance with applicable state statutory provisions, relating to appeals of decisions amending an acknowledged comprehensive plan.

LEGISLATIVE BACKGROUND

The current version of the TSP was compiled by the City in conjunction with DKS Associates and completed in July 1999 with an update completed in January 2004. The functions of the TSP are to provide specific information on transportation needs and how to coordinate land use with transportation needs. The TSP is a planning document which is incorporated into the Comprehensive Plan in its entirety by reference. Therefore, any amendment or modification of the TSP requires the City to conduct and follow the Plan amendment process outlined in Section 1 of the Comprehensive Plan.

DESCRIPTION OF PROPOSED COMPREHENISVE PLAN AND TSP AMENDMENTS

As previously mentioned in the Background section, there are two distinct project areas for North Hillsboro, each with a list of required transportation improvements to be added to the TSP's project lists for motor vehicles, bicycles and pedestrians, and reclassification of roadways or adding street segments to create new alignments. This section lists the IAMP and the NW Evergreen Parkway - NW Imbrie Drive - NW Cornelius Pass Road required transportation improvements, with the IAMP improvements listed first.

IAMP Transportation Improvements:

- NW 253rd Avenue: NW Evergreen Road to NW Meek Road (3-lane City collector cross section)
- NW 264th Avenue: NW Evergreen Road to NW Meek Road (3-lane City collector cross section)
- NW Brookwood Parkway: NW Evergreen Road to US 26 (7-lane, County arterial cross section)
- NW Huffman Street: NW Brookwood Parkway to NW 253rd Avenue (5-lane City collector cross section)
- NW Huffman Street: NW 253rd Avenue to NW Sewell Road (3-lane City collector cross section)

- Collector Extension (actual name to be determined): from NW Jacobson Road to NW Schaaf Road (3-lane City collector cross section)
- NW Meek Road: disconnect from NW Brookwood Parkway
- NW Meek Road Residential Area: remove Special Study Area Boundary and Alignment Study
- NW Schaaf Road: from NW Helvetia Road to NW Century Boulevard (3-lane City collector cross section)
- US 26/NW Brookwood Parkway/NW Helvetia Road Interchange: new loop ramp and interchange modifications including NW Jacobson Road and NW Groveland Road realignment

NW Evergreen Parkway-NW Imbrie Drive–NW Cornelius Pass Road Improvements:

- NW 229th Avenue: Construct 2nd southbound lane for 400 feet south of NW Evergreen Parkway
- NW Evergreen Parkway: NW 229th Avenue to NW Imbrie Drive (widen to provide dual eastbound and westbound left turn lanes)
- NW Imbrie Drive: NW Evergreen Parkway to NW Cornelius Pass Road (add second eastbound through-lane, for a 4-lane cross section with 2 eastbound lanes, 1 westbound lane and 1 continuous left turn median lane)
- NW Cornelius Pass Road: NW Cornell Road to US 26 eastbound (widen to provide 7-lane County arterial boulevard cross section)

PROPOSED TEXT AMENDMENTS

The following sections of the TSP need to be amended to add the transportation improvements associated with the roadways or change functional classifications for the roadways listed previously. All of the text amendments would involve text in the Transportation System Plan Update dated January 2004.

Table 1-1 Amendments
Pedestrian Master Plan Priority Projects

This table includes pedestrian projects recommended to be shown on Figure 1-2 Pedestrian Master Plan and are illustrated on Figure 1-2a. Cost estimates are based on additional sidewalk, curb and gutter, drainage, driveway adjustments and landscaping as required. Right-of-way costs and additional roadway pavement costs, if known are included in the estimates. The cost estimates are conceptual and subject to refinement upon further study.

There is an existing project listed in Table 1-1 located in North Hillsboro that is proposed to be deleted (as shown in strikeout text). Staff recommends that the table be amended with the following:

Pedestrian Master Plan Priority Projects

Project	From	To	Stand-alone Project	Roadway Improvement Project	Lead Agency	Cost**
NW 253rd Ave	NW Evergreen Rd	NW Meek Rd		√	Hillsboro	$5,000,000
NW 264th Ave	NW Evergreen Rd	NW Meek Rd		√	Hillsboro	$18,600,000
NW Brookwood Pkwy	NW Evergreen Rd	US 26		√	Washington County	$6,700,000
NW Brookwood Pkwy/ NW Helvetia Rd	US 26 Eastbound Ramps	NW Jacobson Rd		Part of Brookwood Interchange Project	ODOT	$38,000,000
NW Cornelius Pass Rd	NW Cornell Rd	US 26		√	Washington County	$8,600,000
NW Huffman St	NW Brookwood Pkwy	NW 253rd Ave		√	Hillsboro	$4,500,000
NW Huffman St	NW 253rd Ave	NW Sewell Rd		√	Hillsboro	$7,500,000
Collector Rd (actual name TBD)	NW Jacobson Rd	NW Schaaf Rd		√	Hillsboro	$2,500,000
NW Schaaf Rd	NW Helvetia Rd	NW Century Blvd (at NW Westmark Dr)		√	Hillsboro	$4,000,000
~~NW Shute Rd~~	~~NW Evergreen Rd~~	~~US 26/Sunset Hwy~~	~~√~~		~~Washington County~~	~~TBD~~

** Project cost estimates represent 2012 dollars. All cost estimates are conceptual. For roadway improvement projects, the cost estimate represents the whole street improvement necessary for a multi-modal street including sidewalks. For stand-alone projects, the cost estimate represents the cost for retrofitting the existing street cross section to add sidewalks and landscape strips and associated costs.

Table 1-2 Amendments
Bicycle Master Plan Priority Projects

This table includes bicycle projects recommended to be shown on Figure 1-3 Bicycle Master Plan and are illustrated in Figure 1-3a. Cost estimates are based on additional sidewalk, curb and gutter, drainage, driveway adjustments and landscaping as required. Right-of-way costs and additional roadway pavement costs, if known are included in the estimates. The cost estimates are conceptual and subject to refinement upon further study.

There is an existing project listed in Table 1-2 for North Hillsboro that is proposed to be deleted (as shown in strikeout text). Staff recommends that the table be amended with the following:

Bicycle Master Plan Priority Projects

Project	From	To	Stand-alone Project	Roadway Improvement Project	Lead Agency	Cost*8
NW 253rd Ave	NW Evergreen Rd	NW Meek Rd		√	Hillsboro	$5,000,000
NW 264th Ave	NW Evergreen Rd	NW Meek Rd		√	Hillsboro	$18,600,000
NW Brookwood Pkwy	NW Evergreen Rd	US 26		√	Washington County	$6,700,000
NW Brookwood Pkwy/ NW Helvetia Rd	US 26 Eastbound Ramps	NW Jacobson Rd		Part of Brookwood Interchange Project	ODOT	$38,000,000
NW Cornelius Pass Rd	NW Cornell Rd	US 26		√	Washington County	$8,600,000
NW Huffman St	NW Brookwood Pkwy	NW 253rd Ave		√	Hillsboro	$4,500,000
NW Huffman St	NW 253rd Ave	NW Sewell Rd		√	Hillsboro	$7,500,000
Collector Rd (actual name TBD)	NW Jacobson Rd	NW Schaaf Rd		√	Hillsboro	$2,500,000
NW Schaaf Rd	NW Helvetia Rd	NW Century Blvd (at NW Westmark Dr)		√	Hillsboro	$4,000,000
~~NW Shute Rd~~	~~NW Evergreen Rd~~	~~US 26/Sunset Hwy~~	~~√~~		~~Washington County~~	~~TBD~~

** Project cost estimates represent 2012 dollars. All cost estimates are conceptual. For roadway improvement projects, the cost estimate represents the whole street improvement necessary for a multi-modal street including bike lanes. For stand-alone projects, the cost estimate represents the cost for retrofitting the existing street cross section to add bike lanes and associated costs.

Table 1-3 Amendments
Motor Vehicle Project List

This table lists motor vehicle projects illustrated in Figure 1-5a, recommended to be included in, amended, or deleted from the list including sidewalks, bicycle lanes, mixed use paths, cycle tracks, and transit accommodations as required, with the projects organized by priority: Highest Priority, Second Highest Priority and Third Highest Priority. It includes the location and description of the projects, indicates the Regional Transportation Plan (RTP) planning status (for financially constrained and priority system improvements in June 2010 RTP), the lead agency for the project, and the estimated cost (based on 2012 dollars).

There are some existing projects listed in Table 1-3 located in North Hillsboro that are proposed to be deleted or amended (as shown in strikeout text) and replaced by the new or amended motor vehicle projects. Staff recommends that the table be amended with the following:

Motor Vehicle Project List

Location	Description	Planning Status*	Lead Agency	Cost**
Highest Priority Projects				
NW 253rd Ave: NW Evergreen Rd to NW Meek Rd	Construct 3 Lanes	RTP 10822	Hillsboro	$5,000,000
~~253rd Avenue~~	~~Improvements north of Evergreen Road; add southbound right turn lane~~	~~Not in Plans~~	~~Wash. County~~	~~$690,000~~
NW 264th Ave: NW Evergreen Rd to NW Meek Rd	Construct 3 Lanes	Not in Plans	Hillsboro	$18,600,000
NW Brookwood Pkwy: NW Evergreen Rd to US 26	Widen to 7 Lanes	RTP 11146	Washington County	$6,700,000
NW Cornelius Pass Rd: NW Cornell Rd to US 26	Widen to 7 Lanes	Not in Plans	Washington County	$8,600,000
~~Huffman Road~~	~~Extend west of Shute Rd to 253rd Ave~~	~~Not in Plans~~	~~Wash. County~~	~~$922,300~~
NW Huffman St: NW Brookwood Pkwy to NW 253rd Ave	Construct 5 Lanes	RTP 10821	Hillsboro	$4,500,000
NW Huffman St: NW 253rd Ave to NW Sewell Rd	Construct 3 Lanes	RTP 10821	Hillsboro	$7,500,000
Collector Rd (actual name TBD): NW Jacobson Rd to NW Schaaf Rd	Construct 3 Lanes	Not in Plans	Hillsboro	$2,500,000
NW Schaaf Rd: NW Helvetia Rd to NW Century Blvd	Construct 3 Lanes	Not in Plans	Hillsboro	$4,000,000
US 26/NW Brookwood Pkwy/NW Helvetia Rd Interchange	New loop ramp and interchange modifications including NW Jacobson Rd and NW Groveland Rd realignment	RTP 10600	ODOT/Washington County/Hillsboro	$38,000,000
Second Highest Priority Projects				
~~Jacobson Road at Helvetia~~	~~Realign intersection north of US 26~~	~~Not in Plans~~	~~Hillsboro~~	~~$1,900,000~~
~~US 26/Shute Road~~	~~New loop ramp and interchange modifications~~	~~RTP 3149~~	~~ODOT/Wash. County~~	~~$6,400.000~~

* RTP = Regional Transportation Plan, financially constrained and priority system improvements, June 2010 for RTP project numbers: 10600, 10821, 10822, and 11146.

** Cost estimates represent 2012 dollars.

Table 4-7 Amendments
Updates to Bicycle Master Plan

Table 4-7 contains the proposed updates to the Bicycle Master Plan (Figure 1-3) as illustrated in Figure 1-3a. Staff proposes updating this table to add planned bike facilities for the proposed transportation improvements in North Hillsboro. Staff recommends that the table be amended with the following:

Roadway	Hillsboro 2015 TSP	Draft Hillsboro 2020 TSP
NW 253rd Ave - NW Evergreen Rd to NW Meek Rd	N/A	Planned Bike Lanes
~~NW 253rd Realignment – NW Evergreen Rd to NW Huffman St~~	~~N/A~~	~~Planned Bike Lanes~~
NW 264th Ave - NW Evergreen Rd to NW Meek Rd	N/A	Planned Bike Lanes
NW Brookwood Pkwy - NW Evergreen Rd to US 26	N/A	Planned Bike Lanes
NW Brookwood Pkwy/NW Helvetia Rd – US 26 Eastbound Ramps to NW Jacobson Rd	N/A	Planned Bike Lanes
Collector Rd (actual name TBD) – NW Jacobson Rd to NW Schaaf Rd	N/A	Planned Bike Lanes
~~NW Huffman St Extension – NW Shute Rd to NW Evergreen Rd~~	~~N/A~~	~~Planned Bike Lanes~~
NW Huffman St – NW Brookwood Pkwy to NW 253rd Ave	N/A	Planned Bike Lanes
NW Huffman St – NW 253rd Ave to NW Sewell Rd	N/A	Planned Bike Lanes
~~NW Imbrie Dr~~	~~Bicycle Way Network~~	~~Planned Bike Lanes~~
~~North/South Road – NW Huffman St to NW Meek Rd~~	~~N/A~~	~~Planned Bike Lanes~~

Table 4-10 Amendments
Updates to Functional Classification Plan

Table 4-10 shows updates to the Functional Classification Plan illustrated in Figure 1-9a to reflect the expanded TSP study area, on-going regional planning, the functional needs of Hillsboro, and consistency with the Regional Transportation Plan. This table is proposed to be amended to address changes in functional classification for the transportation projects added to the motor vehicles project list. These projects need to be added to be consistent with the RTP and implement the transportation system for North Hillsboro. Staff recommends that the table be amended with the following:

Updates to Functional Classification Plan

Roadway	Hillsboro 2015 TSP	Draft Hillsboro 2020 TSP
NW 253rd Ave - NW Evergreen Rd to NW Meek Rd	N/A	Planned Collector
~~253rd Avenue realigned – Evergreen to Huffman~~	~~N/A~~	~~Planned Collector~~
NW 264th Ave - NW Evergreen Rd to NW Meek Rd	N/A	Planned Collector
Collector Rd (actual name TBD) – NW Jacobson Rd to NW Schaaf Rd	N/A	Planned Collector
NW Huffman St – NW Brookwood Pkwy to NW 253rd Ave	N/A	Planned Collector
NW Huffman St – NW 253rd Ave to NW Sewell Rd	N/A	Planned Collector

Roadway	Hillsboro 2015 TSP	Draft Hillsboro 2020 TSP
~~North/South road – Huffman to Meek~~	~~N/A~~	~~Planned Collector~~
NW Schaaf Rd – NW Helvetia Rd to NW Century Blvd	N/A	Planned Collector

Table 4-11 Amendments
Updates to Future Streets Right-of-Way Plan

The Future Streets Right-of-Way Plan (Figure 1-6) provides the right-of-way requirements for arterial and collector streets which are anticipated within the TSP planning horizon to require more than two lanes. The updates to the Future Streets Right-of-Way Plan for North Hillsboro are summarized in Table 4-11 and are illustrated in Figure 1-6a. Staff recommends that the table be amended with the following:

Updates to Future Streets Right-of-Way Plan

Roadway	Hillsboro 2015 TSP	Draft Hillsboro 2020 TSP
NW 253rd Ave - NW Evergreen Rd to NW Meek Rd	N/A	Planned 2/3 lanes
~~253rd Avenue realigned – Evergreen to Huffman~~	~~N/A~~	~~Planned 2/3 lanes~~
NW 264th Ave - NW Evergreen Rd to NW Meek Rd	N/A	Planned 2/3 lanes
NW Brookwood Pkwy – NW Evergreen Rd to US 26	N/A	Planned 6/7 lanes
Collector Rd (actual name TBD) – NW Jacobson Rd to NW Schaaf Rd	N/A	Planned 2/3 lanes
NW Cornelius Pass Rd – NW Cornell Rd to US 26	N/A	Planned 6/7 lanes
~~Huffman – 253rd to Shute~~	~~N/A~~	~~Planned 2/3 lanes~~
NW Huffman St – NW Brookwood Pkwy to NW 253rd Ave	N/A	Planned 4/5 lanes
NW Huffman St – NW 253rd Ave to NW Sewell Rd	N/A	Planned 2/3 lanes
NW Imbrie Dr – NW Evergreen Pkwy to just east of Fred Meyer signal	N/A	Planned 4 lanes
~~North/South road – Huffman to Meek~~	~~N/A~~	~~Planned 2/3 lanes~~
NW Schaaf Rd – NW Helvetia Rd to NW Century Blvd	N/A	Planned 2/3 lanes

Table 4-13
Updates to Street Improvement Plan

This table summarizes updates to the Street Improvement Plan (Figure 1-5) which are illustrated in Figure 1-5a. Staff recommends that the table be amended with the following:

Updates to Street Improvement Plan

Roadway	Hillsboro 2015 TSP	Draft Hillsboro 2020 TSP
NW 253rd Ave - NW Evergreen Rd to NW Meek Rd	N/A	Proposed street
~~253rd Avenue realigned – Evergreen to Huffman~~	~~N/A~~	~~Proposed street~~
NW 264th Ave - NW Evergreen Rd to NW Meek Rd	N/A	Proposed street
NW Brookwood Pkwy – NW Evergreen Rd to US 26	N/A	7 lanes
NW Cornelius Pass Rd – NW Cornell Rd to US 26	N/A	7 lanes

Roadway	Hillsboro 2015 TSP	Draft Hillsboro 2020 TSP
~~Huffman – 253rd to Shute~~	~~N/A~~	~~Proposed street~~
NW Huffman St – NW Brookwood Pkwy to NW 253rd Ave	N/A	Proposed street
NW Huffman St – NW 253rd Ave to NW Sewell Rd	N/A	Proposed street
NW Imbrie Dr – NW Evergreen Pkwy to just east of Fred Meyer signal	N/A	Street widening
~~North/South road – Huffman to Meek~~	~~N/A~~	~~Proposed street~~
Proposed road – NW Jacobson Rd to NW Schaaf Rd	N/A	Proposed street
NW Schaaf Rd – NW Helvetia Rd to NW Century Blvd	N/A	Proposed street

Table 4-14
Updates to Traffic Signal Master Plan

This table summarizes updates to the Traffic Signal Master Plan (Figure 1-8) as illustrated in Figure 1-8a. Staff proposes adding the proposed traffic signals for North Hillsboro to this table. Staff recommends that the table be amended with the following:

Updates to Traffic Signal Master Plan

Intersection	Hillsboro 2015 TSP	Draft Hillsboro 2020 TSP
Evergreen Pkwy/253rd Ave	N/A	Proposed Traffic Signal
Brookwood Pkwy/Huffman St	N/A	Proposed Traffic Signal
Helvetia Rd/Schaaf Rd	N/A	Proposed Traffic Signal

The IAMP transportation analysis addressed the issues identified within the Meek Road Study Area in more depth as described in the original text below and recommends changes within the Area including revised transportation connections. Staff proposes to delete the text contained in the Meek Road Study Area in its entirety as follows and to also remove Figure 4-9 Meek Road Study Area from the TSP.

SPECIAL STUDY AREAS

~~Meek Road Study Area~~

~~Concerns exist regarding the proximity of the intersection of Meek Road and Shute Road to the interchange at U.S. 26 and Shute Road. Washington County has designated this as a study area (see Figure 4-9) in order to evaluate options for moving the intersection of Meek Road further south. However, reorienting the roadway to the south would place it within the Shute Road Site Special Development District. The 203 acre site, located at the intersection of Evergreen Road and Shute Road, was added to the urban growth boundary for the purpose of providing large lots for high tech industrial development. Meek Road, situated immediately north of the new district, will be influenced by future development within the Shute Road site. The Conceptual Transportation Plan for Shute Road, drafted by Group MacKenzie suggests that additional analysis would be required with regards to Meek Road to determine any relocation of Meek Road or re-routing of traffic.~~

Within the Special Study Areas section, there is also a section titled Potential Future Connections/Realignments. The TSP is designed to permit consideration of road extensions beyond study areas like the Meek Road Study Area and the urban growth boundary. No specific

roadway alignments have been defined for any of these extensions or realignments, however Figure 4-10 shows seven study areas that were categorized as potential future connections/realignments. Two of the study areas are within North Hillsboro. Staff proposes deleting the description of those two study areas as follows and removing the two study areas from Figure 4-10.

Potential Future Connections/Realignments

~~2. Extensions of Huffman Street and Dawson Creek Drive into 253rd Avenue – part of the Shute Road Concept Plan, these road extensions are intended to provide access to the newly added 230-acre Shute Road Special Industrial Development District.~~

~~3. Jacobson Road Realignment to Helvetia Road – the realignment north of U.S. 26/Shute Road interchange is intended to accommodate potential increased right-of-way necessary for interchange improvements.~~

PROPOSED MAP AMENDMENTS

The TSP and Comprehensive Plan Maps listed below will be amended to reflect the classification change of the planned roadways and proposed improvements for North Hillsboro. Detail maps are provided to show more clearly how the TSP maps are being amended, however these maps will not be added to the TSP. The proposed roadways are labeled as follows on the detail maps:

A. NW Meek Road: disconnect from NW Brookwood Parkway

B. NW Schaaf Road: NW Helvetia Road to NW Century Boulevard (3-lane City collector cross section)

C. Collector Extension (actual name to be determined): from NW Jacobson Road to NW Schaaf Road (3-lane City collector cross section)

D. NW Helvetia Road: US 26 to NW West Union Road (Re-designate as Arterial)

E. NW 253rd Avenue: NW Evergreen Road to NW Meek Road (3-lane City collector cross section)

F. NW West Union Road: from NW Helvetia Road to City Limits (Re-designate as Arterial)

G. NW 264th Avenue: NW Evergreen Road to NW Meek Road (3-lane City collector cross section)

H. NW Huffman Street: NW Brookwood Parkway to NW 253rd Avenue (5-lane City collector cross section)

I. NW Huffman Street: NW 253rd Avenue to NW Sewell Road (3-lane City collector cross section)

J. NW Westmark Drive: NW Croeni Road to NW West Union Road (Re-designate as a Collector)

K. NW Pubols Road: NW Helvetia Road to NW Century Boulevard (Designate as a Local or Street.

L. NW Sewell Road: NW Evergreen Road to NW 264th Avenue (Re-designate as a Local Street - Industrial)

TSP Figure 1-2: Pedestrian Master Plan (see attachment A). See Figure 1-2a: North Hillsboro TSP Amendment Pedestrian Master Plan Detail Map for specific details on how this map is being amended. The Special Study Area Boundary for the Meek Road Study Area and symbols (one in the Special Study Area and one for the NW Dawson Creek Drive/NW 253rd Avenue alignments) for the note that states: "Alignment subject to UGB expansion and/or future refinement or study in these areas" has been deleted from Figure 1-2.

TSP Figure 1-3: Bicycle Master Plan (see attachment B). See Figure 1-3a: North Hillsboro TSP Amendment Bicycle Master Plan Detail Map for specific details on how this map is being amended. The Special Study Area Boundary for the Meek Road Study Area and symbols (one in the Special Study Area and one for the NW Dawson Creek Drive/NW 253rd Avenue alignments) for the note that states: "Alignment subject to UGB expansion and/or future refinement or study in these areas" has been deleted from Figure 1-3.

TSP Figure 1-5: Street Improvement Plan (see attachment C). See Figure 1-5a: North Hillsboro TSP Amendment Improvement Plan Detail Map for specific details on how this map is being amended. The Special Study Area Boundary for the Meek Road Study Area and proposed street arrows for the extensions of NW 253rd Avenue and NW Huffman Street has been deleted from Figure 1-5.

TSP Figure 1-6: Future Streets Where Right of Way is Planned for Two or More Lanes (see attachment D). See Figure 1-6a: North Hillsboro TSP Amendment Future Streets Where Right of Way is Planned for Two or More Lanes Detail Map for specific details on how this map is being amended. The Special Study Area Boundary for the Meek Road Study Area and symbols (one in the Special Study Area and one for the NW Dawson Creek Drive/NW 253rd Avenue alignments) for the note that states: "Alignment subject to UGB expansion and/or future refinement or study in these areas" has been deleted from Figure 1-6.

TSP Figure 1-8: Traffic Signal Master Plan (see attachment E). See Figure 1-8a: North Hillsboro TSP Amendment Traffic Signal Master Plan for specific details on how this map is being amended. The Special Study Area Boundary for the Meek Road Study Area has been deleted from Figure 1-8.

TSP Figure 1-9: Functional Classification Plan (see attachment F). See Figure 1-9a: North Hillsboro TSP Amendment Functional Classification Plan for specific details on how this map is being amended. The Special Study Area Boundary for the Meek Road Study Area and symbols (one in the Special Study Area and one for the NW Dawson Creek Drive/NW 253rd Avenue alignments) for the note that states: "Alignment subject to UGB expansion and/or future refinement or study in these areas" has been deleted from Figure 1-9.

TSP Figure 4-9: Meek Road Study Area (see attachment G). This figure will be deleted in its entirety.

TSP Figure 4-10: Potential Future Connections/Realignments (see attachment H). See Figure 4-10a: North Hillsboro TSP Amendment Potential Future Connections/Realignments for specific details on how this map is being amended. Study Area Nos. 2 and 3, Potential Collector Extensions for NW Dawson Creek Drive/NW 253rd Avenue, NW Beech Street and NW Huffman Street, and the symbols for the note: Alignment subject to UGB expansion and/or future refinement or study in these areas located adjacent to the Potential Collector Extensions will be deleted from Figure 4-10.

Comprehensive Plan Figure 14-1: Functional Classification Plan (see attachment I). Figure 14-1 will be amended similar to TSP Figure 1-9.

Comprehensive Plan Figure 14-1a: Future Streets Where Right of Way is Planned for More Than Two Lanes (see attachment J). This map will be amended similar to TSP Figure 1-6.

Comprehensive Plan Figure 14-2: Street Improvement Plan (see attachment L). This map will be amended similar to TSP Figure 1-5.

Comprehensive Plan Figure 14-4: Bicycle Master Plan (see attachment M). This map will be amended similar to TSP Figure 1-3.

Comprehensive Plan Figure 14-6: Traffic Signal Master Plan (see attachment N). This map will be amended similar to TSP Figure 1-8.

Comprehensive Plan Figure 14-7: Pedestrian Master Plan (see attachment O). This map will be amended similar to TSP Figure 1-2.

RECOMMENDATION

Staff recommends that the Planning Commission approve the attached order, initiating the HCP amendments to the Transportation System Plan to implement North Hillsboro transportation improvements. The initiating order set the date for the first public hearing on the amendments for September 26, 2012.

Respectfully,
CITY OF HILLSBORO PLANNING DEPARTMENT

Jennifer K. Wells, CSBA
Senior Planner

Attachments:

Draft Initiating Order

A. TSP Figure 1-2: Pedestrian Master Plan and Figure 1-2a: North Hillsboro TSP Amendment Pedestrian Master Plan Detail Map

B. TSP Figure 1-3: Bicycle Master Plan and Figure 1-3a: North Hillsboro TSP Amendment Bicycle Master Plan Detail Map

C. TSP Figure 1-5: Street Improvement Plan and Figure 1-5a: North Hillsboro TSP Amendment Street Improvement Plan Detail Map

D. TSP Figure 1-6: Future Streets Where Right of Way is Planned for Two or More Lanes and Figure 1-6a: North Hillsboro TSP Amendment Future Streets Where Right of Way is Planned for Two or More Lanes Detail Map

E. TSP Figure 1-8: Traffic Signal Master Plan and Figure 1-8a: North Hillsboro TSP Amendment Traffic Signal Master Plan

F. TSP Figure 1-9: Functional Classification Plan and Figure 1-9a: North Hillsboro TSP Amendment Functional Classification Plan

G. TSP Figure 4-9: Meek Road Study Area

H. TSP Figure 4-10: Potential Future Connections/Realignments and Figure 4-10a: North Hillsboro TSP Amendment Potential Future Connections/Realignments

I. Comprehensive Plan Figure 14-1: Functional Classification Plan

J. Comprehensive Plan Figure 14-1a: Future Streets Where Right of Way is Planned for More than Two Lanes

K. Comprehensive Plan Figure 14-2: Street Improvement Plan

L. Comprehensive Plan Figure 14-4: Bicycle Master Plan

M. Comprehensive Plan Figure 14-6: Traffic Signal Master Plan

N. Comprehensive Plan Figure 14-7: Pedestrian Master Plan

ORDER NO. 8074

HCP 3-12: NORTH HILLSBORO
TRANSPORATION SYSTEM PLAN AMENDMENTS

AN ORDER INITIATING AMENDMENTS TO HILLSBORO COMPREHENSIVE PLAN ORDINANCE NO. 2793, AS AMENDED, SPECIFICALLY TO THE TRANSPORTATION SYSTEM PLAN TEXT IN TABLES 1-1, 1-2, 1-3, 4-7, 4-10, 4-11, 4-13, AND 4-14 TO RECLASSIFY AND UPDATE INFORMATION FOR TRANSPORTATION IMPROVEMENTS FOR THE NORTH HILLSBORO INDUSTRIAL AREA, AND DELETING TEXT IN ITS ENTIRETY CONTAINED IN CHAPTER 4: FUTURE DEMAND AND LAND USE, SPECIAL STUDY AREAS, MEEK ROAD STUDY AREA, POTENTIAL FUTURE CONNECTIONS/REALIGNMENT ITEMS NOS. 2 AND 3, AND AMENDING TRANSPORTATION SYSTEM PLAN MAPS IN FIGURES 1-2, 1-3, 1-5, 1-6, 1-8, AND 1-9 TO RECLASSIFY AND UPDATE INFORMATION FOR TRANSPORTATION IMPROVEMENTS IDENTIFIED FOR THE NORTH HILLSBORO INDUSTRIAL AREA, AND DELETING FIGURE 4-9 AND TWO STUDY AREAS FROM FIGURE 4-10, AND AMENDING COMPREHENSIVE PLAN MAPS FIGURES 14-1, 14-1A, 14-2, 14-4, 14-6, AND 14-7 TO REFLECT THE CHANGES TO THE TRANSPORTATION SYSTEM PLAN REGARDING THE RECLASSIFICATION AND UPDATE OF INFORMATION FOR TRANSPORTATION IMPROVEMENTS IDENTIFIED FOR THE NORTH HILLSBORO INDUSTRIAL AREA

WHEREAS, Comprehensive Plan Section 1 (III) authorizes the Planning Commission to initiate major Comprehensive Plan text and map amendments, and

WHEREAS, Comprehensive Plan Section 1 (III) sets forth the procedures and criteria for major Comprehensive Plan amendments, and

WHEREAS, in the North Hillsboro Industrial Area, transportation improvements were identified in ODOT's US-26 / Brookwood-Helvetia Interchange Area Management Plan and separately for NW Cornelius Pass Road, NW Evergreen Parkway and NW Imbrie Drive for future industrial development, where Hillsboro Transportation System amendments are necessary in order to ensure that the transportation improvements can occur in the near future, and

WHEREAS, Section 1 (III) of the Hillsboro Comprehensive Plan Ordinance, as amended, requires consideration, process, and a public hearing by the Hillsboro Planning Commission with respect to initiating proposed major amendments to the Comprehensive Plan such as the proposed Transportation System Plan amendments to implement transportation improvements in the North Hillsboro Industrial Area, and

WHEREAS, if approved, this Order would initiate Planning Commission consideration and action on the proposed Transportation System Plan text and map amendments to the Hillsboro Comprehensive Plan Ordinance, as amended.

THE CITY OF HILLSBORO PLANNING COMMISSION ORDERS AS FOLLOWS:

Section 1. The Planning Director is directed to schedule a public hearing before the Planning Commission on September 26, 2012, on the proposed Major Comprehensive Plan Text and Map

amendments to reclassify and update information for transportation improvements identified for the North Hillsboro Industrial Area.

Section 2. The Planning Director is further directed to give notice of the public hearing before the Planning Commission following the procedures set forth in Section 1(III)(6) of the Hillsboro Comprehensive Plan.

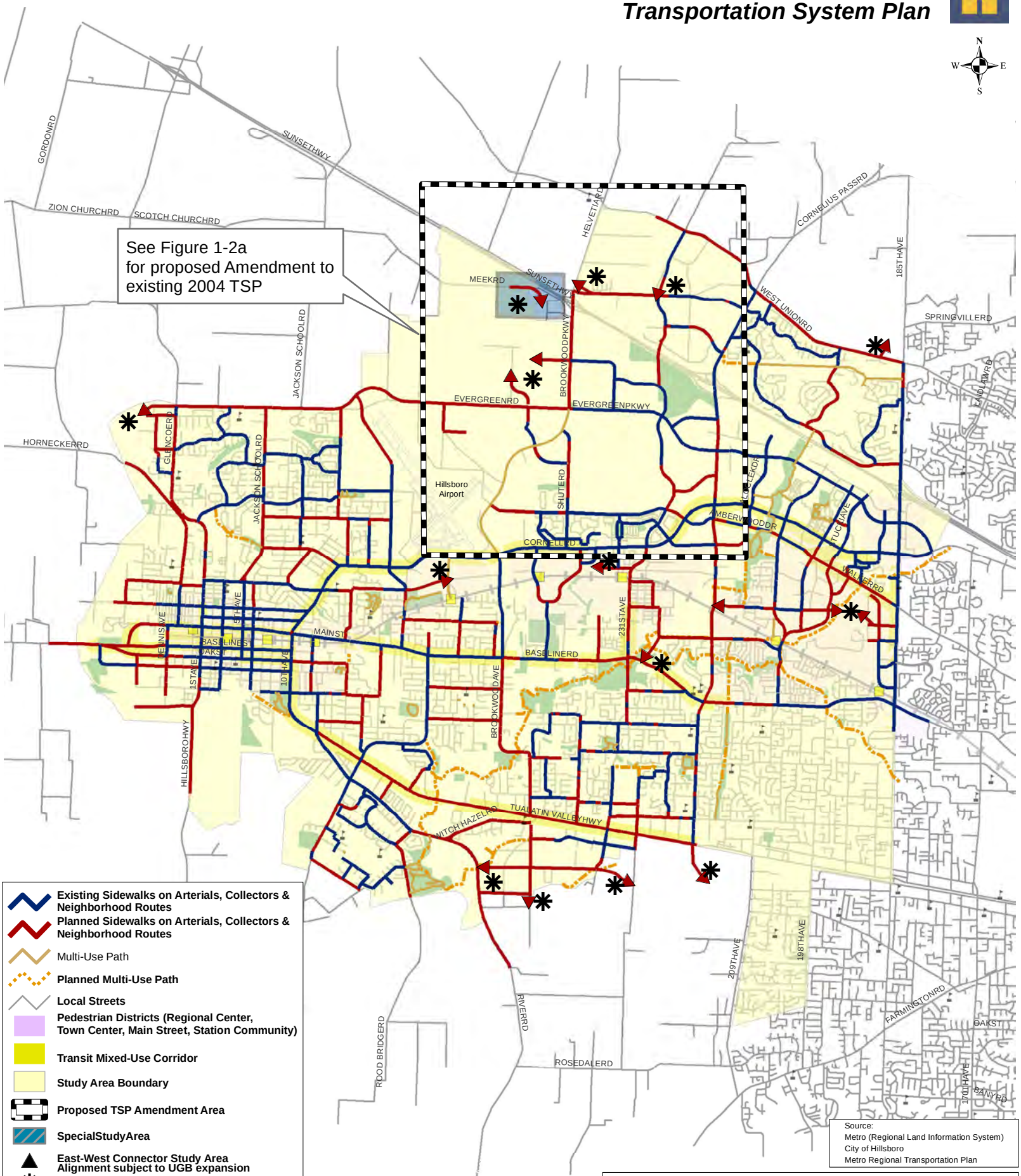
Section 3. This order takes effect immediately upon approval.

Approved this 8th day of August, 2012.

_____
John Coulter President

ATTEST: _____
Lisa Califf, Secretary

City of Hillsboro
Transportation System Plan



Existing Sidewalks on Arterials, Collectors & Neighborhood Routes

Planned Sidewalks on Arterials, Collectors & Neighborhood Routes

Multi-Use Path

Planned Multi-Use Path

Local Streets

Pedestrian Districts (Regional Center, Town Center, Main Street, Station Community)

Transit Mixed-Use Corridor

Study Area Boundary

Proposed TSP Amendment Area

SpecialStudyArea

East-West Connector Study Area
Alignment subject to UGB expansion and/or future refinement or study in these areas.

Light Rail Transit Stop

Light Rail Transit Line

Parks

Schools

Source:
Metro (Regional Land Information System)
City of Hillsboro
Metro Regional Transportation Plan

Figure 1-2
PEDESTRIAN MASTER PLAN

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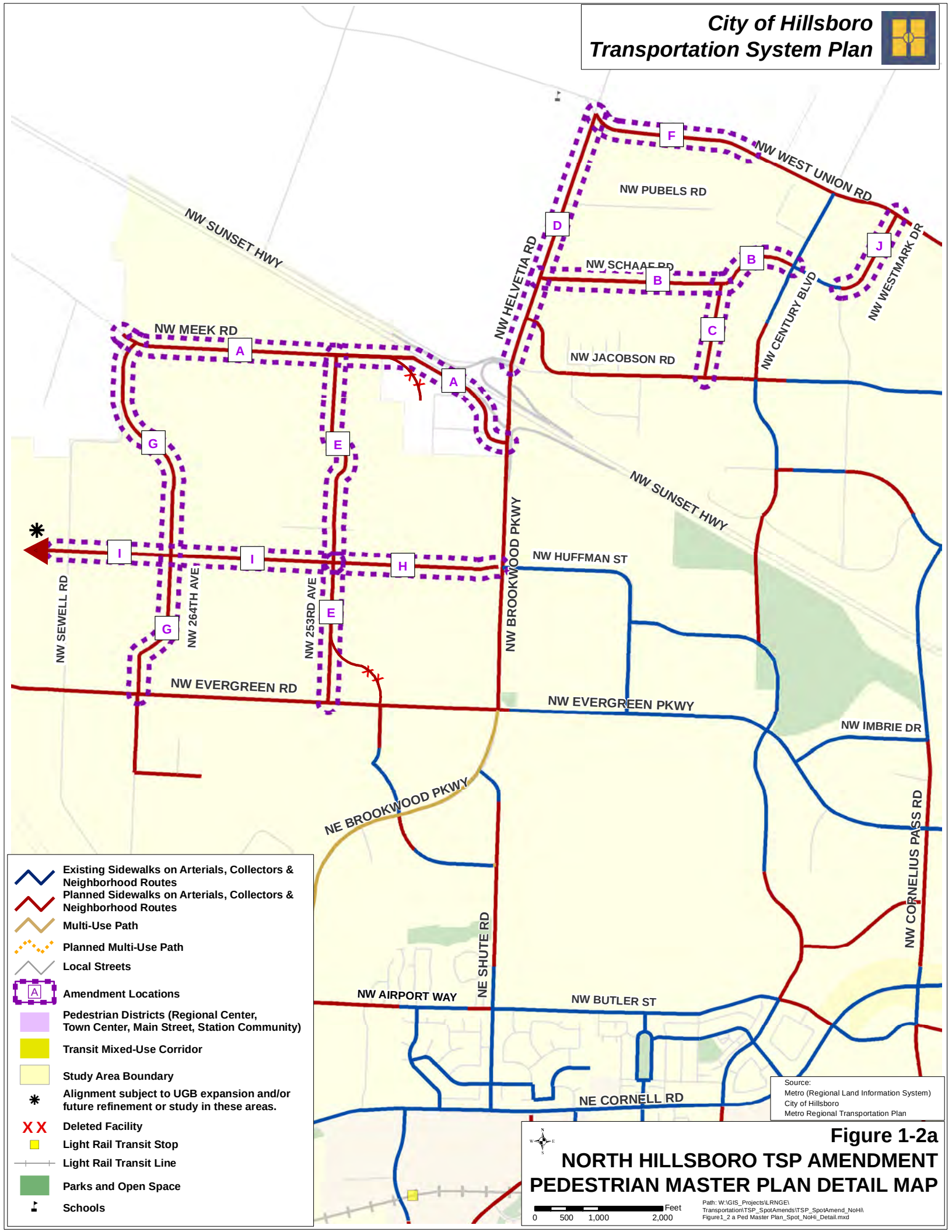
City of Hillsboro
Transportation System Plan
NW SUNSET HWY
NW MEEK RD
NW PUBELS RD
NW WEST UNION RD
NW HELVETIA RD
NW SCHAAF RD
NW CENTURY BLVD
NW WESTMARK DR
NW JACOBSON RD
NW SUNSET HWY
NW BROOKWOOD PKWY
NW HUFFMAN ST
NW SEWELL RD
NW 264TH AVE
NW 253RD AVE
NW EVERGREEN RD
NW EVERGREEN PKWY
NW IMBRIE DR
NE BROOKWOOD PKWY
NW CORNELIUS PASS RD
NE SHUTE RD
NW AIRPORT WAY
NW BUTLER ST
NE CORNELL RD
A
B
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Existing Sidewalks on Arterials, Collectors & Neighborhood Routes
Planned Sidewalks on Arterials, Collectors & Neighborhood Routes
Multi-Use Path
Planned Multi-Use Path
Local Streets
Amendment Locations
Pedestrian Districts (Regional Center, Town Center, Main Street, Station Community)
Transit Mixed-Use Corridor
Study Area Boundary
Alignment subject to UGB expansion and/or future refinement or study in these areas.
Deleted Facility
Light Rail Transit Stop
Light Rail Transit Line
Parks and Open Space
Schools
Source:
Metro (Regional Land Information System)
City of Hillsboro
Metro Regional Transportation Plan
Figure 1-2a
NORTH HILLSBORO TSP AMENDMENT
PEDESTRIAN MASTER PLAN DETAIL MAP
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City of Hillsboro
Transportation System Plan

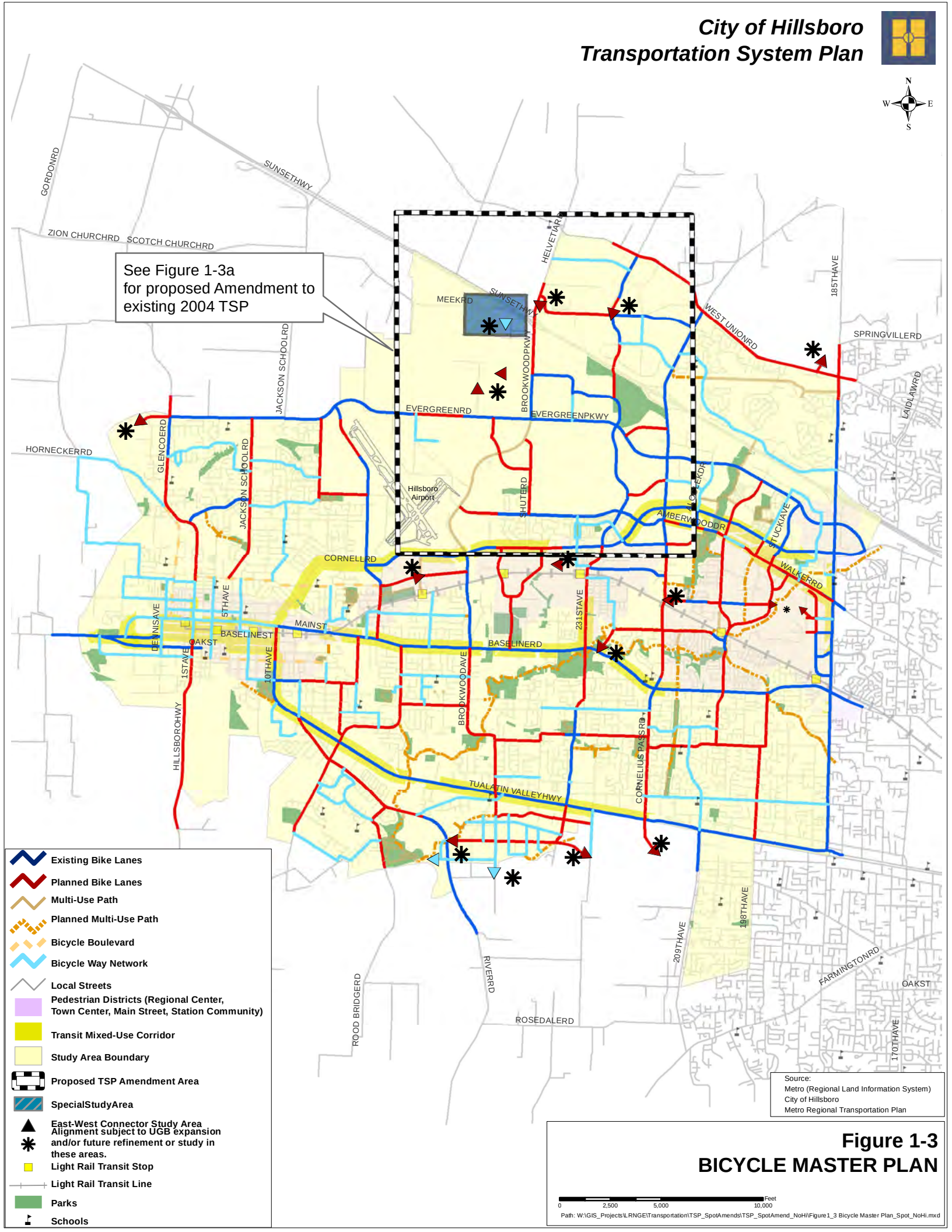


Figure 1-3
BICYCLE MASTER PLAN

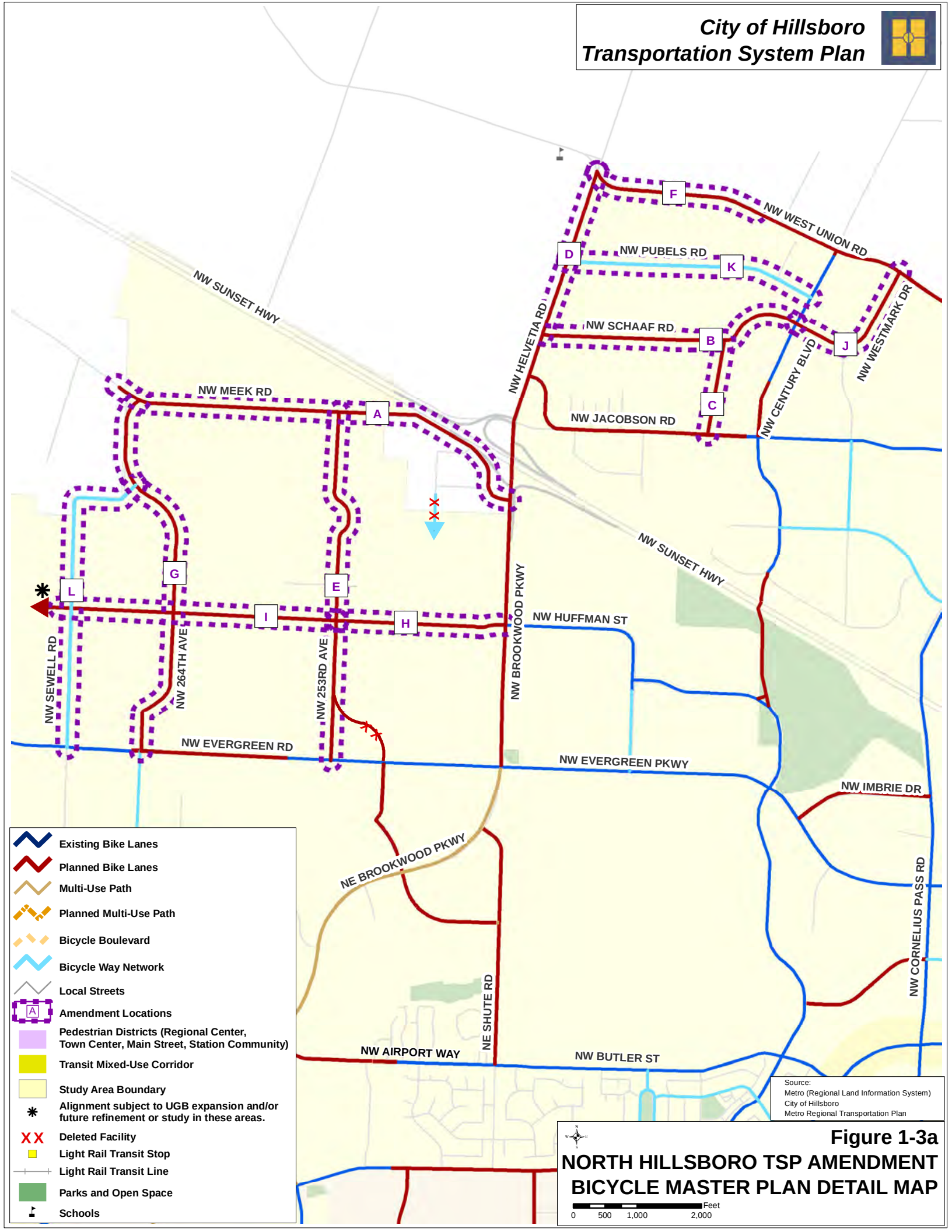
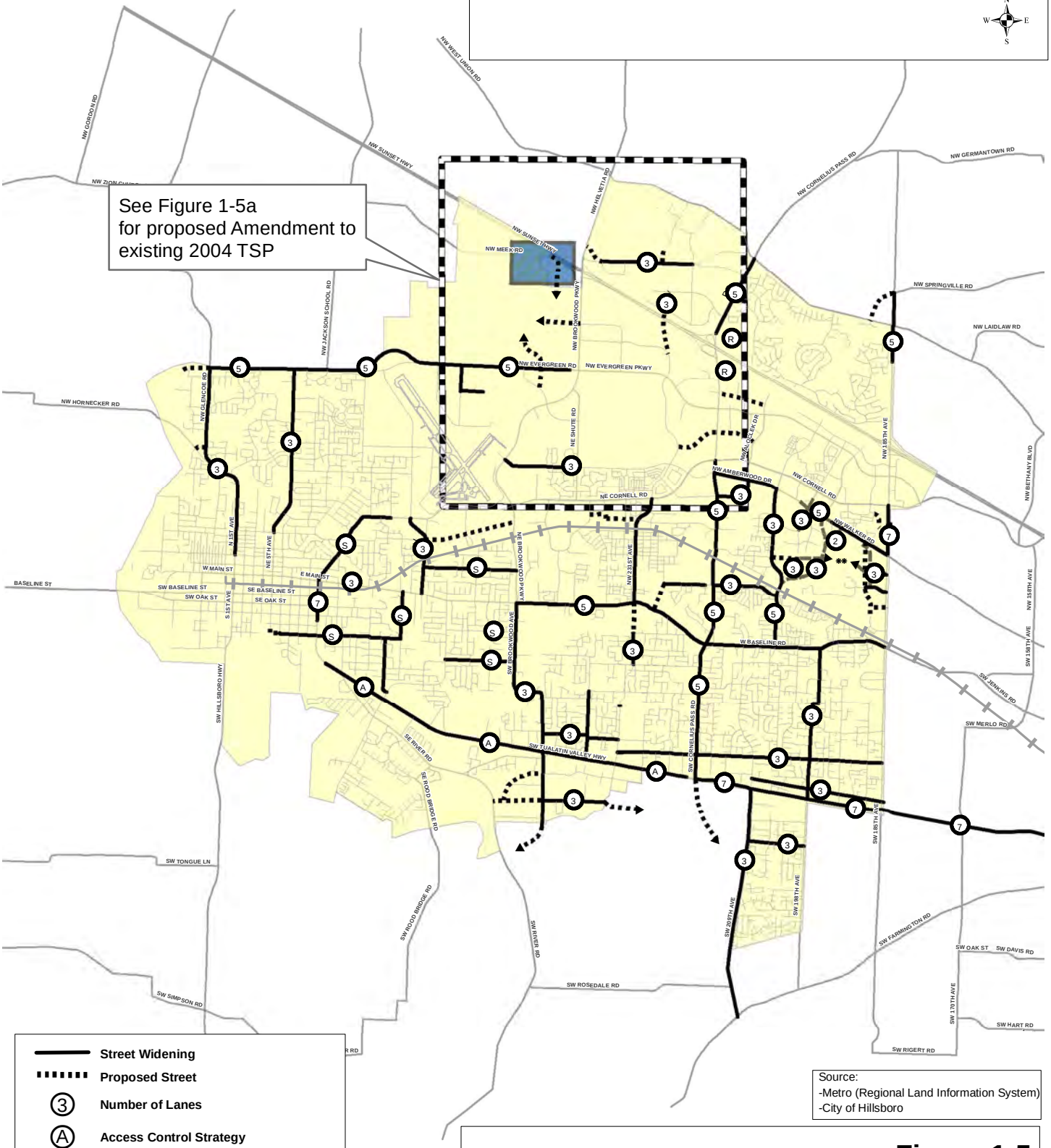


Figure 1-3a
NORTH HILLSBORO TSP AMENDMENT
BICYCLE MASTER PLAN DETAIL MAP

City of Hillsboro
Transportation System Plan



Street Widening
Proposed Street
Number of Lanes
Access Control Strategy
New Ramps
Multi-modal Street Reconstruction
SpecialStudyArea
Proposed TSP Amendment Area
Potential Wilkins Street Alignment Area

Source:
-Metro (Regional Land Information System)
-City of Hillsboro

Figure 1-5
STREET IMPROVEMENT PLAN

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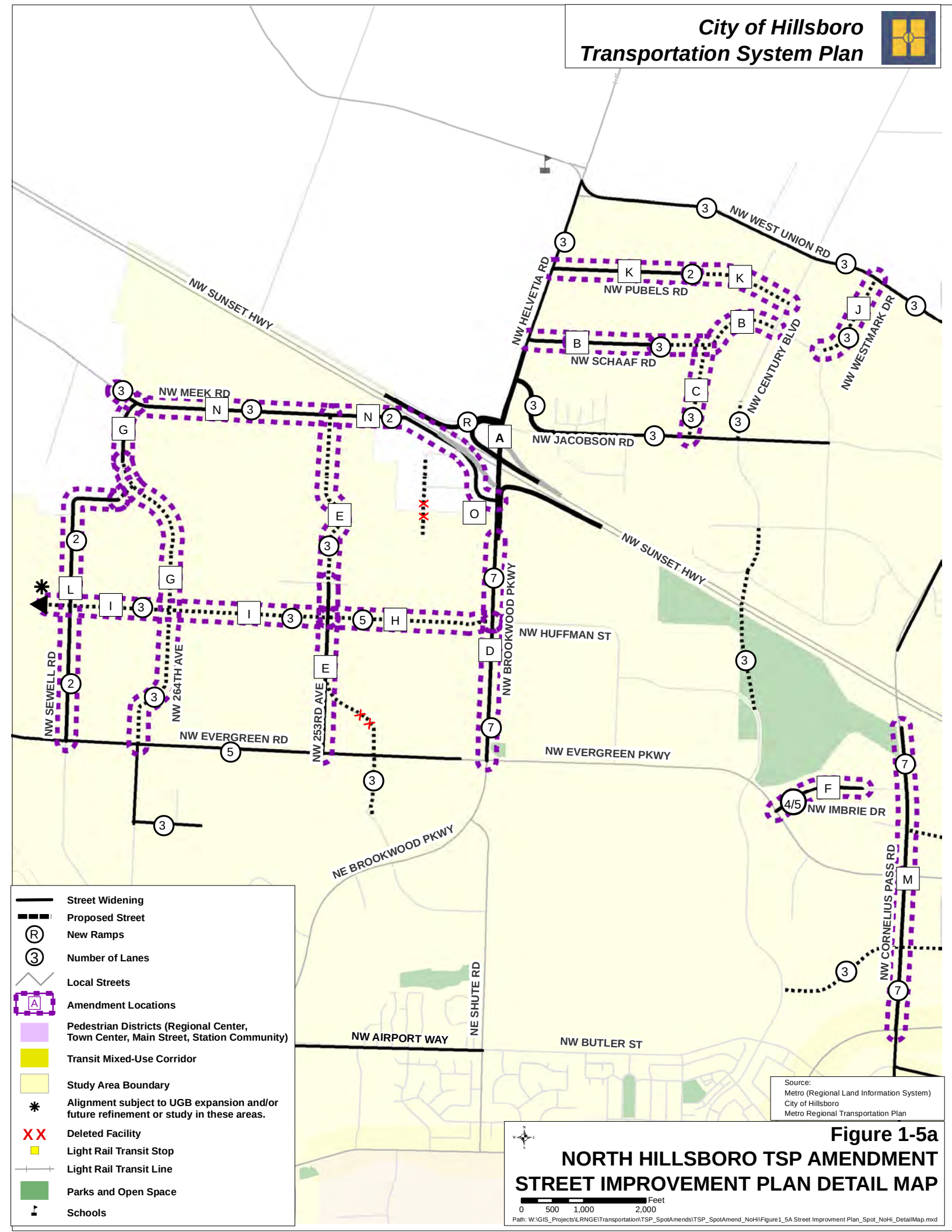
City of Hillsboro
Transportation System Plan
NW SUNSET HWY
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NW HELVETIA RD
NW PUBELS RD
NW SCHAAF RD
NW CENTURY BLVD
NW WESTMARK DR
NW JACOBSON RD
NW MEEK RD
NW SUNSET HWY
NW BROOKWOOD PKWY
NW HUFFMAN ST
NW SEWELL RD
NW 264TH AVE
NW 253RD AVE
NW EVERGREEN RD
NW EVERGREEN PKWY
NW IMBRIE DR
NE BROOKWOOD PKWY
NW CORNELIUS PASS RD
NE SHUTE RD
NW AIRPORT WAY
NW BUTLER ST
Street Widening
Proposed Street
New Ramps
Number of Lanes
Local Streets
Amendment Locations
Pedestrian Districts (Regional Center, Town Center, Main Street, Station Community)
Transit Mixed-Use Corridor
Study Area Boundary
Alignment subject to UGB expansion and/or future refinement or study in these areas.
Deleted Facility
Light Rail Transit Stop
Light Rail Transit Line
Parks and Open Space
Schools
Source:
Metro (Regional Land Information System)
City of Hillsboro
Metro Regional Transportation Plan
Figure 1-5a
NORTH HILLSBORO TSP AMENDMENT
STREET IMPROVEMENT PLAN DETAIL MAP
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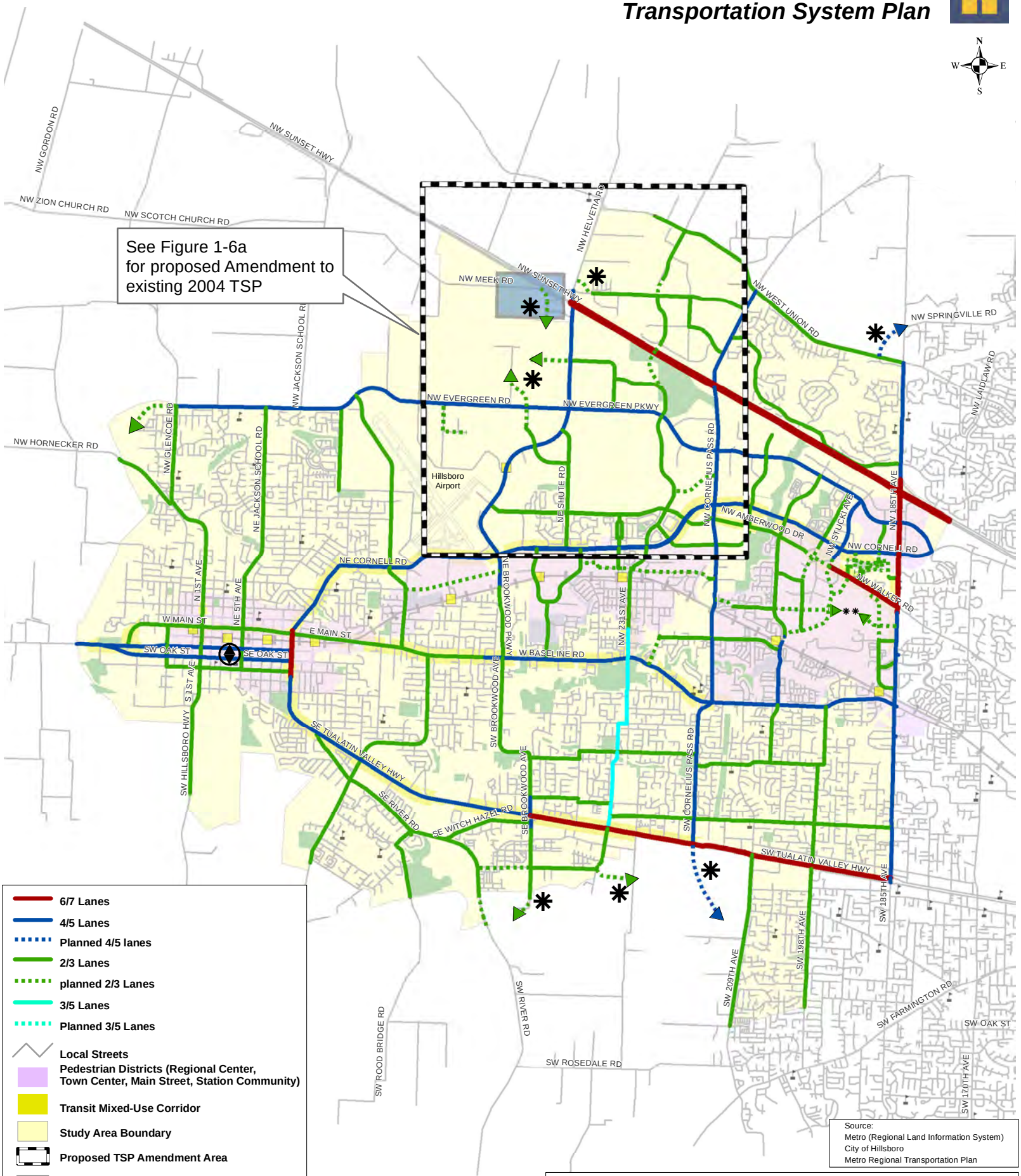
City of Hillsboro
Transportation System Plan



- 6/7 Lanes
- 4/5 Lanes
- Planned 4/5 lanes
- 2/3 Lanes
- planned 2/3 Lanes
- 3/5 Lanes
- Planned 3/5 Lanes
- Local Streets
- Pedestrian Districts (Regional Center, Town Center, Main Street, Station Community)
- Transit Mixed-Use Corridor
- Study Area Boundary
- Proposed TSP Amendment Area
- SpecialStudyArea
- Alignment subject to UGB expansion and/or future refinement or study in these areas.
- East-West Connector Study Area
- Couplet with 3 lanes in each direction

Source:
Metro (Regional Land Information System)
City of Hillsboro
Metro Regional Transportation Plan

Figure 1-6
FUTURE STREETS WHERE RIGHT OF WAY IS PLANNED FOR TWO OR MORE LANES

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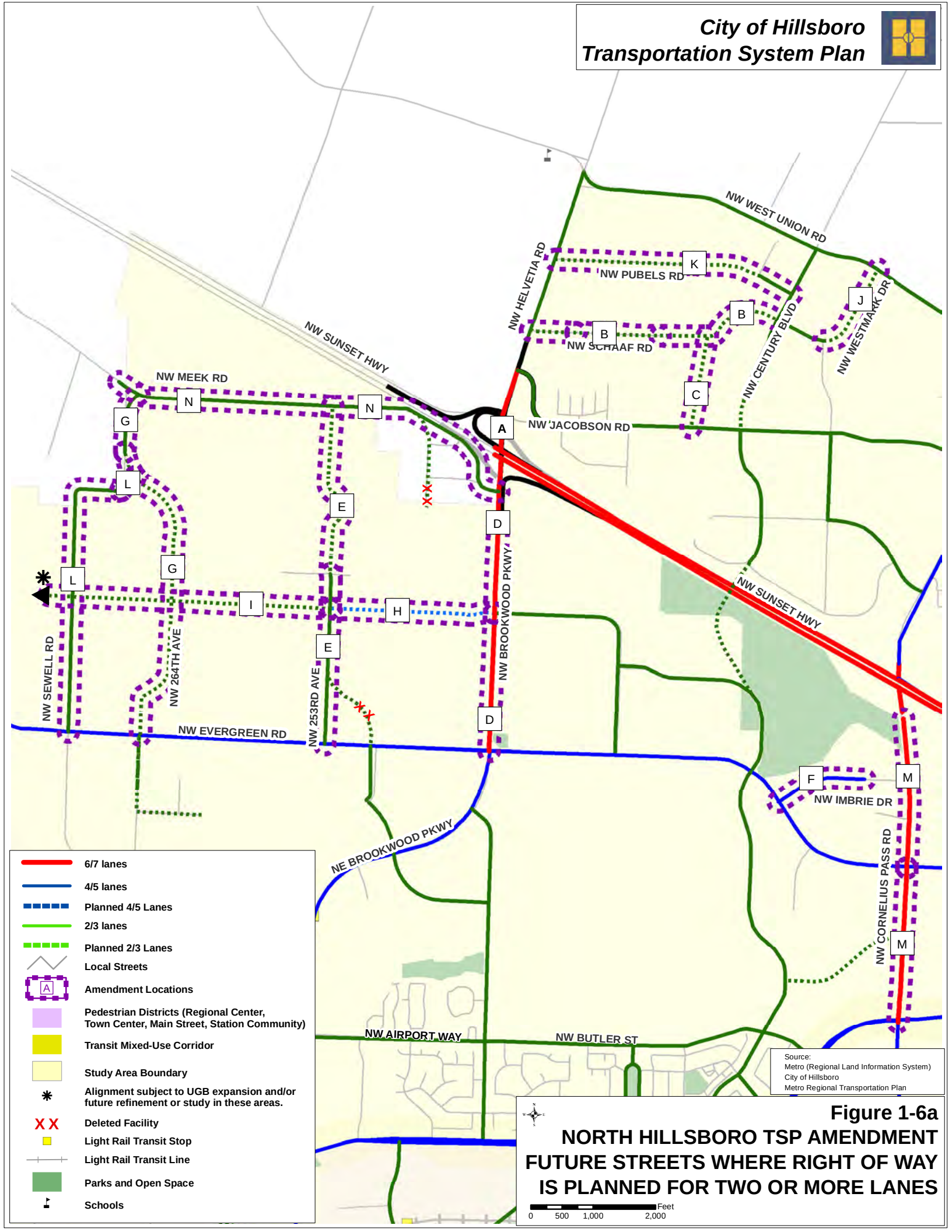
City of Hillsboro
Transportation System Plan
NW WEST UNION RD
NW HELVETIA RD
NW PUBELS RD
NW SCHAAF RD
NW CENTURY BLVD
NW WESTMARK DR
NW SUNSET HWY
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NW BROOKWOOD PKWY
NW SUNSET HWY
NW SEWELL RD
NW 264TH AVE
NW 253RD AVE
NW EVERGREEN RD
NW IMBRIE DR
NE BROOKWOOD PKWY
NW CORNELIUS PASS RD
NW AIRPORT WAY
NW BUTLER ST
A
B
C
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G
H
I
J
K
L
M
N
6/7 lanes
4/5 lanes
Planned 4/5 Lanes
2/3 lanes
Planned 2/3 Lanes
Local Streets
Amendment Locations
Pedestrian Districts (Regional Center, Town Center, Main Street, Station Community)
Transit Mixed-Use Corridor
Study Area Boundary
Alignment subject to UGB expansion and/or future refinement or study in these areas.
Deleted Facility
Light Rail Transit Stop
Light Rail Transit Line
Parks and Open Space
Schools
Source:
Metro (Regional Land Information System)
City of Hillsboro
Metro Regional Transportation Plan
Figure 1-6a
NORTH HILLSBORO TSP AMENDMENT
FUTURE STREETS WHERE RIGHT OF WAY IS PLANNED FOR TWO OR MORE LANES
Feet
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1,000
2,000

City of Hillsboro
Transportation System Plan

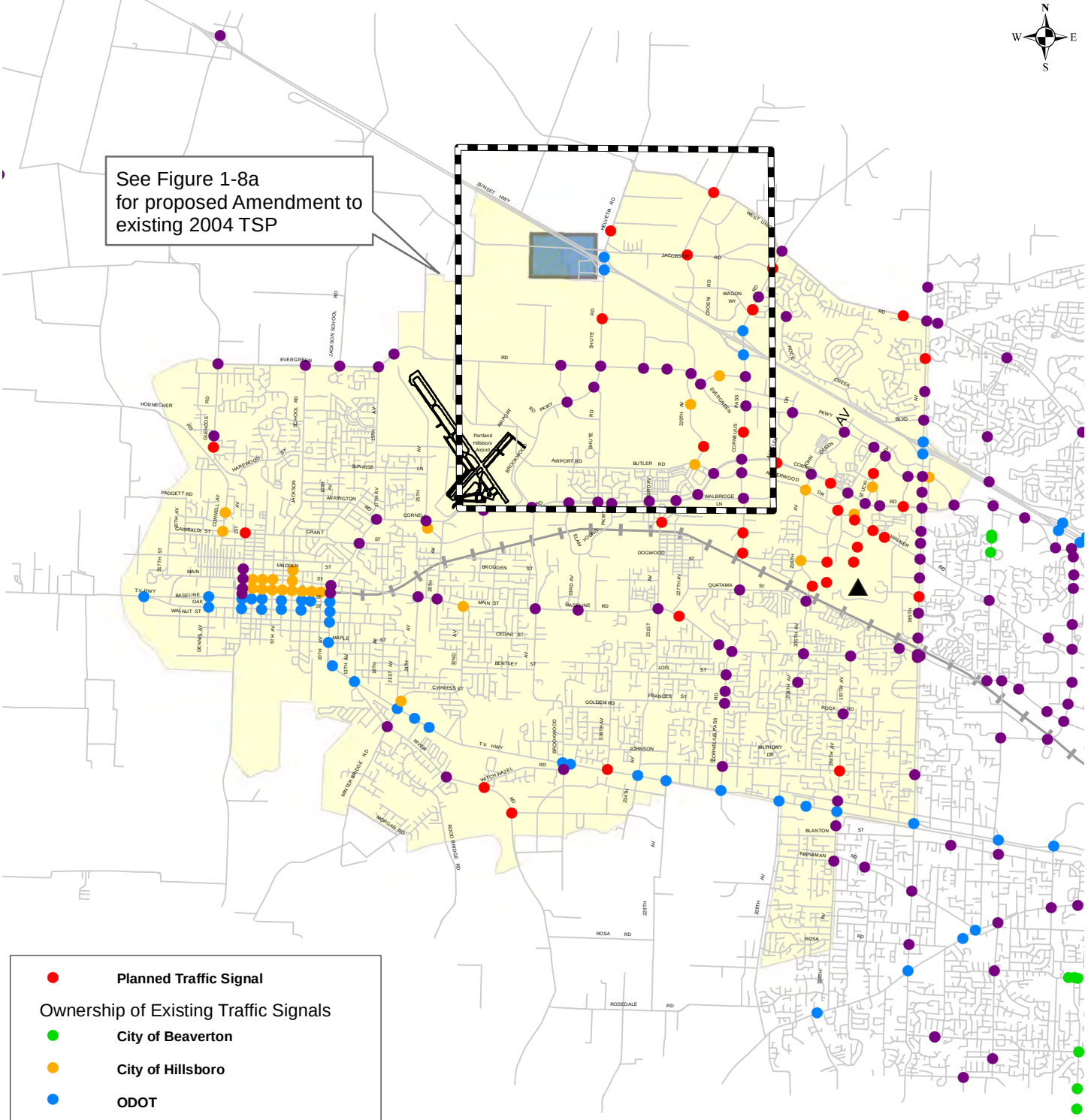

Figure 1-8
HILLSBORO TRAFFIC SIGNAL MASTER PLAN

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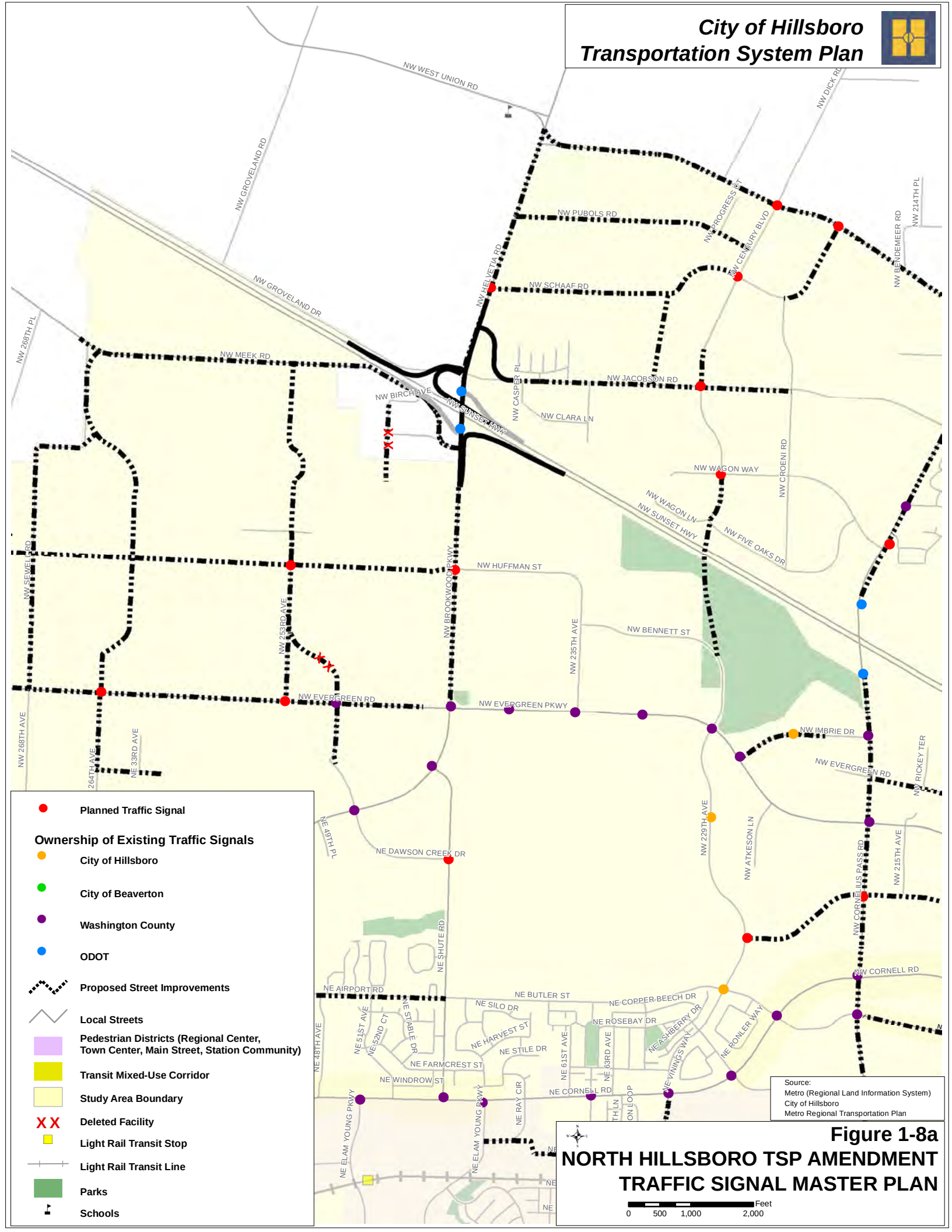
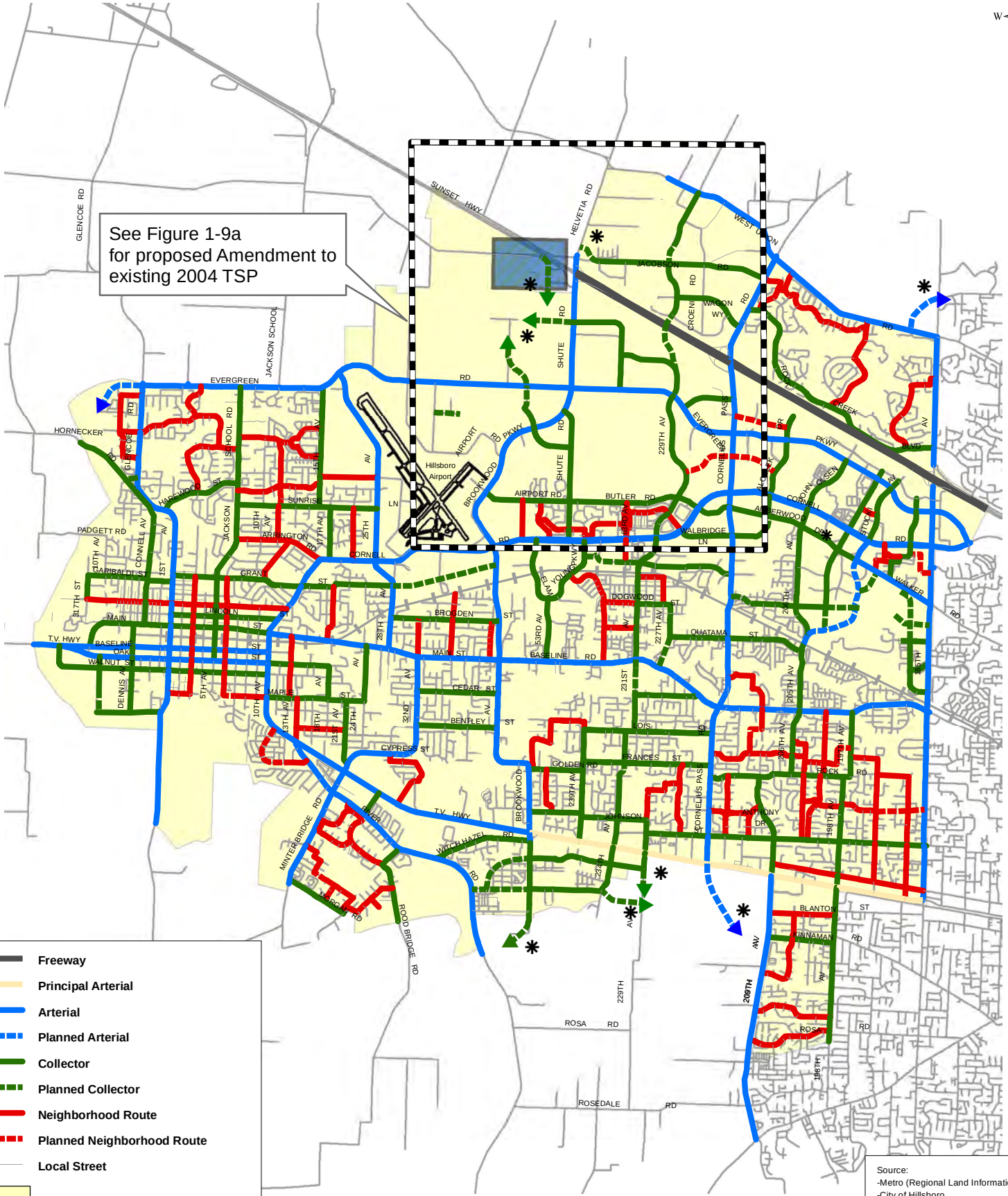

City of Hillsboro
Transportation System Plan
NW WEST UNION RD
NW GROVELAND RD
NW GROVELAND DR
NW DICK RD
NW PUBOLS RD
NW PROGRESS ST
NW CENTURY BLVD
NW BRANDEMEER RD
NW 214TH PL
NW HELVETIA RD
NW SCHAAF RD
NW 268TH PL
NW MEEK RD
NW BIRCH AVE
NW SUNSET HWY
NW CASPER PL
NW JACOBSON RD
NW CLARA LN
NW WAGON WAY
NW CROENI RD
NW WAGON LN
NW SUNSET HWY
NW FIVE OAKS DR
NW SEWELL RD
NW HUFFMAN ST
NW BROOKWOOD PKWY
NW 253RD AVE
NW 235TH AVE
NW BENNETT ST
NW EVERGREEN RD
NW EVERGREEN PKWY
NW 268TH AVE
264TH AVE
NE 33RD AVE
NW IMBRIE DR
NW EVERGREEN RD
NW RICKEY TER
NW 229TH AVE
NW ATKESON LN
NW CORNELIUS PASS RD
NW 215TH AVE
NE 49TH PL
NE DAWSON CREEK DR
NE SHUTE RD
NW CORNELL RD
NE AIRPORT RD
NE BUTLER ST
NE SILO DR
NE COPPER BEECH DR
NE ROSEBAY DR
NE ASHBERRY DR
NE RONLER WAY
NE 48TH AVE
NE 51ST AVE
NE 52ND CT
NE STABLE DR
NE HARVEST ST
NE STILE DR
NE 61ST AVE
NE 63RD AVE
NE FARMCREST ST
NE WINDROW ST
NE CORNELL RD
NE VININGS WAY
NE ELAM YOUNG PKWY
NE RAY CIR
Planned Traffic Signal
Ownership of Existing Traffic Signals
City of Hillsboro
City of Beaverton
Washington County
ODOT
Proposed Street Improvements
Local Streets
Pedestrian Districts (Regional Center, Town Center, Main Street, Station Community)
Transit Mixed-Use Corridor
Study Area Boundary
Deleted Facility
Light Rail Transit Stop
Light Rail Transit Line
Parks
Schools
Source:
Metro (Regional Land Information System)
City of Hillsboro
Metro Regional Transportation Plan
Figure 1-8a
NORTH HILLSBORO TSP AMENDMENT
TRAFFIC SIGNAL MASTER PLAN
Feet
0 500 1,000 2,000

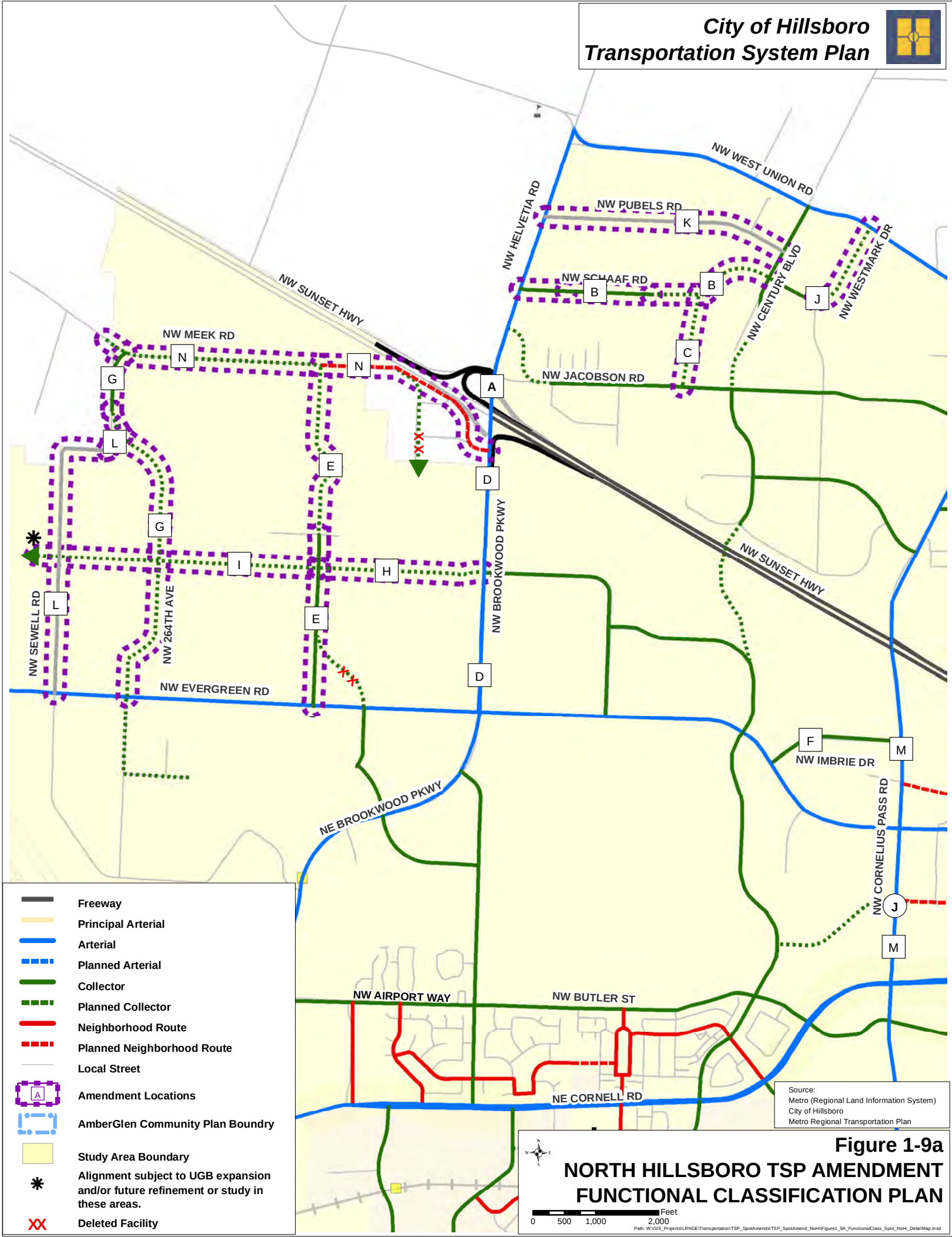


Source:
-Metro (Regional Land Information System)
-City of Hillsboro

Figure 1-9
HILLSBORO FUNCTIONAL CLASSIFICATION PLAN

0 2,500 5,000 10,000 Feet

City of Hillsboro
Transportation System Plan



- Freeway
- Principal Arterial
- Arterial
- Planned Arterial
- Collector
- Planned Collector
- Neighborhood Route
- Planned Neighborhood Route
- Local Street
- Amendment Locations
- AmberGlen Community Plan Boundry
- Study Area Boundary
- * Alignment subject to UGB expansion and/or future refinement or study in these areas.
- XX Deleted Facility

Source:
Metro (Regional Land Information System)
City of Hillsboro
Metro Regional Transportation Plan

Figure 1-9a
NORTH HILLSBORO TSP AMENDMENT
FUNCTIONAL CLASSIFICATION PLAN

0 500 1,000 2,000 Feet

Path: W:\GIS_Projects\LRNGE\Transportation\TSP_SpotAmends\TSP_SpotAmend_NoHil\Figure1_9A_FunctionalClass_Spot_NoHi_DetailMap.mxd

Exhibit C

US26: Brookwood Parkway/Helvetia Road Interchange Area Management Plan and Appendices (refer to Part 2 of 2)

August 2012

US 26: Brookwood Parkway/ Helvetia Road

Interchange Area Management Plan

Hillsboro and Washington County, Oregon

Prepared by:

DAVID EVANS AND ASSOCIATES INC.

Prepared for:

Oregon Department of Transportation

September 2012

US 26: Brookwood Parkway/ Helvetia Road

Interchange Area Management Plan

Hillsboro and Washington County, Oregon

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- Stacy Thomas, JLA Public Involvement

September 2012

LIST OF ACRONYMS

ADT	Average Daily Traffic
EBR	Shute Road Interchange Improvement Project Environmental Baseline Report
IAMP	Interchange Area Management Plan
JTA	Jobs and Transportation Act
LOS	Level of Service
MOU	Memorandum of Understanding
MP	Mile Point
OAR	Oregon Administrative Rules
ODOT	Oregon Department of Transportation
OHP	Oregon Highway Plan
PAC	Project Advisory Committee
PMT	Project Management Team
PPG	Project Policy Group
RTP	Regional Transportation Plan
TDM	Transportation Demand Management
TSM	Transportation System Management
TSP	Transportation System Plan
UGB	Urban Growth Boundary
v/c	volume-to-capacity

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INTRODUCTION

BACKGROUND

Oregon Department of Transportation (ODOT) is modifying the US 26: Brookwood Parkway/Helvetia Road interchange as part of the US 26: Brookwood Parkway/Helvetia Interchange Jobs and Transportation Act (JTA) Project. Oregon Administrative Rule (OAR) 734-051 and the Oregon Highway Plan (OHP) require preparation of an Interchange Area Management Plan (IAMP) for a new interchange and recommend it for major modifications to an existing interchange. The JTA Project modifications to the interchange are costly, and the purpose of this IAMP is to protect the interests of the state, local governments, and their citizens to ensure that the interchange functions through the planning horizon year of 2035 as it is currently being designed.

US 26 is a freight route linking Portland to Washington County and the Oregon coast. It is an important transportation corridor for the regional economy and is a primary lifeline and tourist route for coastal communities (see **Figure 1**, Vicinity Map). US 26 is locally and regionally significant in moving people, goods, and services through North Hillsboro and throughout the metropolitan region and the state.

The Brookwood interchange has been, and will continue to serve as, a major entry point to large high-tech employment centers based throughout North Hillsboro. The interchange is a critical access point, currently serving the mobility needs of 25,000 employees of the high-tech companies and expected to serve the future expansion of these high-tech companies as well as new companies that locate within North Hillsboro properties added to the regional Urban Growth Boundary (UGB) in the future. The interchange serves employee commute trips and truck freight traffic generated by raw material supply and finished product distribution associated with the major industries in North Hillsboro.

PURPOSE

The purpose of the IAMP is to:

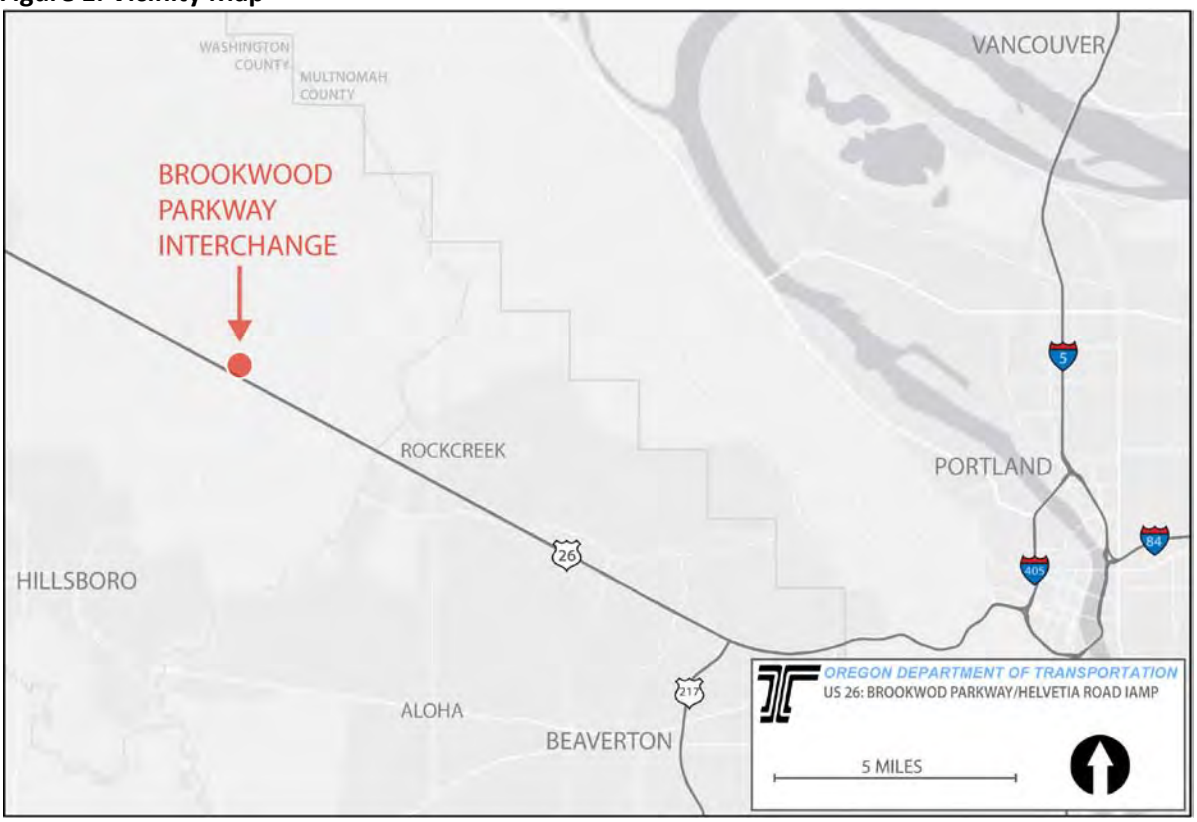
- Support the US 26: Brookwood Parkway/Helvetia Interchange JTA Project
- Support the ongoing and future City of Hillsboro and Washington County transportation, land use, and economic development planning efforts in and around the study area described below (North Hillsboro); and
- Protect the future function of the interchange.

PROBLEM STATEMENT

The US 26: Brookwood Parkway/Helvetia Road interchange is configured as a standard diamond with traffic signals at both ramp junctions. The interchange is currently approaching or exceeding the mobility standards identified in the OHP for this facility. The heavy westbound off-ramp traffic during the AM peak hour heading southbound and the corresponding northbound-to-eastbound movement in the PM peak hour are of primary concern. These heavy flows have a detrimental effect on traffic operations on the US 26 mainline, the surface arterial roadways near the interchange, and the expansion of current and future businesses (and jobs) in the surrounding area that depend on adequate interchange traffic capacity.

Local road connections to Brookwood Parkway and Helvetia Road near the interchange do not meet OHP access spacing standards, and the proximity of the local road connections to the interchange make local road access difficult and contribute to traffic congestion at and near the interchange during peak travel times. Traffic at the US 26: Brookwood Parkway/Helvetia Road interchange is projected to increase as new industrial development is attracted to North Hillsboro.

Figure 1. Vicinity Map



On October 20, 2011, the Metro Council approved modest expansions to the region's UGB in four areas. One of the four areas is a 330-acre area north of Hillsboro, in the vicinity of the US 26: Brookwood Parkway/Helvetia Road interchange, for the purposes of attracting future large-site industrial employers. The 330-acre expansion in North Hillsboro, located southwest of the interchange, will add additional traffic at the interchange (see **Figure 2)**.

COORDINATION WITH LOCAL JURISDICTIONS

JOBS AND TRANSPORTATION ACT PROJECT

The Oregon JTA of 2009 appropriated $45,000,000 for ODOT to design and construct needed improvements to the interchange to address existing operation and safety issues and to address anticipated future travel demand in North Hillsboro. The JTA-funded interchange improvement project includes:

- Design and construction of a westbound-to-southbound loop ramp on US 26 at Brookwood Parkway;
- Design and reconstruction of the westbound entrance ramp to US 26;
- Design and construction of intersection and storage improvements for the US 26 eastbound entrance ramp;
- Design and construction of improved bicycle and pedestrian facilities and an additional travel lane southbound across the Brookwood/Helvetia overcrossing of US 26; and
- Allocation of excess JTA funding to Washington County and the City of Hillsboro to design and construct local road improvements in the immediate vicinity to support access to and from the interchange.

ODOT, WASHINGTON COUNTY, CITY OF HILLSBORO COORDINATION

ODOT, Washington County, and the City of Hillsboro formed a cooperative partnership to guide the preparation of the IAMP. The formation of this interagency partnership included the development and approval of a Memorandum of Understanding and a Partnering Agreement detailed below.

MEMORANDUM OF UNDERSTANDING

The project partners are ODOT Region 1, Washington County, and the City of Hillsboro (the Partners). The Partners developed a Memorandum of Understanding (MOU—August 5, 2010) to jointly agree on the need to address necessary improvements to the interchange itself within the proposed JTA Project budget. The MOU memorializes the intentions of the Partners for their collaborative work on the JTA Project. The MOU identifies needed improvements that were developed through previous planning work conducted by the City of Hillsboro, as well as traffic analysis of the interchange and the other connected roadways. The MOU states that the Partners would participate jointly in the planning, the environmental permitting process, construction oversight for the project improvements, and the development of the IAMP, before ODOT transfers money to the city or county for associated local street system improvements in the interchange vicinity.

PARTNERING AGREEMENT

The Partners signed a Partnering Agreement on December 16, 2010. It establishes the JTA and IAMP terms, tasks, priorities, boundaries, phases, roles and responsibilities, and communication protocols.

IAMP GOALS AND PRIORITIES

The goals state the intentions of the Partners for operations in the management area (defined below). Based on the purpose and the problem statement, the goals of the IAMP are to:

- Support the ongoing and future City of Hillsboro and Washington County transportation, land use, and economic development planning efforts in and around the study area; and
- Protect the future function of the interchange.

The IAMP priorities include safety and capacity improvements that:

- Maintain or improve safety and operations at the US 26 interchange, and at other facilities in the vicinity of the interchange area;
- Identify and address the interchange operation needs associated with current and future industrial land designated in the existing adopted comprehensive plan, to the extent feasible;
- Develop a local street network that provides for local connectivity and helps minimize the need for local travel using or traveling through the interchange; and
- Identify facilities for adequate bicycle and pedestrian circulation in the area.

IAMP STUDY AREA AND INTERCHANGE MANAGEMENT AREA

IAMP STUDY AREA

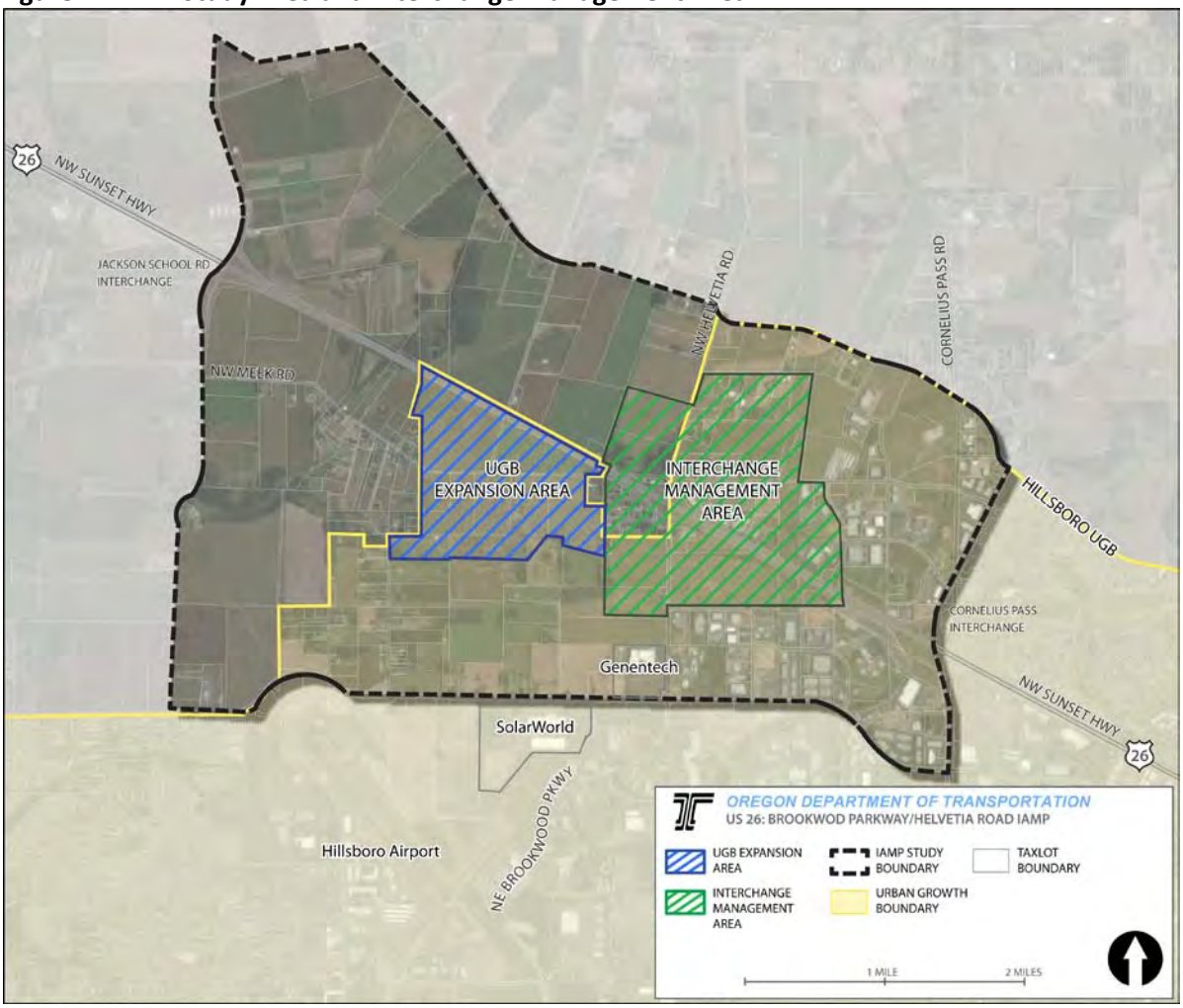
The IAMP Study Area includes a section of the US 26 corridor and the accompanying local road networks serving North Hillsboro, including land encompassed by Cornelius Pass Road (at US 26 mile point [MP] 62.53) on the east, Evergreen Road on the south, Jackson School Road (at US 26 MP 58.42) on the west, and West Union Road on the north, as shown in **Figure 2**. Existing and planned land uses and activities within the IAMP Study Area inform the IAMP planning process.

INTERCHANGE MANAGEMENT AREA

The Interchange Management Area, also delineated in **Figure 2**, includes the land within 1,320 feet to the north and south of the interchange ramp terminals, extending beyond Schaaf Road to the

north and beyond Huffman Road to the south. To the east and west of the interchange, this Interchange Management Area includes land that may be affected by realignment of an existing facility or planned construction of a new facility. Land that is within the IAMP Study Area but is not within the Interchange Management Area boundary is not subject to the provisions in the IAMP.

Figure 2. IAMP Study Area and Interchange Management Area



COMMITTEE STRUCTURE/PUBLIC INPUT

This section summarizes the decision-making process and public involvement used during the development of the IAMP. Project committees guided the process and provided important policy, community, and technical feedback through the project.

DECISION-MAKING

The decision-making process involved three groups: the Project Management Team (PMT), Project Advisory Committee (PAC), and the Project Policy Group (PPG). The PAC provided input to the PMT, and the PMT provided final recommendations to the PPG for decisions regarding the IAMP (see **Figure 3**).

PROJECT MANAGEMENT TEAM (PMT)

Lead staff from ODOT, Washington County, City of Hillsboro, and the consultant team comprised the project team (PMT). The PMT provided day-to-day project oversight, administration, and management and was responsible for facilitating the PAC.

PROJECT POLICY GROUP (PPG)

The PPG was comprised of senior agency management staff for the project.

PROJECT ADVISORY COMMITTEE (PAC)

The Project Advisory Committee (PAC) was created to guide the IAMP process and provide important policy, community, and technical feedback throughout the project. The PAC was composed of technical staff from partner jurisdictions and community stakeholder representatives. Members were strategically selected to represent the interests of all of the Partners in the IAMP and to provide a venue for representatives of the public to follow and contribute to the development of the plan. PAC members included one representative each from the Helvetia Community Association, Meek Neighborhood, Hillsboro Chamber of Commerce, Brookwood area bicyclists, Jacobson Road (Pac Trust), City of Hillsboro, and Washington County, and the ODOT project manager. The purpose of the committee was to ensure that technically viable solutions are also responsive to community needs. PAC members, PMT members, PPG members, and members of the public attended the PAC meetings. PAC duties include:

- Providing technical recommendations to the PMT concerning IAMP strategy, assumptions, and land use and transportation proposals in coordination with pertinent county and city plans and programs;
- Reviewing consultant deliverables;
- Advising the PMT on community concerns and issues;
- Serving as liaisons to constituents and representing the community as a whole; and
- Building interjurisdictional consensus by communicating with jurisdictional and agency partners to ensure issues are identified and addressed early.

PUBLIC INVOLVEMENT

Interviews, public meetings, and briefings were held with neighbors, business interests, and local community organizations. Informational materials—newsletters, the project website, and a press release—provided project updates to the general public.

OPEN HOUSES

Two events were held to share information and invite feedback from the general public. The first was held January 17, 2012, at Liberty High School in Hillsboro, Oregon. Forty-nine (49) people signed in to the event. The second event was held June 25, 2012 at the Hillsboro Civic Center. Twenty-three (23) people signed in. Information handouts and comment cards were made available.

At both open house events; project information was shared, and PMT staff engaged participants in discussion and answered their questions. A comment form was used at each open house as the primary tool for recording the feedback received. Feedback received was recorded in an open house summary and shared with the PAC.

PUBLIC OUTREACH

Two key methods were used to reach the interested public in and around the study area. The community received project updates and an invitation to the two project open houses through two project newsletters. Each newsletter was mailed to approximately 3,100 addresses in an area surrounding the interchange and posted on the project website approximately two weeks before each open house. Newsletters included names, titles, and contact information for PMT staff. In addition to the project newsletters, email notifications were sent. The list included individuals who had expressed interest in the project, legislators, emergency service providers, local businesses, organizations, and members of the PAC.

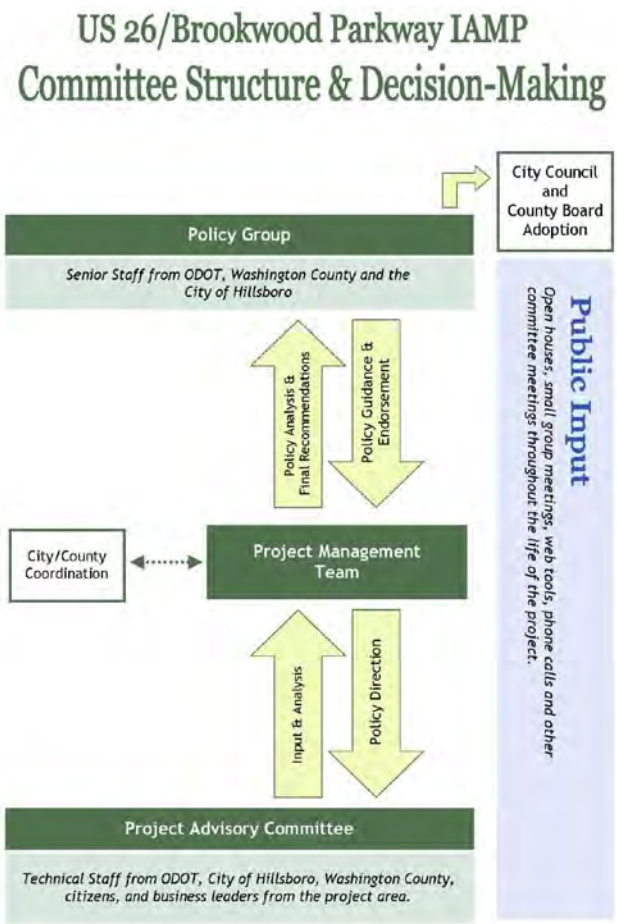
PROJECT WEBSITE

The project website was developed and made publicly available early in the process. It was the central location for project information and served as a resource for the public and PAC members. The site included a project description, maps, project schedule, open house materials, and PAC materials. The project website also advertised the open houses on its home page (www.oregon.gov/odot/hwy/region1/us26_brookwoodpkwy).

PRESS RELEASE

A press release was sent to media contacts through ODOT's Region 1 office before each event.

Figure 3. Committee Structure and Decision-Making Process



EXISTING CONDITIONS

LAND USE ANALYSIS

The US 26: Brookwood Parkway/Helvetia Road interchange is located within both the City of Hillsboro and Washington County jurisdictional boundaries. **Figure 4** shows the city/county generalized zoning designations. The figure also shows the city/county boundary and the UGB.

The IAMP Study Area represents the western developed edge of the Portland Metropolitan area, with large areas of farmland mostly to the west, and is adjacent to industrial areas and residential development to the east. The interchange is a critical access point, serving the mobility needs for high-tech and supporting companies located both inside and outside of the IAMP Study Area, including Intel, Genentech, SolarWorld, TriQuint Semiconductor, Tokai Carbon USA, and Tokyo Ohka Kogyo America (TOK America). Hillsboro Airport, Oregon's second busiest airport, is just south of the IAMP Study Area. Major community features include the Rice Northwest Museum of Rocks and Minerals (on the National Register of Historic Places), West Union Elementary School, Liberty High School, Oregon Department of Environmental Quality Sunset/Hillsboro Vehicle Emission Testing Station, the Gordon Faber Recreation Complex west of Cornelius Pass Road, and the Hillsboro Public Library.

The northwest quadrant of the IAMP Study Area is within Washington County jurisdiction. The portion of the southwest quadrant of the IAMP Study Area within Washington County jurisdictional boundaries consists of rural residential uses and rural agricultural uses and is zoned Exclusive Farm Use and Agriculture and Forest. The portion of the southwest quadrant within the City of Hillsboro is undeveloped and used for agricultural uses, except for the 75-acre parcel that is owned by Genentech Incorporated and that is zoned Industrial. The northeast quadrant of the IAMP Study Area is within the City of Hillsboro and is mostly commercial/industrial uses. Land use designations in this northeast quadrant are mostly industrial, with a band of floodplain designation for Waibel Creek. The southeast corner of the IAMP Study Area is within the City of Hillsboro and has agricultural and commercial/industrial uses interspersed with a few smaller, undeveloped parcels. Designations include floodplain and industrial. The City of Hillsboro has also implemented a Significant Natural Resource Overlay to protect natural resources located along portions of the floodplains in the area. **Table 1** shows acreage within the IAMP Study Area by designation.

The IAMP Study Area covers a total of 4,770 acres under the land use jurisdictions of Washington County and the City of Hillsboro. Washington County has responsibility for 68 percent of the land area and is zoned EFU (Exclusive Farm Use) and rural residential uses. Hillsboro has land use authority for the remaining 32 percent of the land area located in the eastern portion of the IAMP Study Area. Only 2 percent of the land within the existing city limits is designated for commercial or residential use—98 percent is designated industrial.

Figure 4. City/County Generalized Zoning Designations

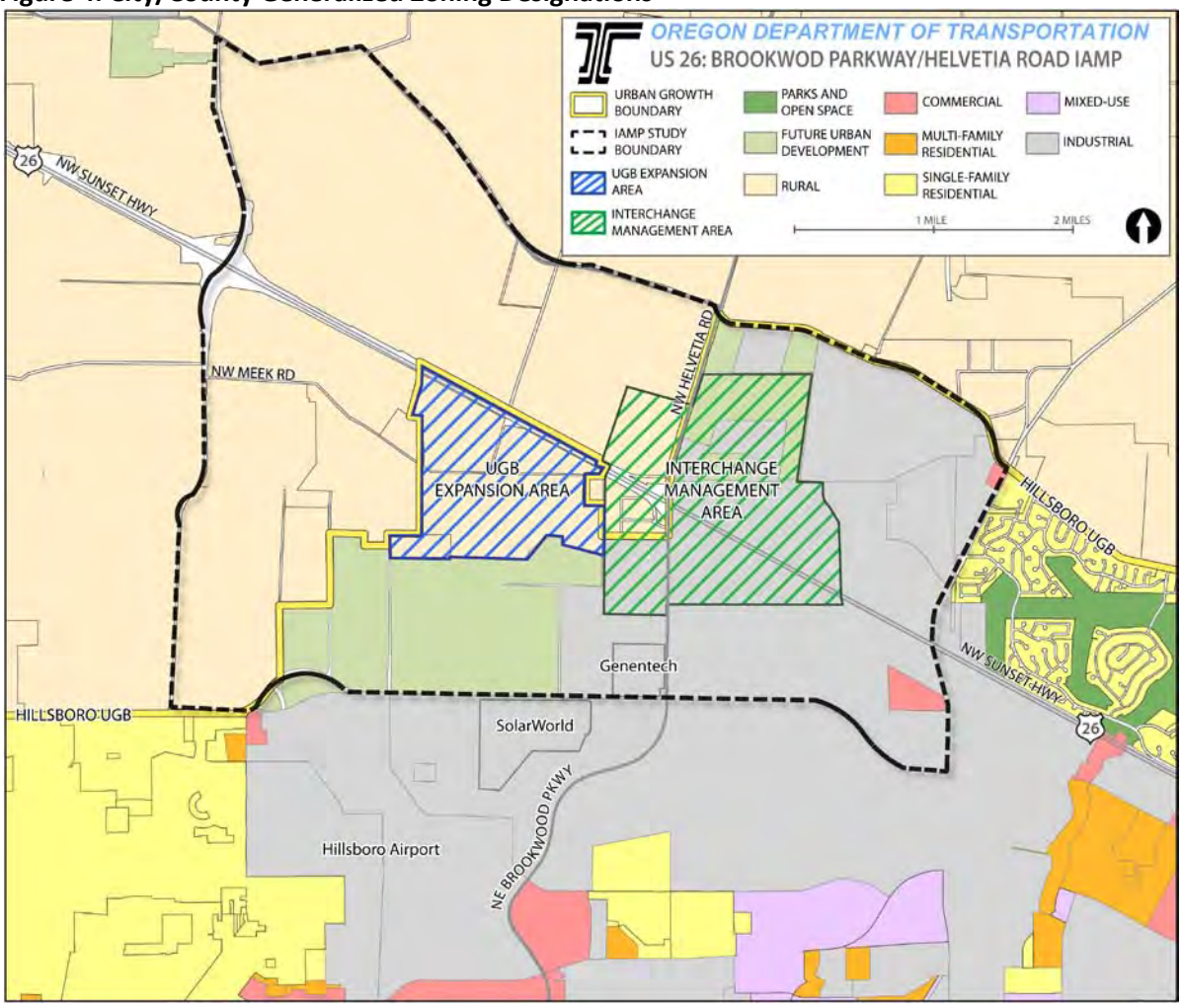


Table 1. Acres by Zoning Designation in the IAMP Study Area and Interchange Management Area

	Acres			
Zoning	**Study Area**	**%Study Area**	**Mgt Area**	**%Mgt Area**
Hillsboro				
Commercial	27.3	1%	0.0	0%
Industrial	1,484.5	30%	430.5	66%
Single Family Residential	2.7	0%	0.0	0%
SUBTOTAL	**1514.5**		**430.5**	
Washington County				
Rural	2,609.7	55%	109.0	17%
Future Urban Development	645.4	14%	111.6	17%
Industrial	0.6	0%	0.0	0%
SUBTOTAL	**3255.7**		**220.6**	
TOTAL	**4770.2**	**100%**	**651.1**	**100%**

NATURAL AND CULTURAL RESOURCES ANALYSIS

Natural and cultural resources were identified for the IAMP using multiple sources, in particular, the Shute Road Interchange Improvement Project Environmental Baseline Report (EBR) (MB&G 2010). Although the EBR focused on an Area of Potential Influence (API) that was different from the IAMP Study Area, the areas overlap, and information common to both is included in this IAMP in this section. The EBR API included more area to the west and south than the IAMP Study Area, as well as a long, narrow corridor along US 26.

The EBR identified three general vegetation communities in the API that were within the IAMP Study Area: riparian forest/wetland fringe along the McKay Creek unnamed tributaries, oak woodland adjacent to Helvetia Road, and disturbed/maintained grassland/highway right-of-way adjacent to the highway facilities.

The summary of natural and cultural resources in the IAMP Study Area is contained in Technical Memorandum #2, in **Appendix B**. Resources identified are floodplains and floodways, Goal 5 resources, wetlands, plant and wildlife species, hazardous materials, historic resources, archaeological resources, Section 4(f) resources (public parks and historic sites), and Section 6(f) resources (Land and Water Conservation Fund sites).

This environmental and cultural resource baseline report was prepared by ODOT specifically to support the JTA-funded US 26: Brookwood Parkway/Helvetia Road interchange improvement project. The EBR is being utilized by the design team to avoid and/or mitigate adverse impacts to significant resources at and near the interchange. In the future, Washington County and the City of Hillsboro will perform additional environmental and cultural resource baseline work for transportation projects within the IAMP Study Area.

TRANSPORTATION ANALYSIS

The existing conditions transportation analysis summarizes traffic volumes, operations, and safety issues, and discusses bicycle/pedestrian facilities. The transportation analysis focused primarily on the Interchange Management Area near the interchange and, to a lesser extent, on the broader IAMP Study Area. After adoption of this IAMP, Washington County and the City of Hillsboro will conduct more detailed traffic analysis work in the IAMP Study Area as they update their local TSPs.

TRAFFIC VOLUMES

Traffic volume data was collected at 39 intersections and five 24-hour classification count locations within the IAMP Study Area. The common peak hour for the intersections was 7:30 to 8:30 AM and 4:45 to 5:45 PM. The peak hour at each intersection may not correspond to the common peak hour, but all individual peak hours generally overlap within at least a portion of the common peak hour. **Figure 5** illustrates the IAMP Study Area intersections.

TRAFFIC OPERATIONS

The two methods used to measure traffic operations of roadways and intersections are volume-to-capacity (v/c) ratio and level of service (LOS). When the v/c ratio is closer to zero, traffic conditions are generally good, with little congestion and low delays for most intersection movements. As the v/c ratio approaches 1.00, traffic becomes more congested and unstable, with longer delays. Six LOS standards have been established, ranging from LOS A, where there is little or no delay, to LOS F, where there is delay of more than 50 seconds at unsignalized intersections, or more than 80 seconds at signalized intersections.

INTERSECTION OPERATIONS

Traffic operations were evaluated at all 39 IAMP Study Area intersections during the PM peak hour and at the 15 key AM peak hour intersections.

Figure 5 illustrates the IAMP Study Area intersections. Intersections highlighted in red are the intersections that are failing to meet operational standards in the AM and/or PM peak hour.

Table 2 summarizes the intersections that exceed operational standards for ODOT, the City of Hillsboro, or Washington County.

Figure 5. 2011 Existing Peak Hour Intersection Operations

Table 2. 2011 Existing Intersections Where Operational Standards Are Exceeded[1]

Intersection		Critical Movement[2] AM (PM)	AM		PM		Jurisdiction Where Operational Standard Not Met[3]
			V/C Ratio	LOS	V/C Ratio	LOS	
Interchange Management Area							
9	Brookwood Pkwy @ Meek Rd	EB L/T/R (EB L/T/R)	>1.0	F	0.33	F	All
IAMP Study Area							
22	Jackson School Rd @ US26 WB Ramps	(WB L/T)	0.63	C	0.98	F	All
24	Jackson School Rd @ Scotch Church Rd	(EB L/R)	Not analyzed in AM Peak Hour		0.83	F	Hillsboro
26	Jackson School Rd @ Evergreen Pkwy	Overall	0.85	E	0.89	D	Hillsboro
11	Brookwood Pkwy @ Genentech Access	(WB L/T/R)	Not analyzed in AM Peak Hour		>1.0	F	Wash Co, Hillsboro
35	Cornelius Pass Rd @ US26 WB Ramps	Overall	>1.0	F	0.91	D	All
37	Cornelius Pass Rd @ Evergreen Pkwy	Overall	0.79	D	>1.0	E	Wash Co, Hillsboro

For intersection approaches NB = northbound, SB = southbound, EB = eastbound, and WB = westbound. At the intersection approach L = left-turn movement, T = through movement, and R=right-turn movement. Some approaches have shared lanes where two or more travel movements may be permitted as indicated with a slash.

Notes:

1. Shaded results indicate an intersection that fails to meet operational standards. Operational standards for ODOT, Washington County, and the City of Hillsboro can be found in Technical Memorandum #2.
2. The critical movement at a signalized intersection is the overall operation of the intersection. The critical movement at an unsignalized intersection is the stopped (or yield) movement with the worst v/c ratio.
3. "All" indicates the following jurisdictions: ODOT, City of Hillsboro, Washington County.

For the Interchange Management Area, the intersection of Brookwood Parkway at Meek Road exceeds operational standards during the AM and PM peak hour. The movements that are failing are on the minor street approach at the intersection that is close to the eastbound ramp terminal. For the IAMP Study Area, six intersections would exceed operational standards during the AM and/or PM peak hour. Future growth in traffic volumes will exacerbate substandard operations and impact surrounding intersections.

FREEWAY OPERATIONS

US 26 within the IAMP Study Area (between the Jackson School Road interchanges and the Cornelius Pass Road interchange) is operating within ODOT standards.

SAFETY

A crash analysis was conducted to determine whether any significant, documented safety issues exist within the IAMP Study Area. The crash analysis included a review of crash history data supplied by the ODOT Crash Analysis and Reporting Unit for the period between January 1, 2008, and December 31, 2010, the three most recent full years of complete data records.

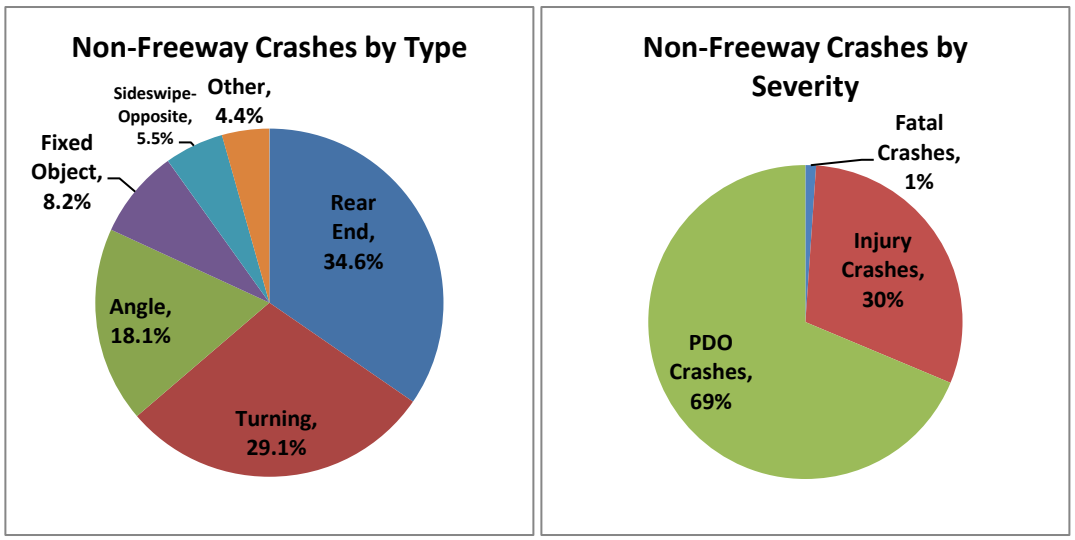
NON-FREEWAY

During the three-year period there were 182 reported crashes within the IAMP Study Area on local roadways or at intersections. Approximately 30 percent (55 crashes) involved minor injuries, and 69 percent (125 crashes) were property-damage-only crashes. The majority of crashes (63 crashes)

were rear end-related crashes, which are frequently attributed to congestion and queuing. The next most frequent type of crash (53 crashes) was turning-related. There were two reported bicycle/pedestrian crashes within the IAMP Study Area. There are no obvious crash trends that would warrant mitigation within the IAMP Study Area, although modifications to the geometry at the unsignalized intersection of Jackson School Road at West Union Road would have the potential to improve safety.

Approximately 30 percent (55 crashes) of all reported non-freeway crashes involved minor injuries, 69 percent (125 crashes) involved property-damage-only crashes, and the remaining 1 percent (2 crashes) involved a fatality or serious injury collision. The following figures summarize the local roadway and intersection related crashes within the IAMP Study Area by crash type and by severity.

Figure 6. Non-Freeway Study Area Crash Type and Severity from 2008 to 2010

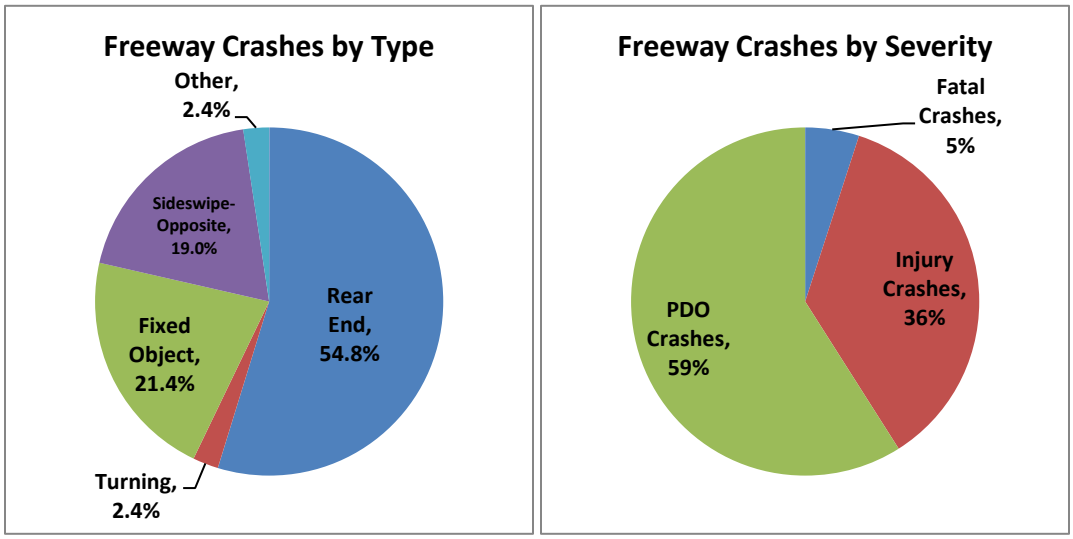


FREEWAY

The 42 crashes that occurred along US 26 within the IAMP Study Area during the three-year period were primarily rear end, fixed-object, and sideswipe related. None of the freeway crashes were pedestrian or bicycle related. Approximately 36 percent (15 crashes) of the freeway crashes involved minor injuries, 59 percent (25 crashes) involved property-damage-only crashes, and the remaining 5 percent (2 crashes) involved a fatality or serious injury collision.

The safety data for this section of US 26 indicates a low incidence of traffic crashes (one-fourth the statewide average for similar facilities within the urban highway system). The following figures summarize the freeway related crashes within the IAMP Study Area by crash type and by severity. There are no obvious crash trends that would warrant mitigation.

Figure 7. Freeway Study Area Crash Type and Severity from 2008 to 2010



BICYCLE AND PEDESTRIAN FACILITIES

The existing US 26: Brookwood Parkway/Helvetia Road interchange and segments of Brookwood Parkway and Helvetia Road were originally constructed without bicycle or pedestrian facilities, because this area of North Hillsboro was rural and the interchange was designed for motor vehicles. At present, Brookwood Parkway between Evergreen Road and the interchange has no marked bike lanes within the Interchange Management Area. Sidewalks are present on the section of Brookwood Parkway between Huffman Street south to Evergreen Road, but sidewalks have not yet been extended to the interchange. North of the interchange, Helvetia Road does not have marked bike lanes or sidewalks within the Interchange Management Area. A few intermittent sections of sidewalks do exist in some of the rural residential neighborhoods north of the interchange. The US 26: Brookwood Parkway/Helvetia Road interchange structure was constructed without sidewalks or marked bike lanes. Sidewalks were not included in the original interchange and road designs because of rural nature of North Hillsboro at the time this interchange was constructed.

Bicycle use in North Hillsboro has increased in popularity in recent years as the area transitions to more urban types of land uses and as recreational bicycle use has increased in the area. Brookwood Parkway and Helvetia Road are becoming a popular bicycle route for recreational riders touring the Helvetia area north of the interchange.

Pedestrian activity in the vicinity of the interchange remains minimal in large part because of the limited population in the area and lack of development within walkable distance for the residents that do live here. As urban uses develop in North Hillsboro and the area south of the interchange develops for light industrial uses, it is anticipated that additional pedestrian and bicycle facilities will be needed. New bicycle and pedestrian links will be important to connect existing intermittent sidewalks along some of the local roads north of the interchange and to provide better connectivity and a safer traveling environment for an increasing number of cyclists and pedestrians as the area develops.

FUTURE CONDITIONS

FUTURE 2035 BASELINE CONDITIONS (NO BUILD)

The 2035 Baseline conditions transportation analysis summarizes the future land use, transportation network, traffic volumes, traffic operations, queuing, and safety in the IAMP Study Area.

FUTURE LAND USE

There are two key areas within the UGB designated for future planning and development: the North Hillsboro Industrial Area/Sanctuary and the UGB expansion area (see **Figure 8**). Information from these existing concept plans has been incorporated into this IAMP.

The North Hillsboro Industrial Area covers two areas north and south of the interchange that overlap with the IAMP Study Area. The Industrial Sanctuary Zone (IS) that implements the North Hillsboro Industrial Area Community Plan retains and strengthens the requirements for large lots and restrictions on commercial development. However, it does broaden allowable industrial uses and still allows commercial, retail, office, and service support uses. Permitted uses are industrial services, manufacturing and production, public safety facilities, warehousing and distribution, wholesale sales, and utility facilities. There are multiple conditional and limited uses as well. Commercial nodes are limited to less than 20,000 square feet in three areas that support industrial uses. The plan also establishes a planning foundation for possible future UGB expansions.

On October 20, 2011, the Metro Council decided to expand the region's UGB, including the 330-acre (358.89 acres including roads and right-of-way) area north of Hillsboro, in the vicinity of NW Meek Road and south of US 26, for the purposes of attracting future large-site industrial employers. After adoption of the IAMP, the City of Hillsboro plans to start the planning process required by Metro's Urban Growth Management Functional Plan Title 11: Planning for New Urban Areas (Metro Code section 3.07) to allow for the future planning and development of the 358.89-acre area. The City of Hillsboro will annex the land areas within the UGB for future industrial land uses.

The areas outside the Metro UGB will remain designated for rural uses.

All of the year 2035 scenarios using the regional transportation model include the North Hillsboro Industrial Area and the UGB expansion area. Travel demand model assumptions for households and employment in the IAMP Study Area for the base year (2010) and future year (2035) are shown in **Table 3**.

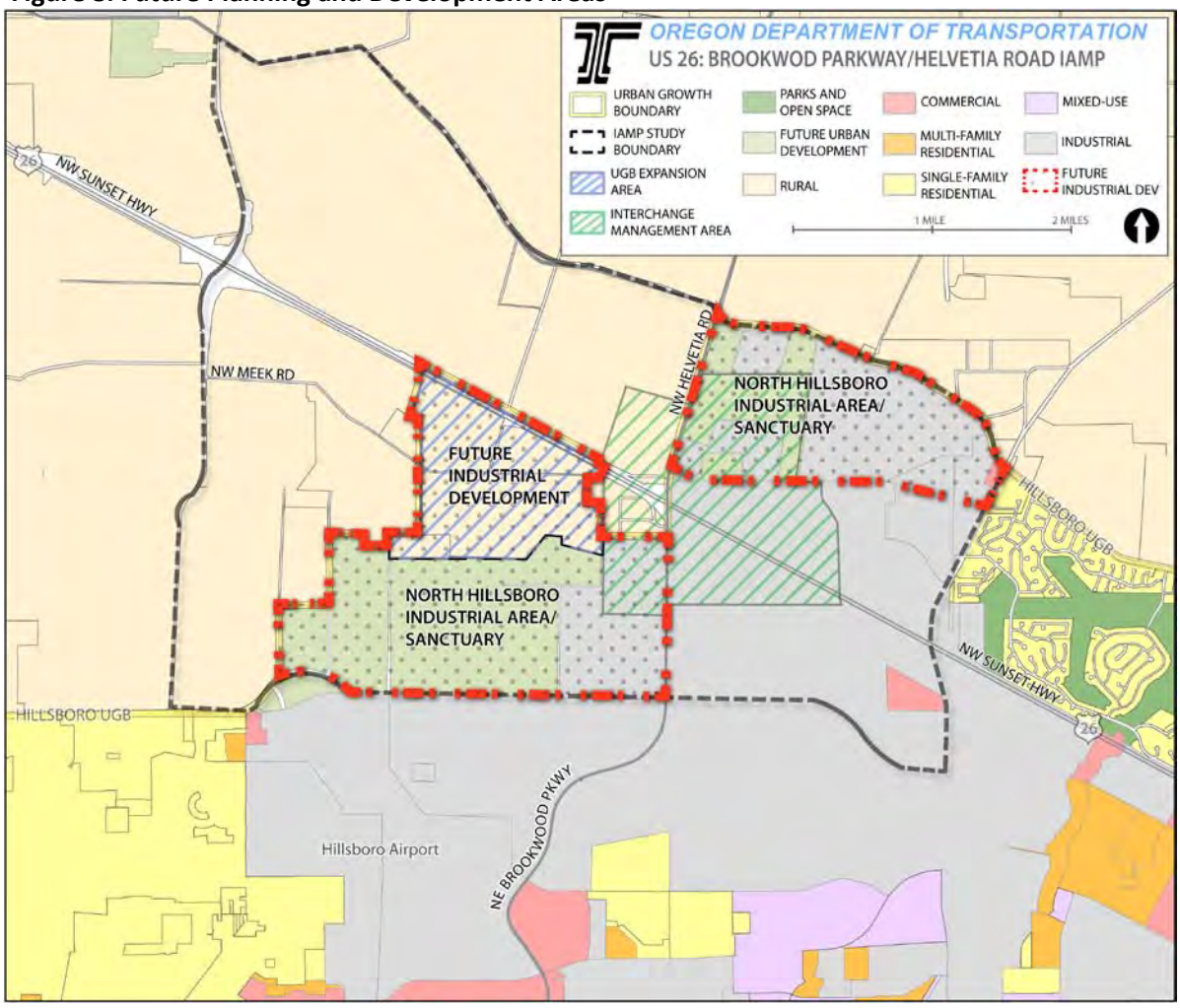
As **Table 3** shows, the number of households in the IAMP Study Area is projected to grow by approximately 20 percent over the 2010 conditions. The number of jobs in the IAMP Study Area is expected to grow by more than six times the current number. This will result in a substantial number of vehicle trips entering and exiting the IAMP Study Area.

Table 3. Households and Employment for Base Year 2010 and Future Year 2035

	2010[1]	**2035**[2]	**Difference**
Households	298	353	56
Employment	4,876	29,716	24,840

Notes:
1. 2010 data based on Metro's household and employment allocation.
2. 2035 data based on City of Hillsboro's household and employment allocation.
3. Household and Employment data based on 14 Traffic Analysis Zones: 1252, 1253, 1254, 25% of 1255, 1257, 1258, 1259, 1260, 1261, 1270, 1271, 1272, 1273, and 1274.

Figure 8. Future Planning and Development Areas



TRANSPORTATION NETWORK

The 2035 Baseline is based on a financially constrained transportation system. The financially constrained system will include projects from Metro's adopted 2035 Regional Transportation System Plan (RTP) and both city and county adopted Transportation System Plans (TSPs). Projects in local community plans were not included in the travel demand model. The 2035 Baseline assumes that the JTA Project is not constructed.

TRAFFIC VOLUMES

Planned population growth and expected land uses resulted in an average vehicular growth rate from 2011 to 2035 of approximately 50 percent for the AM peak hour and approximately 45 percent for the PM peak hour. Traffic volume growth varies throughout the IAMP Study Area, with some intersections experiencing a minimal growth of approximately 2 percent. Intersections where there are intense land use changes have forecasted traffic volumes that are more than double existing traffic volumes.

The expected growth within the IAMP planning horizon (2011–2035) will require future transportation improvements to the local road network in North Hillsboro. The local road network will be improved over time to support the new industrial development and to improve access to the Brookwood interchange. This IAMP will provide Washington County, the City of Hillsboro, and ODOT

with a planning tool to coordinate local and state highway planning efforts in the future.

INTERSECTION OPERATIONS

Traffic operations were evaluated at all 39 IAMP Study Area intersections during the PM peak hour and at 17 key AM peak hour intersections (the intersections of Brookwood Parkway at Huffman Street and Brookwood Parkway at Genentech Access were added for the 2035 AM analysis). **Figure 9** illustrates the IAMP Study Area intersections for the 2035 Baseline scenario. Intersections shaded in red show intersections that fail to meet operational standards in the AM and/or PM peak hour.

Table 4 summarizes the intersections that exceed operational standards for ODOT, City of Hillsboro, or Washington County for the 2035 Baseline scenario.

Figure 9. 2035 Baseline Peak Hour Intersection Operations, 2035 No Build

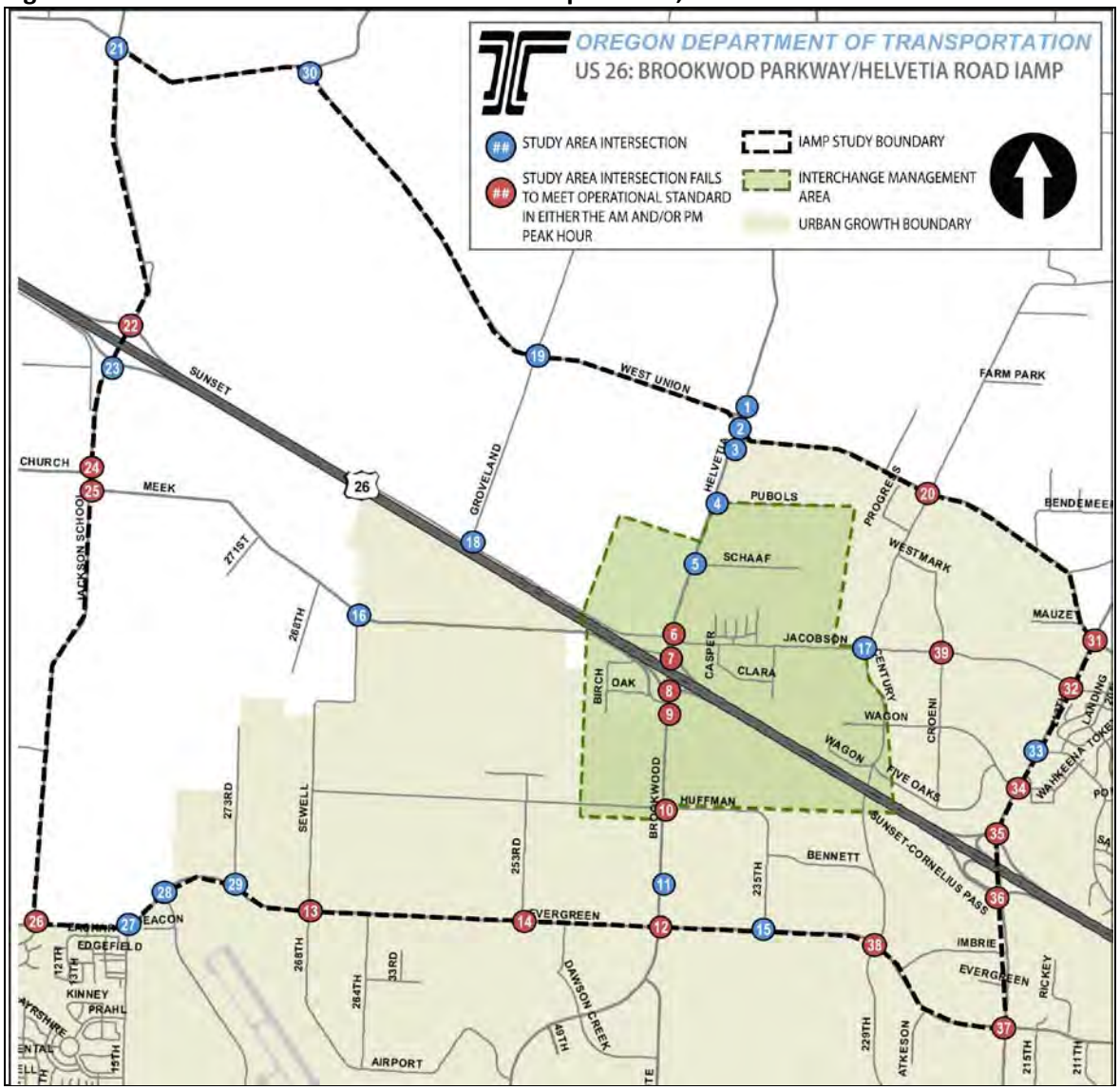


Table 4. 2035 Baseline Intersections Where Operational Standards Are Not Met[1]

	Intersection	Critical Movement[2] AM (PM)	AM V/C Ratio	AM LOS	PM V/C Ratio	PM LOS	Jurisdiction Where Operational Standard Not Met[3]
Interchange Management Area							
6	Helvetia Rd @ Jacobson Rd	WB L/T/R (WB L/T/R)	0.13	C	>1.0	F	All
7	Brookwood Pkwy @ US26 WB Ramps	Overall	0.93	D	>1.0	D	ODOT, Wash Co
8	Brookwood Pkwy @ US26 EB Ramps	Overall	>1.0	D	>1.0	D	ODOT, Wash Co
9	Brookwood Pkwy @ Meek Rd	NB L (EB L/T/R)	>1.0	F	>1.0	F	All
10	Brookwood Pkwy @ Huffman St	Overall	>1.0	F	>1.0	F	Hillsboro
IAMP Study Area							
22	Jackson School Rd @ US26 WB Ramps	Overall	>1.0	F	>1.0	F	All
24	Jackson School Rd @ Scotch Church Rd	(EB L/R)	Not analyzed in AM Peak Hour		>1.0	F	Wash Co, Hillsboro
25	Jackson School Rd @ Meek Rd	(WB L/R)	Not analyzed in AM Peak Hour		>1.0	F	Wash Co, Hillsboro
26	Jackson School Rd @ Evergreen Pkwy	Overall	>1.0	E	>1.0	F	Wash Co, Hillsboro
13	Sewell Rd @ Evergreen Pkwy	(SB L/T)	Not analyzed in AM Peak Hour		>1.0	F	Wash Co, Hillsboro
14	253rd Ave @ Evergreen Pkwy	(SB L)	Not analyzed in AM Peak Hour		>1.0	F	Wash Co, Hillsboro
12	Brookwood Pkwy @ Evergreen Pkwy	Overall	0.77	C	0.99	E	Hillsboro
20	Century Blvd @ West Union Rd	(SB L/T/R)	Not analyzed in AM Peak Hour		>1.0	F	Wash Co, Hillsboro
39	Croeni Rd @ Jacobson Rd	(SB L)	Not analyzed in AM Peak Hour		>1.0	F	Wash Co, Hillsboro
38	229th Avenue @ Evergreen Pkwy	Overall	>1.0	F	>1.0	F	Wash Co, Hillsboro
31	Cornelius Pass Rd @ West Union Rd	Overall	0.99	E	>1.0	F	Wash Co, Hillsboro
32	Cornelius Pass Rd @ Jacobson Rd	Overall	Not analyzed in AM Peak Hour		>1.0	D	ODOT, Wash Co
35	Cornelius Pass Rd @ US26 WB Ramps	Overall	>1.0	F	>1.0	F	All
36	Cornelius Pass Rd @ US26 EB Ramps	Overall	0.78	B	0.87	B	ODOT
37	Cornelius Pass Rd @ Evergreen Pkwy	Overall	0.94	E	>1.0	F	Wash Co, Hillsboro
34	Cornelius Pass Rd @ Wagon Way	Overall	Not analyzed in AM Peak Hour		>1.0	E	Wash Co, Hillsboro

For intersection approaches NB = northbound, SB = southbound, EB = eastbound, and WB = westbound. At the intersection approach L = left-turn movement, T = through movement, and R=right-turn movement. Some approaches have shared lanes where two or more travel movements may be permitted as indicated with a slash.

Notes:

1. **Shaded** results indicate an intersection that fails to meet operational standards. Operational standards for ODOT, Washington County, and the City of Hillsboro can be found in Technical Memorandum #3.
2. The critical movement at a signalized intersection is the overall operation of the intersection. The critical movement at an unsignalized intersection is the stopped (or yield) movement with the worst v/c ratio.
3. "All" indicates the following jurisdictions: ODOT, City of Hillsboro, Washington County.

For the Interchange Management Area, the 2035 Baseline conditions are expectedly worse than existing conditions, with five intersections exceeding operational standards during the AM and/or PM peak hour compared to one intersection under existing conditions. The eastbound and westbound Brookwood Parkway ramp termini would be over capacity and would fail to meet operational standards.

For the IAMP Study Area, 16 intersections would exceed operational standards during the AM and/or PM peak hour compared to six intersections under existing conditions. The westbound ramp terminal at Jackson School Road and the eastbound and westbound Cornelius Pass Road ramp termini would be over capacity and would fail to meet operational standards.

QUEUING

Queuing was evaluated using SimTraffic (a microsimulation tool) at the Jackson School Road interchange, the Cornelius Pass Road interchange, and along Brookwood Parkway/Helvetia Road from Jacobson Road to Evergreen Parkway. **Table 5** illustrates the approach and time period when queuing would be expected to extend into the upstream intersections for the Interchange Management Area and the IAMP Study Area.

Table 5: 2035 Baseline Intersections with Queue Spillback

Intersection with Queue Spillback		Direction & Movement	Peak Period	
			AM	PM
Interchange Management Area				
7	Brookwood Pkwy @ US26 WB Ramps	WBLT	■	■
		NBT		■
8	Brookwood Pkwy @ US26 EB Ramps	EBLT	■	■
		NBT		■
		SBT	■	
9	Brookwood Pkwy @ Meek Rd	EBLTR	■	■
		SBTR	■	
10	Brookwood Pkwy @ Huffman St	EBTR		■
		WBTR	■	
		NBL	■	■
		NBTR	■	
		SBTR	■	
IAMP Study Area				
22	Jackson School Rd @ US26 WB Ramps	WBLT	■	■
23	Jackson School Rd @ US26 EB Ramps	NBR		■
11	Brookwood Pkwy @ Genentech Access	NBTR	■	
12	Brookwood Pkwy @ Evergreen Pkwy	EBTR	■	■
		NBT	■	
35	Cornelius Pass Rd @ US26 WB Ramps	NBT		■
		SBT		■
36	Cornelius Pass Rd @ US26 EB Ramps	NBT		■
		NBR		■

■ = Queue spillback during peak period

NB = northbound, SB = southbound, EB = eastbound, and WB = westbound. At the intersection approach L = left-turn movement, T = through movement, and R=right-turn movement.

For the Interchange Management Area with 2035 Baseline conditions, four intersections would have approaches with queue spillback, and queuing from Brookwood Parkway would extend onto US 26. In addition, southbound queuing along Brookwood Parkway during the AM peak hour would spill back into upstream intersections. The queuing that primarily occurs in the northbound direction and on the minor street approaches of unsignalized intersections at Jacobson Road and Meek Road during the PM peak hour will be addressed through the JTA Project and local projects identified in the IAMP.

For the IAMP Study Area, six intersections would have queuing with spillback into upstream intersections during either the AM and/or PM peak hour. This includes the eastbound and westbound ramp terminals at Jackson School Road and Cornelius Pass Road. During the PM peak hour, the eastbound ramp meters at Jackson School Road and southbound Cornelius Pass Road spill back into upstream intersections. Queuing at these intersections will not be addressed in the IAMP.

FREEWAY OPERATIONS

US 26 within the IAMP Study Area (between the Jackson School Road interchanges and the Cornelius Pass Road interchange) would operate within ODOT standards except for the westbound diverge to Brookwood Parkway/Helvetia Road during the AM peak hour. This segment is forecast to operate at a v/c ratio of 1.09, resulting in slowing and congestion on the mainline affecting all travel lanes.

SAFETY AND ACCESS MANAGEMENT DEFICIENCIES

The Baseline operations analysis reveals several long-term traffic safety issues that need consideration. Long delays and extensive queues may cause drivers to engage in riskier actions, such as running lights or traveling longer distances in the two-way left-turn lane to go around queues, which could result in more turning, angle, and sideswipe collisions. On unsignalized side streets, longer delays may increase the likelihood that drivers would accept shorter gaps in the mainline traffic, putting them at risk for turning or angle collisions.

US 26 westbound exit ramp: Congestion at the Brookwood/Helvetia westbound ramp terminal with US 26 will impact overall freeway operations, which could result in more rear-end and sideswipe collisions. Where congestion is expected to worsen, current safety concerns as well as new safety concerns (especially queuing backing onto US 26) would be exacerbated. This causes the diamond interchange to fail and is one of the prime motivations for the JTA Project.

Eastbound entrance ramp: Queuing for the eastbound entrance ramp could potentially cause conflicts with northbound through movements on Brookwood Parkway.

Jacobson Road: This intersection does not meet minimum interchange access spacing standards and will not meet operational standards.

Meek Road/Brookwood Parkway: This intersection does not meet minimum interchange access spacing standards and the current sight distance is inadequate considering the speed on Brookwood Parkway. In addition, the intersection will not meet operational standards and will experience queue spillback during the peak period. Longer delays may increase the likelihood that drivers would accept shorter gaps in the mainline traffic, putting them at risk for turning or angle collisions.

Groveland Drive: This intersection does not meet minimum interchange access spacing standards and the current sight distance is inadequate considering the speed on Brookwood Parkway.

Bicycle and Pedestrian Access: Inadequate bicycle and pedestrian facilities crossing US 26 could cause potential conflicts with vehicles and other modes attempting to use the interchange.

FUTURE 2035 BUILD CONDITIONS

LAND USE

The land use assumptions for the 2035 Build conditions are the same as for the Baseline.

TRANSPORTATION NETWORK

Within the Interchange Management Area, the 2035 Build scenario assumes that in addition to the city and county TSP projects, the JTA Project is constructed and that Jacobson Road is realigned to the north to improve access spacing between the new JTA interchange and Jacobson Road.

THE JTA PROJECT

The JTA Project will address existing operation and safety issues and address anticipated future travel demand in North Hillsboro. These improvements are directed at enabling job development of the employment areas within the City of Hillsboro. The JTA-funded interchange improvements include:

- The westbound-to-southbound loop ramp on US 26 and an additional travel lane southbound across the Brookwood/Helvetia overcrossing of US 26 will alleviate the safety issue along US 26 at the westbound exit ramp.
- Intersection and storage improvements for the US 26 eastbound entrance ramp will provide more storage for vehicles entering the freeway and reduce potential conflicts on Brookwood Parkway.
- Improved bicycle and pedestrian facilities will reduce conflicts between modes.
- Jacobson Road will be realigned to the north to improve access spacing between the new JTA interchange and Jacobson Road.

Figure 10 shows the JTA project map and **Figure 11** shows the JTA cross section.

IMPROVEMENTS TO SUPPORT THE JTA PROJECT

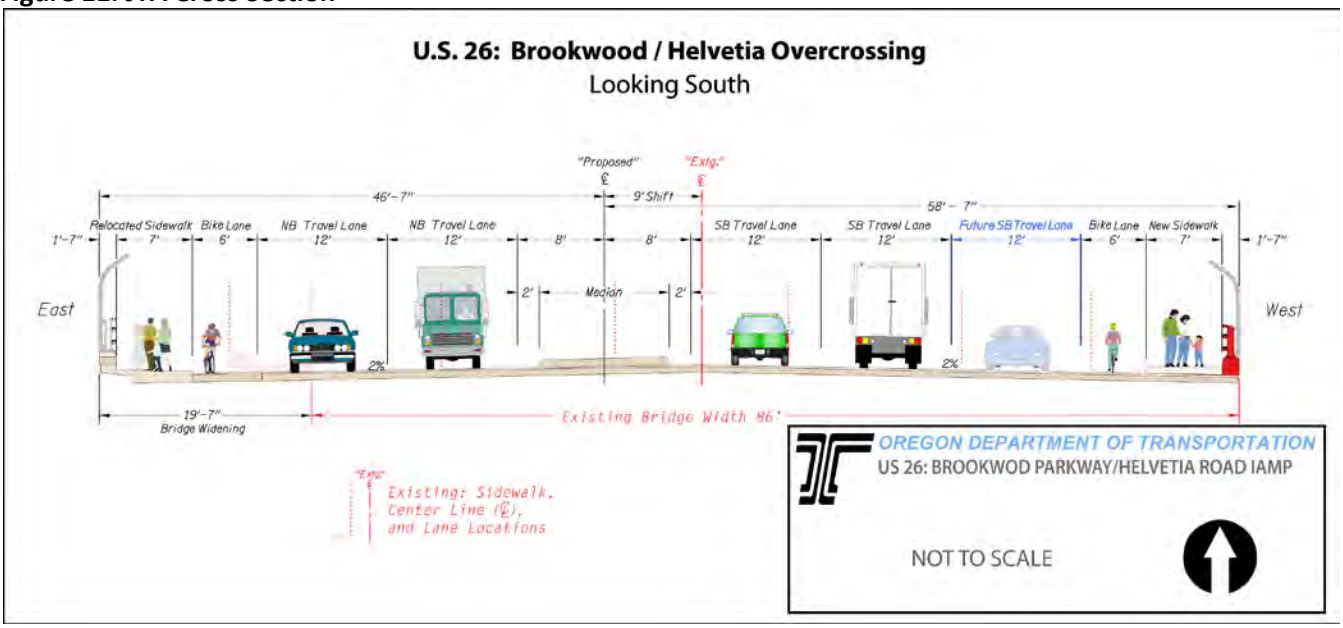
In addition, four road improvement projects are necessary to support the JTA Project within the Interchange Management Area:

- **Brookwood Parkway:** The new interchange loop ramp requires three lanes southbound to accommodate the amount of traffic expected to use the interchange in the AM peak period and to access industrial lands. Three lanes northbound from Evergreen Road to the eastbound US 26 ramp terminal will provide storage for vehicles entering US 26 eastbound in the PM peak period and reduce potential conflicts on Brookwood Parkway.
- **253rd Avenue (Meek Road):** 253rd Avenue will be widened to three lanes with bike lanes and sidewalks from Evergreen Road to Meek Road to provide an alternate route once Meek Road is cut off from Brookwood Parkway due to interchange spacing standards and safety concerns. It will also provide access to industrial lands and a parallel route to Brookwood Parkway.
- **Groveland Drive Realignment:** In order to improve safety and meet access spacing standards, Groveland Drive is to be reconnected to Helvetia Road across from Schaaf Road. The loop ramp precludes Groveland Drive from connecting at the current location. Schaaf Road is the southernmost practical connection point that avoids the grove of trees and the floodplain in the northwestern quadrant of the interchange.
- **Huffman Street East of 253rd Avenue:** Huffman Street is required to access undeveloped industrial land within the UGB and provide a parallel route to Evergreen Parkway. Five lanes will be needed on Huffman Street between Brookwood Parkway and 253rd Avenue to accommodate traffic accessing the industrial lands while preserving capacity for through movements. Huffman Street, in combination with the 253rd Avenue extension, provides an alternate route once Meek Road is disconnected from Brookwood Parkway due to

interchange spacing standards and safety concerns.

Figure 10. JTA Project Map

Figure 11. JTA Cross Section



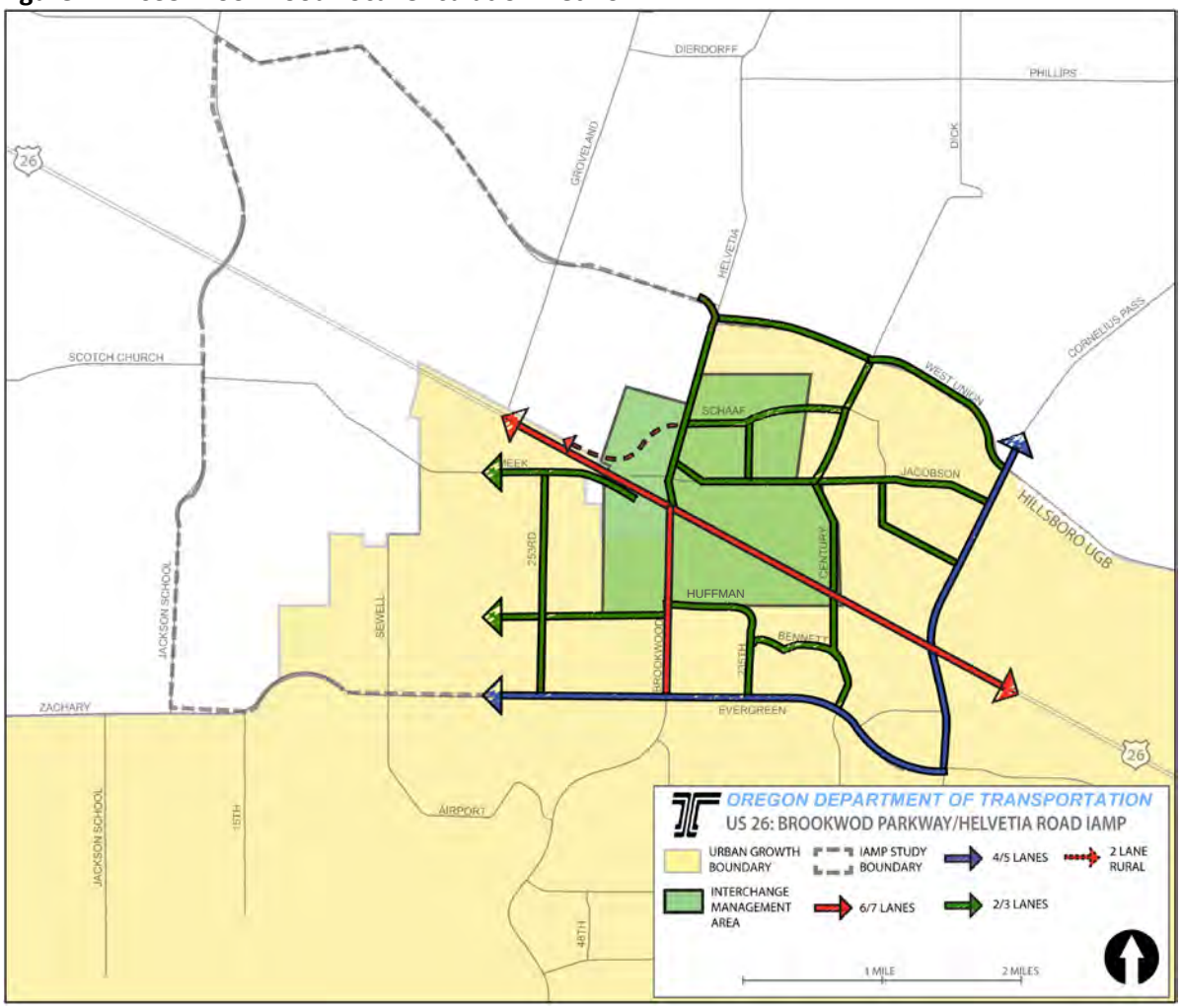
LOCAL STREET CONNECTIONS

The following projects were identified in local TSPs and concept plans. ODOT, Washington County, and the City of Hillsboro will continue to work in partnership in planning for future road improvements to address the traffic safety and access issues in the vicinity of the US 26: Brookwood Parkway/Helvetia Road interchange. Projects not addressed as part of the JTA-funded interchange improvements or through excess JTA funding will be further evaluated in the updates to the Washington County and City of Hillsboro TSPs. Local projects are:

- **Huffman Street West of 253rd Avenue:** Huffman Street west of 253rd Avenue is needed to access industrial lands and provide a parallel route to Evergreen Parkway.
- **264th Avenue:** 264th Avenue is needed to provide a parallel local route to Jackson School Road and to access industrial lands.
- **Schaaf Road:** Schaaf Road east of Helvetia Road is needed to access industrial lands and to provide a parallel route to Jacobson Road, and will extend to connect to Century Boulevard.
- **Connector Road:** A new connector road will connect Jacobson Road to Schaaf Road northeast of the interchange.
- **Century Boulevard:** A new overpass will connect Century Boulevard from Evergreen Parkway to Jacobson Road, Schaaf Road and West Union Road.

Figure 12 illustrates the proposed local circulation system to accommodate the future 2035 traffic projections within the IAMP Study Area. This proposed system allows for the east/west movement of traffic to the future development areas with the City's UGB areas and provides a new north/south crossing of US 26 at Century Boulevard. This will allow north/south traffic to cross US 26 without having to use the interchanges at Brookwood Parkway and Cornelius Pass Road.

Figure 12. 2035 Brookwood Local Circulation Network



TRAFFIC VOLUMES

Future Build traffic volumes for the IAMP Study Area were forecast based on the adopted City of Hillsboro and Washington County TSPs and the RTP. Planned population growth and expected land uses, based on locally adopted comprehensive plans, resulted in an average vehicular growth rate from 2011 to 2035 of approximately 50 percent for the AM peak hour and approximately 45 percent for the PM peak hour. Traffic volume growth varies throughout the IAMP Study Area, with some intersections experiencing a minimal growth of approximately 2 percent. Intersections near areas of intense lane use changes have forecasted traffic volumes that are more than double existing traffic volumes.

INTERSECTION OPERATIONS

Traffic operations were evaluated at all 39 IAMP Study Area intersections during the PM peak hour and at 17 key AM peak hour intersections as analyzed under the Baseline scenario. **Figure 13** illustrates the IAMP Study Area intersections. Intersections shaded in red show intersections that fail to meet operational standards in the AM and/or PM peak hour.

Table 6 summarizes the intersections that exceed operational standards for ODOT, City of Hillsboro, or Washington County for the 2035 Build scenario.

Figure 13. 2035 Build Peak Hour Intersection Operations

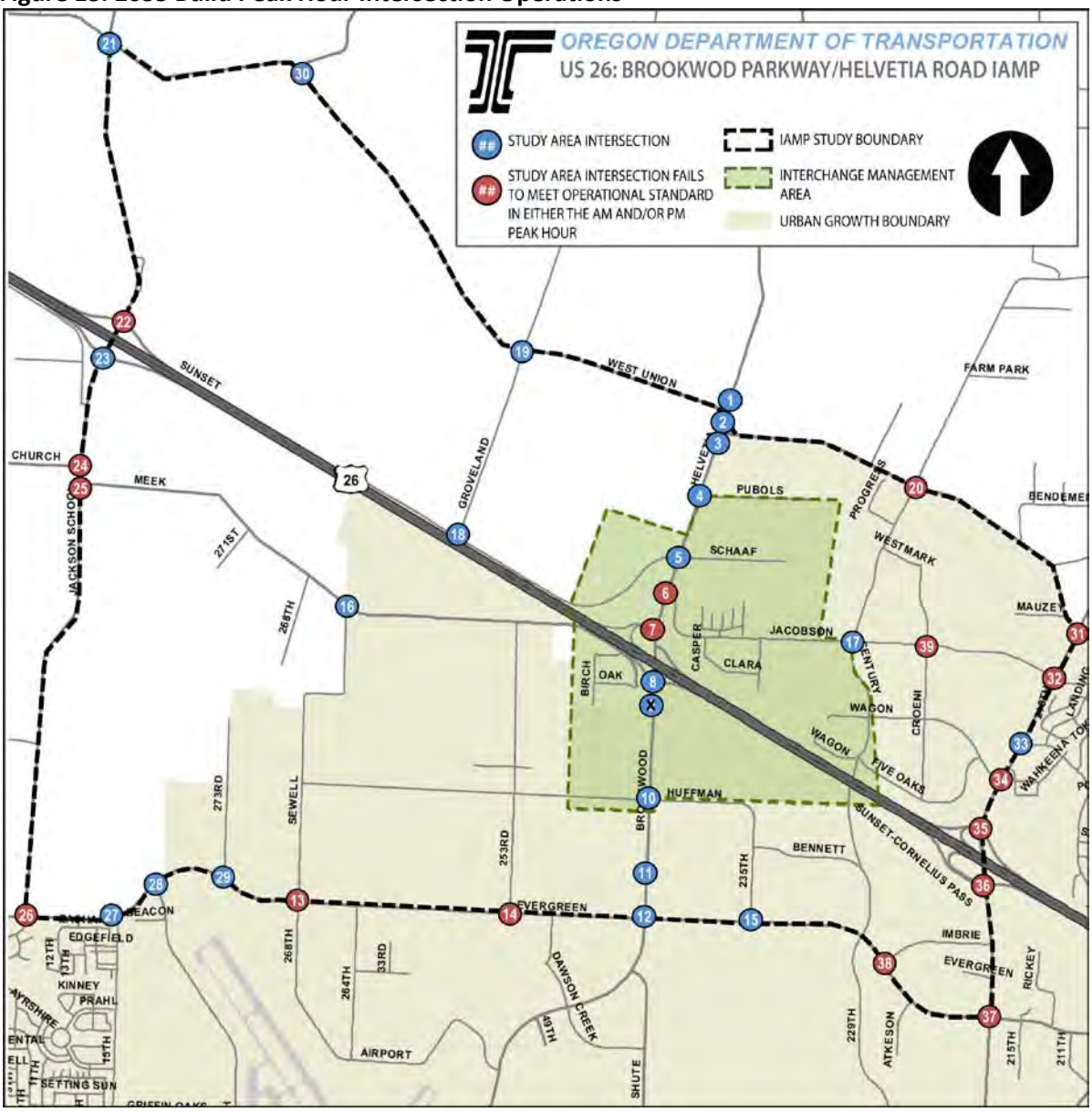


Table 6. 2035 Build Intersections Where Operational Standards Are Not Met[1]

	Intersection	Critical Movement[2] AM (PM)	AM		PM		Jurisdiction Where Operational Standard Not Met[3]
			V/C Ratio	LOS	V/C Ratio	LOS	
Interchange Management Area							
6	Helvetia Rd @ Jacobson Rd	WB L (WB L)	0.18	C	>1.0	F	All
7	Brookwood Pkwy @ US26 WB Ramps	Overall	0.97	C	0.58	A	ODOT
IAMP Study Area							
22	Jackson School Rd @ US26 WB Ramps	Overall	>1.0	F	>1.0	F	All
24	Jackson School Rd @ Scotch Church Rd	(EB L/R)	Not analyzed in AM Peak Hour		>1.0	F	Wash Co, Hillsboro
25	Jackson School Rd @ Meek Rd	(WB L/R)	Not analyzed in AM Peak Hour		>1.0	F	Wash Co, Hillsboro
26	Jackson School Rd @ Evergreen Pkwy	Overall	>1.0	E	>1.0	F	Wash Co, Hillsboro
13	Sewell Rd @ Evergreen Pkwy	(SB L)	Not analyzed in AM Peak Hour		>1.0	F	Wash Co, Hillsboro
14	253rd Ave @ Evergreen Pkwy	(SB L)	Not analyzed in AM Peak Hour		>1.0	F	Wash Co, Hillsboro
20	Century Blvd @ West Union Rd	(SB L/T/R)	Not analyzed in AM Peak Hour		>1.0	F	Wash Co, Hillsboro
39	Croeni Rd @ Jacobson Rd	(SB L)	Not analyzed in AM Peak Hour		>1.0	F	Wash Co, Hillsboro
38	229th Avenue @ Evergreen Pkwy	Overall	1.00	F	>1.0	F	Wash Co, Hillsboro
31	Cornelius Pass Rd @ West Union Rd	Overall	>1.0	F	>1.0	F	Wash Co, Hillsboro
32	Cornelius Pass Rd @ Jacobson Rd	Overall	Not analyzed in AM Peak Hour		>1.0	E	ODOT, Wash Co
35	Cornelius Pass Rd @ US26 WB Ramps	Overall	>1.0	F	>1.0	E	All
36	Cornelius Pass Rd @ US26 EB Ramps	Overall	0.74	A	0.88	B	ODOT
37	Cornelius Pass Rd @ Evergreen Pkwy	Overall	0.88	D	>1.0	F	Wash Co, Hillsboro
34	Cornelius Pass Rd @ Wagon Way	Overall	Not analyzed in AM Peak Hour		>1.0	D	ODOT, Wash Co

For intersection approaches NB = northbound, SB = southbound, EB = eastbound, and WB = westbound. At the intersection approach L = left-turn movement, T = through movement, and R=right-turn movement. Some approaches have shared lanes where two or more travel movements may be permitted as indicated with a slash.

Notes:

1. **Shaded** results indicate an intersection that fails to meet operational standards. Operational standards for ODOT, Washington County, and the City of Hillsboro can be found in Technical Memorandum #4.
2. The critical movement at a signalized intersection is the overall operation of the intersection. The critical movement at an unsignalized intersection is the stopped (or yield) movement with the worst v/c ratio.
3. "All" indicates the following jurisdictions: ODOT, City of Hillsboro, Washington County.

The 2035 Build condition shows improvement from the Baseline condition. The JTA Project and Brookwood Parkway improvements would improve intersection operations near US 26 within the Interchange Management Area. All intersections analyzed within the Interchange Management Area are forecast to meet operational standards with the exception of two intersections. The Brookwood Parkway at US 26 westbound ramp terminal would operate with a v/c ratio of 0.97 during the AM peak hour, which exceeds the OHP standard of 0.85. Even though the westbound ramp terminal is forecast to exceed the OHP v/c standard, the Brookwood interchange ramp terminals would not impact US 26 operations as they are forecast to under the Baseline scenario. Under Build conditions, the ramp terminals will operate at an overall intersection LOS C or better during the AM and PM peak hours and will improve safety. The proposed intersection design will maintain safe stopping sight distance for all off-ramps under the forecast 2035 traffic volumes.

In addition to the westbound ramp terminal, Helvetia Road at Jacobson Road will not meet operational standards during the PM peak hour. Similar to the Baseline condition, vehicles turning left from Jacobson Road would experience long delays waiting for gaps in traffic on Helvetia Road. A future project connecting Jacobson Road to Schaaf Road east of Helvetia Road will lead to the conversion of Jacobson Road at Helvetia Road to right-in/right-out and reroute left-turning traffic to the intersection of Schaaf Road at Helvetia Road. It is assumed that this intersection would be signalized and, once signalized; this intersection will be able to accommodate the additional left-turning traffic.

Within the IAMP Study Area, many of the same intersections that failed to meet operational standards under the Baseline scenario would also fail to meet them under the Build scenario. With the Build scenario, 15 intersections would fail to meet operational standards compared to 16 intersections that would fail to meet operational standards with the Baseline scenario.

For intersections that fail to meet City of Hillsboro, Washington County, or ODOT standards, improvements may be pursued by the jurisdictions that would result in these intersections operating below the appropriate standards. Improvements may include (but are not limited to) signalizing intersections, optimizing signal timing, providing protected turn movements, adding turn lanes, adding through lanes and/or additional ramp meter storage. These improvements will be addressed in local TSPs.

OPERATIONAL JUSTIFICATION FOR IMPROVEMENTS THAT SUPPORT THE JTA

The proposed improvements in the IAMP Study Area will allow Brookwood Parkway and the intersection of Brookwood Parkway at Huffman Street to operate within operational standards. Under the 2035 Build conditions, Brookwood Parkway is expected to have an Average Daily Traffic (ADT) of 38,500 vehicles, which would result in peak period/peak direction demand of approximately 2,600 vehicles and would require three lanes of traffic in each direction. Huffman Street is estimated to have an ADT of 18,000 vehicles and a peak period/peak direction volume of approximately 1,500 vehicles. This will require two lanes in each direction on Huffman Street.

In addition, the turn lanes required at the intersection Brookwood Parkway and Huffman Street will allow the intersection to meet operational standards. Under 2035 Baseline conditions, the intersection of Brookwood Parkway at Huffman Street would be operating at a LOS F with a v/c ratio greater than 1.0, resulting in long queues along both Brookwood Parkway and Huffman Street. The proposed improvements to the intersection of Huffman Street with Brookwood Parkway under the build scenario would result in an LOS of D and a v/c ratio of 0.99. These will meet the City of Hillsboro and Washington County operational standards.

The following projects are justified based on need for access to industrial lands or as an alternative to a closed access near the Brookwood interchange and not based on operational needs:

- 253rd Avenue north of Evergreen Parkway
- Groveland Drive realignment
- Huffman Street east of 253rd Avenue
- Huffman Street west of 253rd Avenue
- 264th Avenue
- Schaaf Road

QUEUING

Queuing was evaluated at the Jackson School Road interchange, the Cornelius Pass Road interchange, and along Brookwood Parkway/Helvetia Road from Jacobson Road to Evergreen Parkway. **Table 7** below illustrates the approach and time period when queuing would be expected to extend into the upstream intersections for the Interchange Management Area and the IAMP Study Area.

The only intersection for the 2035 Build scenario within the Interchange Management Area forecast to spill back into an upstream intersection is Brookwood Parkway at Huffman Street during the AM peak hour. The large number of southbound vehicles on Brookwood Parkway requires the majority of the intersection green time each cycle. This results in longer queues on the minor street approaches. Although more traffic would be on Brookwood Parkway (no metering effect at the ramp terminals as is the case under the Baseline scenario), the queuing would not extend into the Brookwood Parkway eastbound ramp terminal. In addition, queue spillback would not occur from the ramp terminals at Brookwood Parkway onto US 26 as forecast under the Baseline scenario.

Table 7. 2035 Build Intersections with Queue Spillback

Intersection with Queue Spillback		Direction & Movement	Peak Period	
			AM	PM
Interchange Management Area				
10	Brookwood Pkwy @ Huffman St	WBT	■	
IAMP Study Area				
22	Jackson School Rd @ US26 WB Ramps	WBLT	■	■
23	Jackson School Rd @ US26 EB Ramps	NBT		■
12	Brookwood Pkwy @ Evergreen Pkwy	EBTR		■
		NBT	■	■
		SBT	■	
		SBR	■	
35	Cornelius Pass Rd @ US26 WB Ramps	NBT		■
		SBT		■
36	Cornelius Pass Rd @ US26 EB Ramps	NBT		■
		SBT		■

■ = Queue spillback during peak period

NB = northbound, SB = southbound, EB = eastbound, and WB = westbound. At the intersection approach L = left-turn movement, T = through movement, and R=right-turn movement.

During the PM peak hour, queuing primarily occurs in the northbound direction and on the minor street approaches of Jacobson Road, Huffman Street, and Evergreen Parkway. The Brookwood Parkway/Helvetia Road eastbound on-ramp spills back from the ramp meter onto Brookwood Parkway under the Build scenario and not the Baseline scenario. This is due to demand (which is similar in both the Baseline and Build scenarios) being able to reach the on-ramp in the Build scenario and not the Baseline scenario. In the Baseline scenario, vehicles are unable to reach the interchange from Meek Road, Huffman Street, and Evergreen Parkway, resulting in northbound Brookwood Parkway queuing extending from the eastbound US 26 ramp meter to south of the Genentech access.

In the IAMP Study Area, two intersections in the AM and five in the PM peak hour would have queuing with spillback into upstream intersections. This is a slight improvement over the Baseline condition, which is forecast to have three intersections in the AM and five intersections in the PM that would have queuing with spillback into upstream intersections.

FREEWAY OPERATIONS

Highway Capacity Software was used to determine freeway operations along US 26 between the Jackson School Road interchanges and the Cornelius Pass Road interchange for the 2035 Build scenario. During the AM and PM peak hours, US 26 within the IAMP Study Area (between the Jackson School Road interchanges and the Cornelius Pass Road Interchange) would operate within the ODOT standards in the OHP. The westbound mainline segment between the Brookwood Parkway/Helvetia Road off-ramps is forecast to operate at v/c ratios of 0.90 and 0.83 for the AM and PM peak hours. This is less than the OHP standard of 0.99.

With the addition of the westbound loop off-ramp to southbound Brookwood Parkway, the v/c ratio for the Build scenario diverge to Brookwood Parkway/Helvetia Road meets the standards, while the single off-ramp under the Baseline scenario is forecast to operate above ODOT standards. Under Build conditions, the westbound off-ramp to northbound Helvetia Road would operate with a v/c ratio of 0.14 and the westbound off-ramp to southbound Brookwood Parkway would operate with a v/c ratio of 0.54. During the PM peak hour, the westbound off-ramp to northbound Helvetia Road would operate with a v/c ratio of 0.07 and the westbound off-ramp to southbound Brookwood Parkway would operate with a v/c ratio of 0.23.

SAFETY

LOCAL NETWORK

The Build scenario operations analysis reveals several long-term traffic safety issues that need consideration. Long delays and extensive queues may cause drivers to engage in riskier actions, such as running lights or traveling longer distances in the two-way left-turn lane to go around queues, which could result in more turning, angle, and sideswipe collisions. On unsignalized side streets, longer delays may increase the likelihood that drivers would accept shorter gaps in the mainline traffic, putting them at risk for turning or angle collisions. Where congestion is expected to worsen, it is safe to assume that current safety concerns would be exacerbated.

HIGHWAY

Congestion at the Brookwood/Helvetia westbound ramp terminal with US 26 under the Build scenario is improved compared to the Baseline conditions, which should result in improved safety on US 26 and US 26 westbound off-ramps.

BICYCLE AND PEDESTRIAN FACILITIES

Washington County has recently completed a Suitability Mapping process as part of its Bicycle and Pedestrian Improvement Prioritization Project. The segment of Brookwood Parkway south of the US 26: Brookwood Parkway interchange scored at a High Level, with Helvetia Road scoring at a Medium Level, indicating areas where bicycle and pedestrian

improvements will likely have the highest impact on the largest number of existing and potential users. The development of the US 26: Brookwood Parkway/Helvetia Road IAMP provides ODOT, Washington County, and the City of Hillsboro with a planning framework to fully consider and plan for future bicycle and sidewalk improvements within and near the Interchange Management Area and extending beyond to the IAMP Study Area.

The JTA-funded Brookwood interchange improvement project includes both bicycle and sidewalk facilities. The interchange redesign will include striped bike lanes and sidewalks on both sides of the bridge structure crossing US 26. The bike lanes and sidewalks will terminate to the north at Jacobson and they will end just south ends of the interchange structure, because bicycle and pedestrian facilities do not currently exist on either Brookwood Parkway to the south or Helvetia Road to the north of the interchange.

Washington County's 2020 Transportation Plan calls for sidewalks and bike lanes on Brookwood Parkway south of the interchange, and newly developed design options add flexibility to the design of these facilities. Sidewalks and bike facilities are also planned for on Helvetia Road adjacent to the urban area north of the interchange; improvements to Helvetia Road sections adjacent to the rural lands would be consistent with rural roadway design standards. Some sidewalk and bike facility improvements would be included with future Helvetia Road improvement projects for the Interchange Management Area, but it is expected that these improvements to the north will be limited to the immediate interchange area. In addition, the City of Hillsboro will include sidewalks and bike lanes in its plans and designs for the North Hillsboro UGB expansion area southwest of the interchange.

INTERCHANGE AREA MANAGEMENT PLAN

This IAMP consists of the interchange function statement, land use assumptions, prioritized transportation and circulation improvement projects, transportation demand management measures, transportation system management measures, and an access management plan.

INTERCHANGE FUNCTION AND CLASSIFICATION

The primary function of the US 26: Brookwood Parkway/Helvetia Road interchange is to serve existing and future industrial and employment uses based throughout North Hillsboro inside the existing UGB. The secondary function is to provide access to the residences in the unincorporated community and local attractions surrounding the interchange.

US 26 (Sunset Highway No. 47) from MP 53.33 to MP 73.81 is classified as part of the National Highway System, a highway of Statewide Importance, Expressway, Freight Route, and federally designated truck route.

The Washington County Transportation System Plan (TSP) 2020 designates US 26 as a freeway, and Brookwood Parkway and Cornelius Pass Road as arterials**.** According to the TSP, arterial streets serve as primary connections to and provide freight movement in support of Principal Arterials. Arterial streets link major commercial, residential, industrial, and institutional areas. Arterials have moderate access control for cross streets and driveways.

LAND USE ASSUMPTIONS

Interchange improvements are consistent with City of Hillsboro land use and transportation plans and regulations. Other amendments to the Hillsboro Comprehensive Plan, TSP, or zoning and subdivision ordinances and the Washington County Comprehensive Framework Plan, Community Plans, 2020 Transportation Plan, and Community Development Code are not necessary. The City of Hillsboro has undertaken extensive planning efforts in the Interchange Management Area and adopted the North Hillsboro Industrial Area Community Plan.

ODOT is relying on the currently adopted plans, policies, and codes to ensure that the land uses within the Interchange Management Area remain supportive of the function of the interchange (see **Appendix A**). The City of Hillsboro and Washington County participated in the preparation of the IAMP. The IAMP assumes that, within the Interchange Management Area, the City of Hillsboro and Washington County will maintain their respective:

- Current land use designations with current uses and densities;
- Plan and code amendment processes;
- Requirements for traffic impact studies; and
- Processes for notification to ODOT regarding land use actions that may affect state transportation facilities.

This IAMP assumes that the City of Hillsboro either will retain the current comprehensive plan and zoning designations and code provisions that the IAMP relies on to protect the performance of the US 26: Brookwood Parkway/Helvetia Road interchange, or that the City of Hillsboro will notify ODOT and jointly undertake an evaluation of impacts to the interchange and potentially amend the IAMP if it proposes to change designations. The Hillsboro Comprehensive Plan (Ordinance No. 2793-4-77, approved April 5, 1977, and amended through March 2012), the Zoning Ordinance Volume I (No. 1945), and Subdivision Ordinance (No. 2808) maintain a variety of zoned uses within the Interchange Management Area. Changes to the current plan designations, zoning, and development standards could dramatically affect the number of trips generated, trip patterns, and traffic volumes at intersections and the interchange. Should these occur, traffic operations at the interchange could approach capacity more rapidly than anticipated, shortening the life of the new interchange and hastening the need for costly investments for additional interchange improvements.

Since provisions of the Hillsboro Comprehensive Plan and Washington County Comprehensive Framework Plan for the Urban Area, the West Union Community Plan, and Rural/Natural Resource Plan and the city and county zoning and subdivision ordinances are adopted by reference into this IAMP, ODOT has the ability to review and weigh in on proposed amendments to plans and codes, before their adoption by the City of Hillsboro and Washington County, to ensure that any changes to these land uses avoid development that would unacceptably jeopardize the achievement of the goal and objectives of the IAMP.

Applicable provisions of the following City of Hillsboro and Washington County plans and codes are adopted by reference into this IAMP:

- The Hillsboro Comprehensive Plan designations within the Interchange Management Area, as shown on the adopted Hillsboro Area General Plan Map and described in the Hillsboro Area General Plan.
- Washington County West Union Community Plan and Rural/Natural Resource Plan designations within the Interchange Management Area, as shown on the maps and described in the plans.
- The City of Hillsboro and Washington County land use and zoning designations within the Interchange Management Area, as shown on the adopted maps (see **Figure 4** and described, defined, and regulated in the City of Hillsboro Development Code and Washington County Community Development Code.

PRIORITIZED TRANSPORTATION AND CIRCULATION IMPROVEMENT PROJECTS

The transportation improvement projects within the IAMP Study Area have been tiered based on their support of and importance for the Brookwood interchange. This tiering was reviewed at a public open house and then approved by the PAC to prioritize local road network projects near the interchange. The Partnering Agreement stipulates that excess funding not needed for the current JTA Project will be transferred to Washington County or City of Hillsboro as appropriate based upon roadway improvement jurisdiction. This excess JTA funding will be used to fund some of the local road improvements that support the improved interchange.

PRIORITIZATION PROCESS

Throughout the IAMP process the PMT and the PAC developed and revised the project priority list. PAC Meeting #2 was focused on discussing and prioritizing potential transportation improvements in the area. Project management team members prepared and presented maps that displayed the City of Hillsboro and Washington County identified improvements as a starting point. PAC members provided input on the maps during the meeting and also provided additional comments later. The PAC agreed that improvements are meant to open up access to industrial land within the city of Hillsboro and also improve interchange performance.

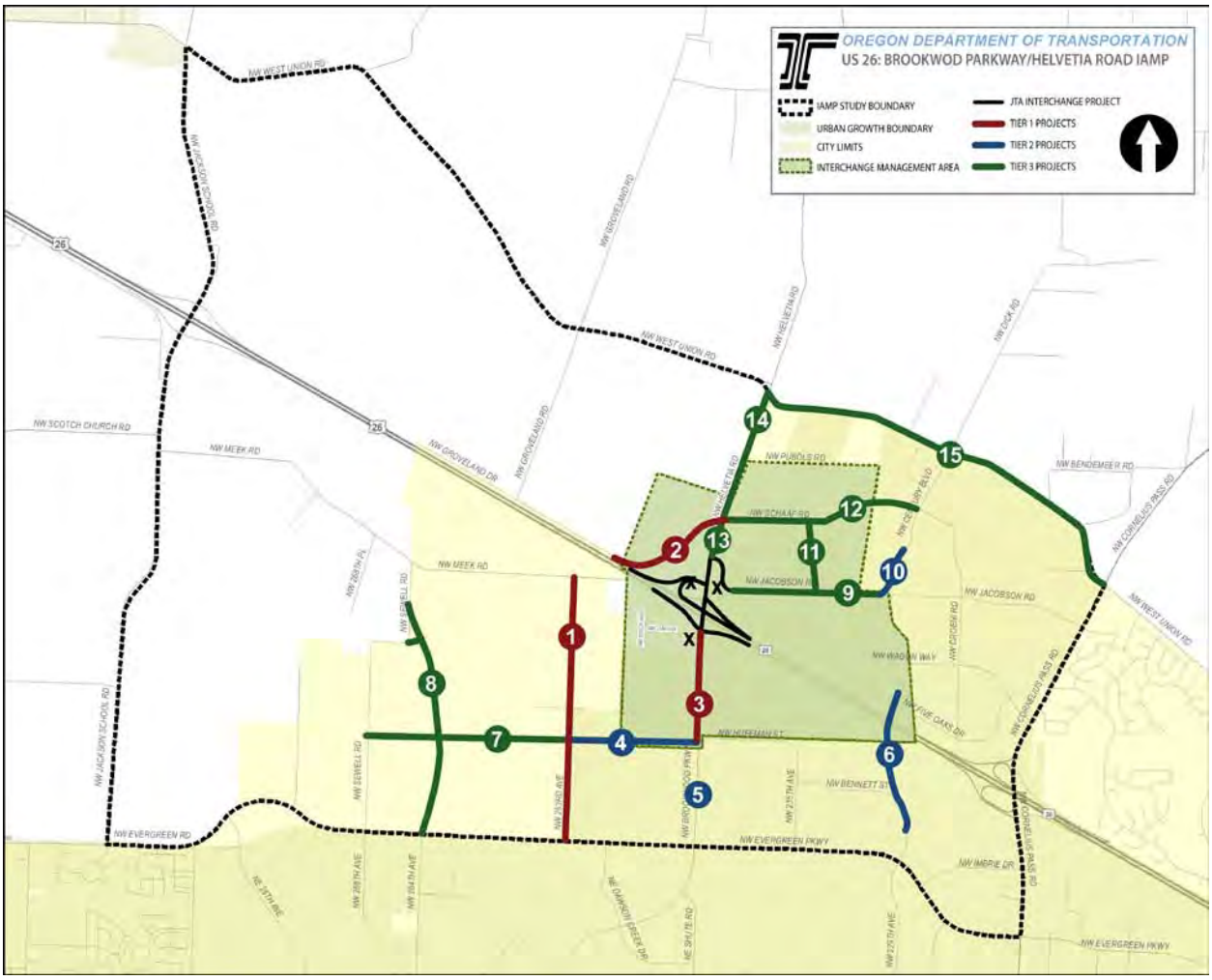
The project management team developed the tiers based on input from PAC Meeting #2 and Open House #1. At PAC Meeting #3 on April 13, 2012, the project management team discussed the reasoning behind the proposed tiers. At the conclusion of PAC Meeting #3, all PAC members present except for one member generally agreed the recommended tiers were appropriate based on public and technical input.

Table 8 lists and **Figure 14** shows the tiering of projects to support the interchange. These priorities relate to the Interchange Management Area and the JTA Project. Some of the tiered projects in the immediate vicinity of the interchange may be addressed in the short term if excess funding from the JTA interchange improvement project is available. Washington County and the City of Hillsboro will have responsibility for planning and scheduling future local roadway improvements near the interchange during the planning horizon.

Table 8. Proposed IAMP Improvement Projects

	Map / Project #	Project Name	Washington County Functional Classification	Project Location	Project Description
Tier 1 Projects	1	253rd Avenue	Collector (proposed)	Evergreen Road to Meek Road (outside city limits; inside UGB)	Construct three lanes with bike lanes and sidewalks
	2	Groveland Drive Realignment	Local street	Helvetia Road to Groveland Drive (outside UGB)	Construct two-lane rural connector
	3	Brookwood Parkway	Arterial	Huffman Street to US 26 eastbound ramp terminal	Widen to three lanes northbound and three lanes southbound and construct with bike lanes and sidewalks
Tier 2 Projects	4	Huffman Street	Collector (proposed)	Brookwood Parkway to 253rd Avenue (outside city limits; inside UGB)	Construct five lanes with bike lanes and sidewalks
	5	Brookwood Parkway	Arterial	Evergreen Parkway to Huffman Street	Widen to three lanes northbound and three lanes southbound and construct with bike lanes and sidewalks
	6	231st Avenue/ Century Boulevard	Collector	Bennett Street to West Union Road	Construct two-/three-lane US 26 overpass with bike lanes and sidewalks, connecting existing segments
	10	Century Boulevard	Collector	Jacobson Road and Century Boulevard	Construct three-lane roadway with bike lanes and sidewalks
Tier 3 Projects	7	Huffman Street	Collector (proposed)	253rd Avenue to Sewell Road (outside city limits; inside UGB)	Construct three lanes with bike lanes and sidewalks
	8	264th Avenue	Collector (proposed)	Evergreen Road to Meek Road (outside city limits; inside UGB)	Build three lanes with bike lanes and sidewalks
	9	Jacobson Road	Collector	Jacobson Road at Helvetia Road	Widen and add bike and pedestrian facilities
	11	Jacobson Road to Schaaf Road	Collector	Jacobson Road to Schaaf Road	Construct three-lane roadway with bike lanes and sidewalks
	12	Schaaf Road	Collector (proposed)	Helvetia Road to Century Road	Construct three-lane roadway with bike lanes and sidewalks
	13	Helvetia Road	Arterial	Jacobson Road to Schaaf Road	Construct three-lane roadway with bike lanes and sidewalks
	14	Helvetia Road	Arterial	Schaaf Road to West Union Road	Construct three-lane roadway with bike lanes and sidewalks
	15	West Union Road	Collector	Helvetia Road to Cornelius Pass Road	Construct three-lane roadway with bike lanes and sidewalks

Figure 14. Proposed IAMP Improvement Projects



TIER 1 PROJECTS

253rd Avenue (project 1). 253rd Avenue will be constructed to three lanes with bike lanes and sidewalks from Evergreen Road to Meek Road to provide an alternate route once Meek Road is cut off from Brookwood Parkway due to interchange spacing standards and safety concerns. It will also provide access to industrial lands and provide a parallel alternate route to Brookwood Parkway.

Groveland Drive Realignment (project 2). Groveland Drive needs to be realigned to improve safety and meet access spacing standards. Groveland Drive is to be reconnected to Helvetia Road across from Schaaf Road. The new westbound-southbound US 26 loop ramp precludes Groveland Drive connecting at the current location. Schaaf Road is the southernmost practical connection point that avoids the grove of trees and floodplain in the northwestern quadrant of the interchange.

The JTA interchange project removes the Groveland Drive connection to Helvetia Road. ODOT, Washington County, and the City of Hillsboro explored a wide range of options to reconnect or reroute Groveland Drive (see **Table 9**). Using engineering judgment and public comments the following options were analyzed and rejected.

Table 9. Groveland Drive Realignment Options Considered and Rejected

Options	Property Impacts	Environmental Impacts	Comments
Permanently Close	No property impacts	No environmental impacts	Rejected because of out-of-direction travel and impact to property owners of permanently routing trips on a substandard rural road, including the Rice Rock Museum.
Tunnel	Limited property impacts	Potential environmental and engineering issues	Rejected because of the major engineering impacts and cost factors.
Roundabout	Major property impacts	Major environmental impacts	Rejected because of the major environmental impacts to the oak grove and traffic operations impacts to the interchange.
Realign through the Oak Grove Area	Major property impacts	Major environmental impacts	Rejected because of the major property and environmental impacts to the oak grove.

After the evaluation and consultation, it was determined that the reconnection of Groveland Drive to Helvetia Road was needed to provide access to the surrounding existing rural uses. The realignment of the rural road will follow the Washington County policies and requirements for realignment of an existing rural road in farm land.

Brookwood Parkway (project 3). The new westbound-southbound US 26 loop ramp requires three lanes south between the US 26 interchange and Huffman Street to accommodate the amount of traffic expected to use the interchange in the AM peak period and to access industrial lands. Three lanes northbound will provide storage for vehicles entering eastbound US 26 in the PM peak period.

TIER 2 PROJECTS

Huffman Street (project 4). The IAMP proposes to construct Huffman Street between Brookwood Parkway and 253rd Avenue to five lanes to accommodate future growth in the North Hillsboro Area. Huffman Street is required to access undeveloped industrial land within the UGB and provide a parallel route to Evergreen Parkway. Five lanes will be needed on Huffman Street between Brookwood Parkway and 253rd Avenue to accommodate traffic accessing the industrial lands while preserving capacity for through movements on Brookwood Parkway.

Brookwood Parkway (project 5). The IAMP proposes to widen Brookwood Parkway to three lanes with bike lanes in each direction between Huffman Street and Evergreen Road. This project is required to accommodate the amount of traffic expected to use the interchange and future growth in the North Hillsboro Area.

231st/Century Boulevard Overcrossing (project 6). This project proposes to construct a two- to three-lane US 26 overpass with bike lanes and sidewalks, connecting existing segments from Bennett Street to West Union Road. This project will provide an alternative route to Brookwood Parkway and Cornelius Pass Road. In addition, it will provide another overcrossing of US 26 between the Brookwood and Cornelius Pass interchanges.

Century Boulevard (project 10). This project would construct a three-lane roadway with bike lanes and sidewalks from Jacobson Road north to the existing road to complete the roadway.

TIER 3 PROJECTS

Tier 3 includes all other City of Hillsboro and Washington County projects that are not included in tiers 1 and 2 (**projects 7** through **9 and 11 through 15**). These project needs and their justification are documented in the Washington

County TSP, City of Hillsboro TSP, or other local community plans.

TRANSPORTATION DEMAND MANAGEMENT MEASURES

Travel Demand Management (TDM) measures are designed to increase the use of commute alternatives, spread the timing of travel, reduce the need to travel, change the routing of Single-Occupant Vehicles and trucks to less congested roadways, and reduce the number of vehicles on the roadway. This is done using strategies that encourage:

- Road users to shift their mode to carpooling, vanpooling, transit, bicycling, and walking programs;
- Road users to shift their time of travel to non-peak periods (e.g., through use of flexible work schedules and off-peak shifts); and
- Telecommuting.

TDM strategies are most effective in areas with high concentrations of employment and where a robust transit system exists. Generally, the strategies are easiest to implement where there are large employers or where a transportation management association has been established to pool the efforts of many smaller employers. These measures are accounted for during the trip-generation and mode-split steps of the four-step process. During trip-generation, the model assumes that all regional centers have TDM measures that are consistent with Metro's 2040 Growth Concept. During the mode-split step, the model is determining whether a road user will make a single-occupant vehicle trip or an alternative mode such as high-occupancy-vehicle, transit, walk, or bicycle.

Goals and policies of the State of Oregon, Metro, Washington County, and the City of Hillsboro contain provisions that embrace TDM measures. Urban areas with populations over 25,000 are required by the Oregon Transportation Planning Rule to address TDM.

Metro's Regional Travel Options program, which has been in place since 2009, looks to reduce car traffic while creating more opportunities for walking, biking, taking transit, and carpooling. The program features a coordinated marketing effort to reach key audiences, an employer outreach program, a regional rideshare program, and a grant program that funds partner efforts. Partnering agencies include but are not limited to ODOT, Washington County, and the Westside Transportation Alliance. Local jurisdictions will continue to work with local business and agencies on implementing TDM in the area.

TRANSPORTATION SYSTEM MANAGEMENT MEASURES

Transportation System Management (TSM) measures are designed to maximize the number of vehicles using the existing transportation facilities, and include:

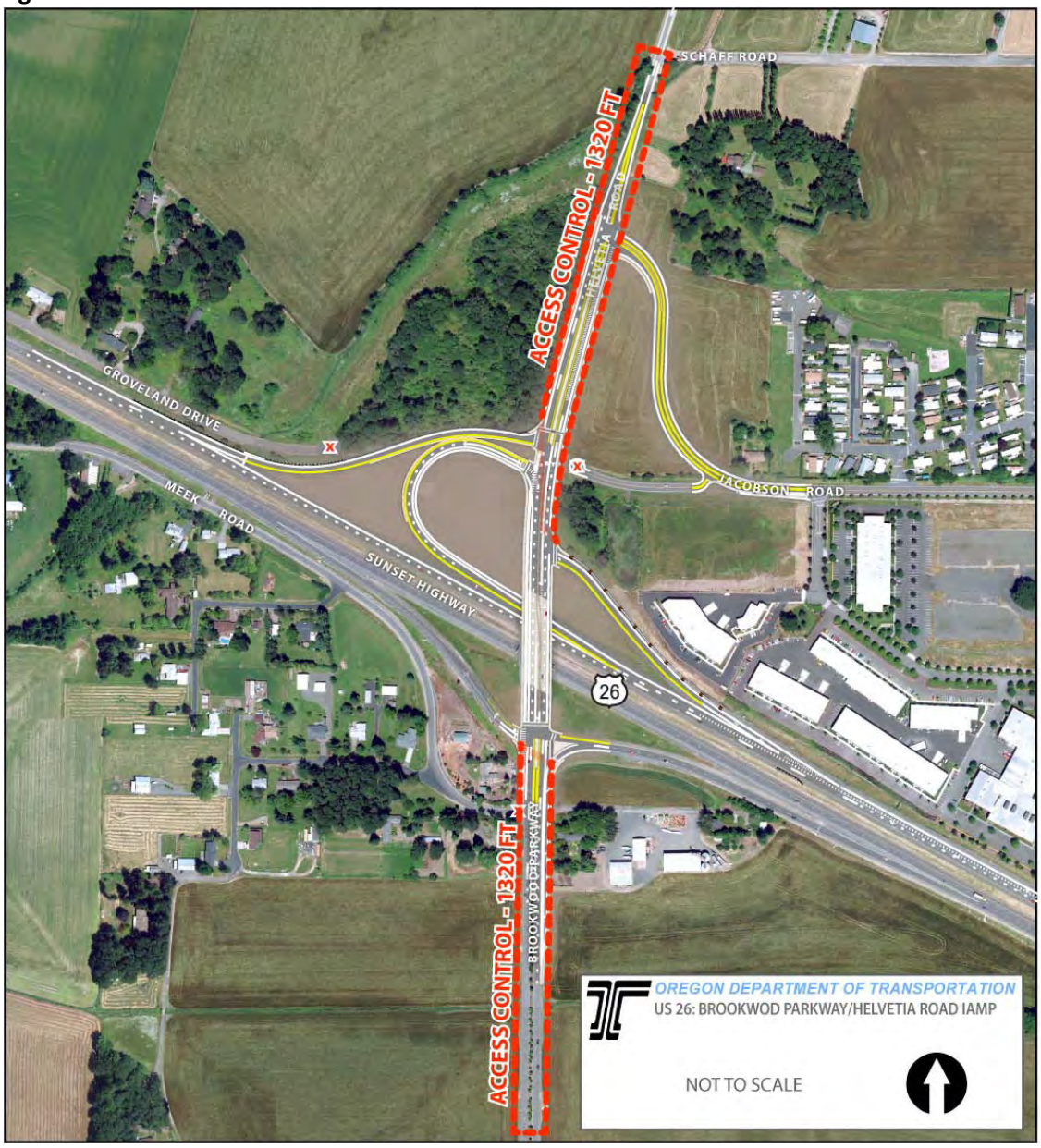
- Traffic engineering measures (such as signal timing changes, provision of turn lanes, turn restrictions, and restriction of on-street parking to increase the number of travel lanes without road widening) that improve the operations and efficiency of streets and intersections;
- System monitoring and traveler information systems (e.g., Intelligent Transportation Systems (ITS), and variable message signs);
- Facility management systems (e.g., ramp meters, special use lanes, and signal priority for special users such as transit); and
- Incident management systems (e.g., incident response and recovery teams).

Components of these TSM measures are in use today and accounted for in the four step process. Ramp meters, turn lanes, and user fees (such as parking costs) are some examples of TSM in the regional travel demand model. Local jurisdictions will continue to monitor, adjust, and implement TSM strategies as needed.

ACCESS MANAGEMENT

ODOT has authority over its state highway facilities and therefore can purchase access control on state highways. ODOT also has the authority to purchase access rights on local roadways within the influence area of intersections or interchanges of highways if it can demonstrate that access to these roadways creates or may result in an adverse effect on the state highway. In addition, local government has authority to manage access on its local roadways. An access management strategy is being prepared for the JTA Project that identifies short-term access management measures for each approach that will be implemented during the construction phases of the JTA Project. As shown in **Figure 15**, ODOT will purchase access control within 1,320 feet from the interchange ramp terminals. Access control means that there will be no right of access between a property abutting the highway and the highway. Per OAR 734-051-4020 (8), Standards and Criteria for Approval of Private Approaches, the access spacing standard for statewide highways with a posted speed of 55 mph is 1,320 feet.

Figure 15. Access Control



The short-term access management measures to be addressed as part of the JTA-funded interchange improvement project include:

- **Jacobson Road:** Closure of the existing roadway connection to Helvetia Road and relocation of the existing connection farther north away from the interchange. This will be constructed as a full intersection as part of the JTA Project. The full intersection will change to a right-in/right-out only when Schaaf Road is constructed to a three-lane facility and Jacobson Road is connected to Schaaf Road (**Project 11**).
- **Meek Road:** Closure of the existing roadway connection to Brookwood Parkway with concurrent new extension of 253rd Avenue from Evergreen Road to Meek Road. The driveway across from Meek Road on Brookwood Parkway will be moved to the south along the property line.
- **Groveland Drive:** Closure of the existing Groveland Drive connection to Helvetia Road north of the interchange and relocation of the existing connection across from Schaaf Road to the north.

IAMP IMPLEMENTATION

The adoption of the IAMP will enable the partner agencies to comply with applicable agency planning requirements and provide for the future planning, development, and management of the transportation system within the IAMP Study Area. The IAMP will be used by ODOT as a planning tool to guide the future planning and management of the interchange that connects to the county and city street systems. The IAMP will be utilized by Washington County and the City of Hillsboro to guide the management and improvements to the local road network in the Interchange Management Area. Specific IAMP implementation actions are detailed below for each partner agency.

ODOT MANAGEMENT ACTIONS

- After the City and County adoption processes, the Oregon Transportation Commission will adopt the US 26: Brookwood Parkway/Helvetia Road IAMP as a transportation facility plan—an amendment to the OHP, per PLA 01, ODOT Transportation Facility Plan Adoption Process.
- ODOT will use the IAMP as a guide in formulating future management decisions regarding the US 26: Brookwood Parkway/Helvetia Road interchange.
- ODOT will continue the partnership with the city and county to guide the implementation of the IAMP.
- ODOT will continue to coordinate with the city and county throughout the UGB expansion process, TSP updates, as well as comprehensive plan and development code amendments and development review process, to ensure the interchange is protected.

CITY OF HILLSBORO MANAGEMENT ACTIONS

- The City of Hillsboro will adopt this IAMP as a refinement plan to its TSP.
- On October 20, 2011, the Metro Council decided to expand the region's UGB, including the 330-acre (358.89 acres including roads and right-of-way) area north of Hillsboro, in the vicinity of NW Meek Road and south of US 26, for the purposes of attracting future large-site industrial employers. After adoption of the IAMP, the City of Hillsboro plans to start the planning process required by Metro's Urban Growth Management Functional Plan Title 11: Planning for New Urban Areas (Metro Code section 3.07) to allow for the future planning and development of the 358.89-acre area. The City of Hillsboro will annex the land areas within the UGB for future industrial land uses.
- Implementation of the local improvement projects shown on **Figure 14** will require the City of Hillsboro to amend the TSP.
    - **Brookwood Parkway (projects #3 and #5).** The new westbound-southbound US 26 interchange loop ramp requires three lanes southbound to accommodate the amount of traffic expected to use the interchange in

the AM to access industrial lands. Three lanes northbound will provide storage for vehicles entering US 26 eastbound in the PM.

- **253rd Avenue (project #1).** 253rd Avenue is required to provide an alternate route once Meek Road is cut off from Brookwood Parkway due to interchange spacing standards and safety concerns. It will also provide access to industrial lands and a parallel route to Brookwood Parkway. (Part of this is outside of the current UGB but within the 330-acre expansion area.)
- **Huffman Street East of 253rd Avenue (project #4).** Huffman Street is required to access undeveloped industrial land within the UGB and provide a parallel route to Evergreen Parkway. Five lanes will be needed on Huffman Street between Brookwood Parkway and 253rd Avenue to accommodate traffic accessing the industrial lands while preserving capacity for through movements.
- **Huffman Street West of 253rd Avenue (project #7).** Huffman Street west of 253rd Avenue is needed to access industrial lands and provide a parallel route to Evergreen Parkway.
- **264th Avenue (project #8).** 264th Avenue is needed to provide a parallel local route to Jackson School Road and to access industrial lands. (Part of this is outside of the current UGB but within the 330-acre expansion area.)
- **New Collector (project #11).** A new collector street is needed to connect Jacobson Road to Schaaf Road.
- **Schaaf Road (project #12)**. Schaaf Road east of Helvetia Road is needed to access industrial lands and provide a parallel route to Jacobson Road.

- The City of Hillsboro will continue to coordinate with ODOT and Washington County in evaluating land use actions (including amendments to the comprehensive plan, TSP, and development code, the UGB expansion, and transportation improvements) that could affect the function of the interchange in order to ensure that coordination is timely and that actions and improvements are consistent with the defined function of the IAMP.

WASHINGTON COUNTY MANAGEMENT ACTIONS

- Washington County will adopt this IAMP by ordinance to its TSP.
- Implementation of the local improvement projects shown on **Figure 14** will require Washington County and the City of Hillsboro to amend their TSPs.
  - **Brookwood Parkway (projects #3 and #5).** The TSP lists the roadway as four to five lanes and classifies it as an arterial, but the proposed improvement is for six lanes. The new westbound-southbound US 26 interchange loop ramp requires three lanes southbound to accommodate the amount of traffic expected to use the interchange in the AM to access industrial lands. Three lanes northbound will provide storage for vehicles entering US 26 eastbound in the PM.
  - Projects listed above under City of Hillsboro (projects #1, 4, 7, 8, 11, and 12).
- **Groveland Drive realignment (project #2).** Groveland Drive is located outside the UGB and is to be reconnected to Helvetia Road.
- Washington County will continue to coordinate with ODOT and the City of Hillsboro in evaluating land use actions (including amendments to the comprehensive plan, TSP, and development code, and transportation improvements) that could affect the function of the interchange in order to ensure that coordination is timely and that actions and improvements are consistent with the defined function of the IAMP.

FUTURE INTERCHANGE DESIGN AND LAND USE CHANGES

- If an alternative interchange design is proposed during design of the JTA Project, additional traffic work would be needed to amend the IAMP. Additional measures would need to be considered, and city and county amendments may be needed.
- If, in the future, the existing land use designations are changed such that they would impact the operation and safety of the interchange, ODOT, the City of Hillsboro, and Washington County shall jointly prepare amendments to the IAMP management actions and prepare an accompanying funding plan to implement those actions.

JTA MEMORANDUM OF UNDERSTANDING

US HWY 26: BROOKWOOD PARKWAY INTERCHANGE IMPROVEMENTS

This ***Memorandum of Understanding*** (MOU) is made and entered into by and between the State of Oregon, acting by and through its Department of Transportation, hereinafter referred to as "ODOT", and the City of Hillsboro, acting by and through its City Council, hereinafter referred to as the "City"; and Washington County, hereinafter referred to as the "County" acting by and through its Board of County Commissioners; collectively referred to as the "Partners". The ***US 26: Brookwood Parkway Interchange Project***, as funded through the Jobs and Transportation Act of 2009, will hereinafter be referred to as the "Project"

I. Purpose

The purpose of this MOU is to memorialize the mutual and shared intent and commitments of the Partners hereby to work collaboratively on the Project. ODOT and the City have worked to obtain funding to improve safety and capacity at and in the vicinity of the US 26: Brookwood Parkway interchange in order to enable jobs and development of currently planned employment land situated at and near the Interchange.

II. Project Management

The Partners intend to participate jointly in planning refinement, the environmental permitting process, as well as construction oversight for the Project improvements identified in Part III of this MOU, including participation in the preparation of an Interchange Area Management Plan (IAMP) for any significant improvements at the interchange. ODOT will lead development of the project. The Partners are encouraged to provide technical advice and input on the design, development and construction of the Project.

III. Project Goals and Deliverables

The Partners will strive to ensure that planning, development and construction approvals required by their respective jurisdictions in order to design and construct the Project will occur through timely, efficient, expedited City, County or ODOT approval processes in order to achieve a seamless transition from Project planning to Project delivery. The Partners will also strive to have open, forthright, timely communications among the Partners throughout Project planning, design and construction.

III.A. Goals for US 26: Brookwood Interchange Project:

The goals of this Project are to develop and implement an Interchange Improvement Project through a collaborative working Partnership and timely Project review processes among the Partners. The Interchange Improvement Project shall achieve the following *US 26: Brookwood Interchange JTA Priorities*:

- To maintain or improve safety and operations in the US 26 project area.
- Increase interchange capacity to meet the needs for current designated industrial lands in the existing adopted comprehensive plan (primary movement WB to SB, secondary movement NB to EB) to the extent feasible.
- Address access management near the Interchange.

The Partners will commence with the design, approvals and construction of the specific Interchange improvements identified below in this MOU.

III.B. JTA Project Purpose

Increase vehicle capacity and facility performance of the West to South movement and north to east access to US 26 at the existing US 26: Brookwood Parkway Interchange within the Legislature JTA budget appropriation for this Project.

JTA Project essentially consists of: 1) the design and construction of needed improvements to Interchange facilities that have been conceptually identified and designed through previous planning work adopted by the City of Hillsboro, and 2) traffic analysis of performance of the Interchange and the other connected roadways before and after construction of the needed Interchange improvements.

III.B.1. "*Base Project*" Interchange Improvements

Specific, "**Base Project**" Interchange improvements associated with Phase I of the Project as referenced in this MOU include the following:

1. Design and construct a westbound to southbound loop ramp on US 26 at Brookwood Parkway;
2. Design and reconstruct the westbound entrance ramp to US 26 ;
3. Design and construct intersection and storage improvements for the US 26 eastbound entrance ramp;
4. Design and construct improved bicycle and pedestrian facilities and an additional travel lane southbound across the Brookwood/Helvetia overcrossing of US 26.

If funding does not materialize as anticipated above, or if unforeseen events increase the cost of construction, the Partners intend to work together diligently and in good faith in a cooperative effort to find funding to cover the deficit or to reduce the work scope to eliminate the deficit, or both.

III.B.2. Interchange Vicinity Local Circulation

During development of the base project, the partners agree to work together to develop an Interchange Area Management Plan (IAMP) that looks at local circulation including evaluating safety and access at Jacobson, Groveland, and Meek

The ***US 26: Brookwood Interchange Area Management Plan*** (IAMP) will be prepared cooperatively by the partners in accordance with the applicable IAMP requirements set forth in ODOT rules and other applicable State policies and procedures, unless its preparation is otherwise waived by the mutual agreement of the Partners and by the appropriate State authority.

III.B.2. Additional Projects and Funding

The following ***Additional Projects*** in the vicinity of the Interchange have been previously identified in local planning efforts. These projects will be further evaluated and prioritized along with other projects identified through the IAMP process:

- Add storage capacity on the EB entrance ramp to 26 and/or Brookwood, so that vehicles do not back up into travel lanes on the County facility and inhibit the NB through movements.
- Effectively serve bicycles and pedestrians.
- Connect Schaff Road to Jacobson (NE of interchange, potential alternate route to Jacobson),
- Realign Meek Road
- Resolve site access at the SE quadrant of interchange.

Should funding remain available, beyond the JTA appropriation funds necessary for completing the Base Project improvements identified in III.B.1 above, the Partners will jointly determine how to prioritize and fund the ***Additional Projects*** improvements to enhance access to and circulation around the industrial property in the vicinity of the Interchange, recognizing that addressing safety issues near the Interchange should be a primary focus of that process. If funds remain available for such local circulation improvements, the IAMP referenced above must be done prior to constructing those local circulation improvements unless IAMP preparation is properly waived by mutual agreement of the Partners and by the appropriate State authority. The planning and design of the local circulation components will be led by the City with ODOT consultation, and will be coordinated with the County. Separate authorization from the County would be required for local circulation improvements in unincorporated areas.

IV. Statement of Partners Acknowledgement and Mutual Intent

The Partners acknowledge that the obligations described in this MOU declare and express their mutual Project intent only, and that the MOU is non-binding. Therefore, by signing this MOU, the Partners commit to a mutual and shared intent to work together to plan, design and construct the Project as generally described in this MOU.

The Partners also acknowledge and understand that, if needed to complete the Project as generally described in this MOU, the Partners intend in good faith to execute needed Cooperative Improvement/Intergovernmental Agreement(s) to address reasonable funding amounts need for potential services that would be provided by the Partners, other than ODOT, as part of this Project or to address Project impacts to facilities, other than ODOT facilities.

This MOU may be executed in counterparts (facsimile or otherwise) which when taken together shall constitute one document for the Partners, notwithstanding that all Partners are not signatories to the same counterpart. All copies of this MOU so executed shall constitute an original.

CITY OF HILLSBORO

By: _____
Jerry W. Willey, Mayor

Date: 8-4-10

Attest: _____
City Recorder

OREGON DEPARTMENT OF TRANSPORTATION

By: _____
Jason Tell, Region 1 Manager

Date: 8/5/10

WASHINGTON COUNTY

By: _____
Andrew Singelakis, Director
Land Use and Transportation

Date: 7/16/10

U.S. 26/Brookwood Parkway Interchange

Interchange Area Management Plan

Draft Partnering Agreement Document

December 16, 2010

The participating agencies agree to the terms of this Partnering Document.

Agreement Partners

- Oregon Department of Transportation (ODOT)
- City of Hillsboro Planning Department
- Washington County Department of Land Use and Transportation (LUT)

Background

The U.S. 26/Brookwood Parkway Interchange is configured as a standard diamond with traffic signals at both ramp junctions (Figure 1). The interchange is currently approaching or exceeding the mobility standards identified in the Oregon Highway Plan (OHP) for this facility. Of primary concern is the heavy westbound off ramp traffic during the AM peak hour heading southbound and the corresponding northbound to eastbound movement in the PM peak and their effects on traffic operations on the U.S. 26 mainline; the surface arterial roadways in the vicinity of the interchange; and the expansion of current and future businesses (and jobs) in the surrounding area that depend on adequate interchange traffic capacity.

Local road connections to Brookwood Parkway and Helvetia Road near the interchange do not meet OHP access spacing standards and the nearness of the local road connections to the interchange make local road access difficult and contribute to traffic congestion at and near the interchange during peak travel times. Traffic at the U.S. 26/Brookwood Parkway Interchange is projected to increase as new industrial development is attracted to North Hillsboro.

U.S. 26 is locally and regionally significant in moving people, goods, and services through North Hillsboro and throughout the metropolitan region and the state. The Brookwood Parkway interchange has been and will continue to serve as a major entry point to large high-tech employment centers based throughout North Hillsboro. The interchange is a critical access point, currently serving the mobility needs of 25,000 employees of the high-tech companies and expected to serve the future expansion of these high-tech companies as well as new companies that locate within North Hillsboro properties added to the Regional Urban Growth Boundary in the future. The interchange serves employee commute trips and truck freight traffic generated by raw material supply and finished product distribution associated with the major industries in North Hillsboro.

Relationship to JTA Project

The Jobs and Transportation Act (JTA) appropriated $45,000,000 for Oregon Department of Transportation (ODOT) to design and construct needed improvements to the interchange to address existing operation and safety issues and to attempt to address anticipated future travel demand.

The City, County and ODOT (Partners) developed a Memorandum of Understanding to memorialize the intentions of the Partners for their collaborative work on the JTA U.S. 26/Brookwood Parkway Interchange Project. The Partners have worked to obtain funding for the U.S. 26/Brookwood Parkway interchange to improve safety and capacity on and in the vicinity of the interchange to enable jobs development of currently planned employment land. The MOU stated that the Partners would participate jointly in the planning, and environmental permitting process, as well as construction oversight for the Project improvements and develop an Interchange Area Management Plan (IAMP) prior to ODOT transferring money to the City or County for associated local street system improvements in the interchange vicinity.

MOU Project Purpose

The MOU was for the Partners to jointly agree on the need to address necessary improvements to the interchange itself within the proposed JTA budget.

The U.S. 26/Brookwood Parkway Project is subject to the MOU which addresses needed improvements that have been identified and developed through previous planning work conducted by the City of Hillsboro, as well as traffic analysis of the interchange and the other connected roadways.

The U.S. 26/Brookwood Parkway JTA Base Project improvements are:

1. Design and construct a westbound to southbound loop ramp on US 26 at Brookwood Parkway;
2. Design and reconstruct the westbound entrance ramp to US 26 ;
3. Design and construct intersection and storage improvements for the US 26 eastbound entrance ramp;
4. Design and construct improved bicycle and pedestrian facilities and an additional travel lane southbound across the Brookwood/Helvetia overcrossing of US 26.

IAMP Purposes

The purposes of the IAMP are to:

- Support the ongoing and future City of Hillsboro and Washington County transportation, land use, and economic development planning efforts in and around the study area described below (North Hillsboro); and

- Protect the future function of the interchange.

The IAMP will integrate state and local transportation facility system planning with land use planning in the area. The land use planning in the area will largely take place through coordinated City and County land use concept planning for the area. The IAMP and such land use concept planning will be closely coordinated.

Coordinated IAMP planning will enable ODOT, the City of Hillsboro, and Washington County to work as partners in the formulation of planning strategies and actions that can guide future improvements to, and operation and management of the U.S. 26 corridor and local roadways within North Hillsboro near the interchange. In addition, the IAMP can provide a baseline of transportation, land use and environmental, and information to support City and County land use and transportation plans for the area. The City of Hillsboro and Washington County will incorporate transportation elements of the IAMP provisions into the Transportation System Plans (TSP), as appropriate.

If land within the IAMP Study Area is added to the Regional UGB in the future, under this Agreement it is the joint intent of ODOT, the County and the City to formulate and carry out policy and/or administrative strategies needed to address OHP and TPR compliance of City or County comprehensive plan and zoning amendments for such land. The Partners agree that the intent of the IAMP is to ease the burden of industrial and employment development in the interchange area consistent with regional and statewide planning and legislative intent of the associated funding.

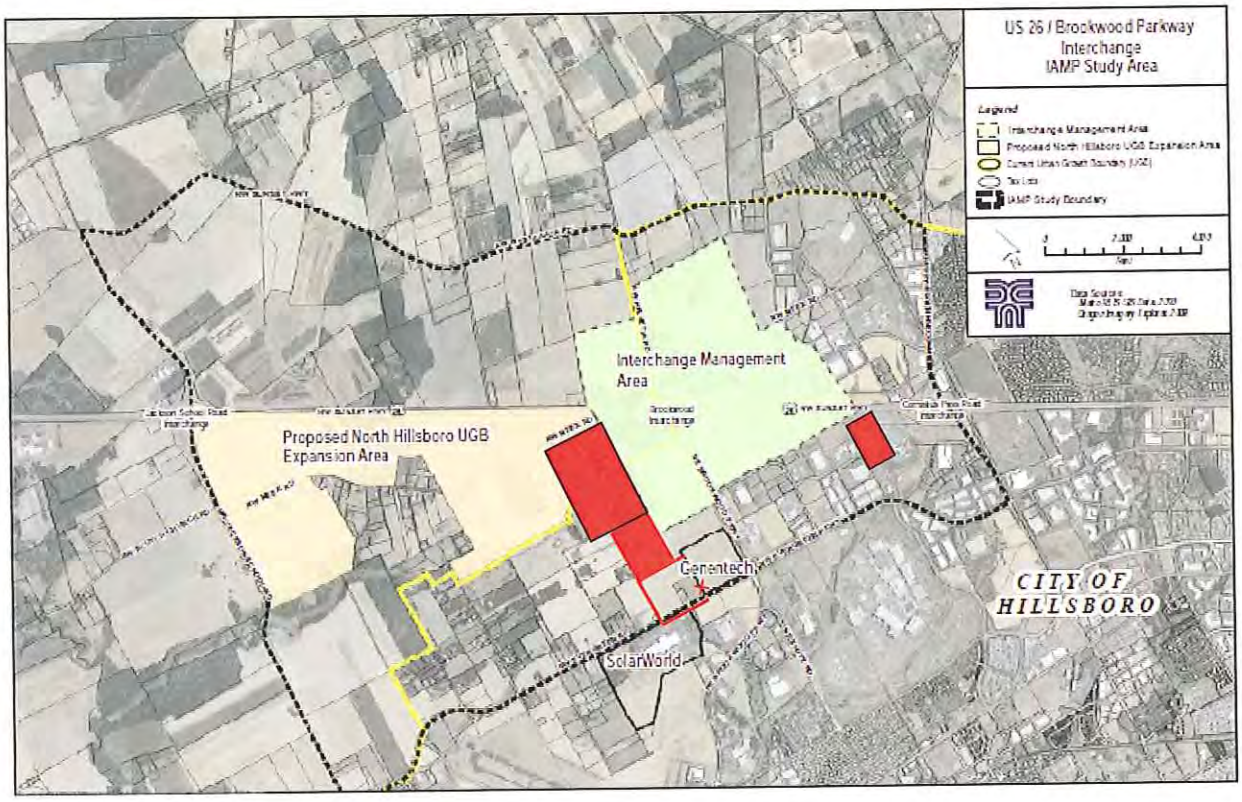
IAMP Study & Plan Boundaries

The IAMP Study Area encompasses land within which information about existing and planned land uses and activities will inform the IAMP planning process. The IAMP Study Area includes a section of the U.S. 26 corridor and the accompanying local road networks serving North Hillsboro. The Study Area includes land encompassed by Cornelius Pass Road on the east, Evergreen Road on the south, and west to Jackson School Road, and West Union Road on the north as shown in Figure 1.

The IAMP Management Area, also delineated in Figure 1, contains the land area included within the formal IAMP Management Area boundary. Land within the IAMP Study Area but located outside the IAMP Management Area is not within the IAMP Management Area boundary and are not subject to the provisions in the IAMP.

This area includes the land within 1,320 feet to the north and south of the interchange ramp terminals, extending beyond Schaaf Road to the North and beyond Huffman Road to the South. To the east and west of the interchange, this boundary will include any area that may be impacted by realignment of an existing facility or planned construction of a new facility.

Figure 1



Goals

- Devise creative and innovative strategies for maintaining regional mobility.
- Improve safety and capacity in the vicinity of the interchange, both to enable jobs development of currently planned employment and to reasonably anticipate impacts of development enabled by future expansions of the Urban Growth Boundary.
- Ensure the project is developed through an effective, efficient, expedited process.

Brookwood Parkway IAMP Priorities shall be, in no particular order, to:

- Maintain or improve safety and operations at the interchange, along U.S. 26, and at other facilities in the vicinity of the interchange project area;
- Identify and address the interchange operation needs associated with current and future industrial land designated in the existing adopted comprehensive plan to the extent feasible;
- Address access safety and management at and near the interchange;

- Address capacity for the interchange EB entrance ramp to U.S. 26, so as to try to avoid vehicles backing up onto the County facility and inhibiting the NB through movements;

- Identify facilities for adequate bicycle and pedestrian circulation in the area;

- Identify the conceptual location of facility realignments or new local road connections near the interchange needed to achieve and support interchange safety and operation; and

- Address long-term access and safety issues and needed changes in alignment and traffic circulation on study area roadways, including Meek Road, Jacobson Road, Schaaf Road and Groveland Road, to support interchange safety and operation.

Partner Project Objectives and Planning Coordination

This section describes Project objectives, resulting products, and planning coordination with other projects.

- Coordinate County and City land use and transportation plans with state highway and local road network improvements designed to address area traffic safety, access, mobility, and local multi-modal connectivity issues and support industrial economic development within the area.

- Seek agreement among ODOT, the County and the City on planning principles and practices and planning tools that will help prevent degradation of long term performance of the U.S. 26/Brookwood Parkway interchange and study area facilities addressed in the IAMP.

- Identify and address existing and anticipated traffic safety and system operations problems and define infrastructure improvements and/or policies to be incorporated into the transportation system plans of the Parties to this Agreement.

- Prepare coordinated ODOT, County, and City long range plans to guide the management and operation of portions of the U.S. 26 corridor and local road networks within the IAMP Management Area and throughout North Hillsboro.

- Produce a scope of work and guiding policy documents that balance social, economic/development, and environmental goals and policies. (e.g. City/County land use and transportation plans, City's Economic Development Strategy.)

- Increase interchange capacity to support full development of planned industrial areas contained within the IAMP Study Area.

Coordination with Other Projects: The process will also track and consider these concurrent and related projects:

- North Hillsboro Industrial Development Strategy;

- Metro Title 11 Urban Reserve Planning;
- City of Hillsboro UGB addition and related Concept Planning efforts;
- Hillsboro and Washington County TSP Updates; and
- McKay Creek Watershed Plan.

Phases

Phase	Description
I. Admin. & Start-Up	Form project team, establish work scope, and shared project assumptions. Hire consultants. Ongoing project management.
II. Public Involvement	Form technical and citizen advisory groups.
III. Definition & Background	Define problem statement, purpose, and goals. Describe related projects.
IV. Existing Conditions	Gather, summarize, and analyze transportation, land use, environmental and urban design background data and existing conditions. Review relevant plans, policies and regulations.
V. Future Baseline Conditions	Identify transportation, land use and environmental issues and problems. Identify major development opportunity sites and areas of potential change.
VI. Alternatives Evaluation & Development of Preferred Concept	Develop alternative land use and transportation concepts to inform development of the area's circulation system. Develop alternatives evaluation criteria. Evaluate alternative concepts and select preferred combined land use and transportation preferred concept, including recommended interchange and transportation system

	improvements.
VII. Access Management Plan	Develop an access management plan that ensures continuing safe and efficient operation of the interchange and provides adequate access for existing and future land uses in the vicinity of the project. The access management plan will be a major component of the IAMP.
VIII. Evaluation of Potential Management Actions	Evaluate a range of potential management actions to help protect the future function of the interchange, address the access needs of existing and future development, and meet the IAMP goals and objectives. Include likely implementing agency (ies), administrative or legislative actions likely to be required, potential effectiveness, and potential impediments to their success of implementation.
IX. Prepare IAMP	Prepare a transportation and land use plan that integrates public involvement and technical efforts to guide long-term management in the planning area.
X. Identify Local Government Plan Amendments	Identify and draft comprehensive plan amendments (e.g., community development code and TSP amendments) necessary to implement the IAMP
VII. Formal Adoption	City of Hillsboro and Washington County adopt plan and/or amendments.
VIII. Implement	Ongoing Implementation.

Roles and Responsibilities

Project Policy Group (PPG)

A Project Policy Group (PPG) and Technical Advisory Group (TAG) will assist in the development of the IAMP. The PPG is comprised of senior management level staff representing ODOT, the County, and the City. Depending on interest, project partners may invite elected officials from impacted jurisdictions to join the PPG. The PPG is expected to meet up to two (2) times during the IAMP process.

This group is responsible to:

- Provide policy guidance for the preparation of the IAMP to the staff, and the TAG; and

- Build inter-jurisdictional consensus on major decisions and approve the Partnering Agreement.

Technical Advisory Group (TAG)

The TAG is comprised of a core group of project staff and consultants representing the partner agencies and their advisors. The TAG may have rotating participation depending on the subjects addressed at any individual meeting. TAG meetings will be coordinated with PPG meetings. The team is expected to meet up to two (2) times during the IAMP process.

This group is responsible to:

- Provide technical recommendations to the PPG concerning IAMP strategy, assumptions and land use and transportation proposals and coordination with pertinent County and City plans and programs;
- Review and approve consultant deliverables; provide direction on strategy and assumptions; and
- Build inter-jurisdictional consensus by communicating with jurisdictional and agency partners to ensure issues are identified and addressed early.

Protocols

For any collaborative process to proceed smoothly, it is helpful for those involved to agree at the outset on the purpose of the partnership and on the procedures and principles by which the group understands it will conduct its interactions and decision making. This document will serve as a basis for discussion.

Purpose of Partnering Protocols

The purpose of this section is to outline groups' roles and responsibilities, and establish communication and decision-making procedures.

Meeting Protocols

- Protocols will be displayed at all TAG meetings.
- Discussions will be facilitated, allowing for the development of a consensus, but a consensus is not required to move forward.
- Members will strive to attend all meetings and arrive prepared and on time.

At the meetings, PPG and TAG members will:

- Share available speaking time so that all members can be heard;

- Be respectful of a range of opinions;
- Focus on successfully completing the agreed upon agenda, and on meeting the project purpose;
- Avoid side discussions;
- Members agree to make a good faith effort to ensure fellow committee members are aware of concerns and complaints;
- Strive for consensus;
- Put cell phones on silent;
- Facilitator will solicit comments and perspectives from many members before a member speaks multiple times on an issue; and
- Meetings will be open to the public to observe; public comment can be given at open house events.

Decision-making

The decision-making process will involve two groups: the TAG and the PPG. The TAG will provide recommendations to the PPG for PPG decisions regarding the IAMP.

Partner protocols:

- TAG members will act to make decisions and recommendations in accordance with the agreed-upon purpose of the project;
- The Partners will consider input from the public and other stakeholders in their decision-making;
- Team members will proactively inform and seek guidance from the decision makers they represent in a good faith effort to ensure final project decisions are acceptable to the decision-making bodies that must adopt or act upon those decisions;
- Partner decisions will be made by consensus—consensus means all members agree that the decision is the most acceptable for the partners as a whole, although an individual member may have a preference for another alternative; and
- If consensus is not achieved at a particular level, it will be elevated to the point that consensus can be reached. From the TAG, the issue will be elevated to the PPG, and the PPG will try to reach a decision. TAG members will advocate for decisions reached through consensus to their decision makers.

Dispute Resolution

If consensus of the core members of the TAG cannot readily be reached:

- TAG members will attempt to resolve the issue outside the TAG meeting; and
- If not resolved at that level, elevate to next level of management until consensus can be reached.

Agreement

12/16/10

City of Hillsboro Date

12/16/10

Washington County Date

12/22/10

ODOT Date

Exhibit F

City of Hillsboro, Ordinance 6031 and Staff Report

US26: Brookwood Parkway/Helvetia Road Interchange Area Management Plan

October 2012

ORDINANCE NO. 6031

HCP 3-12: NORTH HILLSBORO INDUSTRIAL AREA
TRANSPORTATION SYSTEM PLAN AMENDMENTS

AN ORDINANCE AMENDING HILLSBORO COMPREHENSIVE PLAN ORDINANCE NO. 2793, AS AMENDED, SPECIFICALLY TO THE TRANSPORTATION SYSTEM PLAN TEXT IN TABLES 1-I, 1-2, 1-3, 4-7, 4-10, 4-11, 4-13 AND 4-14, AND TRANSPORTATION SYSTEM PLAN MAPS IN FIGURES I-2, 1-3, I-5, 1-6, 1-8, 1-9 AND 4-10 TO RECLASSIFY AND UPDATE INFORMATION FOR TRANSPORTATION IMPROVEMENTS IDENTIFIED FOR THE NORTH HILLSBORO INDUSTRIAL AREA, AND DELETING TEXT IN ITS ENTIRETY CONTAINED IN CHAPTER 4: FUTURE DEMAND AND LAND USE, SPECIAL STUDY AREAS, MEEK ROAD STUDY AREA, AND TWO AREAS LISTED UNDER SPECIAL STUDY AREAS, POTENTIAL FUTURE CONNECTIONS/REALIGNMENTS AND FIGURE 4-9, AND ALSO AMENDING COMPREHENSIVE PLAN MAPS FIGURES 14-I, 14-1A, 14-2, 14-4, 14-6 AND 14-7 TO REFLECT THE CHANGES TO THE TRANSPORTATION SYSTEM PLAN REGARDING THE RECLASSIFICATION AND UPDATE OF INFORMATION FOR TRANSPORTATION IMPROVEMENTS IDENTIFIED FOR THE NORTH HILLSBORO INDUSTRIAL AREA

WHEREAS, transportation improvements for the North Hillsboro Industrial Area were identified in the Oregon Department of Transportation Interchange Management Plan and through traffic studies prepared for recent industrial and commercial expansion projects located the North Hillsboro Industrial Area and in travel forecasting analysis prepared by City of Hillsboro Transportation Planning staff, where Hillsboro Transportation System Plan amendments are necessary in order to ensure that the transportation improvements can occur in the near future; and

WHEREAS, the Hillsboro Transportation System Plan is a planning document which is incorporated into the Hillsboro Comprehensive Plan in its entirety by reference and any amendment or modification of the Transportation System Plan requires the City to conduct and follow the major plan amendment process outlined in Section 1 of the Hillsboro Comprehensive Plan; and

WHEREAS, Section I (III) of the Hillsboro Comprehensive Plan Ordinance, as amended, requires consideration, process, and a public hearing by the Hillsboro Planning Commission with respect to initiating proposed major amendments to the Comprehensive Plan such as the proposed Transportation System Plan amendments to implement transportation improvements for the North Hillsboro Industrial Area as described in the attachments to this Ordinance; and

WHEREAS, the Planning Commission adopted Order No. 8074 initiating the proposed major Comprehensive Plan amendments on August 8, 2012; and

WHEREAS, the Planning Commission held a public hearing on September 26, 2012, to consider the proposed amendments to the Transportation System Plan and received the staff report and public testimony; and

WHEREAS, on September 26, 2012, based on the testimony, the Record and Exhibits A and B attached hereto, the Planning Commission recommended City Council approval of the initiated Comprehensive Plan amendments through adoption of Order No. 8077; and

WHEREAS, the City Council considered the Planning Commission's recommendation at its regular meeting on October 2, 2012;

NOW, THEREFORE, THE CITY OF HILLSBORO ORDAINS AS FOLLOWS:

Section 1. As set forth in Exhibit A, Tables 1-1, 1-2, 1-3, 4-7, 4-10, 4-11, 4-13 and 4-14, and Figures 1-2, 1-3, 1-5, 1-6, 1-8, 1-9 and 4-10 Transportation System Plan maps of the Hillsboro Transportation System Plan Update, January 2004, are amended to reclassify and update information for transportation improvements identified for the North Hillsboro Industrial Area; and Chapter 4: Future Demand and Land Use, Special Study Areas, Meek Road Study Area, and two areas listed under Special Study Areas, Potential Future Connections/ Realignments, and Figure 4-9 are deleted in their entirety; and Figures 14-1, 14-1a, 14-2, 14-4, 14-6 and 14-7 Comprehensive Plan maps are also amended to reflect the changes to the Transportation System Plan Update, January 2004, regarding the reclassification and update of information for transportation improvements identified for the North Hillsboro Industrial Area.

Section 2. Except as herein amended, Comprehensive Plan Ordinance No. 2793, as amended, shall remain in full force and effect.

Section 3. This ordinance affects an action to be taken by the Oregon Transportation Commission at its October 16, 2012 meeting on the amendments involving the Oregon Department of Transportation Interchange Management Plan that is of immediate benefit to the City officers and commissions. An emergency is declared. This ordinance is effective immediately upon its passage and approval by the Mayor.

Approval and adoption by the Hillsboro City Council on this 2nd day of October 2012.

Approved by the Mayor on this 2nd day of October 2012.

Jerry Willey, Mayor

ATTEST:

Amber Ames, City Recorder

EXHIBIT A

HCP 3-12: North Hillsboro Industrial Area Transportation System Plan Amendments
Proposed Comprehensive Plan Text and Map Amendments

Added language is shown as *italicized* text, deleted language is shown as ~~strikethrough~~ and background information about the proposed text and map amendments is provided before the proposed added or deleted language.

PROPOSED TEXT AMENDMENTS

The following sections of the TSP need to be amended to add the transportation improvements associated with the roadways or change functional classifications for the roadways located within the North Hillsboro Industrial Area (North Hillsboro). All of the text amendments would involve text in the Transportation System Plan Update dated January 2004.

Table 1-1 Amendments
Pedestrian Master Plan Priority Projects

This table includes pedestrian projects on Arterials, Collectors, and Neighborhood Routes recommended to be shown on Figure 1-2 Pedestrian Master Plan and are illustrated on Figure 1-2a. Cost estimates are based on additional sidewalk, curb and gutter, drainage, driveway adjustments and landscaping as required. Right-of-way costs and additional roadway pavement costs, if known are included in the estimates. The cost estimates are conceptual and subject to refinement upon further study.

Table 1-1 is amended as follows:

Pedestrian Master Plan Priority Projects

Project	From	To	Stand-alone Project	Roadway Improvement Project	Lead Agency	Cost*
NW 253rd Ave	*NW Evergreen Rd*	*NW Meek Rd*		√	*Hillsboro*	*$8,000,000*
NW 264th Ave	*NW Evergreen Rd*	*NW Meek Rd*		√	*Hillsboro*	*$12,600,000*
NW Meek Road	*NW Sewell Rd (west UGB boundary)*	*NW 253rd Ave Extension*		√	*Hillsboro*	*$6,500,000*
NW Meek Road	*NW 253rd Ave Extension*	*Near NW Brookwood Pkwy*		√	*Hillsboro*	*$4,000,000*
NW Brookwood Pkwy	*NW Evergreen Rd*	*US 26*		√	*Washington County*	*$9,000,000*
NW Brookwood Pkwy/NW Helvetia Rd	*US 26 Eastbound Ramps*	*NW Jacobson Rd Realignment*		*Part of Brookwood Interchange Project*	*ODOT*	*$38,000,000*
NW Helvetia Rd	*NW Jacobson Rd Realignment*	*NW West Union Rd*		√	*Washington County*	*$7,500,000*

Project	From	To	Stand-alone Project	Roadway Improvement Project	Lead Agency	Cost*
NW West Union Rd	*NW Helvetia Rd*	*Hillsboro City Limits*		√	*Washington County*	*$7,000,000*
NW Huffman St	*NW Brookwood Pkwy*	*NW 253rd Ave*		√	*Hillsboro*	*$4,500,000*
NW Huffman St	*NW 253rd Ave*	*NW Sewell Rd*		√	*Hillsboro*	*$7,500,000*
Collector Rd (actual name TBD)	*NW Jacobson Rd*	*NW Schaaf Rd*		√	*Hillsboro*	*$2,500,000*
NW Schaaf Rd	*NW Helvetia Rd*	*NW Century Blvd (at NW Westmark Dr)*		√	*Hillsboro*	*$6,000,000*
NW Westmark Dr Extension	*NW Croeni Rd*	*NW West Union Rd*		√	*Hillsboro*	*$1,500,000*
~~NW Shute Rd~~	~~NW Evergreen Rd~~	~~US 26/ Sunset Hwy~~	~~√~~		~~Washington County~~	~~TBD~~

* Project cost estimates for *projects added to this list in September 2012 represent 2012 dollars, all existing projects listed in the July 2004 TSP Update* represent 2003 dollars. All cost estimates are conceptual. For roadway improvement projects, the cost estimate represents the whole street improvement necessary for a multi-modal street including sidewalks. For stand-alone projects, the cost estimate represents the cost for retrofitting the existing street cross section to add sidewalks and landscape strips and associated costs.

Table 1-2 Amendments
Bicycle Master Plan Priority Projects

This table includes bicycle projects recommended to be shown on Figure 1-3 Bicycle Master Plan and are illustrated in Figure 1-3a. Cost estimates are based on additional sidewalk, curb and gutter, drainage, driveway adjustments and landscaping as required. Right-of-way costs and additional roadway pavement costs, if known are included in the estimates. The cost estimates are conceptual and subject to refinement upon further study.

Table 1-2 is amended as follows:

Bicycle Master Plan Priority Projects

Project	From	To	Stand-alone Project	Roadway Improvement Project	Lead Agency	Cost*
NW 253rd Ave	*NW Evergreen Rd*	*NW Meek Rd*		√	*Hillsboro*	*$8,000,000*
NW 264th Ave	*NW Evergreen Rd*	*NW Meek Rd*		√	*Hillsboro*	*$12,600,000*
NW Meek Road	*NW Sewell Rd (west UGB boundary)*	*NW 253rd Ave Extension*		√	*Hillsboro*	*$6,500,000*

Project	From	To	Stand-alone Project	Roadway Improvement Project	Lead Agency	Cost*
NW Meek Road	*NW 253rd Ave Extension*	*Near NW Brookwood Pkwy*		√	*Hillsboro*	*$4,000,000*
NW Helvetia Rd	*NW Jacobson Rd Realignment*	*NW West Union Rd*		√	*Washington County*	*$7,500,000*
NW West Union Rd	*NW Helvetia Rd*	*Hillsboro City Limits*		√	*Washington County*	*$7,000,000*
NW Huffman St	*NW Brookwood Pkwy*	*NW 253rd Ave*		√	*Hillsboro*	*$4,500,000*
NW Huffman St	*NW 253rd Ave*	*NW Sewell Rd*		√	*Hillsboro*	*$7,500,000*
Collector Rd (actual name TBD)	*NW Jacobson Rd*	*NW Schaaf Rd*		√	*Hillsboro*	*$2,500,000*
NW Schaaf Rd	*NW Helvetia Rd*	*NW Century Blvd (at NW Westmark Dr)*		√	*Hillsboro*	*$6,000,000*
NW Westmark Dr Extension	*NW Century Blvd*	*NW West Union Rd*		√	*Hillsboro*	*$1,500,000*
NW Brookwood Pkwy/NW Helvetia Rd	*US 26 Eastbound Ramps*	*NW Jacobson Rd Realignment*		*Part of Brookwood Interchange Project*	*ODOT*	*$38,000,000*
NW Pubols Rd	*NW Helvetia Rd*	*NW Century Blvd*		√	*Hillsboro*	*$4,000,000*
NW Sewell Rd	*NW Evergreen Rd*	*NW 264th Ave*		√	*Hillsboro*	*$8,000,000*
NW Imbrie Dr	*NW Evergreen Pkwy*	*NW Cornelius Pass Rd*		√	*Hillsboro*	*$3,000,000*
NW Brookwood Pkwy	*NW Evergreen Rd*	*US 26*		√	*Washington County*	*$9,000,000*
~~NW Shute Rd~~	~~NW Evergreen Rd~~	~~US 26/Sunset Hwy~~	~~√~~		~~Washington County~~	~~TBD~~

* Project cost estimates *for projects added to this list in September 2012 represent 2012 dollars, all existing projects listed in the January 2004 TSP Update* represent 2003 dollars. All cost estimates are conceptual. For roadway improvement projects, the cost estimate represents the whole street improvement necessary for a multi-modal street including bike lanes. For stand-alone projects, the cost estimate represents the cost for retrofitting the existing street cross section to add bike lanes and associated costs.

Table 1-3 Amendments
Motor Vehicle Project List

This table lists motor vehicle projects illustrated in Figure 1-5a, recommended to be included in, amended, or deleted from the list including sidewalks, bicycle lanes, mixed use paths, cycle tracks, and transit accommodations as required, with the projects organized by priority: Highest Priority, Second Highest Priority and Third Highest Priority. It includes the location and description of the projects, indicates the Regional Transportation Plan (RTP) planning status (for financially constrained and priority system improvements in June 2010 RTP), the lead agency for the project, and the estimated cost (based on 2012 dollars).

Table 1-3 is amended as follows:

Motor Vehicle Project List

Location	Description	Planning Status*	Lead Agency	Cost**
Highest Priority Projects				
NW Meek Rd: Approach to NW Brookwood Pkwy	*Disconnect NW Meek Rd for vehicle access*	*Not in Plans*	*Wash. County*	*$100,000*
NW Schaaf Rd: NW Helvetia Rd to NW Century Blvd	*Construct 3 Lanes*	*Not in Plans*	*Hillsboro*	*$4,000,000*
Collector Rd (actual name TBD): NW Jacobson Rd to NW Schaaf Rd	*Construct 3 Lanes*	*Not in Plans*	*Hillsboro*	*$2,500,000*
NW Helvetia Road: NW Jacobson Realignment to NW West Union Rd	*Construct 3 Lanes*	*Not in Plans*	*Wash. County*	*$7,500,000*
NW 253rd Ave: NW Evergreen Rd to NW Meek Rd	*Construct 3 Lanes*	*RTP 10822*	*Hillsboro*	*$8,000,000*
~~253rd Avenue~~	~~Improvements north of Evergreen Road; add southbound right turn lane~~	~~Not in Plans~~	~~Wash. County~~	~~$690,000~~
NW West Union Rd: NW Helvetia Rd to City Limits	*Construct 3 Lanes*	*Not in Plans*	*Washington County*	*$7,000,000*
NW 264th Ave: NW Evergreen Rd to NW Meek Rd	*Construct 3 Lanes*	*Not in Plans*	*Hillsboro*	*$12,600,000*
~~Huffman Road~~	~~Extend west of Shute Rd to 253rd Ave~~	~~Not in Plans~~	~~Wash. County~~	~~$922,300~~
NW Huffman St: NW Brookwood Pkwy to NW 253rd Ave	*Construct 5 Lanes*	*RTP 10821*	*Hillsboro*	*$4,500,000*
NW Huffman St: NW 253rd Ave to NW Sewell Rd	*Construct 3 Lanes*	*RTP 10821*	*Hillsboro*	*$7,500,000*

Location	Description	Planning Status*	Lead Agency	Cost**
NW Westmark Dr Extension: NW Century Blvd to NW West Union Rd	*Construct 3 Lanes*	*Not in Plans*	*Hillsboro*	*$1,500,000*
NW Pubols Rd: NW Helvetia Rd to Century Blvd	*Construct 2 Lanes*	*Not in Plans*	*Hillsboro*	*$4,000,000*
NW Sewell Rd: NW Evergreen Rd to NW 264th Ave	*Construct 2 Lanes*	*Not in Plans*	*Hillsboro*	*$8,000,000*
NW Cornelius Pass Rd: NW Cornell Rd to US 26	*Widen to 7 Lanes*	*Not in Plans*	*Washington County*	*$8,600,000*
NW Meek Rd: West UGB boundary to NW 253rd Ave	*Construct 3 Lanes*	*Not in Plans*	*Hillsboro*	*$6,500,000*
NW Meek Rd: NW 253rd Ave to near NW Brookwood Pkwy	*Construct 2 Lanes*	*Not in Plans*	*Hillsboro*	*$4,000,000*
NW Imbrie Dr: NW Cornelius Pass Rd to NW Evergreen Pkwy	*Widen to 4 Lanes (add 1 eastbound lane)*	*Not in Plans*	*Hillsboro*	*$2,500,000*
NW Brookwood Pkwy: NW Evergreen Rd to US 26	*Widen to 7 Lanes*	*RTP 11146*	*Washington County*	*$9,000,000*
US 26/NW Brookwood Pkwy/NW Helvetia Rd Interchange	*New loop off ramp and interchange modifications including NW Jacobson Rd and NW Groveland Rd realignment, Helvetia Rd: Widen to 5 Lanes*	*RTP 10600*	*ODOT/Washington County/Hillsboro*	*$38,000,000*
Second Highest Priority Projects				
~~Jacobson Road at Helvetia~~	~~Realign intersection north of US 26~~	~~Not in Plans~~	~~Hillsboro~~	~~$1,900,000~~
~~US 26/Shute Road~~	~~New loop ramp and interchange modifications~~	~~RTP 3149~~	~~ODOT/Wash. County~~	~~$6,400.000~~

* RTP = Regional Transportation Plan, financially constrained and priority system improvements, *June 2010 for RTP project numbers: 10600, 10821, 10822 and 11146, and* August 2000 *for existing projects listed in the January 2004 TSP Update.*

** Cost estimates represents ~~current 2003~~ *2012 dollars for RTP project numbers: 10600, 10821, 10822 and 11146, and projects that are listed as Not in Plans added to the list in September 2012. The cost estimates for existing projects listed in January 2004 TSP Update represent 2003 dollars.*

Table 4-7 Amendments
Updates to Bicycle Master Plan

Table 4-7 contains the proposed updates to the Bicycle Master Plan (Figure 1-3) as illustrated in Figure 1-3a.

Table 4-7 is amended as follows:

Updates to Bicycle Master Plan

Roadway	Hillsboro 2015 TSP	Draft Hillsboro 2020 TSP
NW 253rd Ave - NW Evergreen Rd to NW Meek Rd	*N/A*	*Planned Bike Lanes*
~~NW 253rd Realignment – NW Evergreen Rd to NW Huffman St~~	~~N/A~~	~~Planned Bike Lanes~~
NW 264th Ave - NW Evergreen Rd to NW Meek Rd	*N/A*	*Planned Bike Lanes*
NW Meek Rd – West UGB Boundary to NW 253rd Ave	*N/A*	*Planned Bike Lanes*
NW Meek Rd – NW 253rd Ave to Brookwood Pky	*N/A*	*Bike Way Network*
NW Helvetia Rd – NW Jacobson Realignment to NW West Union Rd	*N/A*	*Planned Bike Lanes*
NW West Union Rd – NW Helvetia Rd to City Limits	*N/A*	*Planned Bike Lanes*
~~NW Huffman St Extension – NW Shute Rd to NW Evergreen Rd~~	~~N/A~~	~~Planned Bike Lanes~~
NW Huffman St – NW Brookwood Pkwy to NW 253rd Ave	*N/A*	*Planned Bike Lanes*
NW Huffman St – NW 253rd Ave to NW Sewell Rd	*N/A*	*Planned Bike Lanes*
Collector Rd (actual name TBD) – NW Jacobson Rd to NW Schaaf Rd	*N/A*	*Planned Bike Lanes*
NW Schaaf Rd – NW Helvetia Rd to NW Century Blvd	*N/A*	*Planned Bike Lanes*
NW Westmark Dr Extension – NW Century Blvd to NW West Union Rd	*N/A*	*Planned Bike Lanes*
NW Brookwood Pkwy/NW Helvetia Rd at US-26 to NW Jacobson Rd Realignment	*N/A*	*Planned Bike Lanes*
NW Pubols Rd – NW Helvetia Rd to NW Century Blvd	*N/A*	*Bike Way Network*
NW Sewell Rd – NW Evergreen Rd to NW 264th Ave.	*N/A*	*Bike Way Network*
NW Imbrie Dr – NW Evergreen Pkwy to NW Cornelius Pass Rd	~~Planned Bike Lanes~~	*Bike Way Network*
~~NW Imbrie Dr~~	~~Bicycle Way Network~~	~~Planned Bike Lanes~~
~~North/South Road – NW Huffman St to NW Meek Rd~~	~~N/A~~	~~Planned Bike Lanes~~

Table 4-10 Amendments
Updates to Functional Classification Plan

Table 4-10 shows updates to the Functional Classification Plan illustrated in Figure 1-9a to reflect the expanded TSP study area, on-going regional planning, the functional needs of Hillsboro, and consistency with the Regional Transportation Plan. This table is proposed to be amended to address changes in functional classification for the transportation projects added to the motor vehicles project list. These projects need to be added to be consistent with the RTP and implement the transportation system for North Hillsboro.

Table 4-10 is amended as follows:

Updates to Functional Classification Plan

Roadway	Hillsboro 2015 TSP	Draft Hillsboro 2020 TSP
NW Schaaf Rd – NW Helvetia Rd to NW Century Blvd	*N/A*	*Planned Collector*
Collector Rd (actual name TBD) – NW Jacobson Rd to NW Schaaf Rd	*N/A*	*Planned Collector*
NW Helvetia Rd – NW Jacobson Rd Realignment to NW West Union Rd	*N/A*	*Planned Arterial*
NW 253rd Ave - NW Evergreen Rd to NW Meek Rd	*N/A*	*Planned Collector*
~~253rd Avenue realigned – Evergreen to Huffman~~	~~N/A~~	~~Planned Collector~~
~~North/South road – Huffman to Meek~~	~~N/A~~	~~Planned Collector~~
NW West Union Rd – NW Helvetia Rd to City Limits	*N/A*	*Planned Arterial*
NW 264th Ave - NW Evergreen Rd to NW Meek Rd	*N/A*	*Planned Collector*
NW Huffman St – NW Brookwood Pkwy to NW 253rd Ave	*N/A*	*Planned Collector*
NW Huffman St – NW 253rd Ave to NW Sewell Rd	*N/A*	*Planned Collector*
NW Westmark Dr Extension – NW Century Blvd to NW West Union Rd	*Local Industrial Street*	*Planned Collector*
NW Pubols Rd – NW Helvetia Rd to NW Century Blvd	*N/A*	*Planned Local Street*
NW Sewell Rd – NW Evergreen Rd to NW 264th Ave	*N/A*	*Planned Local Street*
NW Meek Rd – West UGB to NW 253rd Ave	*N/A*	*Planned Collector*
NW Meek Rd – NW 253rd Ave to near NW Brookwood Pkwy	*N/A*	*Planned Neighborhood Route*
US 26/NW Brookwood Pkwy/NW Helvetia Rd to NW Jacobson Rd Realignment	*N/A*	*Planned Arterial*

Table 4-11 Amendments
Updates to Future Streets Right-of-Way Plan

The Future Streets Right-of-Way Plan (Figure 1-6) provides the right-of-way requirements for arterial and collector streets which are anticipated within the TSP planning horizon to require more than two lanes. The updates to the Future Streets Right-of-Way Plan for North Hillsboro are summarized in Table 4-11 and are illustrated in Figure 1-6a.

Table 4-11 is amended as follows:

Updates to Future Streets Right-of-Way Plan

Roadway	Hillsboro 2015 TSP	Draft Hillsboro 2020 TSP
NW Schaaf Rd – NW Helvetia Rd to NW Century Blvd	*N/A*	*Planned 2/3 lanes*
Collector Rd (actual name TBD) – NW Jacobson Rd to NW Schaaf Rd	*N/A*	*Planned 2/3 lanes*
NW Helvetia Rd – NW Jacobson Realignment to NW West Union Rd	*N/A*	*Planned 2/3 lanes*
NW 253rd Ave - NW Evergreen Rd to NW Meek Rd	*N/A*	*Planned 2/3 lanes*
~~253rd Avenue realigned – Evergreen to Huffman~~	~~N/A~~	~~Planned 2/3 lanes~~
NW West Union Rd – NW Helvetia Rd to City Limits	*N/A*	*Planned 2/3 lanes*
NW 264th Ave - NW Evergreen Rd to NW Meek Rd	*N/A*	*Planned 2/3 lanes*
NW Huffman St – NW Brookwood Pkwy to NW 253rd Ave	*Planned 2/3 lanes*	*Planned 4/5 lanes*
NW Huffman St – NW 253rd Ave to NW Sewell Rd	*N/A*	*Planned 2/3 lanes*
NW Westmark Dr Extension – NW Century Blvd to NW West Union Rd	*Local Industrial Street*	*Planned 2/3 lanes*
NW Pubols Rd – NW Helvetia Rd to NW Century Blvd	*N/A*	*Planned 2/3 lanes*
NW Sewell Rd – NW Evergreen Rd to NW 264th Ave	*N/A*	*Planned 2/3 lanes*
NW Cornelius Pass Rd – NW Cornell Rd to US 26	*Planned 4/5 lanes*	*Planned 6/7 lanes*
NW Meek Rd – West UGB to NW 253rd Ave	*N/A*	*Planned 2/3 lanes*
NW Meek Rd – NW 253rd to near NW Brookwood Pkwy	*N/A*	*Planned 2/3 lanes*
NW Imbrie Dr – NW Evergreen Pkwy to NW Cornelius Pass Rd	*Planned 2/3 lanes*	*Planned 4/5 lanes*
NW Brookwood Pkwy – NW Evergreen Rd to US 26	*Planned 4/5 lanes*	*Planned 6/7 lanes*
US 26/NW Brookwood Pkwy/NW Helvetia Rd Overcrossing	*Planned 4/5 lanes*	*Planned 6/7 lanes*
~~Huffman – 253rd to Shute~~	~~N/A~~	~~Planned 2/3 lanes~~
~~North/South road – Huffman to Meek~~	~~N/A~~	~~Planned 2/3 lanes~~

Table 4-13
Updates to Street Improvement Plan

This table summarizes updates to the Street Improvement Plan (Figure 1-5) which are illustrated in Figure 1-5a.

Table 4-13 is amended as follows:

Updates to Street Improvement Plan

Roadway	Hillsboro 2015 TSP	Draft Hillsboro 2020 TSP
~~North/South road – Huffman to Meek~~	~~N/A~~	~~Proposed street~~
NW Schaaf Rd: NW Helvetia Rd to NW Century Blvd	*N/A*	*Proposed Street*
Collector Rd (actual name TBD): NW Jacobson Rd to NW Schaaf Rd	*N/A*	*Proposed Street*
NW Helvetia Road: NW Jacobson Rd Realignment to NW West Union Rd	*N/A*	*Street Widening*
~~253rd Avenue realigned – Evergreen to Huffman~~	~~N/A~~	~~Proposed street~~
NW 253rd Ave: NW Evergreen Rd to NW Meek Rd	*N/A*	*Proposed Street*
NW West Union Rd: NW Helvetia Rd to City Limits	*N/A*	*Street Widening*
NW 264th Ave: NW Evergreen Rd to NW Meek Rd	*N/A*	*Proposed Street*
~~Huffman – 253rd to Shute~~	~~N/A~~	~~Proposed street~~
NW Huffman St: NW Brookwood Pkwy to NW 253rd Ave	*N/A*	*Proposed Street*
NW Huffman St: NW 253rd Ave to NW Sewell Rd	*N/A*	*Proposed Street*
NW Westmark Dr: NW Century Blvd to NW Croeni Rd	*N/A*	*Street Widening*
NW Westmark Dr Extension: NW Century Blvd to NW West Union Rd	*N/A*	*Proposed Street*
NW Pubols Rd: NW Helvetia Rd to NW Century Blvd	*N/A*	*Proposed Street*
NW Sewell Rd: NW Evergreen Rd to NW 264th Ave	*N/A*	*Street Widening*
NW Cornelius Pass Rd: NW Cornell Rd to US 26	*N/A*	*Street Widening*
NW Meek Rd: West UGB boundary to NW 253rd Ave	*N/A*	*Street Widening*
NW Meek Rd: NW 253rd Ave to near NW Brookwood Pkwy	*N/A*	*Street Widening*
NW Imbrie Dr: NW Cornelius Pass Rd to NW Evergreen Pkwy	*N/A*	*Street Widening*
NW Brookwood Pkwy: NW Evergreen Rd to US 26	*N/A*	*Street Widening*
US 26/NW Brookwood Pkwy/NW Helvetia Rd Interchange Overcrossing	*N/A*	*Street Widening*
NW Helvetia Rd: Interchange to NW Jacobson Rd Realignment	*N/A*	*Street Widening*

Table 4-14
Updates to Traffic Signal Master Plan
This table summarizes updates to the Traffic Signal Master Plan (Figure 1-8) as illustrated in Figure 1-8a.

Table 4-14 is amended as follows:

Updates to Traffic Signal Master Plan

Intersection	Hillsboro 2015 TSP	Draft Hillsboro 2020 TSP
Evergreen Pkwy/253rd Ave	*N/A*	*Proposed Traffic Signal*
Brookwood Pkwy/Huffman St	*N/A*	*Proposed Traffic Signal*
Helvetia Rd/Schaaf Rd	*N/A*	*Proposed Traffic Signal*

In addition to the proposed amendments to the TSP tables, Chapter 4: Future Demand and Land Use contains a section that establishes and describes Special Study Areas, with corresponding maps that show the boundaries of the Special Study Areas contained in Figures 4-8, 4-9 and 4-10. One of these Special Study Areas is the Meek Road Study Area which is illustrated on Figure 4-9.

The IAMP transportation analysis addressed the issues identified within the Meek Road Study Area in more depth than as described in the original text below and recommends changes within the Area including revised transportation connections. The text contained in the Meek Road Study Area is deleted in its entirety, as follows:

SPECIAL STUDY AREAS

~~**Meek Road Study Area**~~

~~Concerns exist regarding the proximity of the intersection of Meek Road and Shute Road to the interchange at U.S. 26 and Shute Road. Washington County has designated this as a study area (see Figure 4-9) in order to evaluate options for moving the intersection of Meek Road further south. However, reorienting the roadway to the south would place it within the Shute Road Site Special Development District. The 203 acre site, located at the intersection of Evergreen Road and Shute Road, was added to the urban growth boundary for the purpose of providing large lots for high tech industrial development. Meek Road, situated immediately north of the new district, will be influenced by future development within the Shute Road site. The Conceptual Transportation Plan for Shute Road, drafted by Group MacKenzie suggests that additional analysis would be required with regards to Meek Road to determine any relocation of Meek Road or re-routing of traffic.~~

Within the Special Study Areas section, there is also a section titled Potential Future Connections/Realignments. The TSP is designed to permit consideration of road extensions beyond study areas like the Meek Road Study Area and the urban growth boundary. No specific roadway alignments have been defined for any of these extensions or realignments, however Figure 4-10 shows seven study areas that were categorized as potential future connections/realignments. Two of the study areas are within North Hillsboro. The description for those two study areas is deleted as follows:

Potential Future Connections/Realignments

~~2. Extensions of Huffman Street and Dawson Creek Drive into 253rd Avenue – part of the Shute Road Concept Plan, these road extensions are intended to provide access to the newly added 230-acre Shute Road Special Industrial Development District.~~

~~3. Jacobson Road Realignment to Helvetia Road – the realignment north of U.S. 26/Shute Road interchange is intended to accommodate potential increased right-of-way necessary for interchange improvements.~~

Based on the testimony received at the Planning Commission public hearing on September 26, 2012, where the addition of a specific study area to address alternatives for the alignment of NW Westmark Drive Extension from NW Croeni Road east to connect with NW West Union Road was requested (see Exhibit B: Findings of Fact), a new special study area will be added to Chapter 4: Future Demand and Land Use, Special Study Areas, Potential Future Connections/ Realignments. The new special study area is added to the Potential Future Connections/ Realignments section, as follows:

8. *Westmark Drive Extension from Croeni Road east to West Union Road – this road extension is intended to buffer the rural agricultural land adjacent to NW West Union Road by providing an alternative east-west travel corridor between NW Helvetia Road and NW West Union Road west of NW Cornelius Pass Road, minimizing urban traffic demand on NW West Union Road west of NW Cornelius Pass Road and on NW Helvetia Road north of NW Schaaf Road. The goals for this study area are as follows:*

   a. *Reduce the interaction between urban and rural traffic on NW West Union Road and NW Helvetia Road;*

   b. *Look at the implementation of east – west connection of NW Schaaf Road as the primary travel pattern and place the east connection as far east as possible on NW West Union Road;*

   c. *Be sensitive to school children and traffic safety issues; and*

   d. *Coordinate through land use zoning codes to develop and enhance urban – rural edge buffering including landscaped buffers, berms and setbacks.*

PROPOSED MAP AMENDMENTS

The TSP and Comprehensive Plan Maps listed below will be amended to reflect the classification change of the planned roadways and proposed improvements for North Hillsboro. Detail maps are provided to show more clearly how the TSP maps are being amended. If approved, the amendments shown on the detail maps will be incorporated into the amended TSP. The proposed roadways affected by these proposed TSP amendments are labeled as follows on the detail maps:

A. NW Meek Road: disconnect from NW Brookwood Parkway

B. NW Schaaf Road: NW Helvetia Road to NW Century Boulevard (3-lane City collector cross section)

C. Collector Extension (actual name to be determined): NW Jacobson Road to NW Schaaf Road (3-lane City collector cross section)

D. NW Helvetia Road: US 26 to NW West Union Road (3-lane County arterial cross section)

E. NW 253rd Avenue: NW Evergreen Road to NW Meek Road (3-lane City collector cross section)

F. NW West Union Road: NW Helvetia Road to City Limits (3-lane County arterial cross section)

G. NW 264th Avenue: NW Evergreen Road to NW Meek Road (3-lane City collector cross section)

H. NW Huffman Street: NW Brookwood Parkway to NW 253rd Avenue (5-lane City collector cross section)

I. NW Huffman Street: NW 253rd Avenue to NW Sewell Road (3-lane City collector cross section)

J. NW Westmark Drive Extension: NW Croeni Road to NW West Union Road (3-lane City collector cross section)

K. NW Pubols Road: NW Helvetia Road to NW Century Boulevard (2-lane City local industrial street cross section)

L. NW Sewell Road: NW Evergreen Road to NW 264th Avenue (3-lane City local industrial street cross section)

M. NW Cornelius Pass Road: NW Cornell Road to US 26 eastbound (widen to provide 7-lane County arterial boulevard cross section)

N. NW Meek Road: NW Sewell Road (western UGB boundary) to NW 253rd Avenue extension (3-lane City collector cross section)

O. NW Meek Road: NW 253rd Avenue extension to near NW Brookwood Parkway (2-lane City Neighborhood Route)

P. NW Imbrie Drive: NW Evergreen Parkway to NW Cornelius Pass Road (add second eastbound through-lane, for a 4-lane cross section with 2 eastbound lanes, 1 westbound lane and 1 continuous left turn median lane)

Q. NW Brookwood Parkway: NW Evergreen Road to US 26 (7-lane County arterial cross section)

R. US 26/NW Brookwood Parkway/NW Helvetia Road Interchange: new loop off ramp and interchange modifications including NW Jacobson Road and NW Groveland Road realignments. Overcrossing: 6-lane (3 southbound, 2 northbound, 1 bi-directional left turn median). NW Helvetia Road from US 26 to NW Jacobson Road realignment (5-lane County arterial cross section

TSP Figure 1-2: Pedestrian Master Plan (see Attachment A-1). See Figure 1-2a: North Hillsboro TSP Amendment Pedestrian Master Plan Detail Map for specific details on how this map is being amended. The Special Study Area Boundary for the Meek Road Study Area and symbols (one in the Special Study Area and one for the NW Dawson Creek Drive/NW 253rd Avenue alignments) for the note that states: "Alignment subject to UGB expansion and/or future refinement or study in these areas" has been deleted from Figure 1-2. A Special Study Area to consider separation of urban and rural traffic, where the future alignment of NW Westmark Drive Extension is subject to further study is added to Figure 1-2.

TSP Figure 1-3: Bicycle Master Plan (see Attachment A-2). See Figure 1-3a: North Hillsboro TSP Amendment Bicycle Master Plan Detail Map for specific details on how this map is being amended. The Special Study Area Boundary for the Meek Road Study Area and symbols (one in the Special Study Area and one for the NW Dawson Creek Drive/NW 253rd Avenue alignments) for the note that states: "Alignment subject to UGB expansion and/or future refinement or study in these areas" has been deleted from Figure 1-3. A Special Study Area to consider separation of urban and rural traffic, where the future alignment of NW Westmark Drive Extension is subject to further study is added to Figure 1-3.

TSP Figure 1-5: Street Improvement Plan (see Attachment A-3). See Figure 1-5a: North Hillsboro TSP Amendment Improvement Plan Detail Map for specific details on how this map is being amended. The Special Study Area Boundary for the Meek Road Study Area and proposed street arrows for the extensions of NW 253rd Avenue and NW Huffman Street has been deleted from Figure 1-5. A Special Study Area to consider separation of urban and rural traffic, where the future alignment of NW Westmark Drive Extension is subject to further study is added to Figure 1-5.

TSP Figure 1-6: Future Streets Where Right of Way is Planned for Two or More Lanes (see Attachment A-4). See Figure 1-6a: North Hillsboro TSP Amendment Future Streets Where Right of Way is Planned for Two or More Lanes Detail Map for specific details on how this map is being amended. The Special Study Area Boundary for the Meek Road Study Area and symbols (one in the Special Study Area and one for the NW Dawson Creek Drive/NW 253rd Avenue alignments) for the note that states: "Alignment subject to UGB expansion and/or future refinement or study in these areas" has been deleted from Figure 1-6. A Special Study Area to consider separation of urban and rural traffic, where the future alignment of NW Westmark Drive Extension is subject to further study is added to Figure 1-6.

TSP Figure 1-8: Traffic Signal Master Plan (see Attachment A-5). See Figure 1-8a: North Hillsboro TSP Amendment Traffic Signal Master Plan for specific details on how this map is being amended. The Special Study Area Boundary for the Meek Road Study Area has been deleted from Figure 1-8. A Special Study Area to consider separation of urban and rural traffic, where the future alignment of NW Westmark Drive Extension is subject to further study is added to Figure 1-8.

TSP Figure 1-9: Functional Classification Plan (see Attachment A-6). See Figure 1-9a: North Hillsboro TSP Amendment Functional Classification Plan for specific details on how this map is being amended. The Special Study Area Boundary for the Meek Road Study Area and symbols (one in the Special Study Area and one for the NW Dawson Creek Drive/NW 253rd Avenue alignments) for the note that states: "Alignment subject to UGB expansion and/or future refinement or study in these areas" has been deleted from Figure 1-9. A Special Study Area to consider separation of urban and rural traffic, where the future alignment of NW Westmark Drive Extension is subject to further study is added to Figure 1-9.

TSP Figure 4-9: Meek Road Study Area (see Attachment A-7). This figure will be deleted in its entirety.

TSP Figure 4-10: Potential Future Connections/Realignments (see Attachment A-8). See Figure 4-10a: North Hillsboro TSP Amendment Potential Future Connections/Realignments for specific details on how this map is being amended. Study Area Nos. 2 and 3, Potential Collector Extensions for NW Dawson Creek Drive/NW 253rd Avenue, NW Beech Street and NW Huffman Street, and the symbols for the note: Alignment subject to UGB expansion and/or future refinement or study in these areas located adjacent to the Potential Collector Extensions will be deleted from Figure 4-10. A Special Study Area to consider separation of urban and rural traffic, where the future alignment of NW Westmark Drive Extension is subject to further study is added to Figure 4-10.

Comprehensive Plan Figure 14-1: Functional Classification Plan (see Attachment A-9). Figure 14-1 will be amended similar to TSP Figure 1-9.

Comprehensive Plan Figure 14-1a: Future Streets Where Right of Way is Planned for More Than Two Lanes (see Attachment A-10). This map will be amended similar to TSP Figure 1-6.

Comprehensive Plan Figure 14-2: Street Improvement Plan (see Attachment A-11). This map will be amended similar to TSP Figure 1-5.

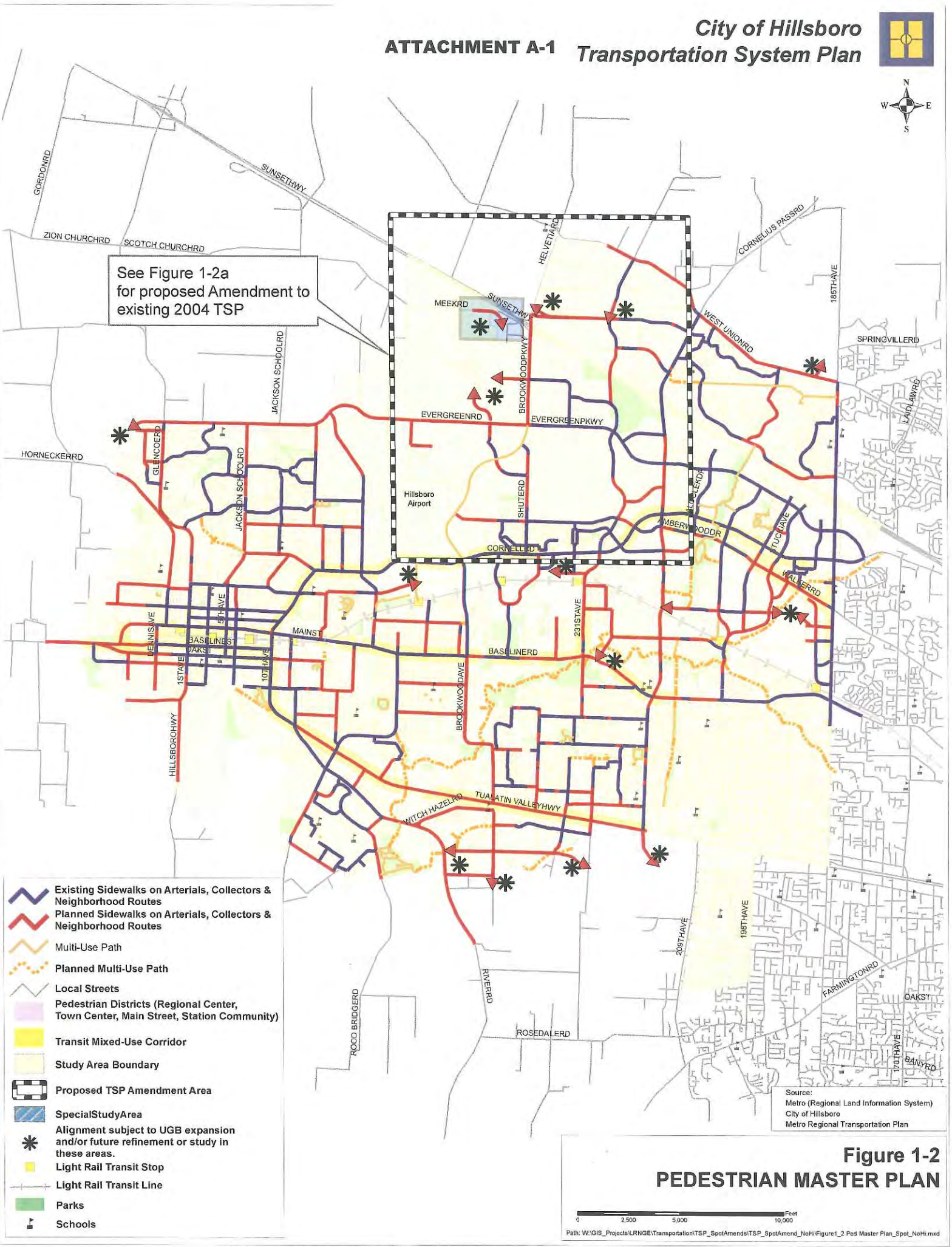
Comprehensive Plan Figure 14-4: Bicycle Master Plan (see Attachment A-12). This map will be amended similar to TSP Figure 1-3.

Comprehensive Plan Figure 14-6: Traffic Signal Master Plan (see Attachment A-13). This map will be amended similar to TSP Figure 1-8.

Comprehensive Plan Figure 14-7: Pedestrian Master Plan (see Attachment A-14). This map will be amended similar to TSP Figure 1-2.

ATTACHMENT A-1

City of Hillsboro Transportation System Plan



- Existing Sidewalks on Arterials, Collectors & Neighborhood Routes
- Planned Sidewalks on Arterials, Collectors & Neighborhood Routes
- Multi-Use Path
- Planned Multi-Use Path
- Local Streets
- Pedestrian Districts (Regional Center, Town Center, Main Street, Station Community)
- Transit Mixed-Use Corridor
- Study Area Boundary
- Proposed TSP Amendment Area
- SpecialStudyArea
- Alignment subject to UGB expansion and/or future refinement or study in these areas.
- Light Rail Transit Stop
- Light Rail Transit Line
- Parks
- Schools

Source:
Metro (Regional Land Information System)
City of Hillsboro
Metro Regional Transportation Plan

Figure 1-2
PEDESTRIAN MASTER PLAN

0 2,500 5,000 10,000 Feet

Path: W:\GIS_Projects\LRNGE\Transportation\TSP_SpotAmends\TSP_SpotAmend_NoHi\Figure1_2 Ped Master Plan_Spot_NoHi.mxd

ATTACHMENT A-1

City of Hillsboro
Transportation System Plan

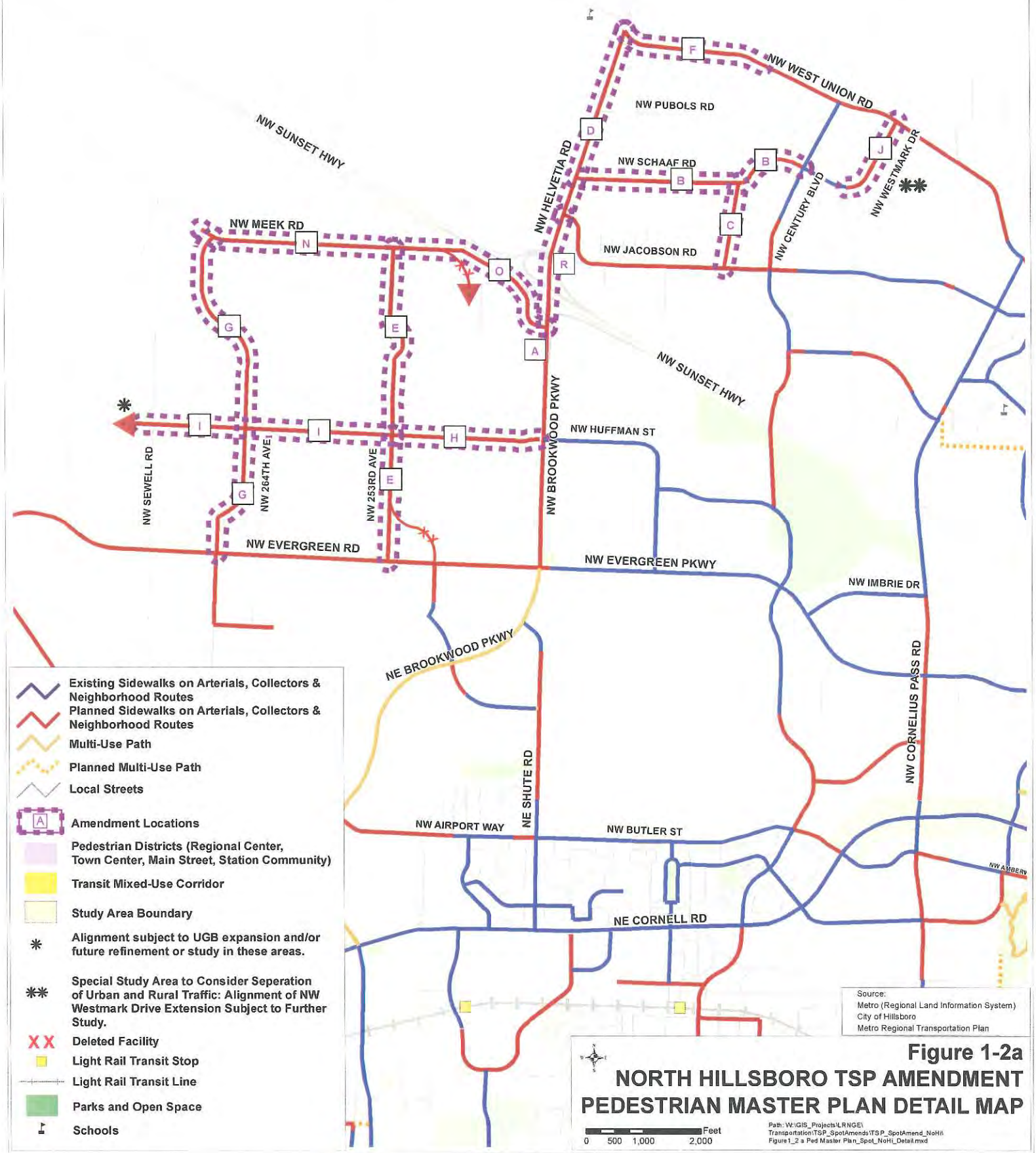
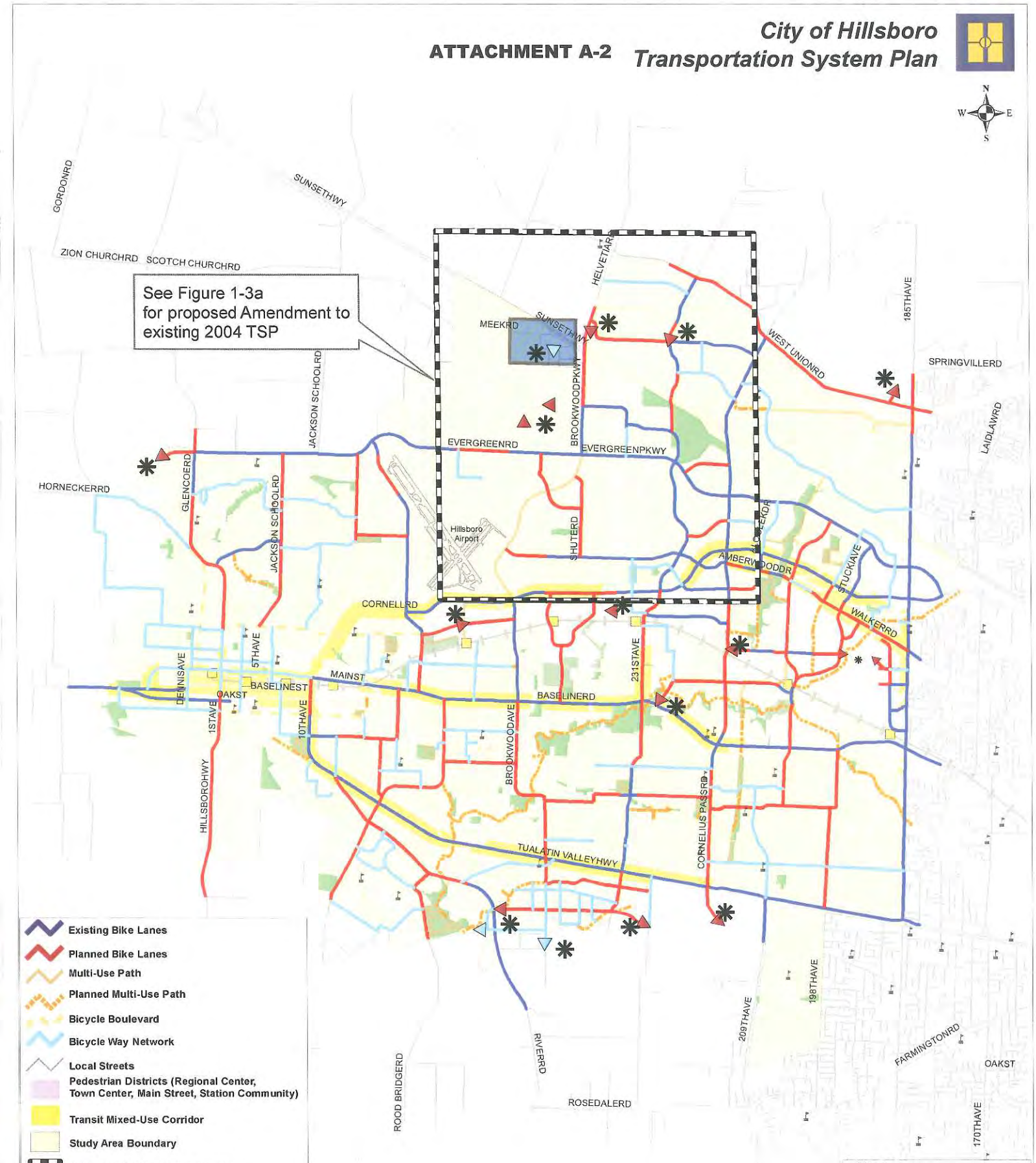


Figure 1-2a
NORTH HILLSBORO TSP AMENDMENT
PEDESTRIAN MASTER PLAN DETAIL MAP

ATTACHMENT A-2

City of Hillsboro Transportation System Plan



- Existing Bike Lanes
- Planned Bike Lanes
- Multi-Use Path
- Planned Multi-Use Path
- Bicycle Boulevard
- Bicycle Way Network
- Local Streets
- Pedestrian Districts (Regional Center, Town Center, Main Street, Station Community)
- Transit Mixed-Use Corridor
- Study Area Boundary
- Proposed TSP Amendment Area
- SpecialStudyArea
- East-West Connector Study Area Alignment subject to UGB expansion and/or future refinement or study in these areas.
- Light Rail Transit Stop
- Light Rail Transit Line
- Parks
- Schools

Source:
Metro (Regional Land Information System)
City of Hillsboro
Metro Regional Transportation Plan

Figure 1-3
BICYCLE MASTER PLAN

0 2,500 5,000 10,000 Feet

Path: W:\GIS_Projects\LRNGE\Transportation\TSP_SpotAmends\TSP_SpotAmend_NoHi\Figure1_3 Bicycle Master Plan_Spot_NoHi.mxd

ATTACHMENT A-2

City of Hillsboro
Transportation System Plan

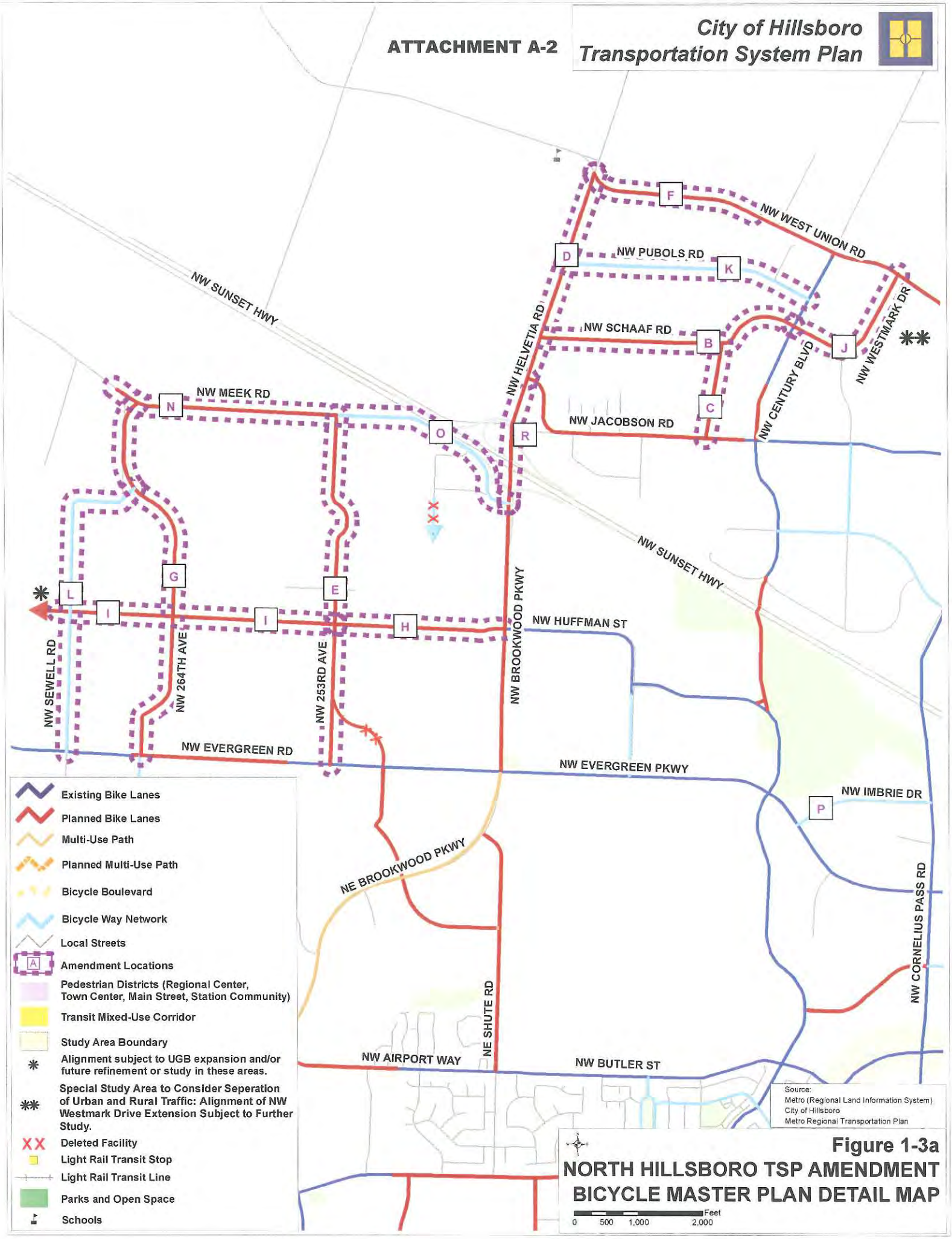
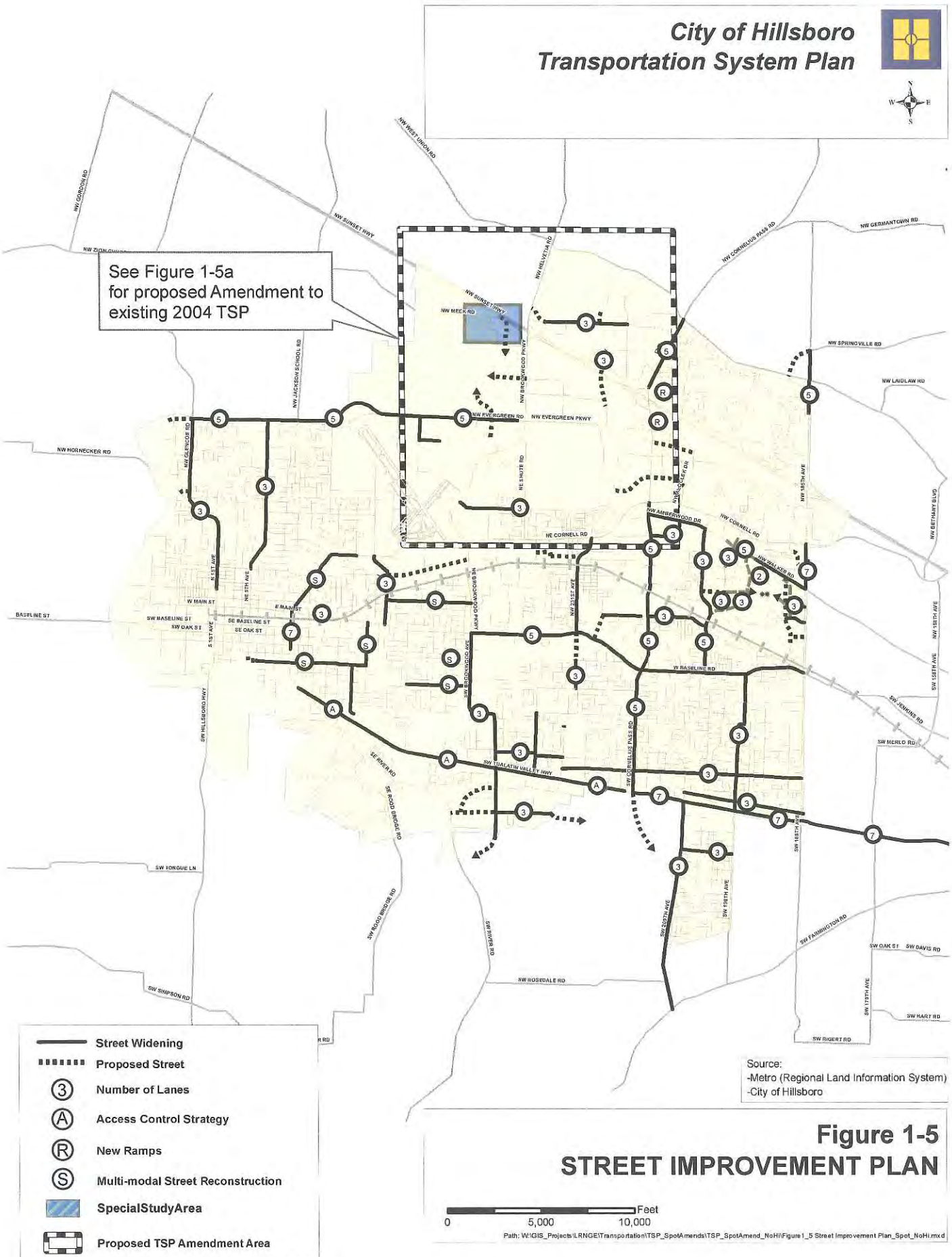


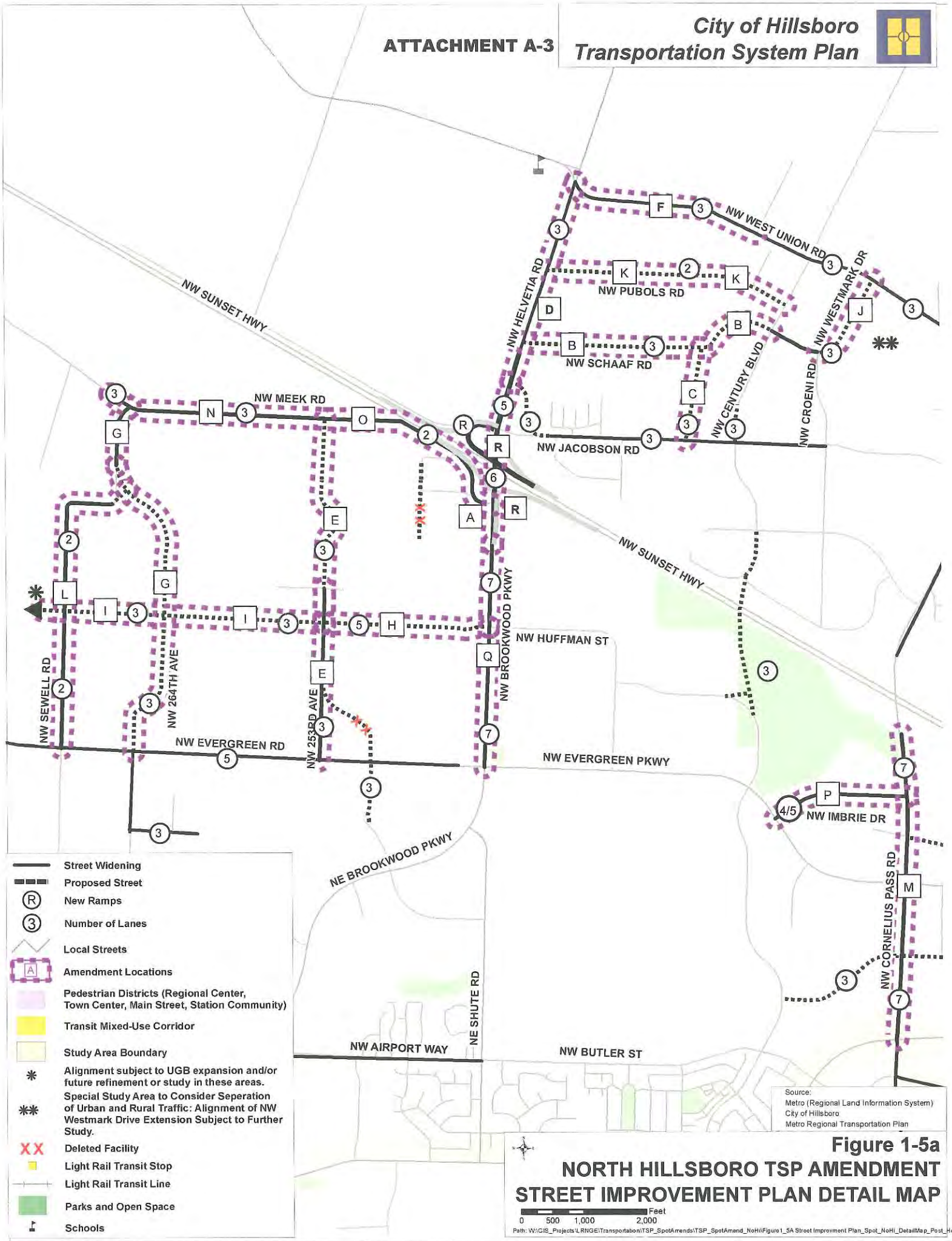
Figure 1-3a
NORTH HILLSBORO TSP AMENDMENT
BICYCLE MASTER PLAN DETAIL MAP

ATTACHMENT A-3



ATTACHMENT A-3

City of Hillsboro
Transportation System Plan



Source:
Metro (Regional Land Information System)
City of Hillsboro
Metro Regional Transportation Plan

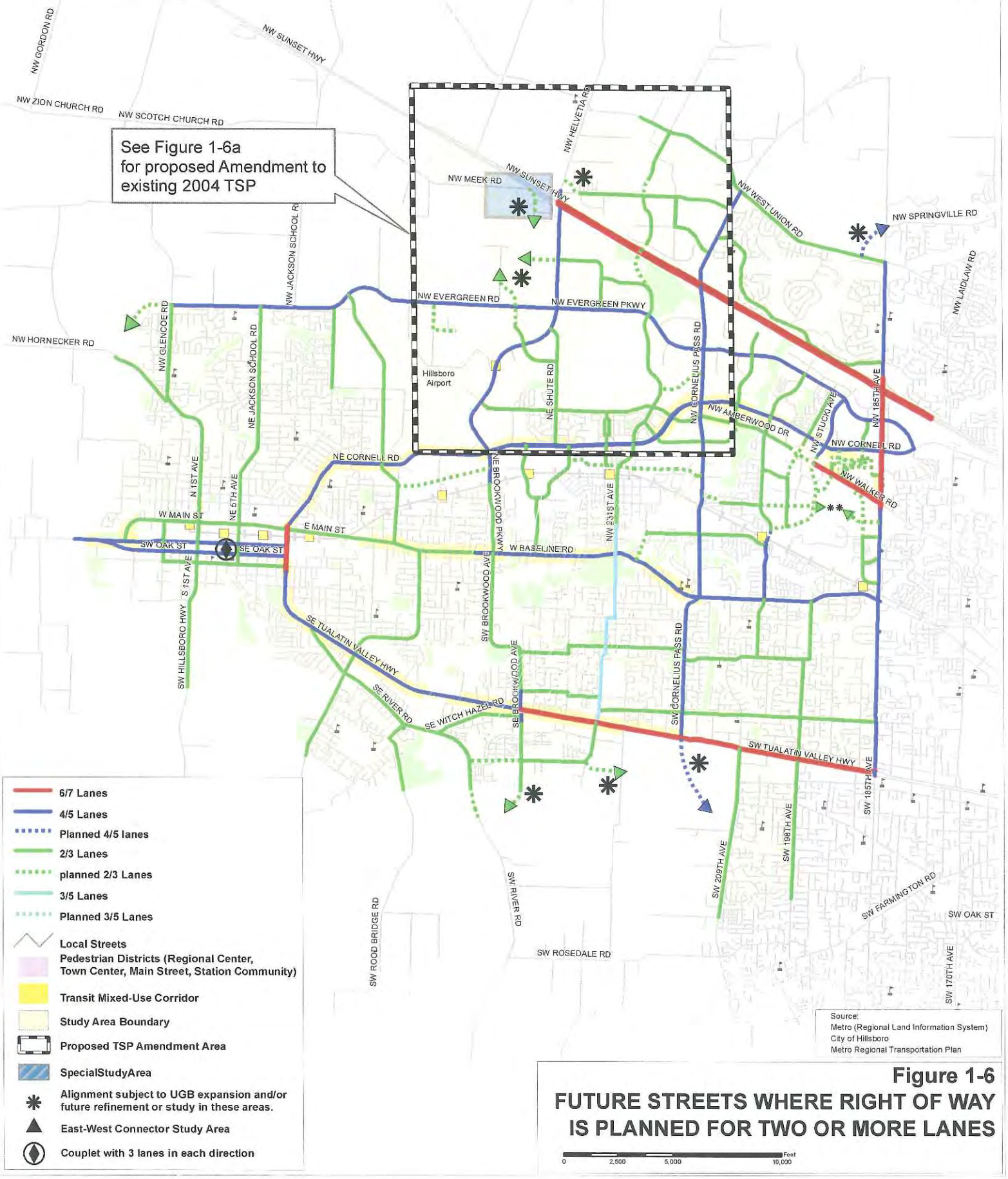
Figure 1-5a
NORTH HILLSBORO TSP AMENDMENT
STREET IMPROVEMENT PLAN DETAIL MAP

Feet
0 500 1,000 2,000

Path: W:\GIS_Projects\LRNGE\Transportation\TSP_SpotAmends\TSP_SpotAmend_NoHi\Figure1_5A Street Improvement Plan_Spot_NoHi_DetailMap_Post_He

ATTACHMENT A-4

City of Hillsboro Transportation System Plan



Source:
Metro (Regional Land Information System)
City of Hillsboro
Metro Regional Transportation Plan

Figure 1-6
FUTURE STREETS WHERE RIGHT OF WAY IS PLANNED FOR TWO OR MORE LANES

ATTACHMENT A-4

City of Hillsboro Transportation System Plan

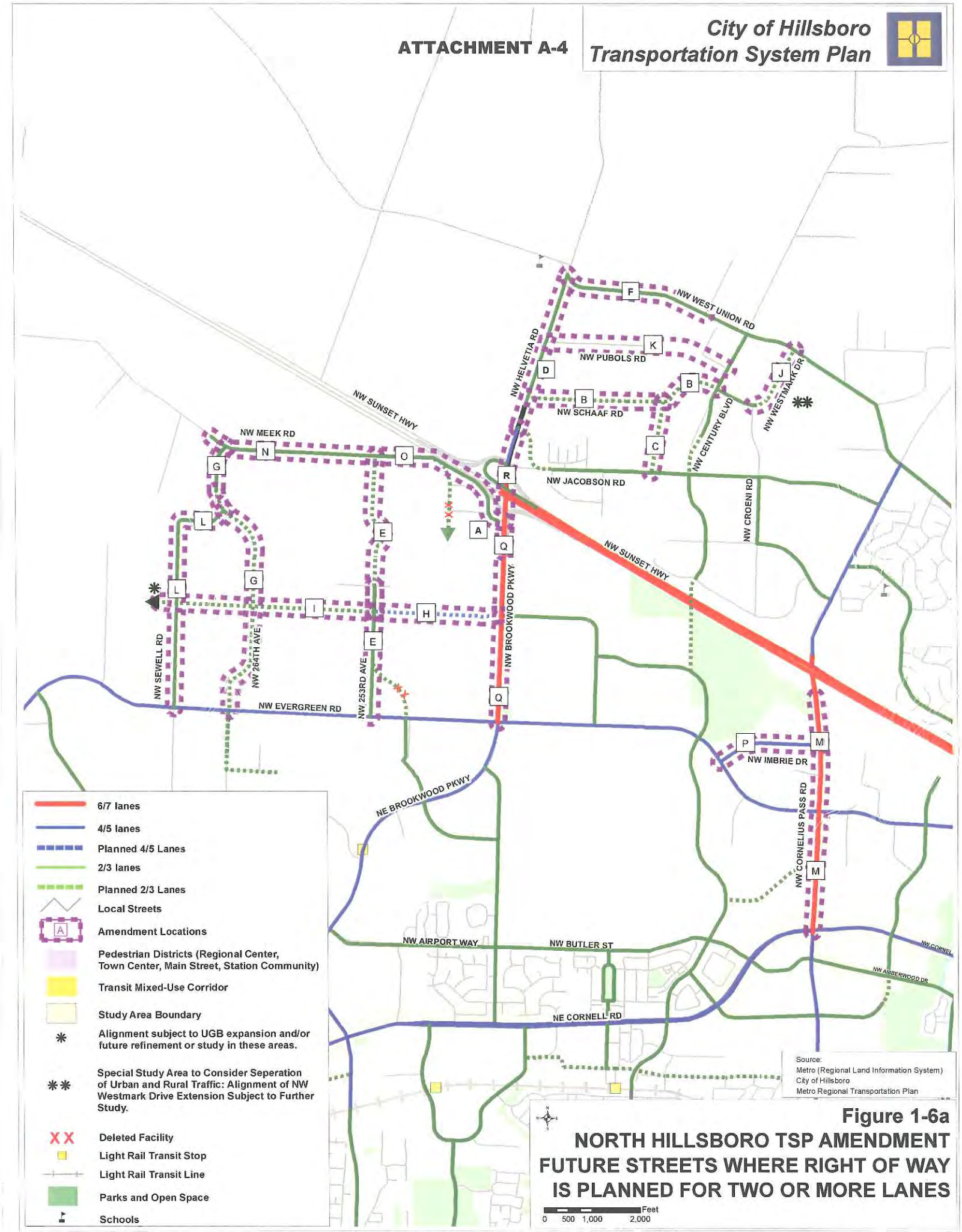
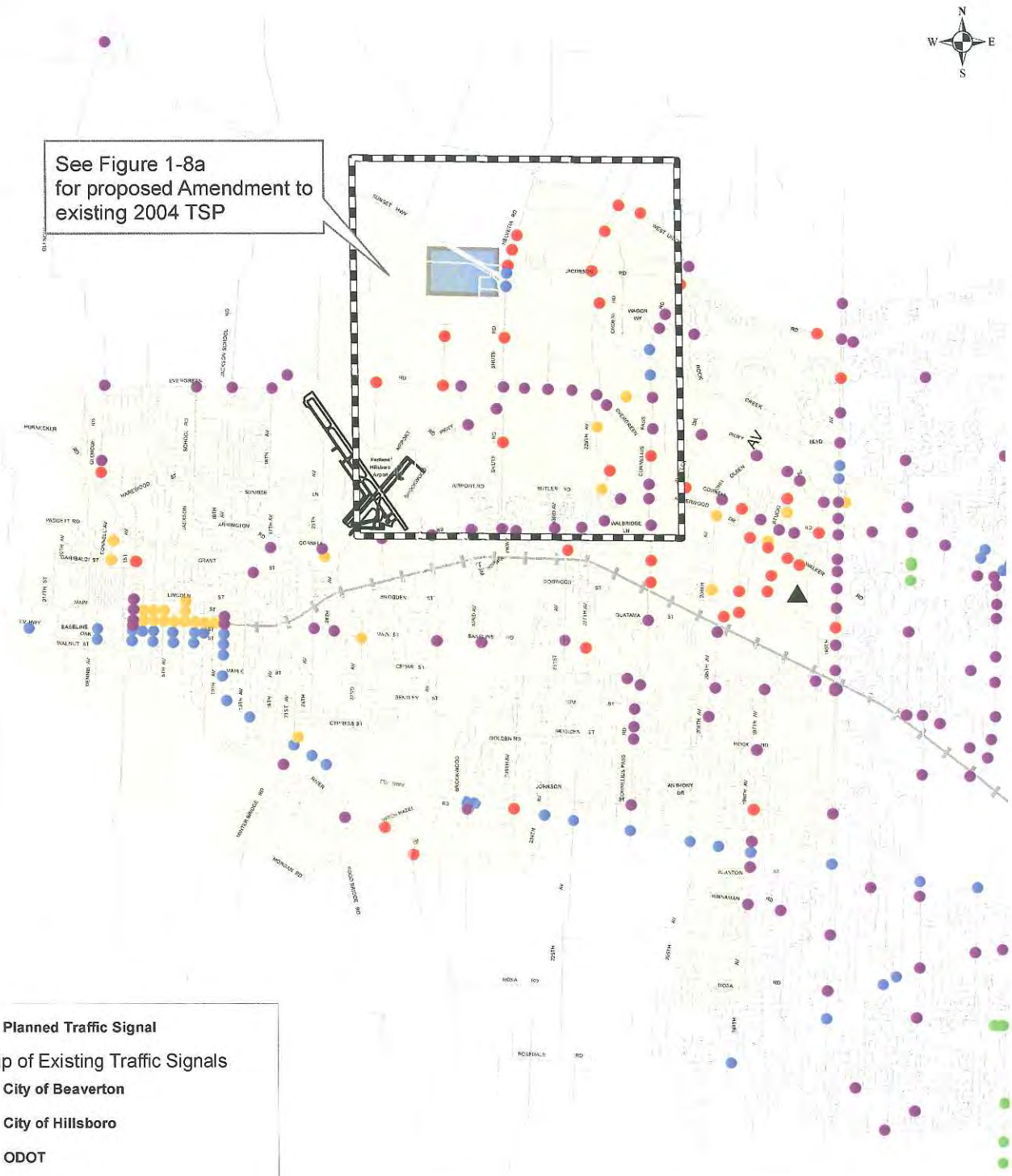


Figure 1-6a
NORTH HILLSBORO TSP AMENDMENT
FUTURE STREETS WHERE RIGHT OF WAY IS PLANNED FOR TWO OR MORE LANES

ATTACHMENT A-5

City of Hillsboro
Transportation System Plan



Planned Traffic Signal

Ownership of Existing Traffic Signals

City of Beaverton

City of Hillsboro

ODOT

Washington County

Proposed TSP Amendment Area

SpecialStudyArea

Study Area Boundary

East-West Connector Study Area

Figure 1-8
NORTH HILLSBORO TSP AMENDMENT
TRAFFIC SIGNAL MASTER PLAN

0 5,000 10,000 Feet

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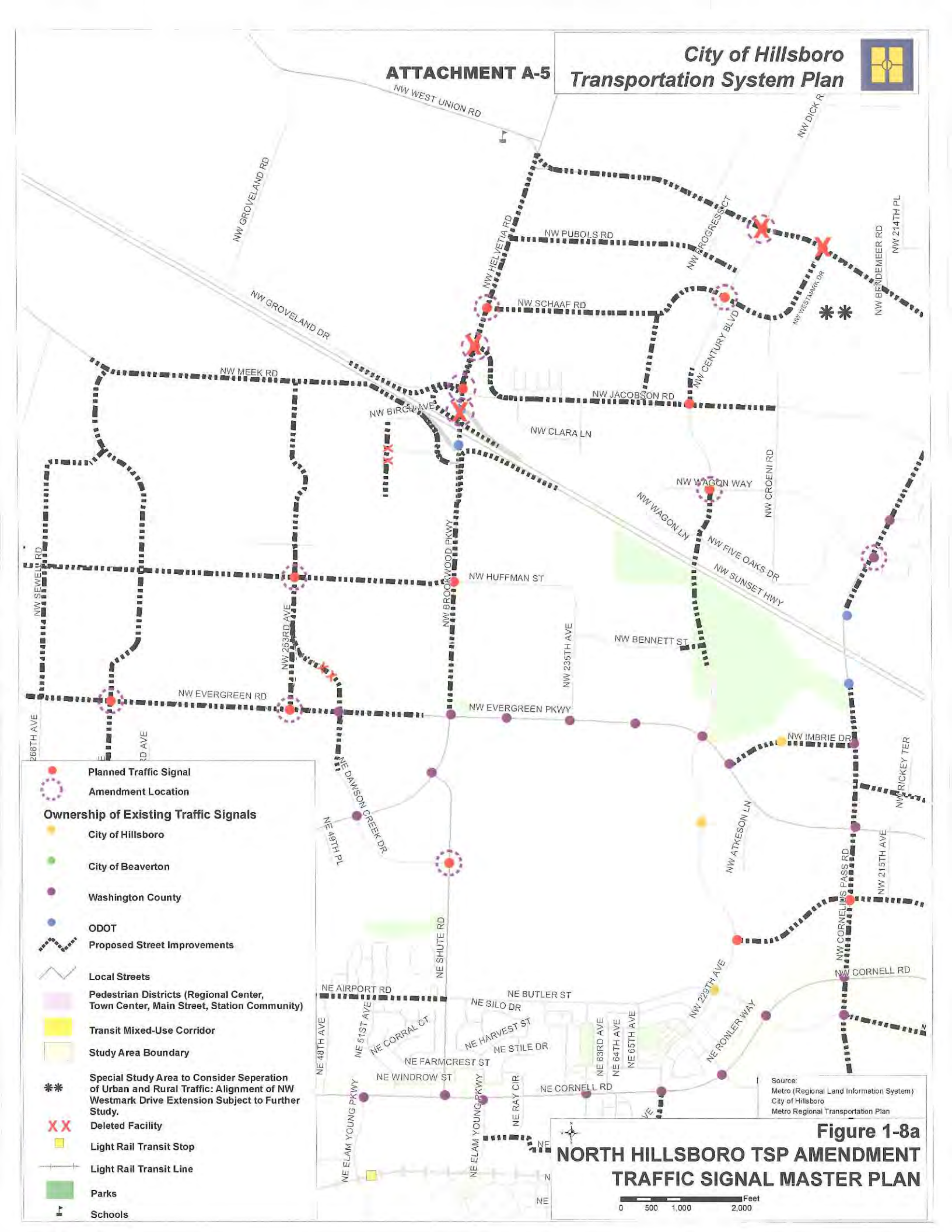

ATTACHMENT A-5
City of Hillsboro
Transportation System Plan
NW WEST UNION RD
NW GROVELAND RD
NW GROVELAND DR
NW DICK R
NW HELVETIA RD
NW PUBOLS RD
NW PROGRESS CT
NW WESTMARK DR
NW BENDEMEER RD
NW 214TH PL
NW SCHAAF RD
NW CENTURY BLVD
NW MEEK RD
NW JACOBSON RD
NW BIRCH AVE
NW CLARA LN
NW WAGON WAY
NW CROENI RD
NW WAGON LN
NW FIVE OAKS DR
NW SUNSET HWY
NW SEWELL RD
NW HUFFMAN ST
NW BROOKWOOD PKWY
NW 263RD AVE
NW 235TH AVE
NW BENNETT ST
NW EVERGREEN RD
NW EVERGREEN PKWY
NW IMBRIE DR
NW RICKEY TER
NE DAWSON CREEK DR
NE 49TH PL
NW ATKESON LN
NW CORNELIUS PASS RD
NW 215TH AVE
NE SHUTE RD
NW CORNELL RD
NE AIRPORT RD
NE BUTLER ST
NE SILO DR
NW 229TH AVE
NE 51ST AVE
NE CORRAL CT
NE HARVEST ST
NE STILE DR
NE 48TH AVE
NE 63RD AVE
NE 64TH AVE
NE 65TH AVE
NE RONLER WAY
NE FARMCREST ST
NE WINDROW ST
NE CORNELL RD
NE ELAM YOUNG PKWY
NE RAY CIR
Planned Traffic Signal
Amendment Location
Ownership of Existing Traffic Signals
City of Hillsboro
City of Beaverton
Washington County
ODOT
Proposed Street Improvements
Local Streets
Pedestrian Districts (Regional Center, Town Center, Main Street, Station Community)
Transit Mixed-Use Corridor
Study Area Boundary
** Special Study Area to Consider Seperation of Urban and Rural Traffic: Alignment of NW Westmark Drive Extension Subject to Further Study.
XX Deleted Facility
Light Rail Transit Stop
Light Rail Transit Line
Parks
Schools
Source:
Metro (Regional Land Information System)
City of Hillsboro
Metro Regional Transportation Plan
Figure 1-8a
NORTH HILLSBORO TSP AMENDMENT
TRAFFIC SIGNAL MASTER PLAN
Feet
0 500 1,000 2,000

ATTACHMENT A-6

City of Hillsboro
Transportation System Plan

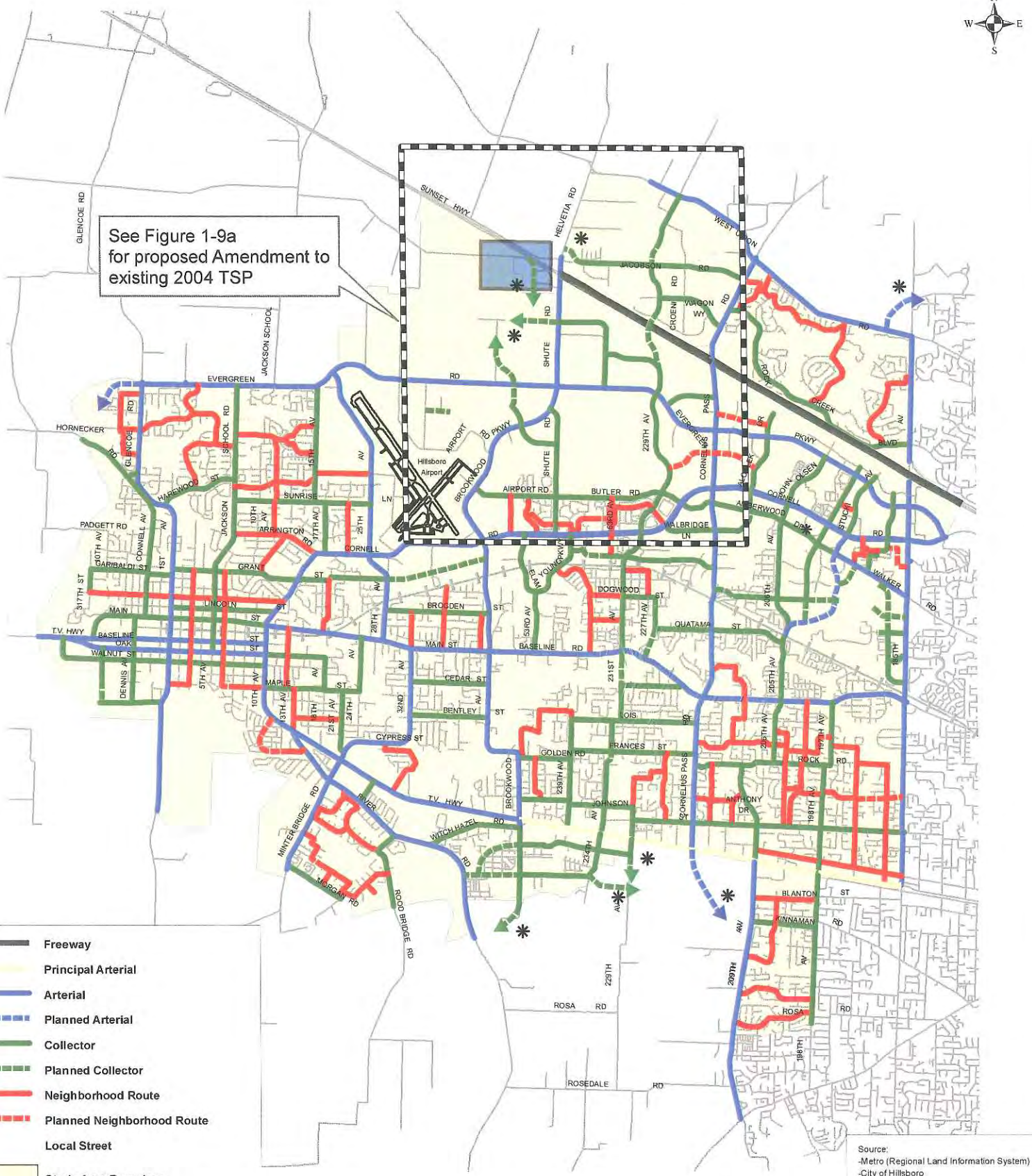


Figure 1-9
HILLSBORO FUNCTIONAL CLASSIFICATION PLAN

ATTACHMENT A-6

City of Hillsboro
Transportation System Plan

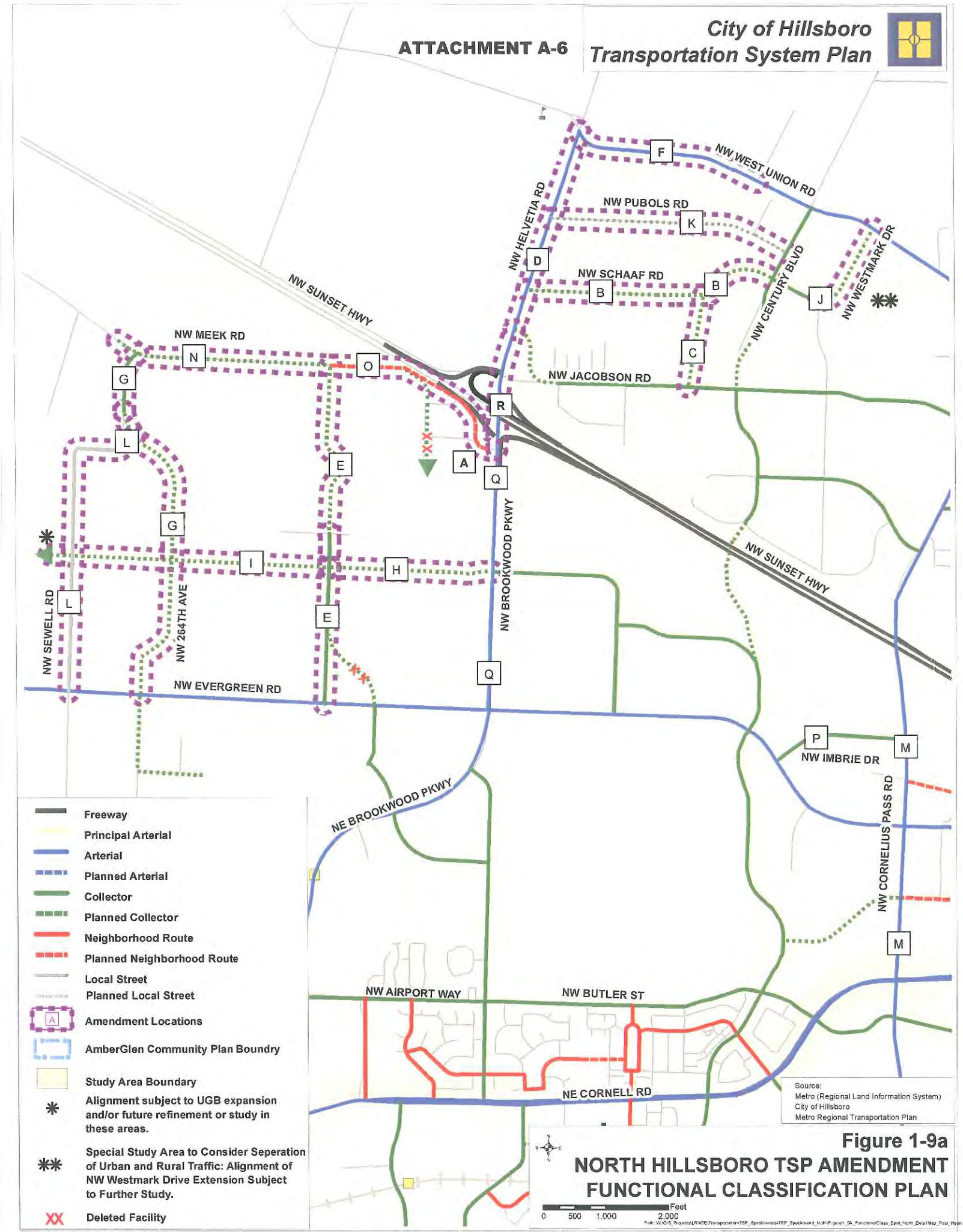


Figure 1-9a
NORTH HILLSBORO TSP AMENDMENT
FUNCTIONAL CLASSIFICATION PLAN

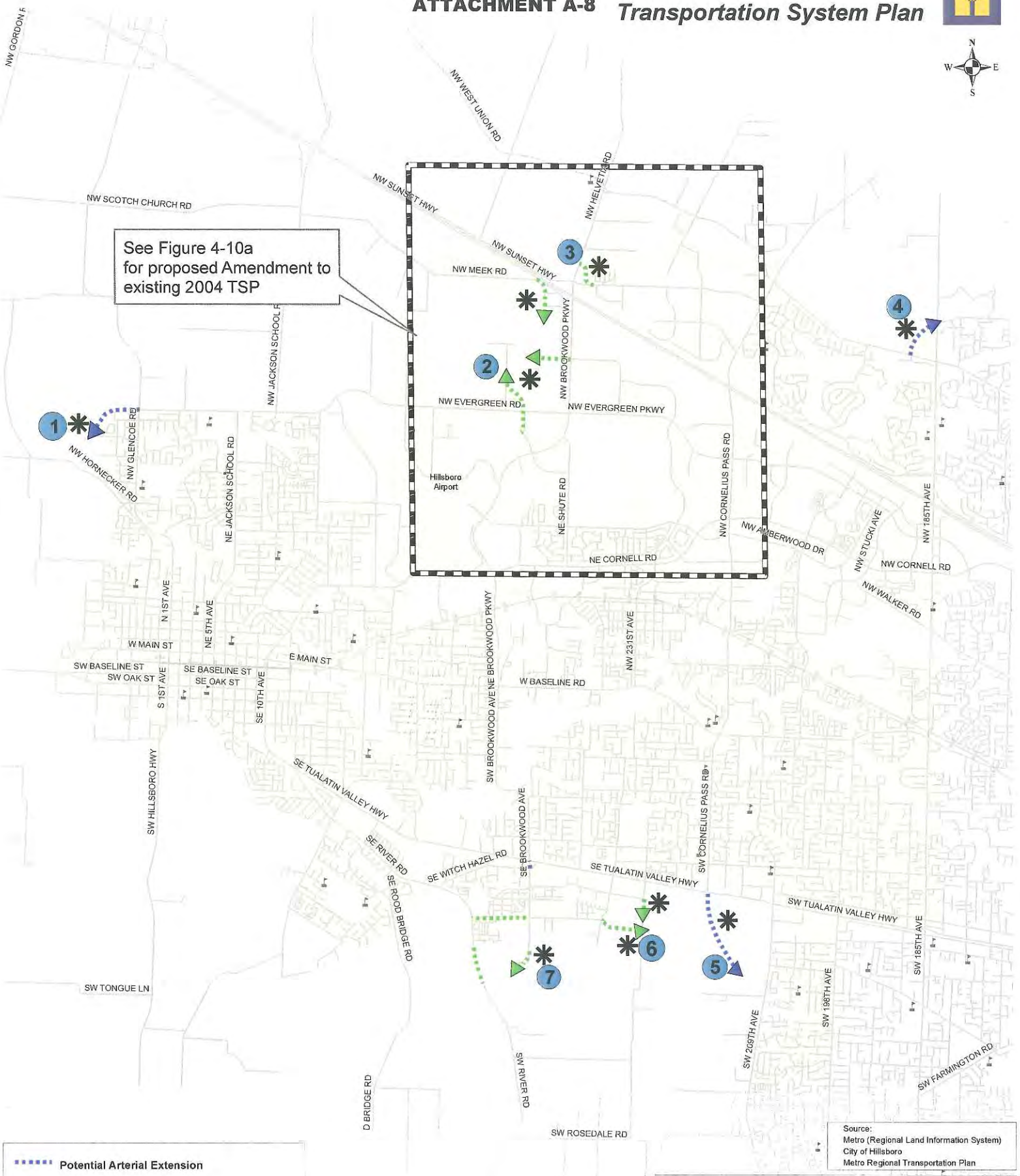
ATTACHMENT A-7

Figure 4-9 Meek Road Study Area

Deleted October 2012, Ordinance _____

ATTACHMENT A-8

City of Hillsboro
Transportation System Plan



Potential Arterial Extension
Potential Collector Extension
Other Streets
Study Area Boundary
Alignment subject to UGB expansion and/or future refinement or study in these areas.

Source:
Metro (Regional Land Information System)
City of Hillsboro
Metro Regional Transportation Plan

Figure 4-10
POTENTIAL FUTURE CONNECTIONS/REALIGNMENTS

0 2,500 5,000 Feet

ATTACHMENT A-8

City of Hillsboro Transportation System Plan

Potential Arterial Extension

Potential Collector Extension

Other Streets

Study Area Boundary

* Alignment subject to UGB expansion and/or future refinement or study in these areas.

** Special Study Area to Consider Seperation of Urban and Rural Traffic: Alignment of NW Westmark Drive Extension Subject to Further Study.

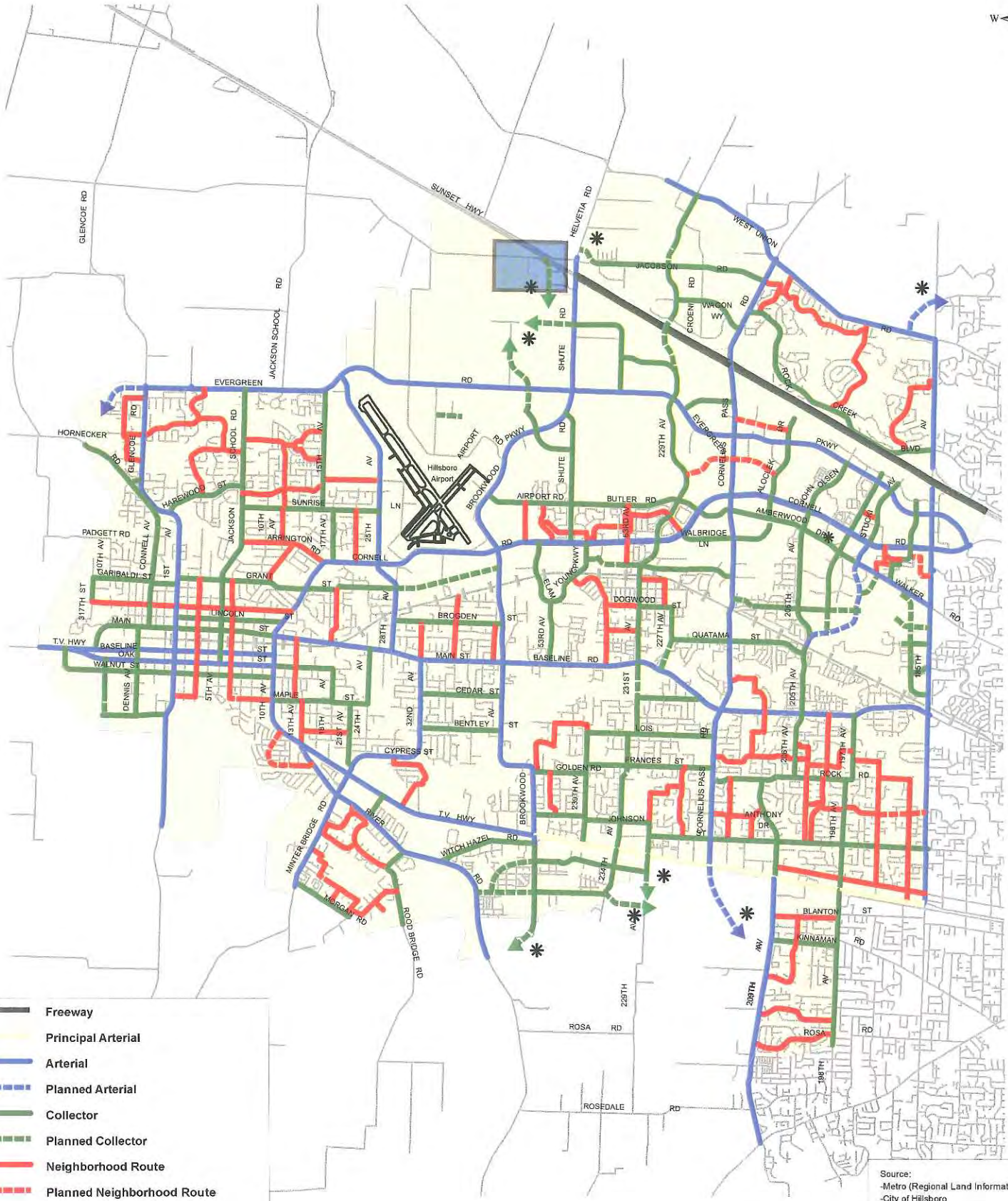
Source:
Metro (Regional Land Information System)
City of Hillsboro
Metro Regional Transportation Plan

Figure 4-10a
POTENTIAL FUTURE CONNECTIONS/REALIGNMENTS

0 2,500 5,000 Feet

ATTACHMENT A-9

City of Hillsboro
Transportation System Plan



Source:
-Metro (Regional Land Information System)
-City of Hillsboro

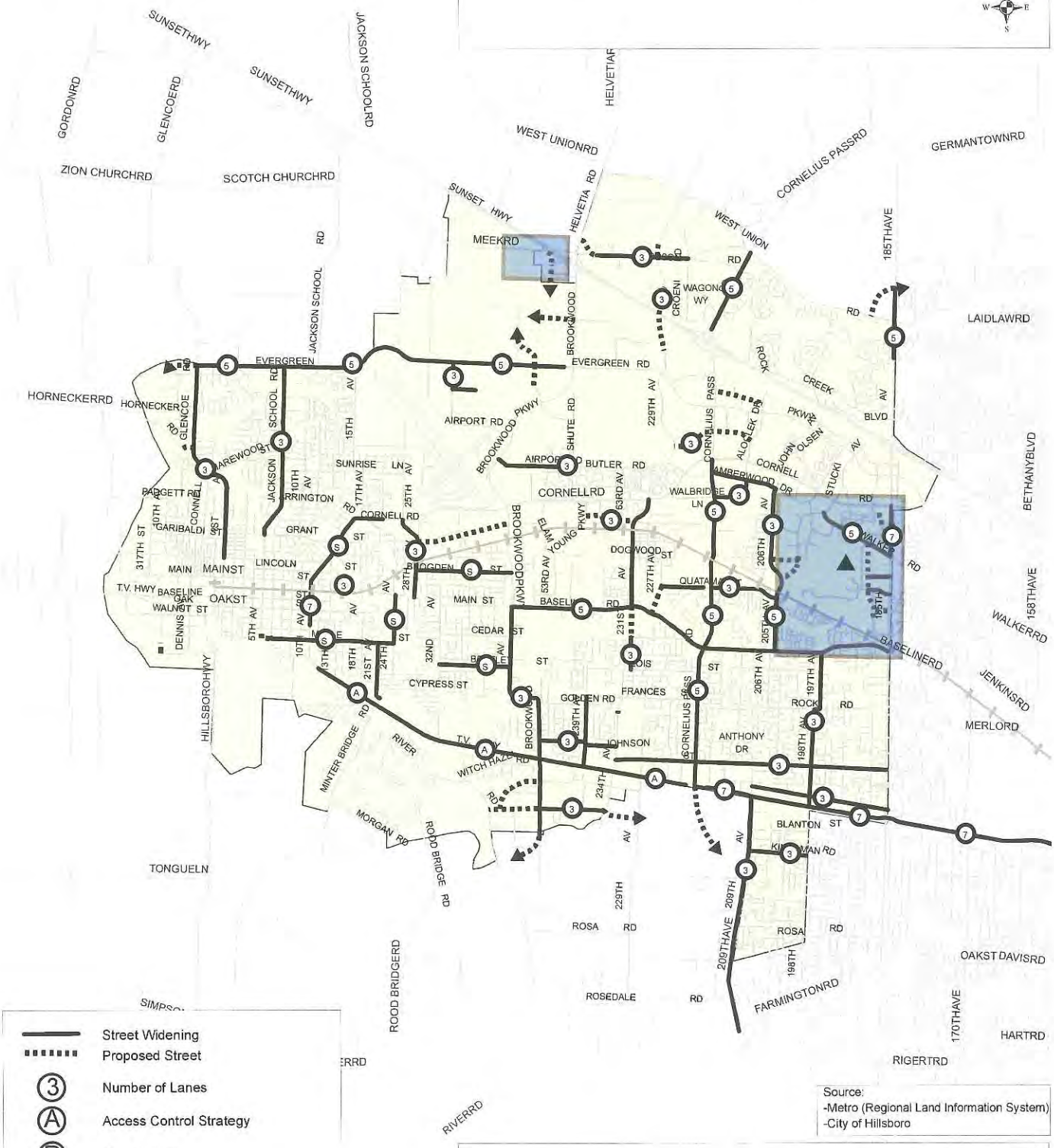
Figure 14-1
HILLSBORO FUNCTIONAL CLASSIFICATION PLAN

Feet
0 2,500 5,000 10,000

Figure 14-1a
FUTURE STREETS WHERE RIGHT OF WAY IS PLANNED FOR TWO OR MORE LANES

ATTACHMENT A-11

City of Hillsboro
Transportation System Plan



Street Widening
Proposed Street
③ Number of Lanes
Ⓐ Access Control Strategy
Ⓡ New Ramps
Ⓢ Multi-modal Street Reconstruction
Proposed TSP Amendment Area
SpecialStudyArea
East-West Connector Study Area

Source:
-Metro (Regional Land Information System)
-City of Hillsboro

Figure 14-2
STREET IMPROVEMENT PLAN

0 5,000 10,000 Feet

Path: W:\GIS_Projects\LRNGE\Transportation\TSP_SpotAmends\TSP_SpotAmend_NoHi\Figure14-2 Street Improvement Plan_Spot_NoHi.mxd

ATTACHMENT A-12

City of Hillsboro Transportation System Plan

- Existing Bike Lanes
- Planned Bike Lanes
- Multi-Use Path
- Planned Multi-Use Path
- Bicycle Boulevard
- Bicycle Way Network
- Local Streets
- Pedestrian Districts (Regional Center, Town Center, Main Street, Station Community)
- Transit Mixed-Use Corridor
- Study Area Boundary
- Proposed TSP Amendment Area
- SpecialStudyArea
- East-West Connector Study Area Alignment subject to UGB expansion and/or future refinement or study in these areas.
- Light Rail Transit Stop
- Light Rail Transit Line
- Parks
- Schools

Source:
Metro (Regional Land Information System)
City of Hillsboro
Metro Regional Transportation Plan

Figure 14-4
BICYCLE MASTER PLAN

0 2,500 5,000 10,000 Feet

Path: W:\GIS_Projects\LRNGE\Transportation\TSP_SpotAmends\TSP_SpotAmend_NoHi\Figure14_4 Bicycle Master Plan_Spot_NoHi.mxd

ATTACHMENT A-13

ATTACHMENT A-14

City of Hillsboro Transportation System Plan

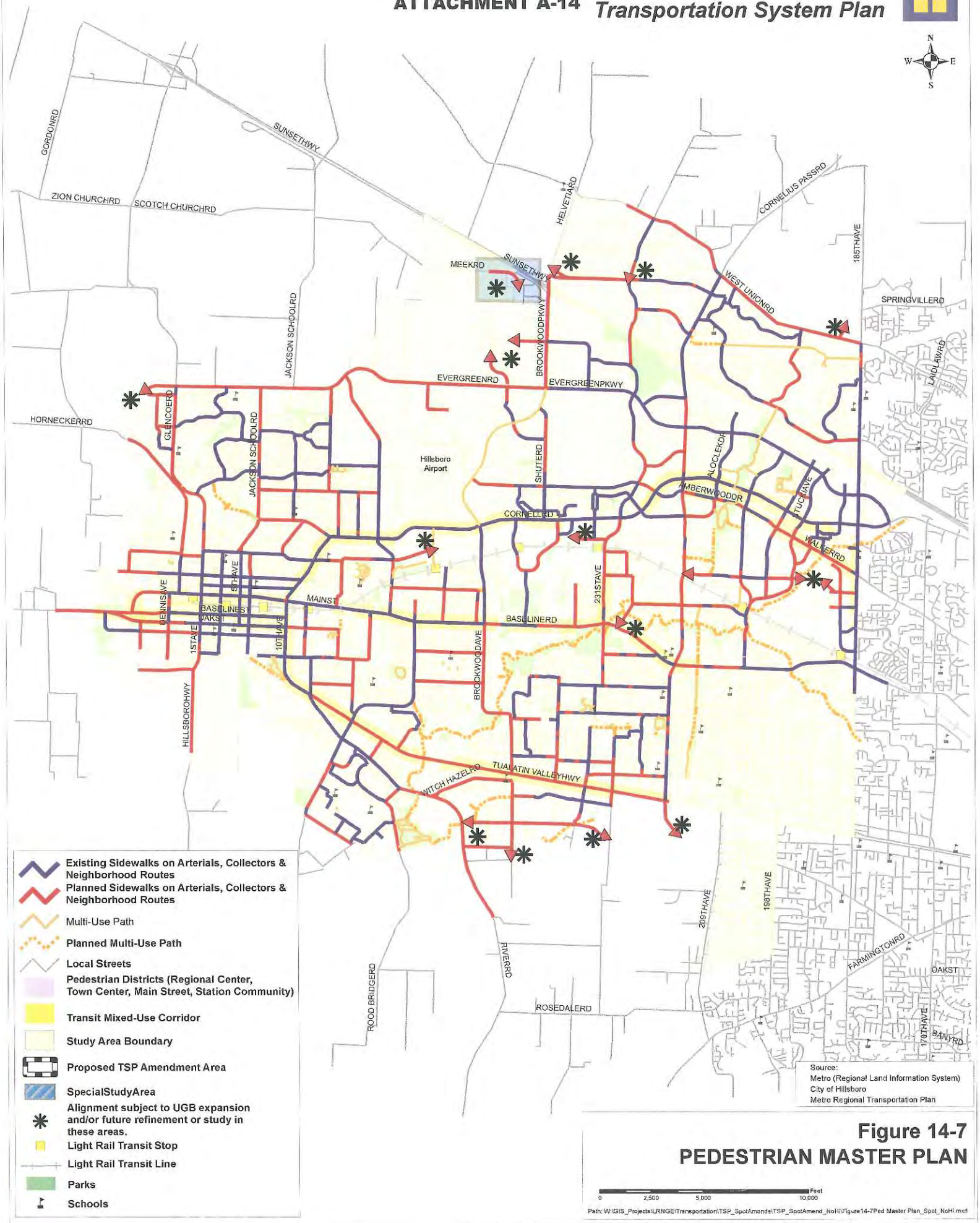


Figure 14-7
PEDESTRIAN MASTER PLAN

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ATTACHMENT A-1

City of Hillsboro Transportation System Plan

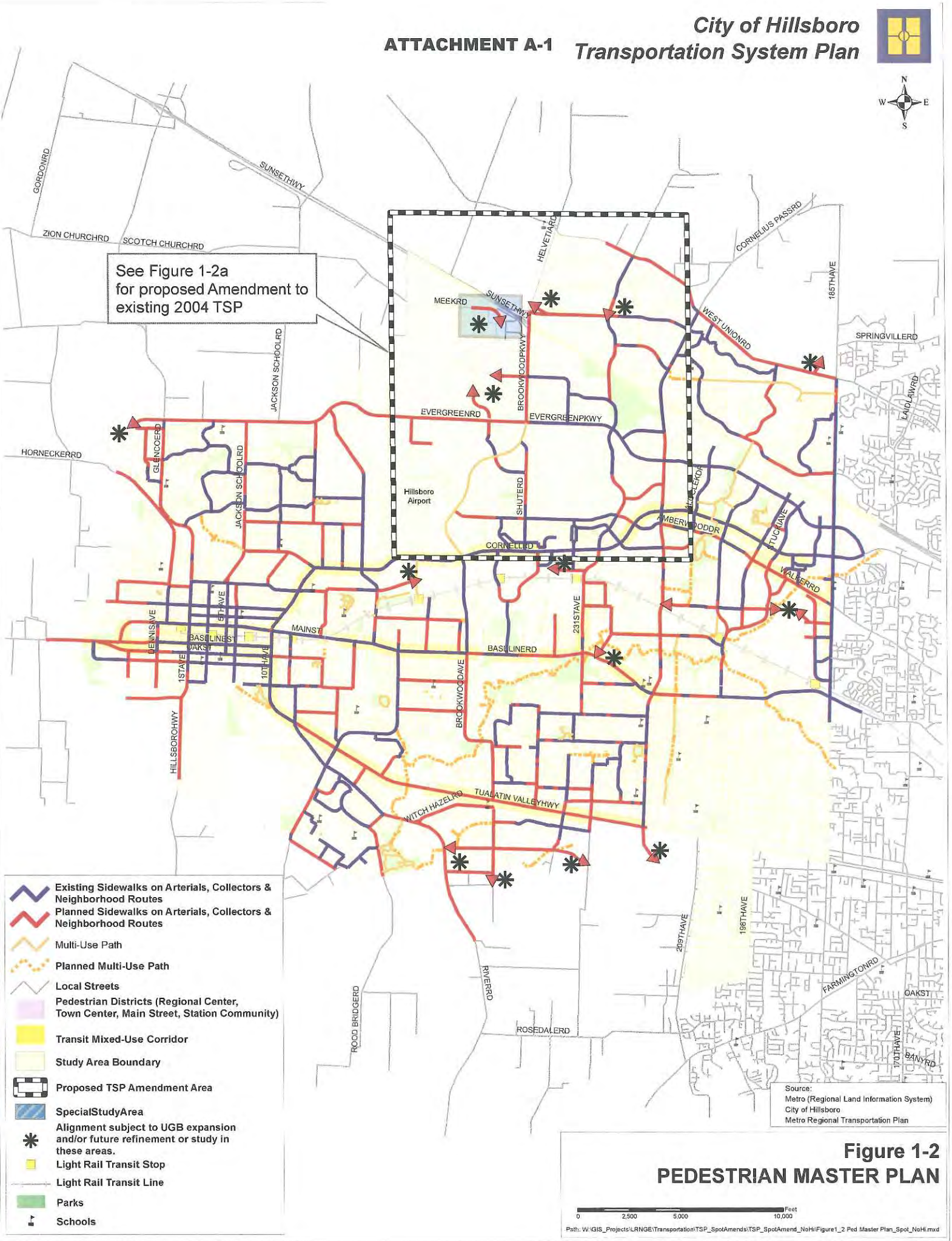


Figure 1-2
PEDESTRIAN MASTER PLAN

EXHIBIT B

BEFORE THE PLANNING COMMISSION
OF THE
CITY OF HILLSBORO

A REQUEST FOR COMPREHENSIVE PLAN AMENDMENTS TO IMPLEMENT TRANSPORTATION IMPROVEMENTS FOR THE NORTH HILLSBORO INDUSTRIAL AREA

CITY OF HILLSBORO
CASE FILE NO. HCP 3-12
FINDINGS OF FACT

NATURE OF AMENDMENTS

The proposed amendments to the Hillsboro Comprehensive Plan (HCP) Ordinance No. 2793, as amended and the City of Hillsboro Transportation System Plan (TSP) Update, January 2004, as amended, to amend text and maps to implement transportation improvements for the North Hillsboro Industrial Area (North Hillsboro) are legislative major plan amendments. The amendments were initiated by the Planning Commission through adoption of Order No. 8074. The proposed amendments would classify, reclassify or create new alignments for roadways in North Hillsboro (within two general project areas described below in the Background section) and make revisions to the TSP's project lists for motor vehicles, bicycles and pedestrians to add or modify the transportation improvements.

BACKGROUND ON PROPOSED AMENDMENTS

There are two general transportation system project areas for North Hillsboro as follows:

The first project area involves the transportation system surrounding and supporting the US 26 Interchange with NW Brookwood Parkway-NW Helvetia Road. Transportation system improvements for this project are encompassed in ODOT's Interchange Area Management Plan (IAMP) and Washington County's A-Engrossed Ordinance 749, adopted September 18, 2012. Additional transportation system plan amendments in this area generally include application of existing Washington County transportation system plan designations to County roadways located within or adjacent to the boundaries of the Helvetia Concept Planning Area, the Evergreen Concept Planning Area, and the area located adjacent to NW Meek Road which was brought into the Urban Growth Boundary in October 2011.

The second project area includes NW Cornelius Pass Road, NW Evergreen Parkway and NW Imbrie Drive. The transportation system improvements for the second project area have been identified through traffic studies prepared for recent industrial and commercial expansion projects in the corridor, as well as travel forecasting analysis prepared by city of Hillsboro transportation planning division staff.

Brookwood-Helvetia/US 26 Interchange Area Management Plan:

The need for transportation system improvements at, and surrounding, the NW Brookwood Parkway/NW Helvetia Road/US 26 Interchange grew out of concept planning work done by the city of Hillsboro for the 249-acre Helvetia Concept Planning Area (located northeast of the Interchange) and the 534-acre Evergreen Concept Planning Area (located southwest of the Interchange). Metro brought these two areas into the Urban Growth Boundary (UGB) in 2002, and 2005, respectively. The Concept Plans identified the type of development (primarily industrial) that should occur and established the general framework for the infrastructure needed to serve these two areas. These areas will be annexed to the city before they develop or redevelop with urban uses.

The Concept Plans were adopted by the Hillsboro City Council on February 5, 2008, and were added to the Hillsboro Comprehensive Plan (Plan) as Section 24. City of Hillsboro, Evergreen Area Industrial Plan (EAIP) and Section 25. City of Hillsboro Helvetia Area Industrial Plan (HAIP). On January 17, 2012, the City amended the Plan to add a new Section 30. North Hillsboro Industrial Area Community Plan, which consolidated the EAIP and HAIP and the Shute Area Industrial Site (Section 20. Shute Road Industrial Site) into a single North Hillsboro Industrial Community Plan, and deleted Sections 20, 24 and 25.

On October 20, 2011, the Metro Council approved modest expansions to the region's UGB in four areas. One of the four areas is a 330-acre area north of Hillsboro in the vicinity of the US 26/NW Brookwood Parkway/NW Helvetia Road Interchange, for the purposes of attracting future large-site industrial employers. A Concept Plan will be developed by the city of Hillsboro in early 2013 for the 330-acres located north of the Evergreen Concept Planning Area and south of US-26, adjacent to NW Meek Road. This area is anticipated to be planned for future industrial zoning, particularly for large-lot industrial sites. Estimated employment capacity for the land contained within the Urban Growth Boundary, including the 330-acres, was included in the analysis of required transportation system improvements necessary to meet travel demand and meet currently adopted performance measures.

Development of the IAMP started in fall, 2010, when the city of Hillsboro and Washington County (County) entered into a Memorandum of Understanding (MOU) with the Oregon Department of Transportation (ODOT) on December 16, 2010. The MOU established the Oregon Jobs and Transportation Act (JTA) and IAMP terms, tasks, priorities, boundaries, phases, roles and responsibilities, and communications protocols.

The purpose of the IAMP partnership is to document and affirm land use assumptions and to identify necessary transportation system improvements required to maintain acceptable levels of transportation mobility. This includes improvements at the interchange, as well as additional infrastructure improvements surrounding and supporting the interchange which will preserve the state's investments for their intended purpose.

The IAMP process is a joint planning effort between ODOT, the County and the City (Partners) which was led by ODOT staff. It included an extensive public involvement process completed in the development of the IAMP which is further described herein. Washington County also completed public hearings and adopted the IAMP recommended transportation system amendments in A-Engrossed Ordinance No. 749, adopted on September 18, 2012.

lmprovements to the US-26/Brookwood – Helvetia Interchange are planned to commence construction in 2013 with completion anticipated in 2015. The improvements are funded with $45 million dollars provided by the JTA enacted by the 2009 Oregon Legislature. The 2012 Legislature additionally approved increased funding for this interchange area through SB 1543 which will add approximately $2 Million to $3 Million from anticipated unexpended funds relating to the ongoing widening of US 26 between NW Cornell Road and NW 185th Avenue. Under agreement with ODOT, if the Interchange costs are less than $45 million (now $47M to $48M), remaining funds would be available for priority projects identified in the IAMP (which occur on both Washington County and City roads).

NW Evergreen Parkway-NW Imbrie Drive–NW Cornelius Pass Road TSP Amendments:

The recommended transportation system improvements for the second project area within North Hillsboro are in response to recent and potential future development expansion on the Intel Ronler Acres Campus and on adjacent industrial green field sites, and are based upon traffic impact studies received over the past 18 months from Intel Corporation's traffic consultant, Group Mackenzie, as well as supplemental transportation studies completed by city of Hillsboro transportation planning division staff. There are two projects that make up these recommended transportation improvements, as follows:

The first project results from an initial draft traffic study for the Intel Ronler Acres Campus D1X Fabrication Plant expansion and focuses on recommended intersection improvements at NW Evergreen Parkway with NW 229th Avenue and NW Imbrie Drive. Its focus is the development of future side-by-side double left turns on NW Evergreen Parkway between NW 229th Avenue and NW Imbrie Drive. Left turn lane improvements on NW Evergreen Parkway between NW 229th Avenue and NW lmbrie Drive, specifically widening to provide double left turn lanes in each direction in this tightly spaced offset of intersections, would necessitate widening NW Imbrie Drive with a second eastbound lane between NW Evergreen Parkway and approximately 100 feet east of the Fred Meyer traffic signal where a second eastbound lane exists.

Staff finds that the addition of the second eastbound lane on NW Imbrie Drive would require amendment to the Transportation System Plan. While intersection level improvements within 500 feet of the NW Evergreen Parkway intersection would be allowed without TSP amendment, the extension of the second eastbound lane will yield safer conditions by eliminatmg merging and weaving movements in the corridor.

The second project is based upon technical analyses prepared by Group Mackenzie in June 2012, supplemented by technical analyses prepared by city of Hillsboro transportation planning division staff and their consultants, David Evans & Associates. These studies recommend consideration of TSP amendments to expand capacity on NW Cornelius Pass Road through the addition of a third northbound and a third southbound travel lane extending from NW Cornell Road to the US 26 eastbound on ramp. The third southbound lane has been found essential in ensuring morning commute traffic can efficiently move away from the US 26 corridor to avoid southbound queue spillbacks extending into the mainline lanes of westbound US 26.

The third northbound travel lane on NW Cornelius Pass Road functions as an auxiliary lane allowing traffic nearing US 26 to select lane destinations well in advance of the traffic signals at NW Imbrie Drive and the approach to the US 26 eastbound traffic signal. The third lane is critical due to double eastbound to northbound left turn lanes feeding into the NW Cornelius Pass Road corridor from NW Cornell Road, NW Ronler Drive, NW Imbrie Drive and NW Evergreen Parkway.

MAJOR PLAN AMENDMENT PROCEDURES

Pursuant to HCP Section 1 (II)(G), a "Major Plan Amendment" includes any significant change to the Comprehensive Plan text or map initiated by the City Council or Planning Commission. A "significant change" is one that amends or refines both the Plan text and map, has operative effect over a large geographic area and is likely to have significant environmental, energy, economic and social consequences. Major plan amendments include but are not limited to Plan amendments that incorporate community plans as part of the Comprehensive Plan or incorporate portions of public facility plans as part of the Comprehensive Plan in accordance with State statute and regulations implementing Statewide Planning Goal 11. All major plan amendments shall be processed in accordance with the provisions specified in Part (III) of this Section.

The proposed amendments to the Hillsboro Comprehensive Plan (HCP) Ordinance No. 2793, as amended and the City of Hillsboro Transportation System Plan (TSP) Update, January 2004, as amended, to amend text and maps to implement transportation improvements for the North Hillsboro Industrial Area meet the definition of a "Major Plan Amendment" and shall be processed in accordance with the procedures specified in HCP Section 1 (III) Plan Revision and Major Plan Amendments. The findings for compliance with Section 1 (III) are as follows:

(III) Plan Revision and Major Plan Amendments

Plan revisions and major plan amendments shall be processed as legislative procedures. The following process shall be used when conducting any plan revision or major plan amendment of the Comprehensive Plan:

(A) For each proposed plan revision or major plan amendment to the Comprehensive Plan, the City Planning Department will:

(1) With the advice and assistance of the CIAC, establish and conduct a citizen involvement program which provides for public involvement and input into the proposed revision or amendment which complies with Statewide Planning Goal 1 requirements. At a minimum, such a public involvement program shall provide for adequate notice on citizen involvement activities; advanced information on matters under consideration; and opportunities for public involvement in all phases of the planning process applicable to the proposed plan revision or major plan amendment as determined by the CIAC.

Finding: Hillsboro planning staff met with the CIAC on July 11, 2012 to establish the citizen involvement program that provides for public involvement and input into the proposed major plan amendments. The CIAC approved the public involvement plan.

(2) Identify issues to be addressed and related information and data to be collected, reviewed and made available for public review. Inform citizens of these issues; and provide opportunity for citizen access to the related information and data; and for citizen input on these issues.

Finding: Staff finds that issues to be addressed were identified, and data was collected, reviewed and made available for public review relating to the proposed transportation improvements for ODOT's Jobs and Transportation Act interchange expansion project at US 26/Brookwood-Helvetia and for ODOT's Interchange Area Management Plan. This work occurred between May, 2011, and June, 2012. ODOT developed the IAMP in partnership with the city of Hillsboro and Washington County, and with consideration of public feedback. The established IAMP goals and priorities listed below informed the development of the IAMP. Staff additionally finds that a separate public involvement program, described in detail below, was undertaken related to amendments proposed for NW Imbrie Drive and NW Cornelius Pass Road area. Public comment received to date is summarized below.

IAMP goals and priorities:

- Support the US 26/Brookwood Parkway/Helvetia Interchange Jobs and Transportation Act design and construction project;
- Support the ongoing and future city of Hillsboro and Washington County transportation, land use, and economic development planning efforts in and around the study area; and
- Identify recommended transportation system improvements in the vicinity of the interchange necessary to provide safe operations and protect the future function of the interchange.

IAMP priorities: The IAMP priorities include safety and capacity improvements that:

- Maintain or improve safety and operations at the US 26 interchange, and at other facilities in the vicinity of the interchange area;
- Identify and address the interchange operation needs associated with current and future industrial land designated in the existing adopted comprehensive plan and recently expanded Urban Growth Boundary, to the extent feasible;
- Develop a local street network that provides for local connectivity and helps minimize the need for local travel using or traveling through the interchange; and
- Identify facilities for adequate bicycle and pedestrian circulation in the area.

During the timeframe described above for development of the IAMP, there were public review drafts of the IAMP culminating with the US 26/Brookwood Parkway/Helvetia Road Interchange Area Management Plan Public Review Draft, dated June 2012. All public review drafts were made available for public review on ODOT's website. ODOT's public review process is described as follows:

IAMP Public Involvement:
Project committees guided the process and provided important policy, community, and technical feedback through the project. Interviews, public meetings and briefings were held with neighbors, business interests, and local community organizations. Informational materials including newsletters, the project website, and a press release provided project updates to the general public.

The decision-making process involved three groups: the Project Management Team (PMT), Project Advisory Committee (PAC), and the Project Policy Group (PPG). The PAC provided input to the PMT, and the PMT provided final recommendations to the PPG for decisions regarding the IAMP.

Lead staff from ODOT, Washington County, city of Hillsboro, and the consultant team comprised the project team (PMT). The PMT provided day-to-day project oversight, administration, and management and was responsible for facilitating the PAC.

The PAC included one representative each from the Helvetia Community Association, Meek Neighborhood, Hillsboro Chamber of Commerce, Brookwood area bicyclists, Jacobson Road (Pac Trust), city of Hillsboro, Washington County, and the ODOT project manager. Project team members and members of the public also attended the PAC meetings. The PAC held its first meeting in May, 2011. The fourth and final PAC meeting was held on June 25, 2012.

IAMP Public Outreach:
Two key methods were used to reach the interested public in and around the study area: project newsletters and the project website.

- Project newsletters: The community received project updates and an invitation to the two project open houses through two project newsletters. Each newsletter was mailed to approximately 3,100 addresses in the Interchange area and posted on the project website about two weeks before each open house. Newsletters included names, titles, and contact information for PMT staff. In addition, e-mail notification of the open houses also were sent (200 addresses for first open house), primarily to individuals who had expressed interest in the project, legislators, emergency service providers, local businesses, organizations and members of the PAC.

- Project Website: The project website was developed and made publicly available early in the process. It was the central location for project information and served as a resource for the public and PAC members. The site included a project description, maps, project schedule, open house materials, and PAC materials. The project website also advertised the open houses on its home page, see link below:

  www.oregon.gov/odot/hwy/region1/us26_brookwoodpkwy

IAMP Open Houses: Two public open houses were held on January 17, 2012 and on June 25, 2012, respectively. Residents of the area received project updates and invitations to the two project open houses through two project newsletters, the project website, and area media (a press release was sent to media contacts through ODOT's Region 1 office before each event). Comment forms made available at each open house provided the primary tool for recording feedback received from the public.

NW Imbrie Drive – NW Cornelius Pass Road Area Amendments:

Issues to be addressed and data to be collected, reviewed and made available for public review on the proposed transportation capacity improvements on NW Evergreen Parkway and NW Imbrie Drive, and separately on NW Cornelius Pass Road, were made available for public review at an open house held on August 16, 2012 at Quatama Elementary School. As previously described in the Background section, the proposed transportation improvements to these three roadways are based upon traffic impact studies received over the past 18 months from Intel Corporation's traffic consultant, Group Mackenzie, as well as supplemental transportation studies completed by city of Hillsboro transportation planning division staff.

The city of Hillsboro held an open house on August 16, 2012 to receive feedback from the community on the transportation improvements for this project area. Washington County also participated and addressed questions about NW Cornelius Pass Road and NW Evergreen Parkway, which are both County arterial roads. Comment cards were available for public comments.

Public notice for the open house was mailed on August 2, 2012, to 7,409 property owners located within a geographic area extending from NW 206th/NW John Olsen Avenue to the east, SE Imlay Avenue/NE 53rd Avenue/NE Elam Young Parkway (west)/NE Shute Road to the west, Tualatin Valley Highway to the south, and US 26 to the north, as the proposed amendments affect the commuting public traveling to and from employment located in North Hillsboro via NW 229th Avenue/NW Cornelius Pass Road/NW Evergreen Parkway, and residents that live in North Hillsboro near the Intel Ronler Acres Campus.

Public notice of the open house was also published in the August 7, 2012 edition of the Hillsboro Argus newspaper, and posted on the City's website.

Approximately 30 people attended the open house, and provided comments in favor of the proposed improvements. City staff also informed the open house participants of date for the public hearing before the Planning Commission and invited them to attend the hearing.

PUBLIC COMMENTS RECEIVED

Evergreen-Imbrie-Cornelius Pass Road Area: The table below summarizes the written comments received at the August 16, 2012, open house, as well as provides a summary of public comments received via email or phone relating to the NW Evergreen Parkway, NW Imbrie Drive and NW Cornelius Pass Road improvements considered in these proposed Amendments. Staff finds that the comments received were generally supportive of the proposed amendments relating to NW Imbrie Drive with associated capacity improvements to NW Evergreen Parkway, and widening improvements on Cornelius Pass Road.

Additionally, staff finds that the comments also strongly supported the City's proposed design on NW Cornelius Pass Road which would accommodate bicycles with an off-street solution such as a multi-use trail or a combination cycle-track and separate sidewalk. The City is working with adjacent property owners and Washington County regarding ongoing landscape maintenance obligations. Various individual comments presented below include a discussion of staff's response to the commenter.

NW 229th Avenue/NW Cornelius Pass Road/NW Evergreen Parkway Proposed TSP Amendments – Public Comments Summary for August 16, 2012 Open House		
Written Comments Received at Open House		
Name	**Contact Information**	**Comments**
Commenter 1	Not given	I like the improvements so long as bicyclists are separated from the heavy fast pace of the cars and truck traffic.
Commenter 2	Not given	I'm all for it. This area has increased so much with traffic; it's great to see there is a good plan to deal with it. Thank you. Great presentation!

Written Comments Received at Open House		
Commenter 3	Not given	Nice visual display once I understood how Exhibit A correlated with B-E. Very informative staff members. Thank you.
Commenter 4	Not given	Seems well thought out – necessary changes; glad that the on-ramp from Cornelius Pass to Hwy 26 will be widened. Thanks for the chance to preview the plans.
Commenter 5	Not given	Plans look good! Need to know start dates for work ASAP! Sidewalks are imperative wherever possible. As numbers of pedestrians and bike riders increase, safety issues increase! Thanks for the opportunity to give feedback!
Commenter 6	Not given	Like the plans. The sooner the better. Worried slightly by the long-term maintenance costs of the trees, shrubs and grass. Other cities I've visited have over time quit maintaining due to cost.
Comments Received via Email or Phone Prior to Open House		
Jamil Ahmad	jamie.ahmad@gmail.com	Concerned with the lack of current and future transit options to serve the high tech employment areas and the proposed high density residential areas (AmberGlen Community Plan Area); concerned with the future traffic created by the baseball stadium, the lack of transit options to the baseball stadium, and the general feeling that the City is prioritizing baseball over serving residential and transportation needs.
Walt Christen	(503) 531-0849	Need NW Cornelius Pass Road as a major arterial all the way through.
Susan Corwin	(503) 622-6429	Recommended the City to not improve NW Imbrie Drive and to instead take advantage of the capacity of the new Ronler Drive. Staff explained that the improvements are needed in addition to the system relief provided by the new Ronler Drive facility.
Kevin Henning Tualatin Valley Water District (TVWD)	(503) 701-0962	As stated in the TVWD's CIP, TVWD plans to replace the water main along NW Cornelius Pass Road and we are looking to coordinate with the proposed roadway improvement if timing of the two projects allows this.
Mark Kingstead	(503) 848-0890	Inquired about whether there will be special levy or whether his property tax will increase because of the improvements. Responded explaining to him that there will be no levy or tax increase due to the improvements.

Comments Received via Email or Phone Prior to Open House		
Brenda Van Horn	brendavh@frontier.com	Request to remove signal at NW Cornelius Pass Road and NW Quatama Road because the wait on NW Quatama Road is sometimes very long with no cars traveling on NW Cornelius Pass Road. Staff has forwarded this issue to Washington County signal operations and requested that signal timing settings be evaluated to optimize system performance and minimize delays.

US-26/Brookwood-Helvetia IAMP Area: Additional correspondence was received relating to IAMP area transportation improvements on the north side of US-26. The correspondence consists of the following letters which are attached to this Exhibit (as Attachments B-1, B-2 and B-3):

- A letter from Citizen Participation Organization (CPO) 8 Steering Committee to the city of Hillsboro Planning Commission dated September 21, 2012;
- A letter dated September 12, 2012, from the Committee for Citizen Involvement to various Washington County committees and staff; and
- A letter dated July 24, 2012 from CPO 8 Chair Linda Peters to the Washington County Board of Commissioners.

Staff notes that the written correspondence received relating to proposed roadway improvements north of US 26 primarily relates in part to concerns associated with the mix of growing urban traffic with critical agricultural activities including the movement of farm equipment.

Staff also notes that other associated concerns relating to impacts of urban traffic on agricultural operation have been raised including the need to address buffering and targeting transportation investments in ways that will keep growing urban traffic from traversing rural roadways and roadways on the urban-rural boundary. Correspondence also includes reference to a storm drainage analysis affecting NW Helvetia Road, NW Schaaf Road and NW Pubols Road.

Staff finds that the transportation improvements, particularly the addition of NW Schaaf Road as a new collector roadway extending east from NW Helvetia Road, connecting to NW Westmark Drive at NW Century Boulevard, and the proposed extension of NW Westmark Drive to intersect NW West Union Road east of NW Century Boulevard have been developed in response to the concerns of minimizing the interface between urban traffic and rural agricultural traffic on NW Helvetia Road and NW West Union Road.

Staff finds that the proposed amendments will rely in near-term on continued use of NW Jacobson Road with full turn movements allowed at NW Helvetia Road, but based upon the transportation analysis, Staff finds that the future development of the NW Schaaf Road – NW Westmark Drive extension to NW West Union Road in coordination with development of adjacent industrial land will be required to provide a critical parallel facility in order to minimize use of the urban-rural edge roadways to accommodate growing urban traffic.

Staff finds that future urban traffic growth will cause unacceptable congestion on NW Helvetia Road and the NW Jacobson Road approach due to inadequate separation between the relocated NW Jacobson Road intersection and the US-26 interchange with NW Helvetia Road-NW Brookwood Parkway. Staff finds that the JTA Project will relocate NW Jacobson Road as far away from the Interchange as is practicable given area wetland and floodplain constraints.

Further, Staff finds that the NW Schaaf Road – NW Westmark Drive extension collector roadway corridor will provide an alternative route within the urban area to minimize use of NW West Union Road-to-NW Helvetia Road as an alternative travel corridor in avoiding the anticipated congestion resulting from the inadequate spacing between the Interchange and the relocated NW Jacobson Road.

Staff finds that evaluation of alternatives for east-west commuter traffic between the US 26/Brookwood-Helvetia Interchange and the intersection of NW Cornelius Pass Road with NW West Union Road has concluded that the development of a new east-west corridor, specifically the construction of a future NW Schaaf Road, connecting to NW Westmark Drive with an extension to NW West Union Road, intersecting as near as practicable to the intersection with NW Bendemeer Road will result in the most efficient traffic operations and will minimize use of area rural roads, and urban-rural "edge" roadways where they are adjacent large lot rural agricultural properties.

With regard to the citizen comments received relating to storm drainage studies, Staff finds that the storm drainage studies will be completed under adopted regulatory agency standards as necessary to allow for adequate design and permitting of IAMP area roadway improvements. Staff further finds that the storm drainage studies have no direct bearing on the designation of roadways and other transportation infrastructure identified in this Amendment as necessary to accommodate future travel demand growth, rather will be required to facilitate future implementation of these recommendations as it relates to the design, permitting, and construction of recommended transportation system improvements.

(3) Notify affected government agencies of planning activities; invite review and comment.

Finding: Government agencies affected by the planning activities (both for the IAMP and for the proposed transportation improvements for NW 229th Avenue, NW Cornelius Pass Road and NW Evergreen Parkway) participated in both planning processes as described in the finding for HCP Section 1(III)(A)(2). Washington County has also amended their Transportation System Plan to add the transportation improvements identified for North Hillsboro through adoption of A-Engrossed Ordinance No. 749, approved on September 18, 2012. ODOT is scheduled to adopt the IAMP through Consent Agenda approval of the Oregon Transportation Commission on October 16, 2012.

The city provided public notice to the Department of Land Conservation and Development (DLCD) of the proposed major plan amendments on August 21, 2012.

(4) Collect relevant information and data.

Finding: Relevant information and data for the proposed transportation improvements was collected and refined as part of the ODOT's process for the proposed improvements for the IAMP, and by the City for the proposed transportation amendments for NW Cornelius Pass Road and NW Imbrie Drive as previously described in the finding for HCP Section 1(III)(A)(2).

(5) Analyze each issue and identify proposed actions which address the issue sufficiently. As part of the public involvement program for the plan revision or major plan amendment:

(a) Compile and combine the issue, relevant data and information and actions into text format and make copies of such text available for review and comments by citizens and affected government agencies.

(b) Compile comments received from citizens and affected government agencies for consideration by the Planning Commission. The Planning Department shall prepare written responses to comments and make the responses available for public review and to the Planning Commission during its consideration of the proposed plan revision or major plan amendment.

Finding: The analysis for each issue and proposed actions for the proposed major plan amendments for North Hillsboro are previously described in the finding for HCP Section 1(III)(A)(2).

(6) A Planning Commission public hearing on a plan revision or major plan amendment shall be conducted after completion of the tasks set forth in Section (III)(A)(1 through 5) above and the citizen involvement program for the plan revision or major plan amendment established by the CIAC. Notice of any public hearing by the Planning Commission or City Council on a plan revision or major plan amendment to the Comprehensive Plan shall be published in a newspaper of general circulation in the City a minimum of 20 days prior to the date of the initial public hearing. Any such notice shall contain:

(a) A summary of the plan revision or major plan amendment.
(b) The time, date and place of the hearing.
(c) The location(s) at which copies of the plan revision or major plan amendment summary may be obtained.
(d) A statement that all interested persons may appear and provide testimony and that only those persons making an appearance of record may appeal the determination of the Planning Commission or City Council.
(e) A general explanation of the requirements for submission of testimony and the procedure for conduct of the hearing.

Finding: The Planning Commission held a public hearing on the proposed major plan amendments on September 26, 2012. Public notice was published in the Hillsboro Argus on September 4, 2012, which was 22 days prior to the date of the initial public hearing. The public notice contained all of the items listed in Section 1(III)(A)(6)(a) through (e).

(7) The Planning Commission may recess the hearing in order to obtain further information or provide additional notification. Upon recessing for these purposes, the Commission shall announce the time and date when the hearing will be resumed.

Finding: The Planning Commission did not recess the hearing in order to obtain further information.

(8) After hearing the plan revision or major plan amendment, the Planning Commission shall forward a recommendation of denial, approval, or approval with modifications of the plan revision or major plan amendment to the City Council.

Finding: Based upon testimony received before the Planning Commission on September 26, 2012, from citizens, including Washington County Commissioner Greg Malinowski, and direction from the Planning Commission, Order No. 8077 to which these findings are attached as Exhibit B forwards a recommendation for approval of the proposed major plan amendments to implement transportation improvements for the North Hillsboro Industrial Area. The Planning Commission directed staff to provide an additional amendment to the Transportation System Plan maps and text to require a Special Area Alignment Study for the NW Westmark Drive Extension between NW Croeni Road and NW West Union Road.

The goals of this study shall include the following:

1. Reduce the interaction between urban and rural traffic on NW West Union Road and NW Helvetia Road;
2. Look at the implementation of east – west connection of NW Schaaf Road as the primary travel pattern and place the east connection as far east as possible on NW West Union Road;
3. Be sensitive to school children and traffic safety issues; and
4. Coordinate through land use zoning codes to develop and enhance urban – rural edge buffering including landscaped buffers, berms, and setbacks

(9) The City Council shall hold a hearing during its consideration of a plan revision and may hold a public hearing on any major plan amendment. Notice of the hearing shall be provided in the manner prescribed in subsection (III)(A)(6). After consideration of the plan revision or major plan amendment, the City Council may adopt or deny the plan revision or major plan amendment.

Finding: Order No. 8077 will be forwarded to City Council for its consideration on October 2, 2012. The City understands that the Council may hold a public hearing on the proposed major plan amendments and would give notice of the hearing in the manner prescribed in subsection (III)(A)(6) if the Council determines that it would hold a public hearing.

(10) The Planning Department shall keep copies of adopted text of the plan revision or major plan amendment on file at the City Hall and City Library for inspection by the public and shall notify citizens and government agencies that copies of the adopted text are available for inspection.

Finding: The Planning Department will keep copies of adopted text of the major plan amendments on file at City Hall for inspection by the public and will notify citizens and government agencies that copies of the adopted text are available for inspection.

(11) The final City Council decision on a plan revision or major plan amendment may be appealed in accordance with applicable State statutory provisions, relating to appeals of decisions amending an acknowledged comprehensive plan.

Finding: The City understands that the final City Council decision on the proposed major plan amendments may be appealed in accordance with applicable State statutory provision relating to appeals of decisions amending an acknowledged comprehensive plan.

(12) The Planning Commission shall also establish and publicize a procedure whereby interested individuals, community organizations and public agencies may request to be included on a regular mailing list of parties to be notified of the initiation of proposed plan revisions or major plan amendments.

Finding: A procedure whereby interested individuals, community organizations and public agencies may request to be included on a regular mailing list of parties to be notified of the initiation of proposed plan revisions or major plan amendments has been established by the Planning Commission.

TRANSPORTATION PLANNING RULE (TPR) FINDINGS

These findings are intended to fully address the Oregon Transportation Planning Rule – Oregon Administrative Rule (OAR) 660-012-0060. OAR 660-012-0060 requires the following:

(1) If an amendment to a functional plan, an acknowledged comprehensive plan, or a land use regulation (including a zoning map) would significantly affect an existing or planned transportation facility, then the local government must put in place measures as provided in section (2) of this rule, unless the amendment is allowed under section (3), (9) or (10) of this rule. A plan or land use regulation amendment significantly affects a transportation facility if it would:

(a) Change the functional classification of an existing or planned transportation facility (exclusive of correction of map errors in an adopted plan);

Finding: Staff finds that the amendments to the Hillsboro Transportation System Plan are being made to establish adequate transportation system improvements necessary to accommodate reasonably likely full development of land contained within the Urban Growth Boundary as adopted through October 2011. Further Staff finds that these amendments add the following new collector and arterial roadways into the transportation system:

- NW 264th Avenue (NW Evergreen Rd to NW Meek Rd): a City 3-lane Collector;
- NW 253rd Avenue (NW Evergreen Rd to NW Meek Rd): a City 3-lane Collector;
- NW Huffman Street (NW Brookwood Pkwy to NW Sewell/west UGB boundary): a City 3-lane Collector;
- NW Schaaf Road (NW Helvetia Rd to NW Century Blvd): a City 3-lane Collector;

- North-South Collector Roadway (name to be determined, between NW Jacobson Rd and NW Schaaf Rd): a City 3-lanc Collector; and
- NW Pubols Road (NW Helvetia Rd to NW Century Blvd): a City 3-lane Collector

Staff finds that these amendments would reclassify two existing roadways: NW Westmark Drive, which is constructed to an Industrial standard Local Street cross section for a one-block distance between NW Century Blvd and NW Croeni Road would be reclassified as a City collector roadway. Staff finds that NW Westmark Drive is additionally described in the existing Hillsboro Transportation System Plan as extending in the future to NW West Union Road with a Local Industrial Street classification. Staff finds that the development of the NW Schaaf Road – NW Westmark Drive Extension corridor between NW Helvetia Road and NW West Union Road will carry collector level traffic volumes in the future, and finds that its development will benefit area rural roadways and urban-rural "edge" arterial roadways by reducing urban traffic which would otherwise affect agricultural equipment movement.

Staff finds that a Special Area Alignment Study shall be conducted prior to establishment of the final design and construction alignment for the NW Westmark Drive Extension. The goals of the Special Area Alignment Study are described in the proposed amendments to the Transportation System Plan, Chapter 4: Future Demand and Land Use, Special Study Areas, Potential Future Connections/Realignments No. 8.

Staff finds that the second existing roadway recommended for reclassification is the segment of NW Meek Road between the planned NW 253rd Avenue extension and NW Brookwood Parkway. Staff concurs with the recommendations of ODOT, Washington County, neighboring property owners, and the IAMP advisory groups that disconnection of vehicular access between NW Meek Road and NW Brookwood Parkway would be in the best interest of the public to ensure public safety adjacent to the Interchange improvements. Pedestrian, bicycle and emergency vehicle access may continue to be accommodated to NW Brookwood Parkway. With the provision of new roadway connections between NW Meek Road and area arterial roadways (NW 253rd Ave. and NW 264th Ave.), the traffic on NW Meek Road will significantly be reduced, thereby removing the need for a collector roadway designation.

Staff finds that the amendments to the Hillsboro Transportation System Plan would also add designation to existing area roadways in a manner consistent with the roadways' existing and planned Washington County TSP designations. These include the following roadways:

- NW Meek Road (West UGB boundary to NW 253rd Avenue): County Collector roadway to be designated as a City 3-lane Collector roadway upon annexation to the city of Hillsboro;
- NW Sewell Road (NW Evergreen Pkwy to NW Meek Rd): County Local Street roadway to be designated as a City Local Industrial Street upon annexation to the city of Hillsboro;
- NW Helvetia Road (NW Jacobson Rd to NW West Union Rd): County 2-lane arterial roadway to be designated as a City 3-lane Arterial roadway upon annexation to the city of Hillsboro; and

- NW West Union Road (NW Helvetia Rd to existing City Limits): County 2-lane arterial roadway to be designated as a City 3-lane Arterial roadway upon annexation to the city of Hillsboro.

(b) Change standards implementing a functional classification system; or

Finding: No changes to adopted standards implementing a functional classification system are proposed or required for these major comprehensive plan amendments.

(c) Result in any of the effects listed in paragraphs (A) through (C) of this subsection based on projected conditions measured at the end of the planning period identified in the adopted TSP. As part of evaluating projected conditions, the amount of traffic projected to be generated within the area of the amendment may be reduced if the amendment includes an enforceable, ongoing requirement that would demonstrably limit traffic generation, including, but not limited to, transportation demand management. This reduction may diminish or completely eliminate the significant effect of the amendment.

(A) Types or levels of travel or access that are inconsistent with the functional classification of an existing or planned transportation facility;

(B) Degrade the performance of an existing or planned transportation facility such that it would not meet the performance standards identified in the TSP or comprehensive plan; or

(C) Degrade the performance of an existing or planned transportation facility that is otherwise projected to not meet the performance standards identified in the TSP or comprehensive plan.

Finding: Staff finds that the amendments would not promote types or levels of travel or access inconsistent with the functional classification of existing or planned transportation facilities, with the exception of existing NW Westmark Drive as discussed in OAR 660-012-0060 (1)(a), which is proposed to be reclassified from an Industrial Local Street standard to a Collector Street standard in order to accommodate anticipated growth in urban travel demand, and which would experience a significant effect as defined in OAR 660-012-0060(1)(c)(A).

Staff finds that the amendments would ensure the existing and planned transportation facilities would operate in a manner which would meet the performance standards identified in the TSP and Comprehensive Plan. Staff finds that OAR 660-012-0060(1)(c)(C) is not applicable.

(2) If a local government determines that there would be a significant effect, then the local government must ensure that allowed land uses are consistent with the identified function, capacity, and performance standards of the facility measured at the end of the planning period identified in the adopted TSP through one or a combination of the remedies listed in (a) through (e) below, unless the amendment meets the balancing test in subsection (2)(e) of this section or qualifies for partial mitigation in section (11) of this rule. A local government using subsection (2)(e), section (3), section (10) or section (11) to approve an amendment recognizes that additional motor vehicle traffic congestion may result and that

other facility providers would not be expected to provide additional capacity for motor vehicles in response to this congestion.

(a) Adopting measures that demonstrate allowed land uses are consistent with the planned function, capacity, and performance standards of the transportation facility.

(b) Amending the TSP or comprehensive plan to provide transportation facilities, improvements or services adequate to support the proposed land uses consistent with the requirements of this division; such amendments shall include a funding plan or mechanism consistent with section (4) or include an amendment to the transportation finance plan so that the facility, improvement, or service will be provided by the end of the planning period.

(c) Amending the TSP to modify the planned function, capacity or performance standards of the transportation facility.

(d) Providing other measures as a condition of development or through a development agreement or similar funding method, including, but not limited to, transportation system management measures or minor transportation improvements. Local governments shall, as part of the amendment, specify when measures or improvements provided pursuant to this subsection will be provided.

(e) Providing improvements that would benefit modes other than the significantly affected mode, improvements to facilities other than the significantly affected facility, or improvements at other locations, if the provider of the significantly affected facility provides a written statement that the system-wide benefits are sufficient to balance the significant effect, even though the improvements would not result in consistency for all performance standards.

Finding: Staff finds that the amendments to the Hillsboro Transportation System Plan will accommodate the growth of traffic beyond the planning horizon and that a significant effect will only be experienced on NW Westmark Drive. Pursuant to OAR 660-012-0060(2)(b), the City proposes to address the significant effect by amending the Transportation System Plan to reclassify NW Westmark Drive from an Industrial Local Street to a Collector Street. Further, the city of Hillsboro finds that the development of all roadways contained within these amendments, inclusive of the NW Westmark Drive reclassification, are financially feasible in accordance with OAR 660-012-0060(4) and thus reasonable to assume can be completed in concurrence with urban development of the subject area, by the end of the planning period. The analysis completed by the IAMP and related City studies have been based upon buildout of the Urban Growth Boundary as amended in October 2012. As such, the planning period is buildout of the areas contained within the current Urban Growth Boundary.

Staff finds that the estimated cost of all proposed amendments contained within this application total an estimated $136 Million. Staff further finds that committed JTA state funds totaling approximately $47 Million would reduce the funding need to approximately $89 Million. Staff estimates collection of Transportation Development Taxes from development of assumed employment growth in the areas of North Hillsboro which would utilize the roadways addressed in this amendment would total approximately $140 Million, not including that portion of transportation system capital improvements which would be required through development

conditions of approval and in accordance with the provisions of County's Transportation Development Tax ordinance. Conservatively, a 25% leverage ratio of additional private funding can reasonably be expected, resulting in anticipated revenue for transportation infrastructure in the amount of $175 Million.

(3) Notwithstanding sections (1) and (2) of this rule, a local government may approve an amendment that would significantly affect an existing transportation facility without assuring that the allowed land uses are consistent with the function, capacity and performance standards of the facility where:

(a) In the absence of the amendment, planned transportation facilities, improvements and services as set forth in section (4) of this rule would not be adequate to achieve consistency with the identified function, capacity or performance standard for that facility by the end of the planning period identified in the adopted TSP;

(b) Development resulting from the amendment will, at a minimum, mitigate the impacts of the amendment in a manner that avoids further degradation to the performance of the facility by the time of the development through one or a combination of transportation improvements or measures;

(c) The amendment does not involve property located in an interchange area as defined in paragraph (4)(d)(C); and

(d) For affected state highways, ODOT provides a written statement that the proposed funding and timing for the identified mitigation improvements or measures are, at a minimum, sufficient to avoid further degradation to the performance of the affected state highway. However, if a local government provides the appropriate ODOT regional office with written notice of a proposed amendment in a manner that provides ODOT reasonable opportunity to submit a written statement into the record of the local government proceeding, and ODOT does not provide a written statement, then the local government may proceed with applying subsections (a) through (c) of this section.

Finding: Staff finds that OAR 660-012-0060(3) is not relevant based upon the findings detailed above under OAR 660-012-0060(1) and OAR 660-012-0060(2). Further, ODOT is anticipated to adopt the IAMP on October 16, 2012, through Oregon Transportation Commission consent agenda containing the designation of NW Schaaf Road between NW Helvetia Road and NW Century Blvd as a Collector roadway with the alignment connecting to NW Westmark Drive at NW Century Blvd. As such, ODOT has identified this corridor to be a critical required Collector roadway necessary to protect the State's investments being made at the US-26/Brookwood-Helvetia interchange.

(4) Determinations under sections (1)–(3) of this rule shall be coordinated with affected transportation facility and service providers and other affected local governments.

(a) In determining whether an amendment has a significant effect on an existing or planned transportation facility under subsection (1)(c) of this rule, local governments shall rely on existing transportation facilities and services and on the planned

transportation facilities, improvements and services set forth in subsections (b) and (c) below.

(b) Outside of interstate interchange areas, the following are considered planned facilities, improvements and services:

(A) Transportation facilities, improvements or services that are funded for construction or implementation in the Statewide Transportation Improvement Program or a locally or regionally adopted transportation improvement program or capital improvement plan or program of a transportation service provider.

(B) Transportation facilities, improvements or services that are authorized in a local transportation system plan and for which a funding plan or mechanism is in place or approved. These include, but are not limited to, transportation facilities, improvements or services for which: transportation systems development charge revenues are being collected; a local improvement district or reimbursement district has been established or will be established prior to development; a development agreement has been adopted; or conditions of approval to fund the improvement have been adopted.

(C) Transportation facilities, improvements or services in a metropolitan planning organization (MPO) area that are part of the area's federally-approved, financially constrained regional transportation system plan.

(D) Improvements to state highways that are included as planned improvements in a regional or local transportation system plan or comprehensive plan when ODOT provides a written statement that the improvements are reasonably likely to be provided by the end of the planning period.

(E) Improvements to regional and local roads, streets or other transportation facilities or services that are included as planned improvements in a regional or local transportation system plan or comprehensive plan when the local government(s) or transportation service provider(s) responsible for the facility, improvement or service provides a written statement that the facility, improvement or service is reasonably likely to be provided by the end of the planning period.

Finding: Staff finds that the US 26/Brookwood-Helvetia interchange is under the jurisdiction of ODOT. ODOT has full funding for the improvements being designed and scheduled for construction commencing in 2013. These improvements are contained within the ODOT IAMP slated for adoption by the Oregon Transportation Commission on October 16, 2012, and are listed in the Metro federal financially constrained Regional Transportation Plan (RTP). As such, Staff finds that they meet the requirements of OAR 660-012-0060(4)(b)(C).

Staff finds that the improvements to Washington County jurisdictional roadways included in this amendment include widening related improvements to NW Cornelius Pass Road and NW Brookwood Parkway. Staff finds that Washington County's adoption of A-Engrossed Ordinance No. 749 on September 18, 2012, assures that these improvements conform with OAR 660-012-0060(4)(b)(E).

Staff finds that remaining improvements proposed in these amendments either are, or will become, under the jurisdiction of the city of Hillsboro. The majority of the roadways contained in these amendments are currently on the Metro financially constrained RTP. Those roadways which are not on the financially constrained RTP have been found by city of Hillsboro staff to be reasonably likely to be provided by the end of the planning period. As such, the city of Hillsboro proposes to amend its Transportation System Plan to incorporate the specific roadway, bicycle, pedestrian and traffic signal improvements as required under OAR 660-012-0060(4)(b)(E).

(c) Within interstate interchange areas, the improvements included in (b)(A)–(C) are considered planned facilities, improvements and services, except where:

(A) ODOT provides a written statement that the proposed funding and timing of mitigation measures are sufficient to avoid a significant adverse impact on the Interstate Highway system, then local governments may also rely on the improvements identified in paragraphs (b)(D) and (E) of this section; or

(B) There is an adopted interchange area management plan, then local governments may also rely on the improvements identified in that plan and which are also identified in paragraphs (b)(D) and (E) of this section.

Finding: The subject area lies outside of an interstate interchange area, since US 26 is not designated as an Interstate freeway.

(d) As used in this section and section (3):

(A) Planned interchange means new interchanges and relocation of existing interchanges that are authorized in an adopted transportation system plan or comprehensive plan;

(B) Interstate highway means Interstates 5, 82, 84, 105, 205 and 405; and

(C) Interstate interchange area means:

(i) Property within one-quarter mile of the ramp terminal intersection of an existing or planned interchange on an Interstate Highway; or

(ii) The interchange area as defined in the Interchange Area Management Plan adopted as an amendment to the Oregon Highway Plan.

Finding: Not applicable to the proposed Amendments.

(e) For purposes of this section, a written statement provided pursuant to paragraphs (b)(D), (b)(E) or (c)(A) provided by ODOT, a local government or transportation facility provider, as appropriate, shall be conclusive in determining whether a transportation facility, improvement or service is a planned transportation facility, improvement or service. In the absence of a written statement, a local government can only rely upon planned transportation facilities, improvements and services identified in paragraphs (b)(A)-(C) to determine whether there is a significant effect that requires application of the remedies in section (2).

Finding: The city of Hillsboro finds that it is reasonable to assume that the transportation system plan amendments contained in HCP 3-12 can be constructed prior to the end of the planning period, and as such with approval of HCP 3-12 deem the facilities to be planned transportation facilities for serving the transportation needs associated with development of the lands contained within the Urban Growth Boundary as they exist pursuant to amendments adopted in October 2011.

(5) The presence of a transportation facility or improvement shall not be a basis for an exception to allow residential, commercial, institutional or industrial development on rural lands under this division or OAR 660-004-0022 and 660-004-0028.

Finding: The proposed major comprehensive plan amendments for the North Hillsboro Industrial Area are not applicable to rural lands under this division or OAR 660-004-0022 and 660-004-0028.

(6) In determining whether proposed land uses would affect or be consistent with planned transportation facilities as provided in sections (1) and (2), local governments shall give full credit for potential reduction in vehicle trips for uses located in mixed-use, pedestrian-friendly centers, and neighborhoods as provided in subsections (a)–(d) below:

(a) Absent adopted local standards or detailed information about the vehicle trip reduction benefits of mixed-use, pedestrian-friendly development, local governments shall assume that uses located within a mixed-use, pedestrian-friendly center, or neighborhood, will generate 10% fewer daily and peak hour trips than are specified in available published estimates, such as those provided by the Institute of Transportation Engineers (ITE) Trip Generation Manual that do not specifically account for the effects of mixed-use, pedestrian-friendly development. The 10% reduction allowed for by this section shall be available only if uses which rely solely on auto trips, such as gas stations, car washes, storage facilities, and motels are prohibited;

(b) Local governments shall use detailed or local information about the trip reduction benefits of mixed-use, pedestrian-friendly development where such information is available and presented to the local government. Local governments may, based on such information, allow reductions greater than the 10% reduction required in subsection (a) above;

(c) Where a local government assumes or estimates lower vehicle trip generation as provided in subsection (a) or (b) above, it shall assure through conditions of approval, site plans, or approval standards that subsequent development approvals support the development of a mixed-use, pedestrian-friendly center or neighborhood and provide for on-site bike and pedestrian connectivity and access to transit as provided for in OAR 660-012-0045(3) and (4). The provision of on-site bike and pedestrian connectivity and access to transit may be accomplished through application of acknowledged ordinance provisions which comply with 660-012-0045(3) and (4) or through conditions of approval or findings adopted with the plan amendment that assure compliance with these rule requirements at the time of development approval; and

(d) The purpose of this section is to provide an incentive for the designation and implementation of pedestrian-friendly, mixed-use centers and neighborhoods by lowering the regulatory barriers to plan amendments which accomplish this type of development. The actual trip reduction benefits of mixed-use, pedestrian-friendly development will vary from case to case and may be somewhat higher or lower than presumed pursuant to subsection (a) above. The Commission concludes that this assumption is warranted given general information about the expected effects of mixed-use, pedestrian-friendly development and its intent to encourage changes to plans and development patterns. Nothing in this section is intended to affect the application of provisions in local plans or ordinances which provide for the calculation or assessment of systems development charges or in preparing conformity determinations required under the federal Clean Air Act.

Finding: Staff finds that the areas surrounding the roadways addressed in these Amendments are not mixed-use or neighborhoods, and as such OAR 660-012-0060(6) does not pertain to the Amendments.

(7) Amendments to acknowledged comprehensive plans and land use regulations which meet all of the criteria listed in subsections (a)–(c) below shall include an amendment to the comprehensive plan, transportation system plan the adoption of a local street plan, access management plan, future street plan or other binding local transportation plan to provide for on-site alignment of streets or accessways with existing and planned arterial, collector, and local streets surrounding the site as necessary to implement the requirements in OAR 660-012-0020(2)(b) and 660-012-0045(3):

(a) The plan or land use regulation amendment results in designation of two or more acres of land for commercial use;

(b) The local government has not adopted a TSP or local street plan which complies with OAR 660-012-0020(2)(b) or, in the Portland Metropolitan Area, has not complied with Metro's requirement for street connectivity as contained in Title 6, Section 3 of the Urban Growth Management Functional Plan; and

(c) The proposed amendment would significantly affect a transportation facility as provided in section (1).

Finding: Staff finds OAR 660-012-0060(9) does not apply to the proposed Amendments.

(10) Notwithstanding sections (1) and (2) of this rule, a local government may amend a functional plan, a comprehensive plan or a land use regulation without applying performance standards related to motor vehicle traffic congestion (e.g. volume to capacity ratio or V/C), delay or travel time if the amendment meets the requirements of subsection (a) of this section. This section does not exempt a proposed amendment from other transportation performance standards or policies that may apply including, but not limited to, safety for all modes, network connectivity for all modes (e.g. sidewalks, bicycle lanes) and accessibility for freight vehicles of a size and frequency required by the development.

(a) A proposed amendment qualifies for this section if it:

(A) Is a map or text amendment affecting only land entirely within a multimodal mixed-use area (MMA); and

(B) Is consistent with the definition of an MMA and consistent with the function of the MMA as described in the findings designating the MMA.

(b) For the purpose of this rule, "multimodal mixed-use area" or "MMA" means an area:

(A) With a boundary adopted by a local government as provided in subsection (d) or (e) of this section and that has been acknowledged;

(B) Entirely within an urban growth boundary;

(C) With adopted plans and development regulations that allow the uses listed in paragraphs (8)(b)(A) through (C) of this rule and that require new development to be consistent with the characteristics listed in paragraphs (8)(b)(D) through (H) of this rule;

(D) With land use regulations that do not require the provision of off-street parking, or regulations that require lower levels of off-street parking than required in other areas and allow flexibility to meet the parking requirements (e.g. count on-street parking, allow long-term leases, allow shared parking); and

(E) Located in one or more of the categories below:

(i) At least one-quarter mile from any ramp terminal intersection of existing or planned interchanges;

(ii) Within the area of an adopted Interchange Area Management Plan (IAMP) and consistent with the IAMP; or

(iii) Within one-quarter mile of a ramp terminal intersection of an existing or planned interchange if the mainline facility provider has provided written concurrence with the MMA designation as provided in subsection (c) of this section.

(c) When a mainline facility provider reviews an MMA designation as provided in subparagraph (b)(E)(iii) of this section, the provider must consider the factors listed in paragraph (A) of this subsection.

(A) The potential for operational or safety effects to the interchange area and the mainline highway, specifically considering:

(i) Whether the interchange area has a crash rate that is higher than the statewide crash rate for similar facilities;

(ii) Whether the interchange area is in the top ten percent of locations identified by the safety priority index system (SPIS) developed by ODOT; and

(iii) Whether existing or potential future traffic queues on the interchange exit ramps extend onto the mainline highway or the portion of the ramp needed to safely accommodate deceleration.

Finding: Staff finds that designation of an MMA is not required for the areas considered in these Amendments.

(B) If there are operational or safety effects as described in paragraph (A) of this subsection, the effects may be addressed by an agreement between the local government and the facility provider regarding traffic management plans favoring traffic movements away from the interchange, particularly those facilitating clearing traffic queues on the interchange exit ramps.

Finding: The proposed Amendments will place in effect necessary transportation system improvements needed to protect the safe operations of the interchange, particularly as it relates to facilitating clearing traffic queues on the interchange exit ramps.

(d) A local government may designate an MMA by adopting an amendment to the comprehensive plan or land use regulations to delineate the boundary following an existing zone, multiple existing zones, an urban renewal area, other existing boundary, or establishing a new boundary. The designation must be accompanied by findings showing how the area meets the definition of an MMA. Designation of an MMA is not subject to the requirements in sections (1) and (2) of this rule.

Finding: Designation of an MMA is not being requested with these Amendments.

(e) A local government may designate an MMA on an area where comprehensive plan map designations or land use regulations do not meet the definition, if all of the other elements meet the definition, by concurrently adopting comprehensive plan or land use regulation amendments necessary to meet the definition. Such amendments are not subject to performance standards related to motor vehicle traffic congestion, delay or travel time.

Finding: Designation of an MMA is not being requested with these Amendments.

(11) A local government may approve an amendment with partial mitigation as provided in section (2) of this rule if the amendment complies with subsection (a) of this section, the amendment meets the balancing test in subsection (b) of this section, and the local government coordinates as provided in subsection (c) of this section.

(a) The amendment must meet paragraphs (A) and (B) of this subsection or meet paragraph (D) of this subsection.

(A) Create direct benefits in terms of industrial or traded-sector jobs created or retained by limiting uses to industrial or traded-sector industries.

(B) Not allow retail uses, except limited retail incidental to industrial or traded sector development, not to exceed five percent of the net developable area.

(C) For the purpose of this section:

(i) "Industrial" means employment activities generating income from the production, handling or distribution of goods including, but not limited to, manufacturing, assembly, fabrication, processing, storage, logistics, warehousing, importation, distribution and transshipment and research and development.

(ii) "Traded-sector" means industries in which member firms sell their goods or services into markets for which national or international competition exists.

(D) Notwithstanding paragraphs (A) and (B) of this subsection, an amendment complies with subsection (a) if all of the following conditions are met:

(i) The amendment is within a city with a population less than 10,000 and outside of a Metropolitan Planning Organization.

(ii) The amendment would provide land for "Other Employment Use" or "Prime Industrial Land" as those terms are defined in OAR 660-009-0005.

(iii) The amendment is located outside of the Willamette Valley as defined in ORS 215.010.

(E) The provisions of paragraph (D) of this subsection are repealed on January 1, 2017.

(b) A local government may accept partial mitigation only if the local government determines that the benefits outweigh the negative effects on local transportation facilities and the local government receives from the provider of any transportation facility that would be significantly affected written concurrence that the benefits outweigh the negative effects on their transportation facilities. If the amendment significantly affects a state highway, then ODOT must coordinate with the Oregon Business Development Department regarding the economic and job creation benefits of the proposed amendment as defined in subsection (a) of this section. The requirement to obtain concurrence from a provider is satisfied if the local government provides notice as required by subsection (c) of this section and the provider does not respond in writing (either concurring or non-concurring) within forty-five days.

(c) A local government that proposes to use this section must coordinate with Oregon Business Development Department, Department of Land Conservation and Development, area commission on transportation, metropolitan planning organization, and transportation providers and local governments directly impacted by the proposal to allow opportunities for comments on whether the proposed amendment meets the definition of economic development, how it would affect transportation facilities and the adequacy of proposed mitigation. Informal consultation is encouraged throughout the process starting with pre-application meetings. Coordination has the meaning given in ORS 197.015 and Goal 2 and must include notice at least 45 days before the first evidentiary hearing. Notice must include the following:

(A) Proposed amendment.

(B) Proposed mitigating actions from section (2) of this rule.

(C) Analysis and projections of the extent to which the proposed amendment in combination with proposed mitigating actions would fall short of being consistent with the function, capacity, and performance standards of transportation facilities.

(D) Findings showing how the proposed amendment meets the requirements of subsection (a) of this section.

(E) Findings showing that the benefits of the proposed amendment outweigh the negative effects on transportation facilities.

Finding: Staff finds OAR 660-012-0060(11) does not apply to the proposed Amendments.

CONCLUSION

For the reasons set forth above, the Planning Commission finds that the Comprehensive Plan and Transportation System Plan text and map amendments proposed to implement transportation improvements for the North Hillsboro Industrial Area are consistent with comprehensive plan goals, policies and implementation measures and meet the approval criteria for a major plan amendment. The Planning Commission hereby recommends approval of HCP 3-12 as supported by these Findings of Fact.

September 21, 2012

To: City of Hillsboro Planning Commission
From: CPO 8 Steering Committee
Re: Ordinance No. 2793

At the regular CPO8 meeting of August 14, 2012, members attending voted unanimously (11 ayes, 0 nays) to authorize the Steering Committee to send a letter to the City of Hillsboro Planning Commission containing the following requests:

1. Considering road changes proposed in the Brookwood/Helvetia Rd./Highway 26 Interchange Area Management Plan, **please focus on moving east-west traffic within the urban area rather than routing it to West Union Road along the northern edge.** This road is a vital rural arterial serving local, agricultural and bicycle traffic. Adding heavy urban commute and freight traffic would severely disrupt adjacent farm activities.

2. **We encourage the City of Hillsboro to work together with Washington County and representatives of the rural and agricultural community to identify buffering measures for major roadways separating urban from rural areas** -such as West Union--to assure that such roadways are able to serve both urban and rural transportation, economic, and livability needs as new urban areas are built out.

In support of these requests, we attach copies of correspondence from

- The Committee for Citizen Involvement (CCI) Steering Committee to Washington County Transportation System Plan Update (TSPU) Community Advisory Committee, asking for such a working group as part of the County's current TSPU; dated September 12, 2012
- CPO8 to Washington County Board of Commissioners re: Ordinance 749; dated July 24, 2012

Sincerely,
Linda Peters
Linda Peters, Vice Chair, for
Citizen Participation Organization 8 Steering Committee
John Driscoll, Chair
Pat Wolter, member at large
Henry Oberhelman, member at large

cc: Planning Director Patrick Ribellia

ATTACHMENT B-2

Committee for Citizen Involvement

OSU Extension Service
155 N. First Avenue, Suite 200, M/S #48
Hillsboro, OR 97124
503-821-1128

September 12, 2012

Transportation Plan Update Community Advisory Committee (CAC)
Transportation Plan Update Interagency Coordinating Committee (ICC)
Andrew Singelakis, Director
Dyami Valentine, Associate Planner
Washington Department of Land Use and Transportation
155 N First Avenue, Suite 350, MS 14
Hillsboro, OR 97124

RE: Proposal for developing policy on major roads (freeway, arterial and collector) serving both urban and rural traffic needs

At the regular meeting of the county's Committee for Citizen Involvement (CCI) on Tuesday, August 21, 2012, attending representatives of County Citizen Participation Organizations (CPO) voted unanimously (12 to 0) to recommend completing the following work as part of the current Transportation Plan Update process:

1) Identify major roads in Undesignated, Rural Reserves and Urban Reserves which serve both rural and urban residents.

2) Identify major roads which separate urban zones from rural/agricultural land zones.

3) Propose design standards and/or route-planning policies for incorporation into Ordinances to protect the economic vitality of rural/agricultural land uses along these roads while serving transportation needs for both urban and rural users.

Some possibilities briefly discussed include:

a) Set buffering standards to prevent crop damage from street lighting, weed seed dispersion, accidents, littering etc. and to protect urban areas from noise, dust, sprays, odors, and other offsite impacts of agricultural practices.

b) Route inter-urban traffic flows through urban areas rather than out to rural edge arterials, especially for employment-residential commutes and commercial freight.

STEERING COMMITTEE

Henry Oberhelman
Chair

Mary Manseau,
Corresponding Secty.

Jim Long

Dick Smith

c) Set roadway design standards and/or adopt traffic flow models which accommodate various modes of transport on or near these roads, including movement of:

- agricultural equipment and vehicles between farm fields;
- commercial freight;
- rural area residents;
- commuter traffic (including bike commuters, pedestrians and transit); and
- traffic generated from agri-tourism, scenic drives and recreation uses.

CCI members are willing to work through our representatives on the CAC and/or on whatever special working group, task force, or joint study committee you might form, to undertake the technical/legal/planning work connected with this request. We believe it would be helpful to engage City and/or Metro planners in working out the buffering standards, since this issue will be critical as Urban Reserves planning proceeds.

Thank you for your consideration, and we look forward to assisting staff and the Board in finding good solutions.

Sincerely,

CCI Steering Committee

cc: Washington County Planning Commission
Washington County Board of Commissioners (Board)

Linda Peters, CPO 8 Chair
25440 NW Dairy Creek Road
North Plains, OR 97133

July 24, 2012

To: Washington County Board of Commissioners
155 N. First Street
Hillsboro, OR 97124

Re: Ordinance 749 Concerning Adoption of the US 26/Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP)

Ordinance 749 proposes to add 15 road projects to Washington County's Transportation Plan as part of the improvements being made to the US 26/Brookwood/Helvetia Interchange: 8 north of US 26 and 7 south of US 26.

Since 2011, we have received frequent briefings from CPO 8 members Robert Bailey and Cherry Amabisca, who sat on the Interchange Planning Advisory Committee and represented the Helvetia Community Association. In the fall of 2011, CPO 8 had a panel presentation by ODOT, City of Hillsboro, and Washington County regarding the interchange and surrounding area.

We support the road projects south of US 26, part of CPO 8, as identified in the Interchange Area Management Plan (IAMP). Some of these road projects are necessary for safe access and egress from the Meek Road neighborhood and have been requested by those residents.

However, we share a number of concerns raised to you and the Planning Commission by the Helvetia Community Association with regard to IAMP projects north of the interchange:

- We recommend that commuter and truck traffic be directed to use US 26 or Jacobsen-to- Schaaf Road rather than West Union Road. Farmers use West Union Road as a major road to move farm equipment, and bicyclists use West Union Road as part of their riding route through the Helvetia area. Increased commuter traffic and increased speeds and noise are not only dangerous for farmers and bicyclists but make it harder to farm in the rural reserve farmland on the north side of West Union Road. We feel that a better solution is to design a road that routes east-west commuter traffic from Cornelius Pass Road via Jacobson to Schaaf Road in a more direct fashion. We support using existing infrastructure wherever possible rather than building new, possibly redundant streets, especially when they will be funded by taxpayers. We consider Jacobson Road to be existing infrastructure and recommend that more be done to use and modify this road to shunt commuter traffic to the Cornelius Pass/West Union junction.
- We recommend that the drainage assessment and plan be completed before determining street readiness in the Schaaf Road/Helvetia Road intersection. The Waibel Creek

drainage has shown flood conditions here in the recent past. We question why no reference is made to this flooding and the current lack of drainage plan in the county staff report.

- We recommend that Washington County convene a representative work group to develop buffer concepts that would help delineate and mitigate conflicts between rural and urban areas, with special consideration to plans for streets and roads. We think this should occur before consideration of those projects referenced in Ordinance 749 on the north side of US 26. Parts of Ordinance 749 would increase urban traffic along the rural area, adding conflict with rural agricultural practices in the Helvetia area.

The above recommendations were voted on by CPO membership in attendance on July 10, 2012 and approved unanimously (6 in attendance, 6 votes in favor, 0 opposed).

Respectfully submitted,

Linda Peters
Chair, CPO8
25440 NW Dairy Creek Rd.
North Plains, OR 97133

WASHINGTON COUNTY
OREGON

September 19, 2012

Hillsboro Planning Commission

My name is Greg Malinowski, I am County Commissioner for District 2 of Washington County. I am speaking today only as the elected representative of the people of District 2. I am testifying today because I have some concerns about the exact Location of the route of Westmark Drive as shown on your maps. There are 1000s of acres of Prime farm land in District 2 and nearby Multnomah county serviced by Farmers who are based North and West of West Union Road. I request that you make that road segment that is not yet constructed as a study area, so that there is time to talk to Intel Corp, about possibly moving the route to a more easterly location to allow farm equipment the potential to access Bendemeer road and bypass the entire West Union/ Corn. Pass intersection. This would achieve some of the following points:

- Farmers have complaining that urban commute level traffic and farm machinery put each other at risk.
- Drainage ditches are needed for tile drainage from farm fields that also create obstacles to fully urbanizing streets (West Union to the north side).
- Many rural roads were initially dedicated as "farm to market" routes. Now, putting mass quantities of urban commute traffic on them will create impediments to farm to market.
- Concentrating traffic south of NW West Union will help stay away from the complications of the Federal Farmland Policy Protection Act, should city and county want to use federal funds to build out roads into farmland on the rural sides.

This would be solely dependent on reaching agreement with Intel, and that they are agreeable to do this. But I would like to keep the option open as we work through this discussion, with Intel. Thank you for your consideration.

Greg Malinowski

Greg Malinowski
Washington County Commissioner
District 2
Greg_Malinowski@co.washington.or.us

CASE NO. HCP 3-12
OFFERED BY Greg Malinowski
DATE September 26, 2012
EXHIBIT NO. _____

CASE NO. HCP 3-12
OFFERED BY Cherry Amabisca
DATE 9.26.2012
EXHIBIT NO. _____

Save Helvetia
13260 NW Bishop Road
Helvetia, OR 97124

www.SaveHelvetia.org

September 26, 2012

Hillsboro Planning Commission
150 East Main Street
Hillsboro, OR 97123

Re: Adoption of the U.S. 26/Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP)

Enclosed is testimony we have submitted to the Washington County Planning Commission and Washington County Board of Commissioners petitions containing signatures of 64 citizens along with 27 letters that express opposition to the use of West Union Road for commuter traffic. They prefer that commuter traffic is routed on east-west thoroughfares through the urban area to the south of West Union Road.

Direct commuter traffic to the south of West Union Road

We continue to advocate for a east-west connections INSIDE the urban area to route commuter traffic between Helvetia Road and Cornelius Pass Road, rather than routing commuter traffic along West Union Road. Farmers use West Union Road as an important road to move farm equipment and bicyclists use West Union Road as part of their riding route through the Helvetia area. Increased commuter traffic bring increased speeds and noise and makes it harder to farm in the rural reserves on the north side of West Union Road.

We recommend that this urban area be made a Study Area so that different alternative routes can be evaluated, such as a Westmark extenstion that routes traffic to come out across from Bendemeer Road, or expansion of the intersection of Jacobson at Cornelius Pass to handle more traffic on a wider Jacobson or a southerly route to connect Schaaf with Jacobson. Whatever the solution, we feel it requires more effort to determine the best way to route commuter traffic through the urban area and keep it away from the rural edge.

Thank you for your time,

Cherry Amabisca
Save Helvetia

ATTACHMENT B-5 P. 1

July 29, 2012

To: Washington County Commissioners

From: Members of La Finquita Del Buho, CSA

RE: Ordinance No. 749 Concerning Adoption of the U.S. 26/Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP)

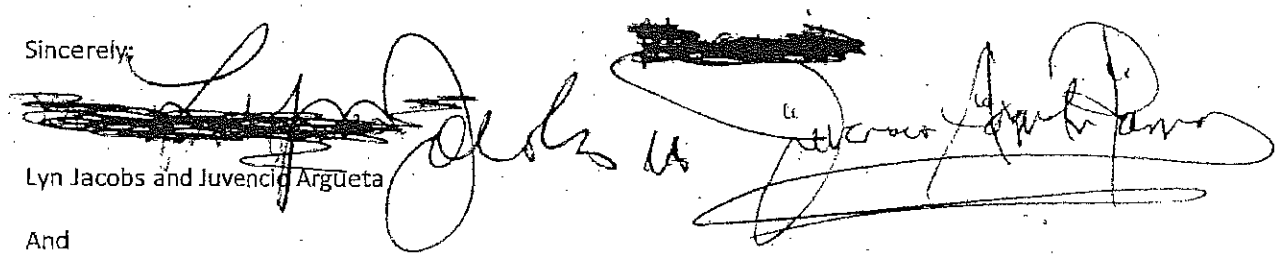
As members of a community that values locally grown organic food we ask that you work to preserve our right to have access to this food. We ask that you look at the entire plan for local "improvements" to the Helvetia area before making any decisions on any part of Ordinance No. 749.

You have been presented with a very narrow map that does not include all of the planned road changes. We want you to see the whole picture and understand the impact of increased traffic along West Union Road, the boundary between the urban and rural reserves. We want you to maintain a strong buffer between the reserves so that farm land and farming can be protected. We do not want traffic from south of Highway 26 moving northeast between Helvetia and Cornelius Pass to come north to West Union.

The addition of the expansion of Cornelius Pass Road to the ordinance is distracting and should be evaluated separately from the U.S. 26 Brookwood/Helvetia Interchange. We feel that making more single occupancy vehicle roads is not in line with goals to reduce greenhouse emissions or to build move environmentally sound communities. Adding more lanes to a road will bring more cars and we want to encourage use of public transportation, carpooling and bike travel.

Please do not make any decisions regarding Ordinance No. 749 without understanding and seeing all of the proposed changes. A piecemeal map is not creative or constructive to this area or any area. Please demand to see the entire plan and work to modify that plan to maintain strong buffers to protect farmland.

Sincerely,



Lyn Jacobs and Juvencio Argueta

And

Members of La Finquita Del Buho, CSA

7960 NW Dick Road

Hillsboro, OR 97124

7/C9/12

ATTACHMENT B-5 p-2

1. Katie Selby · Katie Selby 7904 N Jersey St, Portland OR 97203
2. Leigh Crabtree [signature] 7233 SW Canyon Rd, Portland OR 97225
3. [signature] Dana Mozer 4067 N. Haight Ave Portland 97227
4. [signature] 2137 NE 12TH Ave, Pfd, OR 97212
5. Patrick Whisler 14155 SW Mockingbird Way Sherwood OR 97140
6. [signature] + [signature] 17930 SW Jay St
   Lynn Baker + Eve Lonquist Aloha, OR 97006
7. Brenda Frimoth (for Vicki Howell)
   17673 NW Marylhurst Ct. Portland, OR 97229
8. [signature] Thom Herberg-Duff
   5713 SE Shadowbrook Pl., Hillsboro OR 97123
9. Susan Cass 627 SE 53rd Pdx 97215
10. [signature] 7870 SW Bristol Ct Btn 97007
11. Genevieve Mitchell 16635 SW Whitetail Lane Beaverton, OR 97007
12. Bendu Malini 5315 NW Cady Ln Portland 9722
13. Bill Cosgrove 5492 SW 153 Ave Beaverton, OR 97007
14. Lizzy Stefanowicz 19080 NW Direna St Portland, OR 97229
15. [signature] 11540 NW Oakridge Dr Portland 9722

16. [signature] 11155 SW Cambridge Ave Portland 97225
17. [signature] 17280 NW Tucson St. Beaverton, OR 97006
18. [signature] 2828 NE 69th Ave Portland, OR 97213
19. [signature] 3205 NE 28th Ave Portland, OR 97212
20. [signature] Donna Voldengen 13785 NW Greenwood Dr Portland, OR 97229
21. Kelly Conn 1939 SE 41st Ave P, OR 97214
22. Rich Conn 1939 SE 41st P, OR 97214
23. [signature] 2828 NE 69th Ave Portland OR 97213
24. [signature] 1166 NE 52nd Ave Hillsboro 97124
25. GUENTHER HUBELER 3501 SE 14TH AVE, PORTLAND, OR, 972
26. Neil Collie 3014 SE Woodward, Portland, OR 97202
27. CYNTHIA STARR 1603 SE 40th PORTLAND OR 97214
28. ROY VAN RADEN 14651 NW GERMANTOWN RD PORTLAND, OR 97231
29. [signature] ERIN McCarthy 4925 NE 24th Ave, Portland, OR 97211
30. [signature] JEAN EILERS 4071 NE 22nd PORT. OR 97212

ATTACHMENT B-5

p-1

1/27/16

Shannon Tuller — 3289 NE Dunckley, Portland, OR 97212

3531 N. Kerby Ave, Portland, OR 97227

1705 SE 56th Ave, Portland, OR 97215

18329 SW Santoro Dr, Beaverton, OR 97007

Lisa Reynolds — 45581 SW Saddleback Dr, Gaston OR 97119

Melanie Maker — 351 NE Cedar Ave, Hillsboro OR 97124

Marquita Guzman — 5433 SE Mitchell St, Pdx, OR 97206

Jack + Anna Featherly — 6897 NE Vinings Ln #123, Hillsboro, OR 97124

EDDIE KNIPPEL — 5293 NE WINDROSE ST, HILLSBORO, OR 97124

4522 NE 21st, Unit A, Lot #111, Portland OR 97229

Monica Arce

3926 NE 8th Ave
PORTLAND OR 97212

William Iles

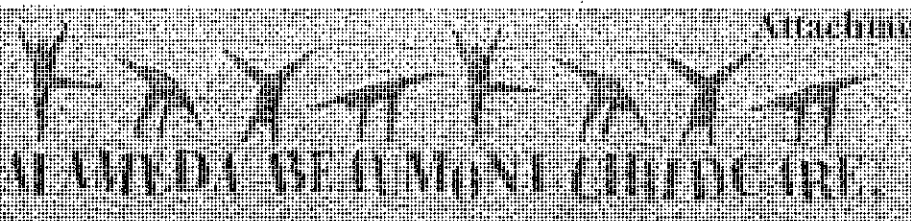
2810 NW Birkenfeld
Portland, 97229

6206 NE 18th
Portland, OR 97211

21214 NW Cannes Dr.
Portland OR 97229

1764 Conifer Dr
Lake Oswego 97034

Attachment B-5



July 27, 2012

To the Distinguished Members of the Washington County Planning Commission:

We are writing to you with grave concerns about plans under consideration to expand traffic flow and add a traffic signal at Dick Road. This will mean a tremendous increase in traffic near La Finquita Farm and will be very disruptive to the farm and to the rural areas around it. Our preschool, Alameda Beaumont Childcare, visits La Finquita Farm weekly. For years, this has been an integral part of ABC's curriculum and hundreds of children and parents have benefited from the educational opportunities it has provided. Our children have learned about farming from real farmers on a real farm. This is a rare opportunity for children growing up in the city.

The children play with the goats (who sometimes nibble on them), help harvest fresh produce and take it home to enjoy, play baseball with the fallen apples and are currently planning a birthday celebration for Bellatrix the cow.

It is amazing that such a rich agricultural area lies within a short drive of Portland. Please protect this wonderful part of Washington County from the negative impact that the proposals under consideration would have on both the rural area and on the small business owners who operate the farm. We urge you to avoid bringing new traffic to this area and instead use existing roads and develop alternative transportation means.

Sincerely,

Parents of ABC Preschool

ATTACHMENT B-5

7/27/12

ATTACHMENT B-5

7/24/12

To: Washington County Planning Commission / Board of Commissioners

Re: Ordinance No. 749 Concerning Adoption of the U.S. 26/Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP)

Members of the Planning Commission, and County Commissioners,

My husband and I live on Dick Road about a quarter mile from the intersection of West Union Road and Dick Road. We own and operate a CSA called "La Finquita del Buho". We grow organic vegetables and raise grass fed beef, lamb, and pork. We supply food to over 500 people from our 2 ½ acre farm. We raise 55 different vegetable crops and supply weekly shares of those vegetables to our 100 families over the course of a 29 week growing season. We have been in business since 2000 and have grown our business from 7 founding members to 100 members. Our member customers come to our farm weekly to pick up their vegetables and to enjoy the unique environment that Helvetia has to offer.

We run a tight operation using appropriate technology, environmentally sound practices and strict attention to organic practices. We manage and run this as a family business. We also sell with Pumpkin Ridge Gardens at the Beaverton Famers Market for the past 7 years. We have been active in the community working to preserve farmland and ensure that people have access to locally grown organic produce and have the opportunity to see and know how their food is grown.

We have worked with many high schools including; Liberty, Catlin Gable and Marshall High to provide access for students to agriculture and small scale farming. It is essential that children of all ages get to see and participate in where their food comes from. Children of all ages come to our farm on a weekly basis and learn about farm life.

We are unique in many ways. Our farm has a very rural feel although we are just ¼ mile from the UGB and 3 miles from the highway. We are accessible and schools find it possible to bring students to our farm for countless learning experiences. Keeping us rural although we are close to an urban area is very important. We need to maintain a buffer from the urban area to maintain our agricultural business. We need to be able to move farm equipment safely from other local farms to our own.

Senator Jeff Merkley and Congresswoman Bonamici value the contribution of farming operations such as ours - their visit to Helvetia last week indicates their interest in small to medium sized farms such as ours. They are doing much to help out operations such as ours with legislation at the federal level -

Washington County should recognize the value of farms as they do and keep traffic away from the farms on the north, rural side of West Union Road.

- We feel you (commissioners) don't see the entire plan in front of you. If I were a commissioner I would strongly object to the piecemeal maps they are presenting without a clear overall picture of a coherent transportation plan. The whole plan is a crazy plan whose only mission appears to be to move large volumes of single car commuters from North Bethany to employment on the south of the freeway.

- By having residential areas segregated from work areas, you are following the uncreative sprawl of the 80's. Moving commuter traffic from North Hillsboro and Bethany to south of 26 with single driver vehicles is not creative and not utilizing public transport that already exists south of highway 26.

- Routing commuter traffic along West Union Road is UNSAFE. Bicyclists use it daily as they traverse Helvetia; farmers use it as an important road to move their slow-moving, wide farm equipment on. It is UNSAFE to add thousands of commuter cars to West Union. Better to route them to the freeway, with the improved interchanges that our tax dollars are paying for, or along a parallel road like Jacobson south of West Union.

- We need a buffer of West Union Road to keep fast commuter traffic away from the farms in the rural reserves on the north side of West Union Road. We expect our elected officials and their appointees to honor and protect farmland, traffic buffers are of utmost importance.

- There is a possible effect of a sizable intersection with traffic lights on the historic West Union Baptist Church which serves as a community meeting place of worship and houses gravesites as far back as the 1850s. The grave yard is active to this date. That church is a historic landmark and sits within 20 feet from West Union and Dick Road.

- We ask that the county work to help protect the buffer between urban and rural reserves and preserve the pearl that is Helvetia. People choose Helvetia as a destination for many reasons. People want the opportunity to bike through rural land, to come out and pick peaches, blueberries and pumpkins, to harvest their own Christmas tree and to taste wine grown on grapes less than 30 miles from Portland.

- Our CSA members choose our farm **La Finquita Del Buho** because they value rural life and value the land. They want their children to know that radishes don't grow in bunches. They want their children to feel how hard it is to produce food; they also want the chance to eat fresh local produce. Our customers depend on a safe rural place to bring their families on a weekly basis and having commuter traffic to contend with would be dangerous. I am submitting over 15 letters from our customers from both the local area and Portland metro area for the record so that you can understand the extent of support Helvetia small farms have.

- I implore you to think critically about all roads and land use decisions that border the rural urban divide. Demand from your advisors and staff a clear complete picture of all proposed roads before deciding on any changes to roads north of highway 26.

Thank you for the opportunity to come before this commission. My husband and I welcome any or all of you to visit our farm to fully understand what we do and how much food we produce on a small but

fertile piece of Helvetia. Please closely evaluate and prioritize what the city and county are doing to preserve farmland, once it is paved over you can't make that land fertile again.

Thank you for your attention.

Lyn Jacobs and Juvencio Argueta

La Finquita Del Buho, CSA

7960 NW Dick Road

Hillsboro, OR 97124

801 Ne Caden Avenue
Hillsboro, OR 97124
July 11, 2012

To Washington County Planning Commission,

I am writing you today to defend farm land. I am a member of La Finquita del Buho, a community supported agriculture farm in Helvetia. This farm is located ¼ mile from the intersection of Dick Road and West Union Road. I have recently learned, to my shock, that the county proposes to transform this portion of West Union Road between Helvetia Road and Cornelius Pass into a major thoroughfare for urban traffic.

I feel a better solution is to focus commuter traffic on the already established Jacobsen Road, which is south of West Union. Please protect the integrity of a rural buffer between industry and agriculture.

Sincerely,

Melanie K. Moler

July 10, 2012

To: Washington County Planning Commission

Re: Ordinance No. 749 Concerning Adoption of the U.S. 26/Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP)

Dear Members of the Planning Commission:

As a resident of Hillsboro for the past 16 years, I have witnessed many changes to area. Many of them positive, but some of the progress has not been for the benefit of the community. My children attended West Union Elementary School, and we saw the addition of the traffic light at the corner near the school. This was for the safety of the residents and didn't directly increase traffic to the area, but Ordinance No. 749 doesn't possess the same motive.

Recently, my son had the benefit of taking a walking field trip from Liberty High School to the La Finquita Farm, which is located off of Dick Road and West Union. This trip had a positive impact on him. He came home convinced we should not only join the co-op farm, but also purchase as much local produce as is feasible. As the urban boundaries expand and traffic increases these unique opportunities will be diminished, at the expense of our children.

The La Finquita Farm is a true co-op, and it feeds many local families. Please don't bring traffic closer to the farm, not only jeopardizing the air quality by adding more pollutants to the environment, but by increasing traffic, and lessening this rural experience.

As a new member of this co-op farm, I feel it is imperative that we each find a voice and share our concerns. Please rethink your proposal, and utilize an alternate route for this long-term plan.

Thank you.

Dawn Knippel
Hillsboro Resident

July 15, 2012

To Whom It May Concern,

I would like to say a word in support of our local CSA farmers Juvencio and Lyn, and to support saving Helvetia from further urban growth. My family has been privileged to be CSA members for 9 years in Helvetia at La Finquita del Buho Farm. It's rural setting is the perfect setup for my family to participate in a sustainable organic farm experience despite our own suburban living. It is very close to our home, yet is a tranquil oasis. We understand there are plans to make new roads through Helvetia, and would like to speak our mind against new roads. This would further erode the heart of Helvetia and diminish the likelihood that my future grandkids could enjoy the same experience. Please reconsider the need for this expansion. We love it the way it is.

Respectfully,

Todd S. Gillingham, MD

July 22, 2012

To: Washington County Planning Commission / Board of Commissioners

Re: Ordinance No. 749 Concerning Adoption of the U.S. 26/Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP)

From:
Albert DiPiero, MD
Jing DiPiero
20360 NW Phillips Road
Hillsboro Oregon

Dear Members of the Planning Commission: and County Commissioners,

We learned with deep consternation of the sudden news of plans to route commuter traffic through the West Union Urban Growth Boundary up to the intersection of Dick Road and West Union.

We strongly object to this plan for several reasons:

- We are active members of the neighborhood and community and live within walking distance of Dick Road and West Union. This plan is detrimental to our neighborhood and dangerous for our children
- We are active members of the CSA called "La Finquita del Buho" at ***7960 NW Dick Road*** where we get all our produce, and we believe this routing of traffic will be detrimental to our ability to get our organic produce and would also be dangerous for our family's travel to "La Finquita del Buho" and for the farmers in the area
- We are active and supportive members of the Hillsboro and Portland business community (we have connections to ZoomCare, The FEI Company, and OHSU). But we feel the harms of the routing of traffic far outweigh any improvement to the business environment this move would provide.

We strongly object to this change,

With best regards,

Albert DiPiero, MD MPH

Jing DiPiero

Mel Tilkicioglu
2810 NW Birkendene Street
Portland, OR 97229

July 15, 2012

To: Washington County Planning Commission and Board of Commissioners

Re: Ordinance No. 749 Concerning Adoption of the U.S. 26/Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP)

Members of the Planning Commission, and County Commissioners,

My family is one of many families who are members of a CSA called "La Finquita del Buho" located on Dick Road about a quarter mile from the intersection of West Union Road and Dick Road. The farm grows organic vegetables and raises grass fed beef, lamb, and pork. Including us, it supplies food to over 500 people.

Like the other members, we go to the farm weekly to pick up vegetables and to enjoy the unique environment that the farm and more broadly Helvetia has to offer. Our children are fortunate to have the opportunity to experience the beauty and bounty of this area, as well as make the important connections between land, animals and the food we eat.

This farm is an important part of our lives and is unique in many ways. It is rural yet accessible, enabling us, our children and so many others to gain the benefits of participating in and learning from the farm and the farmers who run it.

It is of utmost importance to maintain a buffer from the urban area to maintain this farm. We object to the routing of commuter traffic through the West Union UGB up to the intersection of Dick Road and West Union. Our reasons include

- There is immeasurable value in preserving a small part of close in agricultural areas for our current and our future generations. We need to have places where adults and children of all ages can participate in agriculture, learn about land preservation, see how food is grown and benefit from eating fresh, local produce. We also want our children to understand the effort it takes to plant, grow and harvest our food, to know that radishes don't grow in bunches, that peas have shells to clean, and to see the chickens that lay the eggs we eat.
- The increased traffic will also put pressure on the farms on the north side of West Union and will be dangerous for farmers and their equipment since farmers use West Union as a major road for movement during the summer months. These farmers are an integral part of our community, their families, living environment and livelihoods will be forever impacted and altered.
- We feel that the increased commuter traffic, and increased speeds will put bicyclists at risk and impact other ongoing recreational activities such as families coming out to pick peaches, blueberries, pumpkins, to harvest their own Christmas tree.
- There is a possible effect of a sizable intersection with traffic lights on the historic West Union Baptist Church which serves as a community meeting place of worship and houses gravesites as far back as the 1850s. The grave yard is active to this date.
- We feel there are better solutions to traffic routing, such as routing commuter traffic from Cornelius Pass straight through to Helvetia Road via Jacobson Road, further south from West Union.

In closing we implore you to you to prioritize the preservation of close-in farmlands and rethink the decision the city and county are making with respect to Ordinance No. 749. Please do not bring more urban traffic north to West Union and onto Century Blvd. There is a perfectly good high speed road already in place at Jacobson. Please help us maintain the rural buffer by keeping traffic farm south of West Union Road.

Thank you for your consideration.

The Tilkicioglu-Lane Family

Mel, Robert, Alara (7 yrs) and Ross (2.5 yrs)

2810 NW Birkendene Street

Portland, OR 97229

Mel Tilkicioglu

Robert Lane

Cc: CPO 8

Senator Jeff Merkley

Congresswoman Bonamici

Steve and Nancy Boicourt

720 SE 59th Ave

Hillsboro, 97123

July 23, 2012

To: Washington County Planning Commission / Board of Commissioners

Re: Ordinace 749 Concerning Adoption of the US 26/Brookwood Pkwy/Helvetia Rd Interchange Area Management Plan (IAMP)

Members of the planning commission, and County Commissioners

As residents of Washington County, my husband and I are impacted as much as anyone by the choices you as a planning commission make on our behalf. Like so many, we are of course concerned with traffic. However, the decisions you as a committee will make about traffic flow stand to impact far more than the ease of which we travel through our community. We would like to give you our family's perspective on the proposed changes of Ordinance 749.

Over the last hundred years, we as a nation have created an environment where our people have no ties to, or knowledge of where our food comes from, or the conditions under which it was grown. Subsidized by our tax dollars, massive monoculture farming operations have almost completely replaced the family farms that once fed this beautiful country. But these single focus farms have brought with them many threats to our health. It is widely known that monoculture agriculture practices damage the soil, increase dependence on chemical fertilizers and pesticides, encourage the use of genetically modified organisms and contribute to antibiotic resistant bacterial strains. These mono-crops are shipped an average of 1500 miles to reach our dinner tables, forcing crops to be chosen based on how well they ship rather than nutritional content. They are often picked early and held in warehouses for weeks to months and then

chemically ripened before they make it to the grocery store. All of these practices drastically reduce the nutritional content and compromise the health of those who rely on it for sustenance.

With these practices being the norm, the majority of Americans have little to no access to local, truly fresh, safe organic food. We, however, are amazingly blessed to live in an area that allows us that access. You only need to stop by one of our local farmers markets to see how much our community values what our local small farms have to offer. But simply encouraging farmers markets is not enough! It is wrong to then turn around and make it difficult for them to operate, by smothering out the rural areas in which they reside. Without careful thought and protection, our already diminished farming community will continue to dwindle, taking with it our access to the bounty that should be our right and our heritage. Re-routing commuter traffic to encroach on our local farming community is a huge step in the wrong direction! With Jacobsen Rd already in place, it is a far better alternative...one that will support our farming community and all it has to offer.

We urge you to please consider this matter very carefully, as the future of our food depends on it!

Sincerely,

Steve and Nancy Boicourt

Hillsboro Residents

Members of La Finquita Del Buho CSA

ATTACHMENT B-5

July 17, 2012

To: Washington County Planning Commission / Board of Commissioners

Re: Ordinance No. 749 Concerning Adoption of the U.S. 26/Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP)

Members of the Planning Commission, and County Commissioners

When our family moved from rural Eastern Oregon in 1993, we chose to live in Hillsboro rather than other greater Portland communities. Hillsboro Schools offered vocational agriculture and FFA (Future Farmers of America) studies, bike paths, and easy access to rural country side which appealed to us. We applaud the decisions to create a downtown cultural center, neighborhood shopping centers, access to MAX, and tree-lined streets rather than choose strip rows and big-box stores.

We want Helvetia to retain its rural character. Judith teaches at West Union Elementary School. The students have benefited from surrounding nurseries, farms and dairy. What could be better than seeing crops and dairy connect people to the land! Students have a science garden where they plant, grow and harvest. Judith could teach at a school closer to our house but we love the people and open space of Helvetia.

We are members of La Finquita del Buho, a CSA, located a quarter of a mile from the intersection of Dick Road and West Union. It is a great joy to be a part of harvesting and eating vegetables grown on land nearby. We weekly pick up our share of crops and members gather several times a year to socialize. The location is close to Hillsboro and accessible by automobile or bicycle. We look forward to this errand because the space refreshes us.

We object to the proposal of routing commuter traffic through West Union UGB to the intersection of Dick Road and West Union.

*Increased commuter traffic would be dangerous for bicyclers and walkers.

* Increased traffic changes the character of the community.

* Increased traffic increases pressure on rural farms and difficulty in moving equipment.

*Increased traffic would create congestion at the doorstep of the active congregation of West Union Baptist Church.

Instead, provide a high speed route on Jacobsen which is North of Highway 26. This would create a buffer between urban and rural land and maintain the integrity of the community.

Sincerely,

Scott W. Duff

Judith Hedberg-Duff

Scott W. Duff and Judith Hedberg-Duff

July 18, 2012

Dear Planning Commission, and County Commissioners

I am writing this letter concerning the plans to make a main thoroughfare of Dick road in Hillsboro, Oregon. My daughter attends a fabulous school that does a farm share and regular farm trips to a farm on Dick road. To put a busy high traffic road so close to this rural treasure would be detrimental. Many of the students live in an urban environment and this chance for weekly rural farm life "experience" is an excellent opportunity. In my opinion it is also a necessity as fewer and fewer experiences like this are available for children. My daughter has a chance to pet and hold goats, play in a barn, swing on a tire swing in a pasture and press apples into cider. These experiences are a slice of American culture that is dwindling. It is our job to help preserve these places for our children. They need places to run wild, feel free and know that there are still remain pockets in the world that are peaceful and pastoral. To have a busy, noisy road here is not in keeping with the choices and intentions of the people who have chosen to live a more rural life. Your job is to place these roads were they are best suited. This is not a good fit. Keep in mind the children, the animals, the wild places, our culture and our history. Thank you.

Sincerely,

Alexis, Brad and Lily Bouchard

Alexis Bouchard

July 13, 2012

Dear Planning Commission, and County Commissioners

We are disappointed to learn that you are considering installing a major traffic light at Dick Road, with long term plans for greater traffic along Dick Rd. in the future. With the idea being to preserve the rural landscape as much as possible while allowing growth to continue, options south of Dick Road seem wiser and more in balance with what makes the Hillsboro area so unique. Jacobsen Road, for instance, to the south of West Union is one such option, one we hope you will strongly consider instead.

We live in Hillsboro proper, but support La Finquita del Buho, a local Community Supported Agriculture farm, located on Dick Road. La Finquita has given our family a way to connect to nature, farming, and knowledge of where our food comes from while still living in town. In many ways, we represent the two sides of Hillsboro—both urban and rural. Because of this, we have come to appreciate the values of both, and understand how they compliment one another instead of being diabolically opposed. To preserve the urban and rural character of our area, then, we hope you'll strongly consider how we, as well as many of our neighbors, feel thoughtful planning is essential to keeping Hillsboro unique. We're not opposed to growth—we feel it is essential to keep Hillsboro thriving—but we are opposed to growth that doesn't take into consideration the importance of Hillsboro's rural character and what it means to its citizens. To that end, we strongly feel diverting traffic along Dick Road will not only impact a community supported farm but will also impact the rural landscape in ways that are unnecessary and harmful to what makes Hillsboro different from other Portland area regions.

Sincerely,

Brent Johnson

Tennegon Johnson

Britany Johnson

Manning Johnson

ATTACHMENT B-5

DIANE E. JACOBS

2828 NE 69th Avenue ▪ Portland ▪ Oregon 97213
503-288-6166
dianejacobs@igc.org

July 10, 2012

Dear Washington County Planning Commission, and Board of Commissioners,

We have just been informed of Ordinance No. 749 concerning the adoption of the U.S. 26/Brookwood Parkway/Helvetia Road IAMP. We have been CSA members of La Finquita Del Buho since 2002. La Finquita, located on Dick Rd. near West Union Road, offers the community a very special experience that connects people to the land, organic produce, and their neighbors. We have been involved with the struggles to retain Oregon's agricultural heritage lands for the last 10 years. Once prime agricultural land is paved over it is lost forever. We need to protect the rural flavor of the Helvetia area. The proposed intersection will impact our Community Supported Agriculture farm and the surrounding area in the following ways:

- The proposed IAMP will be dangerous for all traffic since farmers use West Union as a major road for equipment movement during the summer months. Increased commuter traffic, and increased speeds puts pressure on the farms on the north side of West Union. There will be unnecessary urban traffic north to West Union and onto Century Blvd. There is a perfectly good high speed road already in place at Jacobson. Help us maintain the rural buffer by keeping traffic farm south of West Union Road.
- A better solution is to route commuter traffic from Cornelius Pass straight through to Helvetia Road via Jacobson Road, further south from West Union
- There is a possible effect of a sizable intersection with traffic lights on the historic West Union Baptist Church which serves as a community meeting place of worship and houses gravesites as far back as the 1850s. The graveyard is active to this date.
- Why bisect active agricultural land that is currently in the UGB but not being built on just because you have the money?
- We ask that the County work to help protect the buffer between urban and rural reserves and preserve Helvetia. People choose Helvetia as a destination for many reasons. People want the opportunity to bike through rural land, to come out and pick peaches, blueberries and pumpkins, to harvest their own Christmas tree and to taste wine grown on grapes less than 30 miles from Portland. Our fellow members choose La Finquita because they value rural life and value the land. We want our children to know where their food comes from.

Please see the value in preserving a small part of close in agricultural areas for our future generations. We need to have places where adults and children of all ages can participate in agriculture, learn about land preservation, and see how food is grown.

Please do not allow this proposed project to proceed as presently conceived. Please get input from all those who might be potentially impacted by this IAMP. Stakeholders must be involved.

Thank you,

Diane Jacobs

Dan Swerbilov

Steven M. & Geri Jacobs
3552 NE US Grant Pl.
Portland, OR 97212

July 12, 2012

Dear Washington Planning Commission Members. and County Commissioners,

It has just come to our attention that you are considering plans to put in a major traffic signal at the corner of Dick Rd an West Union Rd., making Dick road a major north-south road in this rural farming area. This is just the first step in changing a rural road for major traffic purposes. Such plans will greatly change a peaceful farming area including the CSA, La Finquita del Buho farm which is not only the suppler of fresh vegetables but a safe farm experience for 60 or more families This farm therefore provides an experience rapidly becoming far to scarce for many Oregon families. It is essential that more space is maintained between the rural - urban line.

Please help manage this vital separation.

Sincerely,

Steven & Geri Jacobs

July 9, 2012

To: Washington County Planning Commission and County Commissioners,

Re: Ordinance No. 749 Concerning Adoption of the U.S. 26/Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP)

Members of the Planning Commission, and County Commissioners

I am writing to you to address my utter dismay at the decision to route of commuter traffic through the West Union UGB up to the intersection of Dick Road and West Union. This is a lovely pastoral area that has a unique use and purpose. To render the hard work of those who live, farm and benefit from this area is valueless by destroying it with urban growth, traffic and associated activities demonstrates a callous disregard for exactly those qualities which Oregonians most treasure.

Affected by this decision is a small organic farm which is part of the network of ***Community*** Supported Agriculture (CSA) farms. I emphasize the word community because it is indeed a community that you are impacting. The immediate and most noticeable impacts from this intrusive move are:

- Increased potential for accidents and injury to farmers, farm equipment operators and the equipment itself since farmers use West Union as a major road for movement during the summer months
- Increased commuter traffic, and increased speeds puts pressure on the farms on the north side of West Union. As this is designed to be a commuter road the potential for accidents is likely higher as impatient drivers, inexperienced drivers getting to the nearby high school and slow moving farm equipment intersect.
- Increased noise, potential for trespassers, pollution and a potential for even more urban growth once the floodgates are opened.
- The dissection of active agricultural land that is currently in the UGB into smaller parcels thus impacting its use and detracting from the original intent of preserving agricultural zones, not agricultural parcels.
- Decreasing the size and effectiveness of the buffer between urban and rural reserves which is at the heart of Helvetia. People choose Helvetia as a destination for many reasons. People want the opportunity to bike through rural land, to come out and pick peaches, blueberries and pumpkins, to harvest their own Christmas tree and to taste wine grown on grapes less than 30 miles from Portland. I have become a member of La Finquita Del Buho because it is close enough to my suburban home, yet provides the rural experience for myself and my family. I grew up in Illinois surrounded by farm land. I very much value the experience and connection with the land and nature and feel it is an important connection for my children and grandchildren.

Less noticeable but equally important are the impacts on the farm families, animals, property and the CSA community. I am a member of La Finquita Del Buho CSA and have been for a number of years. In addition to the wonderful benefits of coming out to the farm for fresh picked organic food for my family, over the years my children and now my grandchildren have been able to understand our connection with the land in a way most people never get to experience. We have gotten up early on Sunday mornings to help with the harvest and get food ready for pick up. We have been able to purchase meat, cheese, eggs and milk directly from the source. My grandsons have watched a turkey grow from a small bird to a magnificent 40-pounder and just this season a family of ducks came to

visit the farm for a brief period. My 6 year old grandson was delighted to watch the little family wander around the farm quacking their hearts out. There are few places so easily accessible in our busy urban and suburban lives where one can experience this kind of connection with nature.

There are several other key reasons to oppose this decision.

A better, less disruptive, alternative is available. Commuter traffic can be routed from Cornelius Pass straight through to Helvetia Road via Jacobson Road, further south from West Union.

From an environmental perspective, the proposed route impacts wetlands and other protected natural habitat. It is not clear whether a Threatened and Endangered Species survey has been conducted to ensure there are no adverse environmental impacts from this proposed route. Undeveloped agricultural land provides many different habitats important to ecological receptors which are easily disrupted during the course of construction and subsequent increased human activities.

And from a historical preservation perspective, the proposed route negatively impacts the historic West Union Baptist Church which serves as a community meeting place of worship and houses gravesites as far back as the 1850s. The grave yard is active to this date. The church has been listed on the National Register of Historic Places since 1974 and is currently maintained by the American Baptist Churches of Oregon.

There are many reasons why this decision is ill advised, the fact that there is a better , less disruptive alternative makes is totally unnecessary.

Thank you for your time,

Regina Skarzinskas
7870 SW Bristol Court
Beaverton, OR 97007

July 22, 2012

To whom it may concern,

I am a member of La Finquita del Buho, a Community Sponsored Agriculture Farm in Helvetia, Hillsboro Oregon. Our family enjoys having the opportunity to participate, help out in the farm and reap the benefits of locally grown vegetables on a weekly basis. Part of this special experience is the picking up of the vegetables from the farm, and being able to help with some of the many tasks that need to be completed at the farm. This experience would not be the same, if we had to travel through urban sprawl and development to get there. Right now, getting to La Finquita del Buho involves lovely country road driving and limited sprawl.

We have learned of a new plan to direct traffic from the Silicon Forest below Hwy 26 north to Dick Road and West union Road. This would have a large impact on the country side feel that this farm currently enjoys. I urge you to please find other alternatives that save the Helvetia rural lands in Hillsboro, and limit the urban sprawl to areas that are not at this time farm lands, owned by farm families, feeding us locally grown fruits and vegetables and contributing to the health of our communities.

Thank you for listening to my concerns. I hope that protecting rural and farm lands close-in to the Portland/Metro area remains a top-priority.

The Paroissien-Arce Family

7/23/12

ATTACHMENT B-5

To: Washington County Planning Commission / Board of Commissioners

Re: Ordinance No. 749 Concerning Adoption of the U.S. 26/Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP)

Members of the Planning Commission, and County Commissioners,

I am a proud 7 year member of the CSA called "La Finquita del Buho". I stand with our farmers.

They grow organic vegetables and raise grass fed beef, lamb, and pork. They supply food to over 500 people from their 2 ½ acre farm. They raise 55 different vegetable crops and supply weekly shares of those vegetables to their 100 families over the course of a 29 week growing season. They have been in business since 2000 and have grown their business from 7 founding members to 100 members. We, as members, come to their farm weekly to pick up their vegetables and to enjoy the unique environment that Helvetia has to offer.

They run a tight operation using appropriate technology, environmentally sound practices and strict attention to organic practices. They manage and run this as a family business. They also sell with Pumpkin Ridge Gardens at the Beaverton Famers Market for the past 7 years. They have been active in the community working to preserve farmland and ensure that people have access to locally grown organic produce and have the opportunity to see and know how their food is grown.

They have worked with many high schools including; Liberty, Catlin Gable and Marshall High to provide access for students to agriculture and small scale farming. It is essential that children of all ages get to see and participate in where their food comes from. Children of all ages come to our farm on a weekly basis and learn about farm life.

They are unique in many ways. Their farm has a very rural feel although they are just ¼ mile from the UGB and 3 miles from the highway. They are accessible and schools find it possible to bring students to they farm for countless learning experiences. Keeping the farm rural although they are close to an urban area is very important. We need to maintain a buffer from the urban area to maintain our agricultural business. They need to be able to move farm equipment safely from other local farms to their own.

We object to the routing of commuter traffic through the West Union UGB up to the intersection of Dick Road and West Union. We object to the fact that you refer to our road as Century Blvd.

- We feel it will be dangerous for farm equipment since farmers use West Union as a major road for movement during the summer months
- Increased commuter traffic, and increased speeds puts pressure on the farms on the north side of West Union
- We feel a better solution is to route commuter traffic from Cornelius Pass straight through to Helvetia Road via Jacobson Road, further south from West Union
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- We ask that the county work to help protect the buffer between urban and rural reserves and preserve the pearl that is Helvetia. People choose Helvetia as a destination for many reasons. People want the opportunity to bike through rural land, to come out and pick peaches, blueberries and pumpkins, to harvest their own Christmas tree and to taste wine grown on grapes less than 30 miles from Portland. Our members choose our farm because they value rural life and value the land. They want their children to know that radishes don't grow in bunches. They want to feel how hard it is to produce food, but they also want the chance to eat fresh local produce.
- The city of Hillsboro and Washington County seem bent on development please see the value in preserving a small part of close in agricultural areas for our future generations. We need to have places where adults and children of all ages can participate in agriculture, learn about land preservation and see how food is grown.
- Please do not bring more urban traffic north to West Union and onto Century Blvd. There is a perfectly good high speed road already in place at Jacobson. Help us maintain the rural buffer by keeping traffic farm south of West Union Road.

In closing I wish maintaining rural land was a top priority and that maintaining land for growing food was paramount. I implore you to rethink and reprioritize what the city and county are doing to preserve farmland.

Thank you for your attention.

Signature Joan Dellon Name Joanne Dellon

Susan A. Kass
627 SE 53rd Avenue
Portland, OR 97215

July 10, 2012

To: Washington Couty Planning Committee
In Re: Ordinance No. 749

Esteemed members of the planning committee:

I am writing to express my concern about the proposal to reroute commuter traffic through West Union Road and create an intersection at Dick Road.

While I live in Portland, I have worked for 16 years in Washington County and consider it my "backyard." My husband and I are founding members of La Finquita del Buho, a small family-owned CSA on Dick Road. Thanks to our association with La Finquita, my husband and I have come to discover the riches of the Helvetia area and bring family and friends with us, not only to work on "our" farm but also to visit neighboring farms to u-pick berries, peaches and buy fresh corn. My husband is an avid biker and has spent several decades cruising the by-ways of Washington County. We both view with alarm the increasing industrialization of what was once rich productive farmland.

My understanding is that you have several quite viable options for re-routing traffic which would maintain access without impacting irreplaceable farmland. I urge you to Reconsider.

Thank you for your kind attention.

Sincerely yours,

Susan A. Kass and family

July 23, 2012

To: Washington County Planning Commission / Board of Commissioners

Re: Ordinance No. 749 Concerning Adoption of the U.S. 26/Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP)

Members of the Planning Commission, and County Commissioners

I am a proud 2 year member of the CSA called "La Finquita del Buho". I stand with our farmers.

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They run a tight operation using appropriate technology, environmentally sound practices and strict attention to organic practices. They manage and run this as a family business. They also sell with Pumpkin Ridge Gardens at the Beaverton Famers Market for the past 7 years. They have been active in the community working to preserve farmland and ensure that people have access to locally grown organic produce and have the opportunity to see and know how their food is grown.

They have worked with many high schools including; Liberty, Catlin Gable and Marshall High to provide access for students to agriculture and small scale farming. It is essential that children of all ages get to see and participate in where their food comes from. Children of all ages come to our farm on a weekly basis and learn about farm life.

They are unique in many ways. Their farm has a very rural feel although they are just ¼ mile from the UGB and 3 miles from the highway. They are accessible and schools find it possible to bring students to they farm for countless learning experiences. Keeping the farm rural although they are close to an urban area is very important. We need to maintain a buffer from the urban area to maintain our agricultural business. They need to be able to move farm equipment safely from other local farms to their own.

We object to the routing of commuter traffic through the West Union UGB up to the intersection of Dick Road and West Union.

In closing I wish maintaining rural land was a top priority and that maintaining land for growing food was paramount. I implore you to rethink and reprioritize what the city and county are doing to preserve farmland.
Thank you for your attention.

Signature

Michelle Ruby MD
Name

7/10/12

Re: Ordinance No. 749 Concerning Adoption of the U.S. 26/Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP)

Dear Washington County Planning Commission,

My name is Ryan Knippel and I am a student at Liberty High School, going into my Junior year. My family is also a member of a CSA, a group of families who all support and buy produce directly from a farm located on Dick Road. I recently learned of the possible addition or alteration to a major roadway at Dick Road. I cannot fully understand the reasoning for building a new roadway, because I do not know all the factors at bay. That being said, I believe there are some aspects surrounding this decision you are not aware of. This last year, I took AP Environmental Sciences at Liberty, a class which only recently has been added there. Throughout the year we did multiple hands-on activities, directly learning about how development of society can impact the environment. The most impacting experience of the entire year was a field trip to this farm. As a class we left around 11:30 and walked the 1.5 miles, we ate lunch at the farm, got a first hand look at the way things are grown, and then experienced a bit of farming first hand. We spent around an hour and a half planting a new set of crops. Nearly everyone in our class wanted to go back, or wish we had gone earlier in the year. Our teacher plans to take future classes there two or three times, so they can visibly see how crops grow over time.

Living in a suburban area, as a child, gives a unique opportunity to experience an urban world and a rural world as well, but to be honest, not many kids know how food is really grown, or all the processes which are associated with conventional farming as opposed to organic farming. A major roadway may have some benefits for other purposes, but it can be located somewhere else nearby. Please try to take into account the areas that the road will directly effect. This is not something that can always be rationalized into numbers and facts, but this rural area so close to a high school of over 1000 students, gives an extremely interesting look into what actually happens at a farm. If you move the road only a few miles away, it could help preserve this natural area.

As one last note, just like the McDonald's which is being built where the Sweet Oregon Grill used to be, near Lenox, if a major roadway is developed, there will be a change in the area, no matter what exactly is built there. Major corporations are always looking for new areas to expand to, and the Willamette Valley is one of the faster growing areas in the United States. Please, in the short and long term, try to limit the societal growth in this area, after experiencing the farm first hand, it is something that I would hate to see lost.

Thank you,

Ryan Knippel

Ryan Knippel

July 22, 2012

To: Washington County Planning Commission / Board of Commissioners

Re: Ordinance No. 749 Concerning Adoption of the U.S. 26/Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP)

Members of the Planning Commission, and County Commissioners

I am a proud 4 year member of the CSA called "La Finquita del Buho". I stand with our farmers.

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We object to the routing of commuter traffic through the West Union UGB up to the intersection of Dick Road and West Union.

In closing I wish maintaining rural land was a top priority and that maintaining land for growing food was paramount. I implore you to rethink and reprioritize what the city and county are doing to preserve farmland.
Thank you for your attention.

Eve Lonnquist Signature EVE LONNQUIST Name

July 10, 2012

To: Washington County Planning Commission / Board of Commissioners

Re: Ordinance No. 749 Concerning Adoption of the U.S. 26/Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP)

Members of the Planning Commission, and County Commissioners

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In closing I wish maintaining rural land was a top priority and that maintaining land for growing food was paramount. I implore you to rethink and reprioritize what the city and county are doing to preserve farmland.

Thank you for your attention.

[signature] Signature

Lynn R Baker Name

July 10, 2012

To: Washington County Planning Commission

Re: Ordinance No. 749 Concerning Adoption of the U.S. 26/Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP)

Members of the Planning Commission,

I'm writing to support the objection of Lynn Jacobs and Juvencio Argueta from "La Finquita del Buho" towards the decision of routing of commuter traffic through the West Union UGB up to the intersection of Dick Road and West Union.

As a resident of Washington County, I consider La Finquita del Buho as one of the best family places in the area. Not only is it my son's absolutely best places to go (in his words), but for me it is one little piece of heaven in a very industrialized area (and I'm a chemical engineer). As a chemical engineer, I understand the importance of infrastructure to economic development but as an environmental engineer I understand the importance of sustainable practices to our future wellbeing. La Finquita del Buho not only a great example of environmental stewardship, it also provides the community with healthy food, and a connection to a lost link to small scale farms. Please, reconsider and keep this wonderful piece of rural Helvetia undisturbed.

Regards,

Maria Fernandez-Diaz, PE 8086OR

18715 NW Lapine Street

Portland, OR 97229

ATTACHMENT B-5

July 23, 2012

To: Washington County Planning Commission / Board of Commissioners

Re: Ordinance No. 749 Concerning Adoption of the U.S. 26/Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP)

Members of the Planning Commission, and County Commissioners

I am a proud 5 year member of the CSA called "La Finquita del Buho". I stand with our farmers.

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- There is no reason to dissect active agricultural land that is currently in the UGB but not being built on just because you have the money.
- We ask that the county work to help protect the buffer between urban and rural reserves and preserve the pearl that is Helvetia. People choose Helvetia as a destination for many reasons. People want the opportunity to bike through rural land, to come out and pick peaches, blueberries and pumpkins, to harvest their own Christmas tree and to taste wine grown on grapes less than 30 miles from Portland. Our members choose our farm because they value rural life and value the land. They want their children to know that radishes don't grow in bunches. They want to feel how hard it is to produce food, but they also want the chance to eat fresh local produce.
- The city of Hillsboro and Washington County seem bent on development please see the value in preserving a small part of close in agricultural areas for our future generations. We need to have places where adults and children of all ages can participate in agriculture, learn about land preservation and see how food is grown.
- Please do not bring more urban traffic north to West Union and onto Century Blvd. There is a perfectly good high speed road already in place at Jacobson. Help us maintain the rural buffer by keeping traffic farm south of West Union Road.

In closing I wish maintaining rural land was a top priority and that maintaining land for growing food was paramount. I implore you to rethink and reprioritize what the city and county are doing to preserve farmland.

Thank you for your attention.

Max Zapf-Geller Signature MAX ZAPF-GELLER Name

To: Washington County Planning Commission
re: ordinance No. 749

My husband and I have been members of La Finquita Del Buho, CSA for four years. It is very important to us to receive fresh organic vegetables and grass fed beef from them. We value this very much and appreciate the fact that it is a family run business using environmentally sound practices.

It is important to have a buffer between rural and urban areas. It appears there is a viable alternative option south of West Union (Jacobsen Road).

Thank you for your consideration on this important issue that affects us deeply.

Marianne Mauldin / E. Mauldin

Marianne and Eldon Mauldin
4335 N.E.40th Ave
Portland, Or.
97211

7/9/12

July 12, 2012

To: Washington County Planning Commission / Board of Commissioners

Re: Ordinance No. 749 Concerning Adoption of the U.S. 26/Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP)

Members of the Planning Commission, and County Commissioners

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In closing I wish maintaining rural land was a top priority and that maintaining land for growing food was paramount. I implore you to rethink and reprioritize what the city and county are doing to preserve farmland.

Thank you for your attention.

[signature] Signature Rina Chamie Name

July 11, 2012

To: Washington County Planning Commission / Board of Commissioners

Re: Ordinance No. 749 Concerning Adoption of the U.S. 26/Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP)

Members of the Planning Commission, and County Commissioners,

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Thank you for your attention.

_____ Signature Wetover Matt Name

July 23, 2012

To: Washington County Planning Commission / Board of Commissioners

Re: Ordinance No. 749 Concerning Adoption of the U.S. 26/Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP)

Members of the Planning Commission, and County Commissioners;

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Thank you for your attention.

7/23/12

Holly Zaff Signature

Holly Zaff Name

ATTACHMENT B-5

Nina Poliakoff
7710 SW Barnes Rd Unit D
Portland OR 97225

July 19, 2012

To: Washington County Planning Commission / board of commissioners

Re: Ordinance No. 749 Concerning Adoption of the U.S. 26/Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP)

Members of the Planning Commission, and County Commissioners

I am a proud first year member of the CSA called "La Finquita del Buho" located at 7960 NW Dick Road in Hillsboro, OR 97124. They grow organic vegetables and raise grass fed beef, lamb, and pork. They supply food to over 500 people from their 2 ½ acre farm. They raise 55 different vegetable crops and supply weekly shares of those vegetables to 100 families over the course of a 29 week growing season. They have been in business since 2000 and have grown from 7 founding members to 100 members. We come to the farm weekly to pick up vegetables and to enjoy the unique environment that Helvetia has to offer.

I love that I can take a short drive from my home on SW Barnes Rd and be in farm land. Not just farmers market land or a street side produce stand but actual farm land! Isn't this one of the amazing things about this area? I think it is. My parents and I joined this year after learning about the farm through my brother and sister-in-law who are also members. We come out to pick up our share, to harvest and weed. I can not express how wonderful it is to harvest our food. I especially enjoy the weeding. I get to be outside AND I get to be detail oriented. Two of my happiest places.

La Finquita del Buho is unique in many ways. It has a very rural feel although the farm is just ¼ mile from the UGB and 3 miles from highway 26. Keeping the area rural while close to an urban area is very important. We need to maintain a buffer from the urban area to maintain the agricultural business. They need to be able to move farm equipment safely from other local farms to their own.

As a member of the CSA I object to the routing of commuter traffic through the West Union UGB up to the intersection of Dick Road and West Union.

- It will be dangerous for farm equipment since farmers use West Union as a major road for movement during the summer months
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- There is a possible effect of a sizable intersection with traffic lights on the historic West Union Baptist Church which serves as a community meeting place of worship and houses gravesites as far back as the 1850s. The grave yard is active to this date.
- There is no reason to dissect active agricultural land that is currently in the UGB but not being built on just because you have the money.
- We ask that the county work to help protect the buffer between urban and rural reserves and preserve the pearl that is Helvetia. People choose Helvetia as a destination for many reasons. People want the opportunity to bike through rural land, to come out and pick peaches, blueberries and pumpkins, to harvest their own Christmas tree and to taste wine grown on grapes less than 30 miles from Portland.
- The city of Hillsboro and Washington County seem bent on development please see the value in preserving a small part of close in agricultural areas for our future generations. We need to have places where adults and children of all ages can participate in agriculture, learn about land preservation and see how food is grown.
- Please do not bring more urban traffic north to West Union and onto Century Blvd. There is a perfectly good high speed road already in place at Jacobson. Help us maintain the rural buffer by keeping traffic farm south of West Union Road.

Maintaining rural land should be a top priority because maintaining land for growing food is vital. Please rethink and reprioritize what the city and county are doing to preserve farmland.

Thank you for your attention,

Nina Poliakoff

Exhibit G
Washington County, Ordinance 749 and Staff Report

US26: Brookwood Parkway/Helvetia Road Interchange Area Management Plan

October 2012

Continued from August 28, 2012

AGENDA

WASHINGTON COUNTY BOARD OF COMMISSIONERS

Agenda Category:	Public Hearing – Fourth Reading and Fourth Public Hearing Land Use & Transportation; County Counsel (CPO 7)
Agenda Title:	**PROPOSED A-ENGROSSED ORDINANCE NO. 749 – AN ORDINANCE AMENDING THE TRANSPORTATION PLAN ELEMENT OF THE COMPREHENSIVE PLAN RELATING TO THE BROOKWOOD PARKWAY INTERCHANGE AREA MANAGEMENT PLAN**
Presented by:	Andrew Singelakis, Director, Land Use & Transportation Alan Rappleyea, County Counsel

SUMMARY:

A-Engrossed Ordinance No. 749 amends the Washington County Transportation Plan to add some new roadways and modify the functional classification and number of lanes of some existing roadways consistent with the U.S. 26 – Brookwood Parkway/Helvetia Road Interchange Area Management Plan. The ordinance is posted on the county's land use ordinance web page at the following link:

http://www.co.washington.or.us/LUT/Divisions/LongRangePlanning/2012-land-use-ordinances.cfm

The Board conducted public hearings for Ordinance No. 749 on July 24 and August 7, 2012. On August 7, the Board ordered engrossment of the ordinance to include the 7-lane Cornelius Pass Road request by the City of Hillsboro. The hearing was continued to August 28, and September 18, 2012 for the required public hearings for the engrossed ordinance.

- Consistent with Board policy, testimony about the ordinance is limited to two minutes for individuals and five minutes for a representative of a group.

DEPARTMENT'S REQUESTED ACTION:

Read A-Engrossed Ordinance No. 749 by title only and conduct the fourth public hearing. At the conclusion of the hearing, adopt the Ordinance.

COUNTY ADMINISTRATOR'S RECOMMENDATION:

I concur with the requested action.

Agenda Item No.	**4.a.**
Date:	09/18/12

ADOPTED

WASHINGTON COUNTY
OREGON

August 17, 2012

To: Citizen Participation Organizations and Interested Parties

From: Andy Back, Interim Long Range Planning Manager
Department of Land Use & Transportation

Subject: **PROPOSED A-ENGROSSED ORDINANCE NO. 749**

On May 14, 2012, you were notified about initial public hearings before the Planning Commission and the Board of County Commissioners (Board) on proposed Land Use Ordinance No. 749. On June 20, and July 11, 2012 the Planning Commission conducted public hearings on Ordinance 749 and forwarded a recommendation to the Board for approval of Ordinance 749. On July 24 and August 7, 2012 the Board conducted public hearings on Ordinance No. 749, and ordered substantive amendments to this ordinance. These changes have been incorporated into proposed **A-Engrossed Ordinance No. 749** and are summarized below. As required by Chapter X of the County Charter, the Board has directed staff to prepare and provide you with notice of these amendments.

Enclosed for your information is a copy of proposed **A-Engrossed Ordinance No. 749**. Listed below is a description of the ordinance, upcoming hearing dates, and other relevant information. If you have any questions about the ordinance, or if you would like additional information, please contact the Long Range Planning Division.

Ordinance Purpose and Summary

Proposed A-Engrossed Ordinance No. 749 amends the Washington County Transportation Plan to incorporate elements of the U.S. 26-Brookwood Parkway/Helvetia Road Interchange Area Management Plan, and amends the lane number map for Cornelius Pass Road.

Who Is Affected

Residents in the vicinity of the U.S. 26-Brookwood Parkway/Helvetia Road Interchange, and along Cornelius Pass Road between U.S. 26 and Cornell Road.

What Land is Affected

Property in the vicinity of the U.S. 26-Brookwood Parkway/Helvetia Road Interchange, and along Cornelius Pass Road between U.S. 26 and Cornell Road.

Original Ordinance No. 749 Provisions

As originally filed, Ordinance No. 749 proposed the following amendments to the Washington County 2020 Transportation Plan:

- Adds some new roadways and modifies the functional classification and number of lanes of some existing roadways consistent with the U.S. 26-Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP). See ODOT Region 1 website for IAMP overview: http://www.oregon.gov/ODOT/HWY/REGION1/US26_brookwoodpkwy/index.shtml#iamppac

- Limits transportation system changes to roadways within the Urban Growth Boundary (UGB) as it existed before Metro's decision to expand the UGB in October 2011 (Metro Ordinance 11-1264 B).

- Adds or modifies strategy statements in Washington County Transportation Plan Policy 10 - Functional Classification Policy and Policy 19 – Transportation Planning Coordination and Public Involvement Policy to describe and enable implementation of the IAMP.

Proposed A-Engrossed Ordinance No. 749 Provisions

Proposed **A-Engrossed Ordinance No. 749** incorporates all of the above-described amendments, plus the following proposed amendment:

- The lane number designation for Cornelius Pass Road between U.S. 26 and Cornell Road will be changed from 5-lanes to 7-lanes.

Public Hearings
Time and Place

Board of County Commissioners	Board of County Commissioners
6:30 pm	10:00 am
August 28, 2012	September 18, 2012

Hearings will be held in the Shirley Huffman Auditorium in the Public Services Building, 155 North 1st Avenue, Hillsboro, Oregon.

On September 18, 2012, the Board of County Commissioners (Board) may choose to adopt the ordinance, make changes to it, continue the hearing to a future date, or reject the ordinance. If it is adopted, it would become effective on October 18, 2012.

How to Submit Comments

Submit oral or written testimony to the Board at one of the public hearings. Written testimony may be mailed or faxed to the Board in advance of the public hearings in care of the Long Range Planning Division. **We are unable to accept e-mail as public testimony.**

Washington County, Long Range Planning Division
155 N. 1st Ave., Suite 350-14, Hillsboro, OR 97124-3072
Fax: 503-846-4412

Staff Contact

Steve L. Kelley, Senior Planner
155 North 1st Ave., Suite 350-14, Hillsboro, OR 97124-3072
Telephone: 503-846-3764 Fax: 503-846-4412
e-mail: SteveL_Kelley@co.washington.or.us

Proposed Ordinance is available at the following locations:

- Washington County Department of Land Use & Transportation
  Long Range Planning Division, 155 North 1st Ave.
  Hillsboro, OR 97124-3072 Telephone: 503-846-3519
  http://www.co.washington.or.us/LUT/Divisions/LongRangePlanning/2012-land-use-ordinances.cfm
- Cedar Mill Community Library and Tigard Public Library
- Citizen Participation Organizations (CPOs); Call 503-821-1128 for a directory of CPOs.

FILED

AUG 1 0 2012

Washington County
County Clerk

BEFORE THE BOARD OF COUNTY COMMISSIONERS

FOR WASHINGTON COUNTY, OREGON

A-ENGROSSED ORDINANCE 749	An Ordinance Amending the Transportation Plan Element of the Comprehensive Plan Relating to the Brookwood Parkway Interchange Area Management Plan

The Board of County Commissioners of Washington County, Oregon, ordains as follows:

SECTION 1.

A. The Board of County Commissioners of Washington County, Oregon, recognizes that the Transportation Plan Element of the Comprehensive Plan (Volume XV) was adopted on October 25, 1988, by way of Ordinance Nos. 332 and 333, with portions subsequently amended by Ordinance Nos. 343, 382, 409, 419, 426, 432, 450, 463, 470, 471, 473, 474, 480, 483-485, 493, 494, 503, 515, 526, 537, 542, 546, 552, 556, 588, 601, 609, 611, 626, 627, 631, 642, 649, 663, 674, 683, 712, 713, 717, 718, 730, 739, and 744.

B. Subsequent ongoing planning efforts of the County indicate a need for changes to the Transportation Plan to incorporate provisions of the U.S. 26 – Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP). The Board recognizes that the U.S. 26 – Brookwood interchange is slated for improvement beginning in 2013 and, as a result, coordinated development of the local transportation system identified in the IAMP is important in order to ensure sufficient capacity and safe operations due to increased future use. Certain changes to the Washington County Lane Numbers map are necessary to ensure consistency with planning efforts undertaken by other jurisdictions included in the IAMP. The Board takes note that such changes

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are necessary for the benefit of the health, safety, and general welfare of the residents of Washington County, Oregon.

C. Under the provisions of Washington County Charter Chapter X, the Department of Land Use and Transportation has carried out its responsibilities, including preparation of notices, and the County Planning Commission has conducted public hearings on the proposed amendments and has submitted its recommendations to the Board. The Board finds that this Ordinance is based on that recommendation and any modifications made by the Board, as a result of the public hearings process.

D. The Board finds and takes public notice that it is in receipt of all matters and information necessary to consider this Ordinance in an adequate manner, and that this Ordinance complies with the Statewide Planning Goals, the Metro Urban Growth Management Functional Plan, and the standards for legislative plan adoption, as set forth in Chapters 197 and 215 of the Oregon Revised Statutes, the Washington County Charter, and the Washington County Development Code.

SECTION 2.

The following exhibits, attached and incorporated herein by reference, are hereby adopted as amendments to the Transportation Plan:

(A) Exhibit 1: Figure 4C – Washington County Functional Classification System map, is amended to add or modify the functional classification of transportation facilities consistent with the IAMP;

(B) Exhibit 2 (2 pages): Figure 5 – Washington County Lane Numbers map, is amended to add or modify the number of lanes on transportation facilities consistent with the

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IAMP;

(C) Exhibit 3: Policy 10.0 – Functional Classification Policy, is amended to add a strategy to describe and enable implementation of the U.S. 26 – Brookwood Parkway/Helvetia Road Interchange Area Management Plan; and

(D) Exhibit 4: Policy 19.0 – Transportation Planning Coordination and Public Involvement Policy, is amended to integrate the U.S. 26 – Brookwood Parkway/Helvetia Road Interchange Area Management Plan with the Transportation Plan.

SECTION 3.

All other Comprehensive Plan provisions that have been adopted by prior ordinance, which are not expressly amended or repealed herein, shall remain in full force and effect.

SECTION 4.

All applications received prior to the effective date shall be processed in accordance with ORS 215.427.

SECTION 5.

If any portion of this Ordinance, including the exhibits, shall for any reason be held invalid or unconstitutional by a body of competent jurisdiction, the remainder shall not be affected thereby and shall remain in full force and effect, and any provision of a prior land use ordinance amended or repealed by the stricken portion of this Ordinance shall be revived and again be considered in full force and effect.

SECTION 6.

The Office of County Counsel and Department of Land Use and Transportation are

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authorized to prepare planning documents to reflect the changes adopted under Section 2 of this Ordinance, including deleting and adding textual material and maps, renumbering pages or sections, and making any technical changes not affecting the substance of these amendments as necessary to conform to the Washington County Comprehensive Plan format.

SECTION 7.

This Ordinance shall take effect thirty (30) days after adoption.

ENACTED this 18 day of September, 2012, being the 4th reading and 4th public hearing before the Board of County Commissioners of Washington County, Oregon.

ADOPTED

BOARD OF COUNTY COMMISSIONERS
FOR WASHINGTON COUNTY, OREGON

CHAIRMAN

Barbara Hejtmanek
RECORDING SECRETARY

READING		PUBLIC HEARING	
First	July 24, 2012	First	July 24, 2012
Second	August 7, 2012	Second	August 7, 2012
Third	August 28, 2012	Third	August 28, 2012
Fourth	September 18, 2012	Fourth	September 18, 2012
Fifth		Fifth	

VOTE: *Aye:* Duyck, Malinowski, Rogers, Terry *Nay:* Schouten

Recording Secretary: Barbara Hejtmanek Date: 9-18-12

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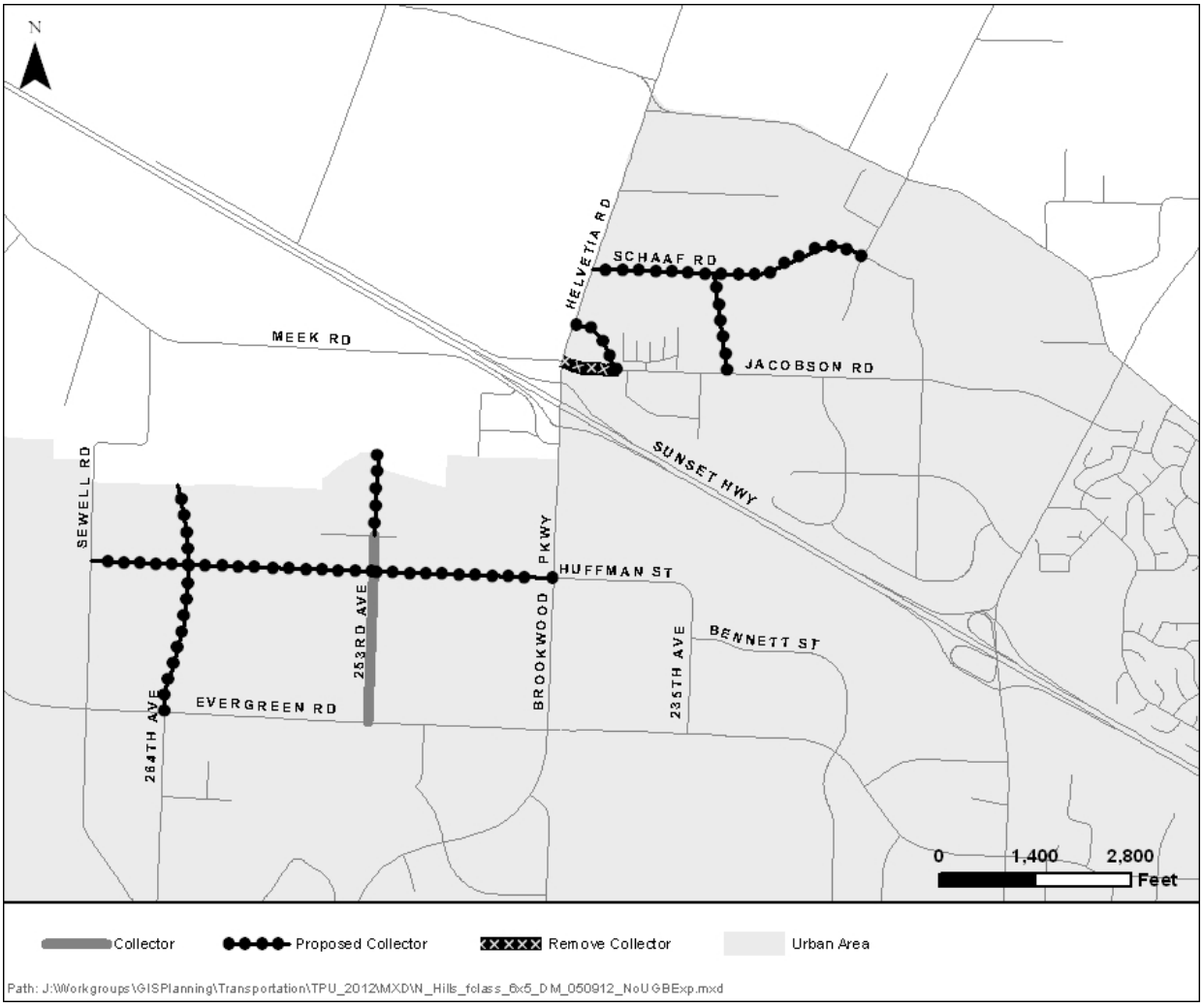
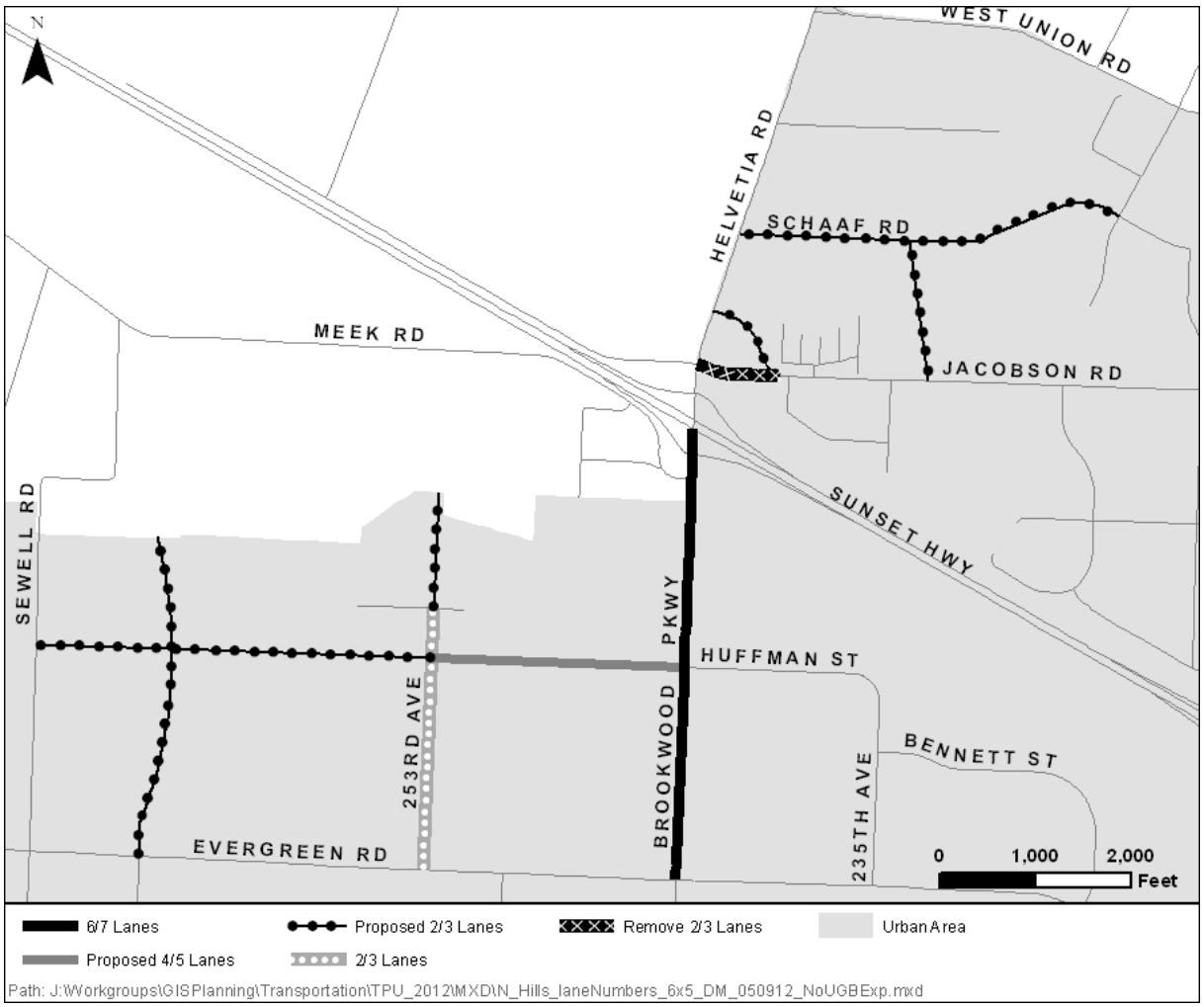
Figure 4C – Washington County Functional Classification System map, is amended as follows:



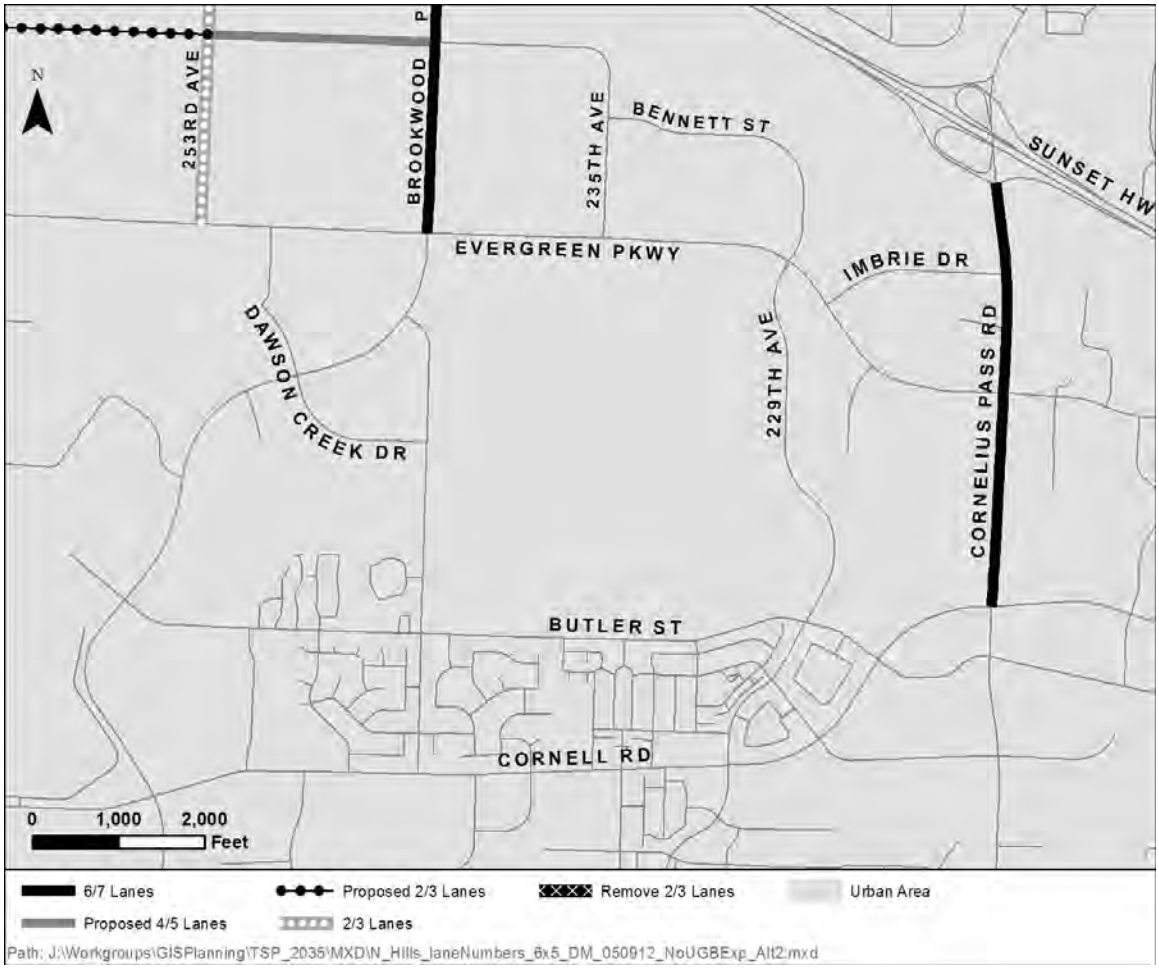
abcdef Proposed additions
~~abcdef~~ Proposed deletions

Figure 5 – Washington County Lane Numbers map, is amended as follows:



abcdef Proposed additions
~~abcdef~~ Proposed deletions

Figure 5 – Washington County Lane Numbers map, is amended as follows:



abcdef Proposed additions
~~abcdef~~ Proposed deletions

Policy 10.0 – Functional Classification Policy is amended as follows:

10.11 The Oregon Department of Transportation (ODOT), the City of Hillsboro and Washington County have developed and adopted an Interchange Area Management Plan (IAMP) for the U.S. 26 - Brookwood Parkway/Helvetia Road Interchange. This interchange, a locally and regionally significant facility, is slated for improvement with funds provided by the state Jobs and Transportation Act. Among its functions is to serve as a primary entry point to regionally-significant high-tech employment centers south of the interchange. The IAMP defines improvements to the local transportation system in the vicinity of the interchange that are necessary to ensure the intended purpose and function of the interchange are maintained and sufficient to ensure safe operations through the year 2035. IAMP elements should be incorporated into the Washington County Transportation Plan, as appropriate.

10.~~11~~12 The Transportation Plan also identifies several specific study areas where the function or alignment of the facility has not been determined. These study areas are described below and shown on the Study Area Map.

Meek Road - Realignment at Brookwood Parkway~~Shute Road~~:
There has been concern regarding the proximity of the intersection at Meek Rd and Brookwood Parkway~~Shute Rd~~ to the interchange at US 26 and Brookwood Parkway~~Shute Rd~~. This ~~study will evaluate options for moving the intersection of Meek further south~~issue has been evaluated and a proposed solution identified through development of the U.S. 26 – Brookwood Parkway/Helvetia Road Interchange Area Management Plan that was developed in conjunction with plans for improvements to the interchange itself.

abcdef Proposed additions
~~abcdef~~ Proposed deletions

Policy 19.0 – Transportation Planning Coordination and Public Involvement Policy, is amended as follows:

19.15 Integrate the U.S. 26 -- Brookwood Parkway/Helvetia Road Interchange Area Management Plan with the Washington County Transportation Plan and carry out its applicable provisions as part of transportation plan implementation.

abcdef Proposed additions
~~abcdef~~ Proposed deletions

AGENDA

US 26: Brookwood Parkway/Helvetia Interchange Project

IAMP PAC Meeting #1
Wednesday, May 25, 2011
2:00 PM – 4:00 PM
Location: Conference Room 113C – Civic Center, Hillsboro, Oregon

Invitees:

PAC Members

Robert Bailey, Helvetia Community Association
Stone Rose, Meek Neighborhood
Deanna Palm, Hillsboro Chamber of Commerce
Tom Waldron, Brookwood area bicyclists
Andrew Jones, Jacobson Road (Pac Trust)
Don Odermott, City of Hillsboro
Blair Crumpacker, Washington County
Tim Wilson, ODOT

Staff

Andrew Singelakis, Washington County
Pat Ribellia, City of Hillsboro
Elizabeth Craig, ODOT
Seth Brumley, ODOT
Andy Johnson, ODOT
John Stutesman, David Evans and Associates
Scott Harmon, David Evans and Associates
Stacy Thomas, JLA Public Involvement

2:00 – 2:30 PM **Welcome and project overview** (Andrew Johnson, ODOT; Pat Ribellia, City of Hillsboro; Andrew Singelakis, Washington County)

- The need and purpose of the IAMP
- Relationship of IAMP to JTA Project
- Partnering agreement
- Roles and responsibilities

2:30 – 3:00 PM **PAC protocols** (Elizabeth Craig, ODOT, and Stacy Thomas, JLA)

- Please refer to handout
- Meeting protocols
- Decision making protocols
- Dispute resolution protocols
- Internal/external communications
- IAMP project schedule—four PAC meetings

3:00 – 3:10 PM **Technical Memorandum #1 and appendix** (John Stutesman, DEA)

- IAMP Definition and Background
- TM #1 Appendix Review of Plans and Policies

3:10 – 3:40 PM **Technical Memorandum #2** (Scott Harmon and John Stutesman, DEA)

- Existing land use conditions
- Existing natural and historic resources
- General overview of existing traffic analysis

3:40 – 3:50 PM **PAC meeting #2 agenda** (John Stutesman, DEA)

- Existing transportation analysis—Technical Memorandum #2
- Future baseline transportation analysis—Technical Memorandum #3
- Future land use scenarios analysis—Technical Memorandum #4

3:50 – 4:00 PM **Public comments** (Members of the public in attendance)

Materials: PAC protocols; Technical Memorandum #1: IAMP Definition and Background; Technical Memorandum #2: Existing Conditions Analysis (without completed transportation section)

MEETING NOTES

US 26: Brookwood Parkway/Helvetia IAMP

PAC Meeting #1
Wednesday, May 25, 2011
2:00 PM – 4:00 PM
Location: City of Hillsboro Civic Center

Attendees:

PAC present:
Robert Bailey, Helvetia Community Association
Deanna Palm, Hillsboro Chamber of Commerce
Tom Waldron, Area bicyclist
Andrew Jones, Jacobson Road (PAC Trust)
Don Odermott, City of Hillsboro
Blair Crumpacker, Washington County
Tim Wilson, ODOT
Brad Choi, City of Hillsboro

Staff present:
Andy Johnson, ODOT
Pat Ribellia, City of Hillsboro
Gary Stockhoff, Washington County
Elizabeth Craig, ODOT
Seth Brumley, ODOT
John Stutesman, DEA
Scott Harmon, DEA
Stacy Thomas, JLA

Public present:
Sharleen Harvey
Cherry Amabisca
Melinda Wallace
Alyson Parra
Val Cady
Paul Gram
Tom Black
Matthew Owen
Glenna Dryden

Welcome and Project Overview

- Andy Johnson welcomed the group and reviewed the purpose and need of the IAMP. He then discussed the relationship of the IAMP to the Brookwood JTA project. Andy, Pat Ribellia and Gary Stockoff, discussed the importance of the project's jurisdictional partnership, as well as the roles and responsibilities of the Project Advisory Committee and their value to the project.

Purpose of Meeting/Committee Introductions/Schedule

- Elizabeth Craig thanked all the committee members for serving and representing their constituencies during the IAMP process. She explained the purpose of the meeting – to set the foundation on how the PAC operates and to begin a discussion of the project issues.
- Introductions of the agency staff, PAC members, and meeting attendees were made. PAC members and staff introduced themselves and explained the stakeholder group that they represent or staff role they play on the project.
- Elizabeth reviewed a schedule illustrating the flow of PAC meetings and open houses. Specific dates need to be set for the meetings, but the subjects to be covered at each meeting were reviewed.

PAC Protocols

- Stacy Thomas reviewed the committee protocols (how the committee would operate) and the decision-making structure for the IAMP process. The group decided to allow a public comment period earlier on the agenda in future meetings if necessary.
- Elizabeth will serve as the primary point of contact for the PAC.

Technical Memorandum #1 and Appendix

- John Stutesman introduced Scott Harmon, who illustrated the IAMP study area, management area and the JTA project area on a map and discussed the significance of each area. Scott then discussed the existing policies and plans that were reviewed and synthesized in order to be used in the IAMP process. He asked the PAC to review the documents and let the team know there are any omissions or corrections that should be considered.
- A committee member asked for a timeline for getting comments to the team. Elizabeth said a deadline would be sent when the meeting summary is distributed. John noted that there was not a tight deadline on this particular task.
- A public attendee noted that the project purpose should include benefit to not only commuters and local jurisdictions, but to interchange area residents as well.
- A public attendee asked what the blank oval on the map represented. Andy noted that it was a placeholder. It would be completed after receiving input from the PAC and the public.
- A public attendee asked why a blank oval wasn't used for Groveland. Andy indicated that it was appropriate to use an oval for that area as well – what would ultimately happen in that area is still being determined and input is needed before a decision is made.
- A public attendee asked if ODOT has standards for spacing between an interchange and driveways. Andy discussed access management standards.
- A public member asked if it is possible for Jacobson to extend to Helvetia Road. Andy noted that local road connections will be considered as the IAMP is prepared.
- Public asked about Brookwood JTA project funding and the team discussed the funding details of the JTA project and potential use for any extra funds, which would be applied to projects in the interchange study area.
- A committee member asked if the IAMP planned for future UGB expansion. Andy explained that the IAMP is focused on full build-out of the current UGB. The interchange will be improved to support the UGB as it is defined today.

Technical Memorandum #2

- John Stutesman noted that this memo is still in progress, and still requires work on existing traffic conditions.

- Scott discussed the work completed on existing land uses. He asked the PAC to comment on omissions or inaccuracies after they have reviewed the document.
- Scott then noted that DEA is working with the project partners to create good baseline traffic information that will be analyzed as part of the IAMP process. The existing traffic conditions work will inform the 2035 future traffic analysis.
- Scott discussed the Brookwood JTA project analysis area, the IAMP influence area and IAMP study area. The traffic and land use analysis will focus on the current UGB as Metro has anticipated development in 2035. In addition, there will be a high level analysis of specifically identified sensitivity areas, which are considered likely to become part of a future UGB expansion. A high level analysis of these sensitivity areas will consider what might happen to the interchange if they were included in the UGB (and fully built out as of 2035).
- Scott mentioned that different roadway scenarios will need to be defined with the PACs input.

Public Comment

- A public attendee suggested holding the PAC meetings when more people could attend – at the end of the work day or evenings.
- A public attendee asked when construction would occur on the Brookwood JTA project. Andy noted that construction would start in 2013 or 2014 and would likely take two construction seasons.
- A public attendee representing the Rice Museum of Rocks and Minerals noted that 20,000 students visit the museum each year and requests that construction impacts be minimized for the numerous school busses needing to access the museum.
- A public attendee asked if the culvert under US 26 is being improved as part of the Brookwood JTA project. Andy said that he didn't know, but ODOT hydrology would consider this.
- A committee member asked about the name of the project. Andy noted that based on public input received at the Brookwood JTA open house, the project name was changed to Brookwood Parkway/Helvetia IAMP.
- A public attendee asked that on page 4 of Tech Memo #1 whether agriculture and tourism activities could be added to the interchange function section. Andy thought that may be possible, but explained the history and purpose of the function statement.
- A public attendee asked if any wetlands have been identified. Andy noted wetlands, along with all environmental features, will be delineated by the team.

Next Steps

- An email will be sent to PAC members with deadlines for comments on the first two technical memos. Comments should be sent to Elizabeth Craig at ODOT, and she will route to the correct team member. Committee members will be polled for their

availability before the next PAC meeting is scheduled. Technical Memos 3 and 4 will be discussed at the next meeting.

AGENDA

US 26: Brookwood Parkway/Helvetia Road Interchange Area Management Plan

IAMP PAC Meeting #2
Monday, October 24, 2011
10:00 AM – 12:00 PM
Location: Conference Room 431 (4th Floor) – Civic Center, Hillsboro, Oregon

Invitees:

PAC Members

Robert Bailey, Helvetia Community Association
Stone Rose, Meek Neighborhood
Deanna Palm, Hillsboro Chamber of Commerce
Tom Waldron, Brookwood area bicyclist
Andrew Jones, Jacobson Road (Pac Trust)
Don Odermott, City of Hillsboro
Blair Crumpacker, Washington County
Tim Wilson, ODOT

Staff

Andrew Singelakis, Washington County
Pat Ribellia, City of Hillsboro
Andy Johnson, ODOT
Elizabeth Craig, ODOT
Seth Brumley, ODOT
John Stutesman, David Evans and Associates
Scott Harmon, David Evans and Associates
Stacy Thomas, JLA Public Involvement

10:00 – 10:10 AM	**Welcome & introductions** *(Project Policy Group: Andrew Johnson, ODOT; Pat Ribellia, City of Hillsboro; Andrew Singelakis, Washington County)*
10:10 – 10:25 AM	**Partner Updates** *(Andy Johnson, ODOT; Don Odermott, City of Hillsboro; Blair Crumpacker, Washington County)* • JTA Project update (Andy Johnson) • Final UGB adjustments, TIGER 3 grant (Don Odermott) • Coordination with other planning projects (Blair Crumpacker)
10:25 – 10:35 AM	**IAMP update** *(Tim Wilson, ODOT; John Stutesman, DEA)* • Updated schedule • PAC meeting #3 agenda o Future traffic performance with proposed local roadway network—TM #3 o Future land use scenarios analysis—TM #4 o Access Management Plan—TM #5 • PAC meeting #4 agenda o Draft IAMP, including potential management actionss
10:35 – 10:45 AM	**Public involvement update** *(Elizabeth Craig, ODOT; Stacy Thomas, JLA)* • Format and role for PAC members • Public open house
10:45 – 11:45 AM	**Work Session –** transportation improvements maps *(John Stutesman, DEA)* • Please refer to handouts • State, regional, county, and city planning • Previously planned local circulation network • Input on proposed local circulation network
11:45 – 11:50 AM	**Wrap up and next steps** *(John Stutesman, DEA)*
11:50 – 12:00 PM	**Public comments** *(Members of the public in attendance)*

Materials: Comments and responses, project schedule, transportation improvements maps, PAC meeting #1 summary, IAMP goals and priorities

U.S. 26: Brookwood Parkway/Helvetia IAMP

PAC Meeting #2
Monday, October 24, 2011
10:00 AM – 12:00 PM
Location: City of Hillsboro Civic Center

Attendees

PAC present:
Robert Bailey, Helvetia Community Assoc.
Melissa Frame (for Stone Rose), Meek Neighborhood
Deanna Palm, Hillsboro Chamber of Commerce
Tom Waldron, Area bicyclist
Matthew Oyen (for Andrew Jones), Jacobson Road (PAC Trust)
Don Odermott, City of Hillsboro
Blair Crumpacker, Washington County
Tim Wilson, ODOT

Staff present:
Andrew Singelakis, Washington County
Steve L. Kelley, Washington County
Pat Ribellia, City of Hillsboro
Andy Johnson, ODOT
Elizabeth Craig, ODOT
Seth Brumley, ODOT
Matt Freitag, ODOT
John Stutesman, DEA
Scott Harmon, DEA
Stacy Thomas, JLA

Public present:
Ron Thompson
John Valley
Sharleen Harvey
Cherry Amabisca
Paul Gram
Melena Wallace
Blake Boyles
Scott Hamilton
Gerry Grossen
Jim Standring

IAMP and JTA project update and schedule

- The JTA project is scheduled for construction in late 2013.
- The IAMP needs to be in place before construction of the JTA project (new interchange).
- Project team members presented the schedule, which anticipates getting the IAMP to adoption by summer 2012.
- The goal is to have a working draft IAMP document for partners, property owners, and residents to add their input by June.
- Matt Gossett of ODOT Right of Way has been starting to contact property owners.
- The project team is working with partners to get traffic data and is preparing technical memoranda on existing and future traffic.
- The IAMP planning horizon is 2035.
- Washington County is updating its Transportation System Plan. The JTA project and the IAMP will be incorporated into the update.
- The IAMP will affect the City's Transportation System Plan.

Metro UGB amendments

- 338 acres around interchange were added to the UGB last week.
- Pat Ribellia of the City of Hillsboro said the priority is to support build-out that is occurring inside the UGB.

Public involvement

- As the schedule shows, the project team anticipates holding a public meeting in early January 2012. The stakeholder meeting is not public; it is targeted to property owners within a certain amount of feet from the interchange. A request was made to add the Rock Museum to this stakeholder list.
- The project mailing list includes residents, businesses, and property owners in the same area as included last November. Some parties that have requested information have been added.
- There is a project website—it is for both the IAMP and JTA projects: www.oregon.gov/odot/hwy/region1/us26_brookwoodpkwy.

Improvements

- The focus of this meeting is on discussing and prioritizing potential transportation improvements in the area. Project team members prepared maps that show City of Hillsboro and Washington County identified improvements. PAC members were asked to give input on the maps during the meeting and also provide additional comments to Elizabeth Craig of ODOT.
- If any funds remain after the completion of the JTA project, the money can be used for local improvements identified in the IAMP.
- Improvements are meant to open up access to industrial land and also improve interchange performance.
- Properties on Groveland are not in boundary.
- The Meek Road connection to Brookwood Parkway will need to be relocated to connect to Brookwood Parkway further south of the interchange, or to connect to 253rd to provide safer access to this residential area. The extension of Meek Road farther south before connecting with Brookwood has substantial land value and riparian impacts; therefore the City may not pursue this option.
- The City of Hillsboro City Council will determine whether to purchase right of way on Schaff Road on November 1, 2011.
- A question was asked about lowering the speed limit on Brookwood.
    - The county makes speed recommendations, but the state establishes the speed.
    - Blair Crumpacker of Washington County said that current conditions justified the 55 mph speed limit, based upon the formula used for these determinations.
    - Future growth factors could influence a new speed limit.
- A question was asked about a cost analysis done for these improvements.
    - Don Odermott of the City of Hillsboro replied that the City has done cost analysis for improvements to Evergreen, 253rd, Schaff, and Jacobson to Schaff.
    - Tim Wilson of ODOT replied that ODOT is evaluating priorities.
    - John Stutesman of DEA added that the IAMP and future improvements will not just be focused on vehicles. Bike and pedestrian facilities are also being considered.
- Robert Bailey asked about a Metro map showing new collector roads.
    - Don Odermott of the City of Hillsboro replied that it is not a part of the IAMP; that is an error on that map.
- Pat Ribellia of the City of Hillsboro said clarity moving forward for the JTA and IAMP improvements is important.
- Tom Waldron asked how bikes and pedestrians will be accommodated (northbound specifically).

- Andrew Johnson of ODOT said this will be evaluated. The goal is to try to eliminate or move any weaving points.
- Don Odermott of the City of Hillsboro said there could be a dropped culvert to address that.

Public comments

- Cherry Amabisca commented that the Meek Road neighborhood is difficult to access and therefore is unsafe. Access to the Rice Northwest Museum of Rocks and Minerals and the connection to Groveland Drive is a concern. Traffic could move through Jacobson/Schaff.
- Sharleen Harvey had a concern with the schedule. Will arterials be constructed prior to limited access to Groveland? She is concerned about temporary access during construction and would like to discuss in more detail after the PAC meeting. Andrew Johnson of ODOT responded that construction may occur in 2013 or later. He is not certain of the order.
- Scott Hamilton reported that flooding and water is a concern, especially around Waibel Creek, and that options to build water storage facilities should be considered. It has been the concern of some area residents and property owners that the existing storm drainage line under U.S. 26 is undersized, which has caused wetlands to be established and contributed to seasonal flooding on private property in the northwest quadrant.
- Melena Wallace asked whether there are any plans to pave Groveland Road. If Groveland Road remains gravel with more traffic, it will affect the filbert crop; dust is also a concern. School bus traffic is heavy at certain times of the year. ODOT staff members responded that there are no current plans to pave Groveland Road.

Project Advisory Committee (PAC) Meeting #4

June 25, 2012
3:30 - 4:30 p.m.
Hillsboro Civic Center

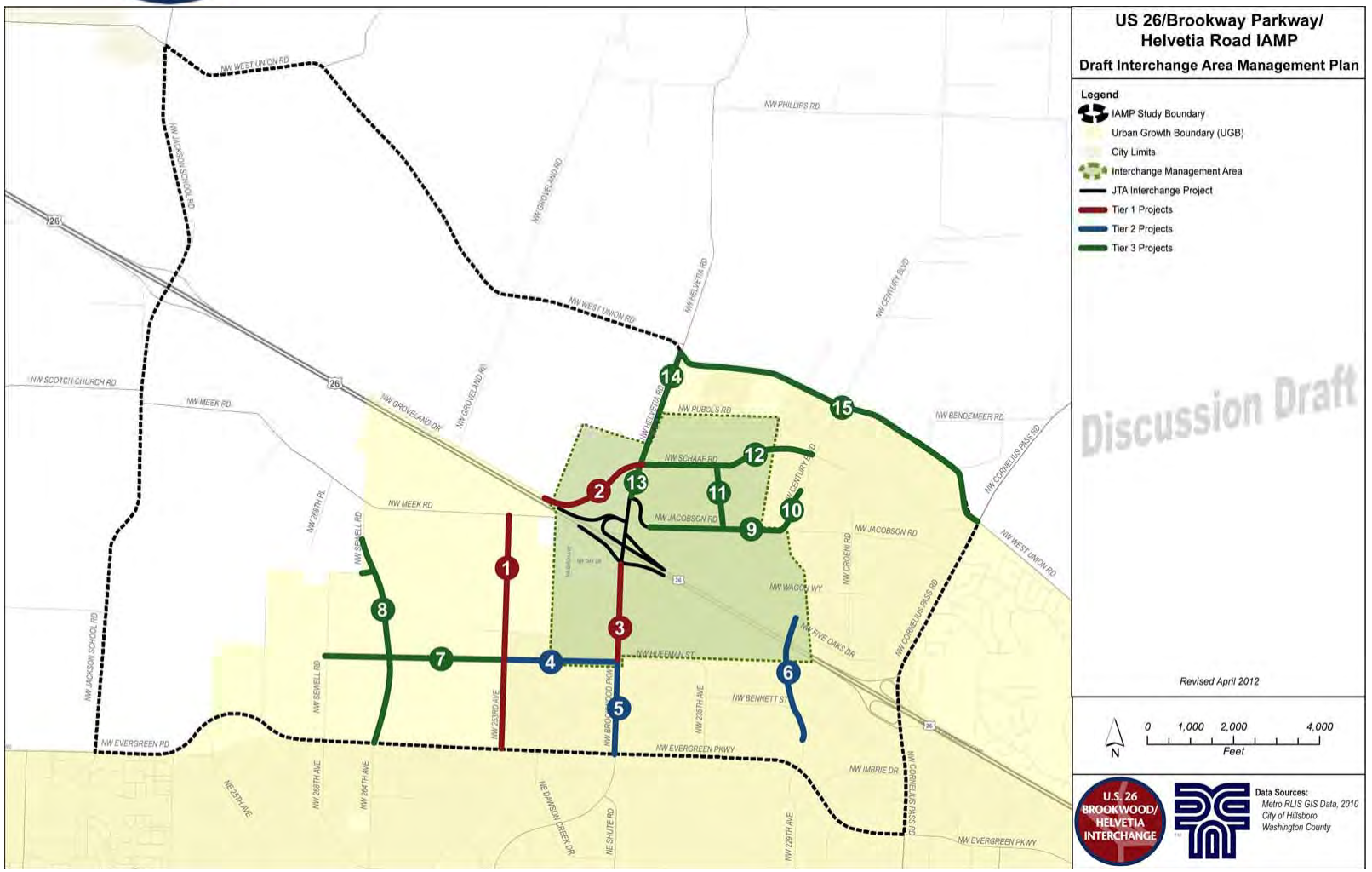
U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

WASHINGTON COUNTY OREGON

CITY OF HILLSBORO

OREGON DEPARTMENT OF TRANSPORTATION

Proposed IAMP Projects



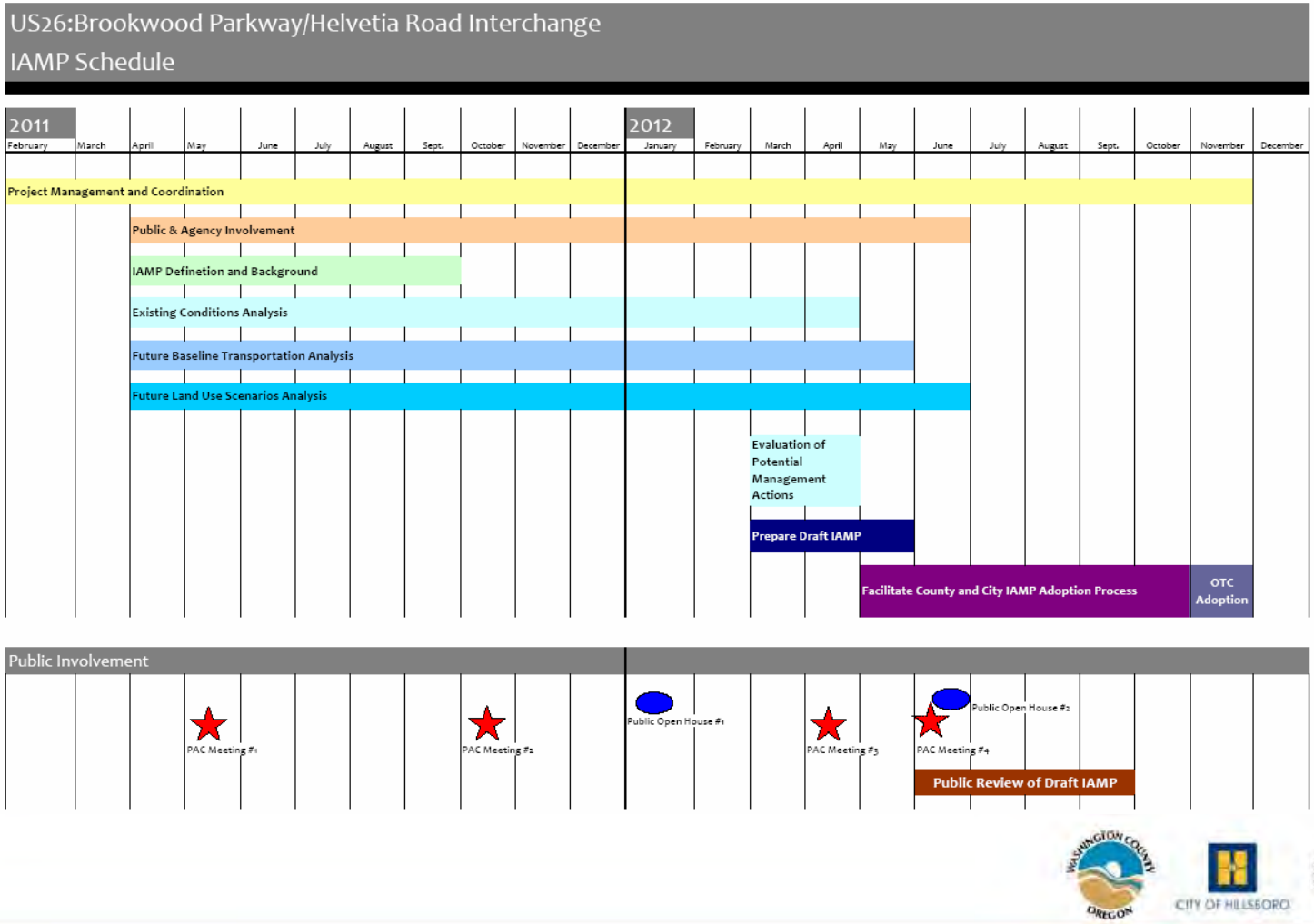
U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

Proposed IAMP Projects

	Map #	Project Name	Washington County Functional Classification	Project Location	Project Description
Tier 1 Projects	1	253rd Avenue	Collector (proposed)	Evergreen Road to Meek Road (outside city limits; inside UGB)	Construct three lanes with bike lanes and sidewalks
	2	Groveland Drive Realignment	Local street	Helvetia Road to Groveland Drive (outside UGB)	Construct two-lane rural connector
	3	Brookwood Parkway	Arterial	Huffman Street to US 26 eastbound ramp terminal	Widen to three lanes northbound and three lanes southbound and construct with bike lanes and sidewalks
Tier 2 Projects	4	Huffman Street	Collector (proposed)	Brookwood Parkway to 253rd Avenue (outside city limits; inside UGB)	Construct five lanes with bike lanes and sidewalks
	5	Brookwood Parkway	Arterial	Evergreen Parkway to Huffman Street	Widen to three lanes northbound and three lanes southbound and construct with bike lanes and sidewalks
	6	231st Avenue/ Century Boulevard	Collector	Bennett Street to West Union Road	Construct two-/three-lane US 26 overpass with bike lanes and sidewalks, connecting existing segments
Tier 3 Projects	7	Huffman Street	Collector (proposed)	253rd Avenue to Sewell Road (outside city limits; inside UGB)	Construct three lanes with bike lanes and sidewalks
	8	264th Avenue	Collector (proposed)	Evergreen Road to Meek Road (outside city limits; inside UGB)	Build three lanes with bike lanes and sidewalks
	9	Jacobson Road	Collector	Jacobson Road at Helvetia Road	Widen and add bike and pedestrian facilities
	10	Century Boulevard	Collector	Jacobson Road and Century Boulevard	Construct three-lane roadway with bike lanes and sidewalks
	11	Jacobson Road to Schaaf Road	Collector	Jacobson Road to Schaaf Road	Construct three-lane roadway with bike lanes and sidewalks
	12	Schaaf Road	Collector (proposed)	Helvetia Road to Century Road	Construct three-lane roadway with bike lanes and sidewalks
	13	Helvetia Road	Arterial	Jacobson Road to Schaaf Road	Construct three-lane roadway with bike lanes and sidewalks
	14	Helvetia Road	Arterial	Schaaf Road to West Union Road	Construct three-lane roadway with bike lanes and sidewalks
	15	West Union Road	Collector	Helvetia Road to Cornelius Pass Road	Construct three-lane roadway with bike lanes and sidewalks

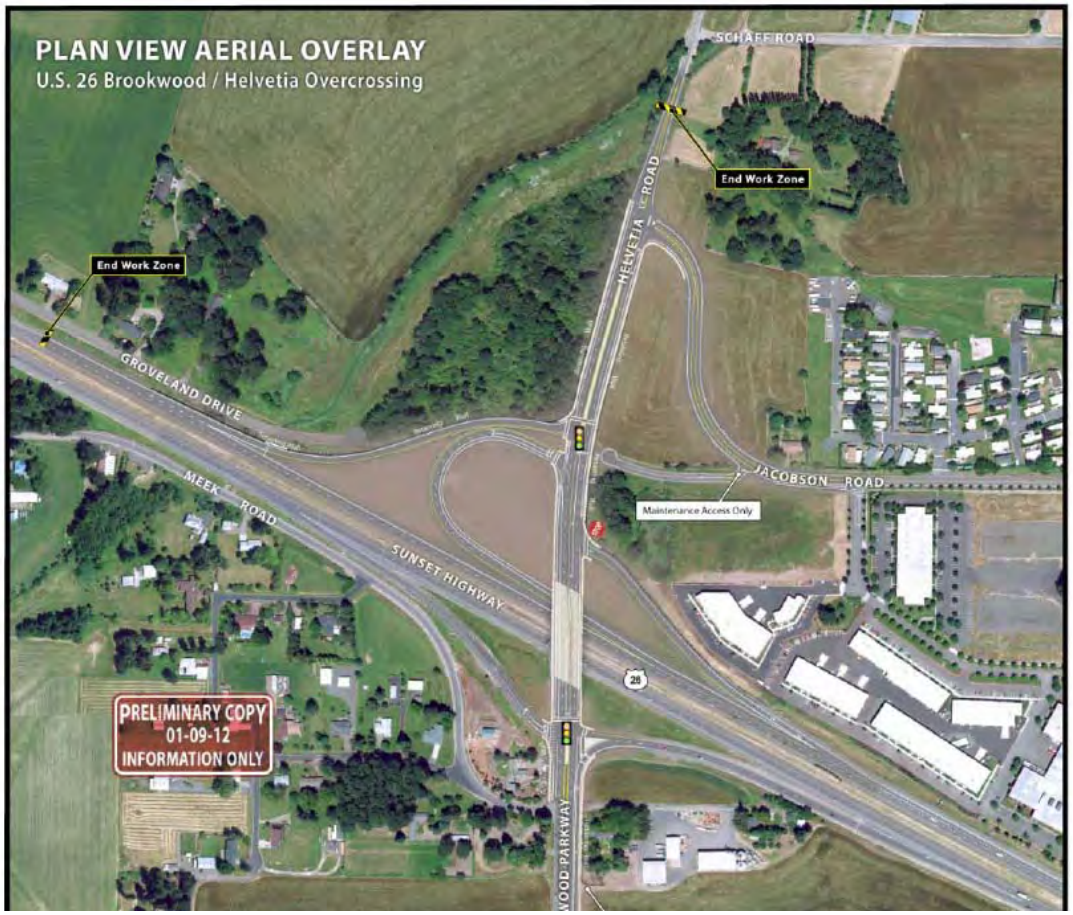
WASHINGTON COUNTY OREGON · CITY OF HILLSBORO · OREGON DEPARTMENT OF TRANSPORTATION

IAMP Schedule



U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

JTA Project

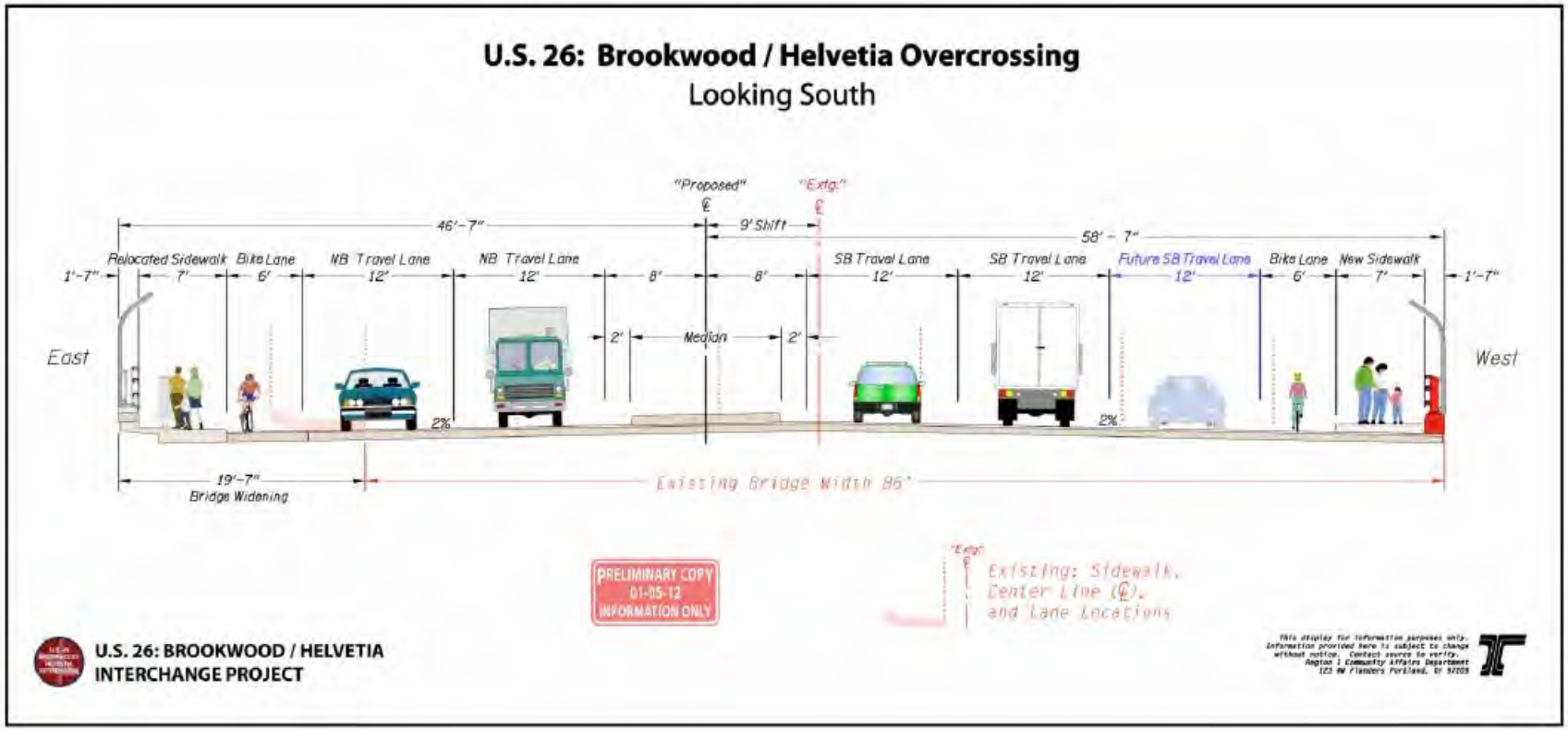


WASHINGTON COUNTY OREGON

CITY OF HILLSBORO

OREGON DEPARTMENT OF TRANSPORTATION

JTA Project


U.S. 26: Brookwood / Helvetia Overcrossing
Looking South
"Proposed"
"Exfg."
9' Shift
46'-7"
58'-7"
Relocated Sidewalk
Bike Lane
NB Travel Lane
NB Travel Lane
SB Travel Lane
SB Travel Lane
Future SB Travel Lane
Bike Lane
New Sidewalk
1'-7"
7'
6'
12'
12'
8'
8'
12'
12'
12'
6'
7'
1'-7"
2'
Median
2'
East
West
2%
2%
19'-7"
Bridge Widening
Existing Bridge Width 86'
PRELIMINARY COPY
01-05-12
INFORMATION ONLY
"Exfg"
Existing: Sidewalk, Center Line (℄), and Lane Locations
U.S. 26: BROOKWOOD / HELVETIA INTERCHANGE PROJECT

U.S. 26: Brookwood Parkway Interchange

A Jobs and Transportation Act Project

The U.S. 26: Brookwood Parkway Interchange is currently overburdened, particularly during morning and evening peak commuter hours. The 2009 Oregon Legislature allocated $45 million in the Jobs and Transportation Act to fund improvements to this interchange. ODOT has worked with the City of Hillsboro and Washington County to develop a project concept that will reduce congestion, improve safety and freight mobility, and increase economic development opportunities, including job retention and creation south of the interchange in Hillsboro.

U.S. 26: Brookwood Parkway Interchange
Open House

Wednesday, Nov. 10
5 p.m. to 7 p.m.
Ronler Acres Fire Station
4455 NW 229th Ave.
Hillsboro, OR 97124

Project elements include:

- constructing a new westbound U.S. 26 to southbound Brookwood Parkway exit loop ramp;
- reconstructing the westbound entrance ramp;
- providing an additional southbound travel lane on the Brookwood Parkway overcrossing; and
- extending the northbound right-turn lane from Brookwood Parkway.

ODOT invites you to an open house to learn more about the project. Staff will be on-hand to discuss the project in more detail, answer your questions, and take comments.

For more information call (503) 731-8237 or email Elizabeth.Craig@odot.state.or.us

Visit the project webpage at: www.oregon.gov/odot/hwy/region1/us26_brookwoodpkwy

WASHINGTON COUNTY OREGON

CITY OF HILLSBORO

OREGON DEPARTMENT OF TRANSPORTATION

Oregon Department of Transportation

U.S. 26: Brookwood Parkway Interchange Project Open House

Wednesday, Nov. 10, 2010
5 p.m. to 7 p.m.
Ronler Acres Fire Station
4455 NW 229th Ave.
Hillsboro, OR 97124

The public is invited to stop in at any time during the open house. Project team members will be on hand to discuss project details and answer questions.

Accommodations will be provided to persons with disabilities. If a sign language interpreter is needed, please call (503) 731-8237 or TTY (800) 735-2900 48 hours prior to the open house.

¿Habla ustéd español? Podemos proveer la información en esta publicación en español. Para recibir la información en español, por favor llamé al (503) 731-4128.

Oregon Department of Transportation
Region 1
123 NW Flanders St.
Portland, OR 97209-4037

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PORTLAND OR
PERMIT NO 11

Oregon Department of Transportation

U.S. 26: Brookwood Parkway/ Helvetia Interchange

A Jobs and Transportation Act Project

Dec. 2011

Brookwood Parkway Interchange Projects Moving Forward

The U.S. 26 Brookwood Parkway/ Helvetia Interchange project, a JTA project (see reverse for details), will reduce congestion, improve safety and freight mobility, and increase economic development opportunities in the interchange area. Elements include:

- A new westbound U.S. 26 to southbound Brookwood Parkway exit loop ramp
- Reconstructing the westbound U.S. 26 entrance ramp
- An additional northbound travel lane on the Brookwood Parkway overcrossing and widening the structure to accommodate an additional future southbound lane
- Extending the northbound right-turn lane from Brookwood Parkway to eastbound U.S. 26
- Enhanced bicycle and pedestrian accommodations on the Brookwood Parkway overcrossing

The project is currently being designed. Construction is estimated to begin in 2013 and be complete in 2015.

In conjunction with the U.S. 26: Brookwood Parkway/ Helvetia Interchange project, ODOT, the City of Hillsboro and Washington County are working on an **Interchange Area Management Plan** (IAMP).

The purpose of the IAMP is to:

- Support the JTA Brookwood Parkway/Helvetia Interchange project;
- Support ongoing and future City of Hillsboro and Washington County transportation, land use, and economic development planning efforts in and around the study area; and
- Protect the future function of the Brookwood Parkway/ Helvetia interchange.

The IAMP is scheduled to be complete summer 2012 and adopted fall 2012.

Open House

Please join the project teams for the interchange improvement project and the IAMP at an open house on Jan. 17, 2012. Drop in anytime during the event to learn more about these important area projects and provide your input.

Tuesday, January 17
5:30 p.m. to 7:30 p.m.
(drop in anytime)

Liberty High School
(Library)
21945 NW Wagon Wy
Hillsboro, OR 97124

Provide Feedback

To provide comments, or to be placed on the mailing list please contact:

Elizabeth Craig
ODOT Community Affairs
503-731-8237
elizabeth.craig@odot.state.or.us

Stay Up To Date

www.oregon.gov/ODOT/HWY/REGION1/US26_brookwoodpkwy/

Visit the website for the latest information:

www.oregon.gov/odot/hwy/region1/us26_brookwoodpkwy

U.S. 26: Brookwood Parkway/ Helvetia Interchange
Oregon Department of Transportation
Region 1
123 NW Flanders St.
Portland, OR 97209-4037

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U.S. 26: Brookwood Parkway/ Helvetia Interchange

A Jobs and Transportation Act Project

Jobs and Transportation Act

The Oregon Jobs and Transportation Act (House Bill 2001) is the transportation funding plan approved by the 2009 Oregon Legislature. Three core themes emerged from the legislation:

- accountability, innovation and environmental stewardship;
- highway, road and street funding; and
- multimodal funding.

Additional provisions address important elements of Oregon's transportation system and our statewide economy.

The JTA identified 37 specific highway projects (plus funding for 12 local governments in eastern Oregon). These projects and allocations total $960.3 million. In ODOT Region 1, there are eight JTA projects, including the U.S. 26: Brookwood Parkway Interchange project.

Open House Summary

Tuesday, January 17, 2012
5:30-7:30 p.m.

Liberty High School Library
21945 NW Wagon Way
Hillsboro, OR

The purpose of the January 17, 2012 open house was to provide updated information about the U.S. 26 Brookwood/Helvetia Interchange Area Management Plan and the JTA Improvement project and to collect feedback from the public.

Attendees were invited to sign in and add their names to the project mailing list. Forty nine (49) people signed in. An information handout and comments cards were made available.

The meeting was staffed by ODOT Region 1, City of Hillsboro, Washington County and consultants. The room was set up with display boards for both projects and a comment area. Displays included project area maps, schedules, goals and priorities design illustrations. People were encouraged to view the displays and interact with project staff.

Project Comments

Open house attendees were invited to submit their comments about the project. Twelve comment cards were completed and submitted (attached). A summary of the key themes and issues that were communicated include:

- Access to Groveland Dr. (and the museum)
- Condition of Groveland Rd.
- Issue of school busses accessing Groveland Road from West Union – turning radius not sufficient

- Improved signage and access to museum at time of Groveland closue
- Meek Road access/alignment/connections
- Height of the retaining walls (JTA project)
- Urban improvements vs. farmland/preservation of rural character
- Jacobsen Road realignment/access
- Bike lanes on Brookwood

Public Outreach

Notification for the meeting included a project information update mailed to 3100 area businesses and residences, and emailed to approximately 200 email addresses (includes community groups, legislators, emergency service providers, media outlets, etc.), an email to the Project Advisory Committee and an announcement on the project web site. The Hillsboro Argus announced the meeting.
www.oregonlive.com/argus/index.ssf/2012/01/us_highway_26_interchange_open.html

Attachments

Sign in sheets

Comment Cards

Handout

Display boards

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

U.S. 26: Brookwood Parkway/ Helvetia IAMP & Brookwood JTA Interchange Project

Open House
January 17, 2012
Liberty High School

Name	Affiliation *(if applicable)*	Mailing Address	Email	Would you like to receive updates by mail/ email? (Y/N)
Debbie + Gerry Grossen		6960 NW Groveland rd Hills 97124	grossen@coho.net	Y
Gene Glasner		12200 SW Fairside Beaverton OR 97005		
Matt Phillips		16128 SW 93rd Ave Tigard 97224	mattheuphillips@gmail.com	Y
Karen Baxter & Brent		27700 NW Meek 97124	BRENTSBAXTER@gmail.com	Y/S MAIL
James + Donna Burns		5840 N W Sewell Rd Hillsboro, OR 97124		
Tim Jellum		24640 NW meek Rd 97124	timothyjellum@hotmail.com	
Bob Sanders	City of Hillsboro	bobs@ci.hillsboro.or.us		email
Pat Ribellia	" "	patrickr@ci.hillsboro.or.us		
Shelley Oylear	Washington County		shelley_oylear@co.washington.or.us	
JAY ESPINOZA	INTEL	JAY.ESPINOZA@INTEL.COM →		YES
Donna Thompson	Rice Museum	~~dec~~ 3231 Lavina Dr. Forest Grove	dnathpn28@aol.com	YES
Gary Shanks		24215 NW Meek Rd, Hillsboro, OR	lordg@regence.net	
Alyson Parra	tenant	24655 NW Groveland Dr 97124	alyhor@gmail.com	y
Kathy Fuller	Hillsboro Argus	158 SE Third Ave	kfuller@hillsboroargus.com	y
Curt & Deanna Vice		23330 NW West Union 97124	cdvice@msn.com	y
Cheryl Anabisca		13260 NW Bishop Rd Hillsboro OR 97124	anabisca@helvetia.us	Y

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

U.S. 26: Brookwood Parkway/ Helvetia IAMP & Brookwood JTA Interchange Project

Open House
January 17, 2012
Liberty High School

Name	Affiliation *(if applicable)*	Mailing Address	Email	Would you like to receive updates by mail/ email? (Y/N)
Bill Zander		PO Box 889 N. Plains 97133	est@wavebarriers.com	
Scott Hamilton		7270 NW Helvetia Rd	Scott@tekchangeleadership.com	y
Ron & Linda Kurtz		29495 NW Oak Dr. Hillsboro, OR 97124	lkurtz55@yahoo.com	Yes
Carol Chesarek		13300 NW Germantown Rd, Portland, OR 97231	ccaux@teleport.com	y

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

U.S. 26: Brookwood Parkway/ Helvetia IAMP & Brookwood JTA Interchange Project

Open House
January 17, 2012
Liberty High School

Name	Affiliation *(if applicable)*	Mailing Address	Email	Would you like to receive updates by mail/ email? (Y/N)
Ron Van Roekel		PO Box 1335 North Plains 97133		Y
Kerry Nussbaumer		10308 NW Helvetia Rd Hillsboro 97124		Y
Kathi Elder-Hefler	Bunch's RV	22625 NW Jacobson Rd - 97124		—
Allen Ambisha		13260 NW Bishop RD 97124	allen@helvetia.us	Y
Horst + Maryjane Vanselow		6295 N.W. 268th Pl Hillsboro 97124	mrvanselow@GMail.com	Yes
Teri Koerner	Forest Grove Chamber	2417 Pacific Ave FG 97116	director@fgchamber.org	YES
Richard Kaiser	Tanasi Underground	4180 NW Susbauer Rd Cornelius 97113	rkaiser@yahoo.com	YES
Don Schoen		7380 NW Groveland Rd. Hillsboro 97124	Don.Schoen@hotmail.com	YES
Bob Baker	Property Owner	13820 SW 325th Pl. Hillsboro 97123	BBaker@nwstarmaterials.com	YES

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

U.S. 26: Brookwood Parkway/ Helvetia IAMP & Brookwood JTA Interchange Project

Open House
January 17, 2012
Liberty High School

Name	Affiliation *(if applicable)*	Mailing Address	Email	Would you like to receive updates by mail/ email? (Y/N)
Ron Howden				
Ron Thompson	City of Forest Grove	3231 Lavina Drive	RThomp7479@AOL.com	Yes
Shaun Quayle		768 NW ADWICK DRIVE, HILLSBORO, OR.	SQUAYLE@KITTELSON.COM	Y
Steve Rose	prop. owners	24555 NW Oak Dr		Y
Matt Dettman		1261 NE Estelle Ct. Hillsboro	leenie@aol.com	Y
TERRY KRAUSE	FRIENDS OF ROCK CREEK	4545 NW NEIKOHN AVE, PORTLAND, OR 97229	ETKRAUSE@FRONTIER.COM	YES
MADONA		4475 NW Quinault CT Port 97229	cevgeek@yahoo.ca	NO
Melody Wallace	Rice Museum	26385 NW Groveland Dr. Hillsboro	info@ Rice northwest museum.org	yes
Amy Jones	OBEC	5000 Meadows Rd Ste 420 97035	ajones@obec.com	yes
Linda de Boer	property owners	11995 NW Dick Rd Hillsboro 97124	HarryLindadeBoer@aol.com	yes
Harry de Boer	" "	" "	HarryLindadeBoer@aol.com	yes
Stephen Roberts	Washington County LUT		stephen_roberts@co.washington.or.us	
Shane Ryan	Metro West Amb	P.O Box 1635 Hillsboro OR	ShaneS@metrowest.fm	Yes
Andrew Singelakis	WASHINGTON CO			yes
LYNNE PARK	Prop. owner	17514 NW Country Dr, Portland 97229	LP@lynnepark.com	Yes

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

U.S. 26: Brookwood Parkway/ Helvetia Interchange
Public Comment Form

Please give us your feedback on the JTA and IAMP projects. If you would like a response from the project team, please include your contact information.

Name Carol Chesarek

Address 13300 NW Germantown Rd
Portland, OR 97231

Phone

E-mail ccaux@earthlink.net

☐ *Check if you would like a response*

☒ *Check if you would like to receive updates by mail/ email*

Comments: Local Plan 7 & 21 are redundant with the new interchange, and show either poor interchange planning or unneeded expense. We should not be building new urban roads through farmland. Pave Groveland & give the Rice Museum nice new signs @ each intersection to guide people to them.

You may make additional comments on the back of this card.

Open House: January 17, 2012

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

U.S. 26: Brookwood Parkway/ Helvetia Interchange
Public Comment Form

Please give us your feedback on the JTA and IAMP projects. If you would like a response from the project team, please include your contact information.

Name LYNNE PARK

Address 17514 NW Country Dr. Portland, 97229

Phone 503-819-3994

E-mail IP@LYNNEPARK.COM

Comments: ~~Intent~~ Request to ~~seek~~ alternative routes for Jacobson Rd ~~re~~ realignment.

☐ *Check if you would like a response*

☒ *Check if you would like to receive updates by mail/ email*

You may make additional comments on the back of this card.

Open House: January 17, 2012

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

U.S. 26: Brookwood Parkway/ Helvetia Interchange
Public Comment Form

Please give us your feedback on the JTA and IAMP projects. If you would like a response from the project team, please include your contact information.

Name Linda Kurtz

Address 24495 NW Oak Dr. Hillsboro, OR 97124

Phone 503-648-5736

E-mail lkurtz55@yahoo.com

☑ *Check if you would like a response*

☐ *Check if you would like to receive updates by mail/ email*

Comments: #1 Concern is traffic trying to access Brookwood Pkwy from Meek Road. Reduce speed on overpass. Make sure during construction we have access to Brookwood Pkwy.

Noise fence on south side of Hwy.

You may make additional comments on the back of this card.

Open House: January 17, 2012

253rd to Meek should be done prior to construction. No eastbound access for people on Meek Road unless you go all the way to Jackson School.

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

U.S. 26: Brookwood Parkway/ Helvetia Interchange
Public Comment Form

Please give us your feedback on the JTA and IAMP projects. If you would like a response from the project team, please include your contact information.

Name ALLEN AMADSCA

Address 13260 NW BISHOP RD
HILLSBORO 97124

Phone —

E-mail allen@helvetia.us

☐ *Check if you would like a response*

☐ *Check if you would like to receive updates by mail/ email*

Comments:

THE #10 N231ST OVERPASS FROM NW BENNETT SHOULD BE RUN NORTH ONLY TO NW JACOBSON WAY TO HELP RESOLVE THE COMMERICAL GETTO CENTERING ON NW JACOBSON RD

JACOBSON RD NEED TO BECOME THE PRIME ACCESS ROUTE

You may make additional comments on the back of this card.

Open House: January 17, 2012

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

U.S. 26: Brookwood Parkway/ Helvetia Interchange
Public Comment Form

Please give us your feedback on the JTA and IAMP projects. If you would like a response from the project team, please include your contact information.

Name Karen Baxter

Address 27200 NW Meek

Phone

E-mail BrentsBAxter @Gmail.com

☐ ***Check if you would like a response***

☒ ***Check if you would like to receive updates by mail/ email***

Comments: Fixing the East End of Meek Road & Freeway Access there is a priority - Then N.S. Access to Evergreen is important

You may make additional comments on the back of this card.

Open House: January 17, 2012

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

U.S. 26: Brookwood Parkway/ Helvetia Interchange
Public Comment Form

Please give us your feedback on the JTA and IAMP projects. If you would like a response from the project team, please include your contact information.

Name _____

Address _____

_____

Phone _____

E-mail _____

☐ ***Check if you would like a response***

☐ ***Check if you would like to receive updates by mail/ email***

Comments: Bike lanes on all of Brookwood - Keep Meek Rd open for Bicyclas

You may make additional comments on the back of this card.

Open House: January 17, 2012

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

U.S. 26: Brookwood Parkway/ Helvetia Interchange
Public Comment Form

Please give us your feedback on the JTA and IAMP projects. If you would like a response from the project team, please include your contact information.

Name James Burns

Address 5840 NW Sewell Rd
Hillsboro, Or 97124

Phone 503 640 6983

E-mail _____

☐ ***Check if you would like a response***

☐ ***Check if you would like to receive updates by mail/ email***

Comments:

MEEK needs To be Realined

Evergreen and Cornelius Pass Rd Needs To be Leveled- out + Tracks Removed!

You may make additional comments on the back of this card.

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

U.S. 26: Brookwood Parkway/ Helvetia Interchange
Public Comment Form

Please give us your feedback on the JTA and IAMP projects. If you would like a response from the project team, please include your contact information.

Name Gerry Grossen

Address 6960 NW Groveland rd Hillsboro OR 97124

Phone 5036453924

E-mail grossen@coho.net

☐ ***Check if you would like a response***

☒ ***Check if you would like to receive updates by mail/ email***

Comments: Deadending Groveland drive and defering traffic to Groveland rd is my concern This will cause increased traffic ie (Busses to rock museam + cars). Groveland rd is not in any condition to handle that much traffic.

You may make additional comments on the back of this card.

Open House: January 17, 2012

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

U.S. 26: Brookwood Parkway/ Helvetia Interchange
Public Comment Form

Please give us your feedback on the JTA and IAMP projects. If you would like a response from the project team, please include your contact information.

Name Patty Hegalt

Address 10223 NW Dick

Phone 503-647-5865

E-mail

☐ ***Check if you would like a response***

☐ ***Check if you would like to receive updates by mail/ email***

Comments: Well thought-out. I like the plan. Thank you for developing a solution for us.

You may make additional comments on the back of this card.

Open House: January 17, 2012

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

U.S. 26: Brookwood Parkway/ Helvetia Interchange
Public Comment Form

Please give us your feedback on the JTA and IAMP projects. If you would like a response from the project team, please include your contact information.

Name Linda de Boer

Address 11995 NW Dick Rd
Hillsboro, OR 97124

Phone

E-mail HarryLindadeBoer@aol.com

☐ ***Check if you would like a response***

☑ ***Check if you would like to receive updates by mail/ email***

Comments: The area North of Schaaf Rd, is rural so it seems unadvisable to run a connecting road along the border. Why not keep the access within the commercial area rather then at its boundary. It's an unnecessary invasion of EFU.

You may make additional comments on the back of this card.

Open House: January 17, 2012

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

U.S. 26: Brookwood Parkway/ Helvetia Interchange
Public Comment Form

Please give us your feedback on the JTA and IAMP projects. If you would like a response from the project team, please include your contact information.

Name HARRY DE BOER

Address 11995 NW DICK RD
HILLSBORO, OR 97124

Phone _____

E-mail HARRYLINDADEBOER@aol.com

☒ ***Check if you would like a response***

☒ ***Check if you would like to receive updates by mail/ email***

Comments: 1. VERY OPPOSED TO PUSHING NORTH BEYOND JACOBSON RD. SCHAAF RD. SHOULD REMAIN IN AGRICULTURAL AREA AND NOT BE SNUCK INTO HILLSBORO'S EXPANSION PLANS. JACOBSON SHOULD BE MAIN ARTERIAL. NEED TO PRESERVE RURAL CHARACTER OF AREA.

2. FIND AN ACCEPTABLE ACCESS TO THE RICE MINERALS MUSEUM WITHOUT CROSSING WETLANDS OR OLD OAK GROVE

You may make additional comments on the back of this card.

Open House: January 17, 2012

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

U.S. 26: Brookwood Parkway/ Helvetia Interchange
Public Comment Form

Please give us your feedback on the JTA and IAMP projects. If you would like a response from the project team, please include your contact information.

Name Ron Thompson

Address 3231 Lavina Dr
Forest Grove OR 97116

Phone

E-mail

Comments: See attachment.

☐ ***Check if you would like a response***

☐ ***Check if you would like to receive updates by mail/ email***

You may make additional comments on the back of this card.

Open House: January 17, 2012

Thank you for your participation at our PAC meeting on Oct. 24th. The minutes are now available on the project webpage:
http://www.oregon.gov/ODOT/HWY/REGION1/US26_brookwoodpkwy/BrookwoodSummary_PAC_2_102411.pdf.
We are still interested in hearing additional comments about the materials presented at the meeting. Specifically looking at the transportation improvement maps
(http://www.oregon.gov/ODOT/HWY/REGION1/US26_brookwoodpkwy/Future_Improvements_Sheets1to4.pdf) and keeping in mind the goals and priorities of the IAMP, the **two questions to think about** are:

1. Are any of these future improvements not needed?
2. Are there projects to improve local circulation that are missing?

As a reminder, the **goals of the IAMP** are to:

- Improve operations on the U.S. 26 mainline towards meeting mobility standards;
- Improve operations on surface arterials in the study area; and
- Accommodate planned growth that depends on the interchange.

To achieve these goals, the **IAMP will identify the following priorities.**

- ***Physical and capacity improvements that:***
  - Maintain or improve safety and operations at the interchange, along US 26, and at other facilities in the vicinity of the interchange project area;
  - Identify and address the interchange operation needs associated with current and future industrial land designated in the existing adopted comprehensive plan, to the extent feasible;
  - Address capacity for the interchange eastbound entrance ramp to US 26, to try to avoid vehicles backing up onto the county facility and inhibiting the northbound through movements;
  - Identify facilities for adequate bicycle and pedestrian circulation in the area; and
  - Develop a local street network that provides for local connectivity and helps minimize the

om: Ron Thompson <rthomp7479@aol.com>
To: Elizabeth.CRAIG <Elizabeth.CRAIG@odot.state.or.us>
ubject: Re: Brookwood Parkway/Helvetia IAMP PAC - Meeting Minutes Available
Date: Mon, Nov 28, 2011 1:54 pm

Elizabeth, My biggest concern is direct access for Rice Rock and Minerals Museum to Helvetia Road. This museum is one of the most visited museum in the Metro Area (27,000 visits per year)and is an National and International attraction.Two universities(PSU and PCC) and all Metro schools study geology at this site weekly. The Museum currently has a two lane paved road(Groveland Road) to Helvetia Road at interchange. As a minimum, Groveland Road needs access at Schaaf Road interchange-this is not an improvement it is to bring back to current standard.

This is important to Forest Grove area because it has 4 or more paid employees and many volunteers at the museum. Also, four motels in Forest Grove have guests because the museum is with 20 minute drive from their businesses. Both Cornelius and Forest Grove Chambers of Commerce and Washington County Visitors Bureau all are concerned if the only route is the Groveland Lane(gravel county road) and West Union Road to Helvetia Road both in distance and condition.

Thanks, Ron Thompson,City Councilor of Forest Grove

----Original Message----
From: CRAIG Elizabeth * ODOT <Elizabeth.CRAIG@odot.state.or.us>
Sent: Thu, Nov 10, 2011 11:42 am
Subject: FW: Brookwood Parkway/Helvetia IAMP PAC - Meeting Minutes Available

To Brookwood Parkway/Helvetia IAMP PAC Members,

Thank you for your participation at our PAC meeting on Oct. 24th. The minutes are now available on the project webpage:
http://www.oregon.gov/ODOT/HWY/REGION1/US26_brookwoodpkwy/BrookwoodSummary_PAC_2_102411.pdf.
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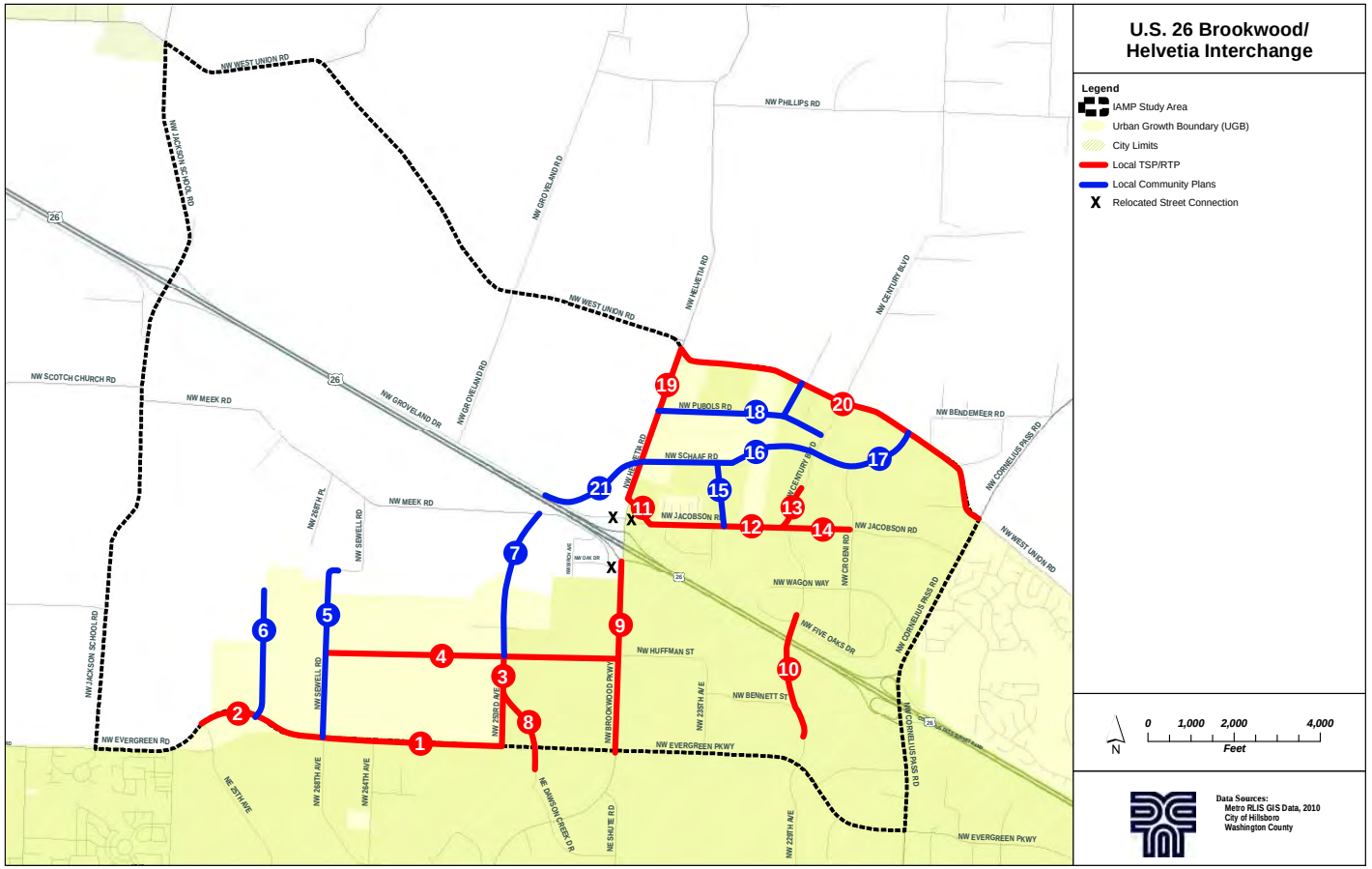
U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

Proposed Local Improvements



Washington County Oregon

Oregon Department of Transportation

CITY OF HILLSBORO

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

Proposed Local Improvements

Map Reference #	Project Name	Location	Project Description	Jurisdiction/Plan	Time Period
1	NW Evergreen Road	NW 253rd Avenue to NW Sewell Road *(initially was two projects: 253rd to Sewell and Sewell to 25th)*	Widen to 5 lanes with bike lanes and sidewalks	City of Hillsboro TSP/ Washington County TSP	Spring 2012
2	NW Evergreen Road	NW Glencoe to NW 25th Avenue	Widen to 5 lanes with bike lanes and sidewalks	City of Hillsboro TSP/ Washington County TSP	2026-2035
3	NW 253rd Avenue	NW Evergreen Road to NW Huffman Street	Build 3 lanes with bike lanes and sidewalks	City of Hillsboro TSP	2008-2017
4	NW Huffman Street	NW Brookwood to NW Sewell	Build 3 lanes with bike lanes and sidewalks	City of Hillsboro TSP	2008-2017
5	NW Sewell Road	NW Evergreen Road to NW Meek Road	Upgrade to 3-lane Collector	Evergreen Concept Plan /City of Hillsboro North Industrial Area Community Plan Improvements	TBD
6	NW 273rd Avenue	NW 273rd Avenue	New Collector	City of Hillsboro North Industrial Area Community Plan Improvements	TBD (Conceptual)
7	NW 253rd Avenue	NW 253rd Avenue to NW Meek Road	Build 3 lanes with bike lanes and sidewalks	City of Hillsboro North Industrial Area Community Plan Improvements	TBD (Conceptual)
8	NW Dawson Creek Drive	NW Evergreen Parkway to NW 253rd Avenue	Realign to connect with 253rd Ave	City of Hillsboro TSP	TBD
9	NW Brookwood Parkway	NW Evergreen Parkway to NW Meek Road	Construct off-street combined bike/ped paths	City of Hillsboro TSP	2008-2017
10	NW 231st/NW Century Boulevard	NW Bennett to NW West Union	Extend 2/3 lanes with US 26 Overpass, connect existing segments	City of Hillsboro TSP/ Washington County TSP	2018-2025
11	NW Helvetia Road/ NW Jacobson Road	NW Helvetia Road/ NW Jacobson Road	Re-alignment of NW Jacobson Road to connect with Schaaf Road east of its intersection with Helvetia Road	City of Hillsboro TSP	TBD
12	NW Jacobson Road	NW Jacobson Road at NW Helvetia Road	Widen and add bike and pedestrian facilities	City of Hillsboro TSP	TBD
13	NW Jacobson Road	NW Jacobson Road and NW Century Boulevard	Add northbound right-turn lane, add northbound right-turn overlap phase, add southbound left-turn lane	City of Hillsboro TSP	TBD
14	NW Jacobson Road/NW Century Boulevard	NW Jacobson Road/NW Century Boulevard	Add an eastbound right-turn lane	City of Hillsboro TSP	TBD
15	NW Jacobson Road to NW Schaaf Road	NW Jacobson Road to NW Schaaf Road	New Collector	City of Hillsboro North Industrial Area Community Plan Improvements	TBD (Conceptual)
16	NW Schaaf Road	NW Pinefarm Place to NW Century Road	Construct 3-lane roadway with bike lanes and sidewalks	City of Hillsboro North Industrial Area Community Plan Improvements	2018-2025
17	NW Westmark Drive	NW Croeni Road to NW West Union Road	Construct 3-lane roadway with bike lanes and sidewalks	City of Hillsboro North Industrial Area Community Plan Improvements	2018-2025
18	NW Pubols Road	NW Helvetia Road to NW Century Boulevard	Upgrade to Washington County industrial standards	Helvetia Concept Plan/City of Hillsboro North Industrial Area Community Plan Improvements	TBD
19	NW Helvetia Road	NW Jacobson Road (NW Schaaf Road) to NW West Union Road	Construct 3-lane roadway with bike lanes and sidewalks	City of Hillsboro TSP	2018-2025
20	NW West Union Road	NW Helvetia Road to NW Cornelius Pass Road	Construct 3-lane roadway with bike lanes and sidewalks	City of Hillsboro TSP	2018-2025
21	Collector from NW Schaaf Road to NW Groveland Drive	Collector from NW Schaff to NW Groveland	New Collector	City of Hillsboro North Industrial Area Community Plan Improvements	TBD (Conceptual)

Washington County Oregon · Oregon Department of Transportation · City of Hillsboro

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

Project Overview

Background

- The Oregon Jobs and Transportation Act of 2009 appropriated $45,000,000 for ODOT to design and construct needed improvements to the interchange to address existing operation and safety issues and to address anticipated future travel demand.
- In order to protect the future operation and safety at the interchange, an Interchange Area Management Plan (IAMP) will be developed.

What is an IAMP

- A long-range (20+ year) plan
- Protects the function, operations, and safety of a highway interchange
- Makes land use and transportation decisions about how best to manage the interchange to protect its long-term function
- Balances conflicting needs of accommodating regional/ long-distance travel with local access and travel needs

How is an IAMP Developed?

- ODOT, Washington County and the City of Hillsboro work with technical experts and community representatives throughout the process.
- The IAMP is mutually adopted by the Oregon Transportation Commission (OTC) and local governments.
- The IAMP will be incorporated in the City of Hillsboro and Washington County Transportation System Plans.

Washington County Oregon · Oregon Department of Transportation · City of Hillsboro

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

IAMP Goals & Priorities

The goals of the IAMP are to:

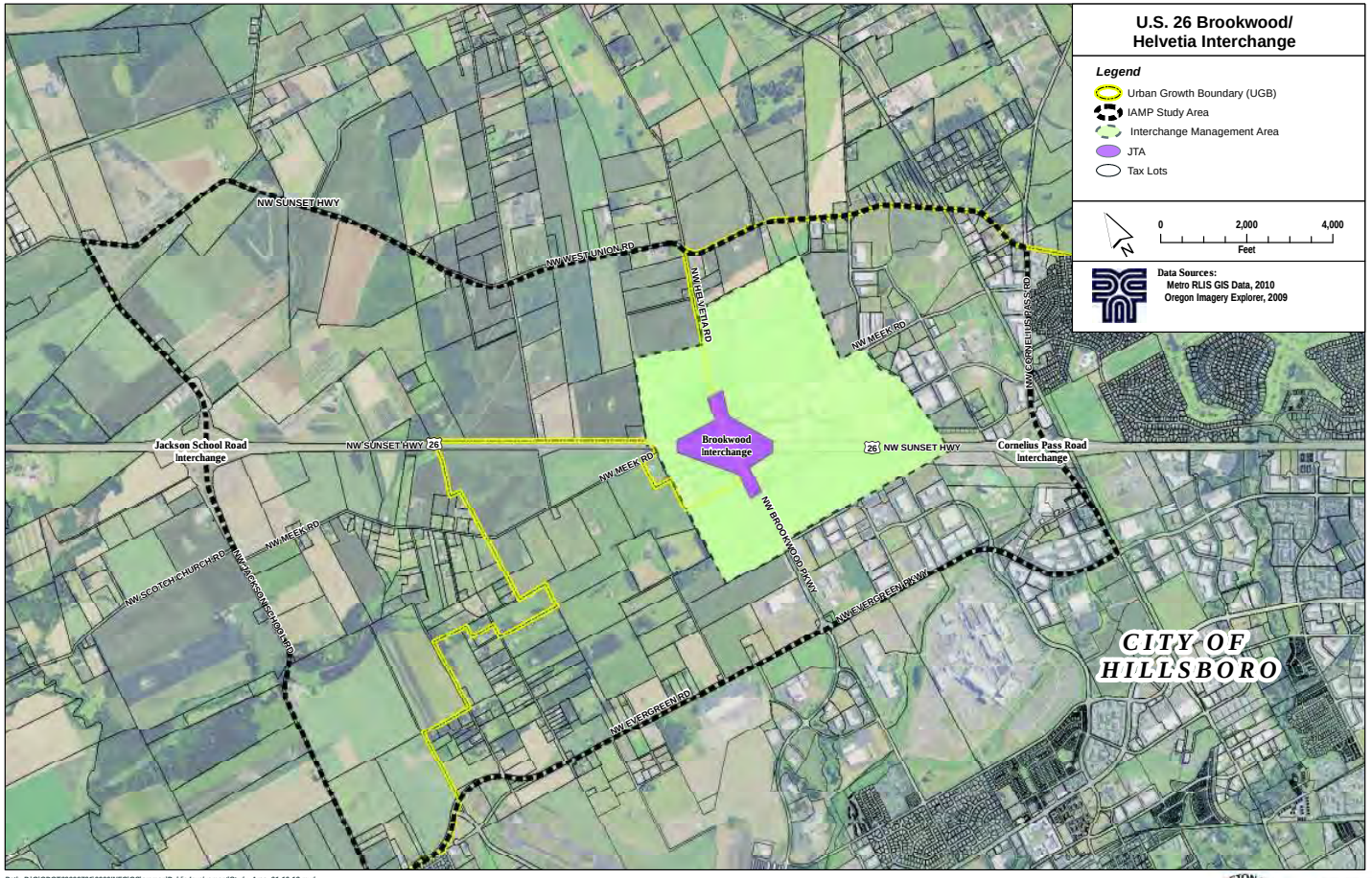
- Support the ongoing and future City of Hillsboro and Washington County transportation, land use and economic development planning efforts in and around the study area; and
- Protect the future function of the interchange.

The IAMP priorities include physical and capacity improvements that:

- Maintain or improve safety and operations at the US 26 interchange, and at other facilities in the vicinity of the interchange project area;
- Identify and address the interchange operation needs associated with current and future industrial land designated in the existing adopted comprehensive plan, to the extent feasible;
- Develop a local street network that provides for local connectivity and helps minimize the need for local travel using or traveling through the interchange; and
- Identify facilities for adequate bicycle and pedestrian circulation in the area.

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

Study Area



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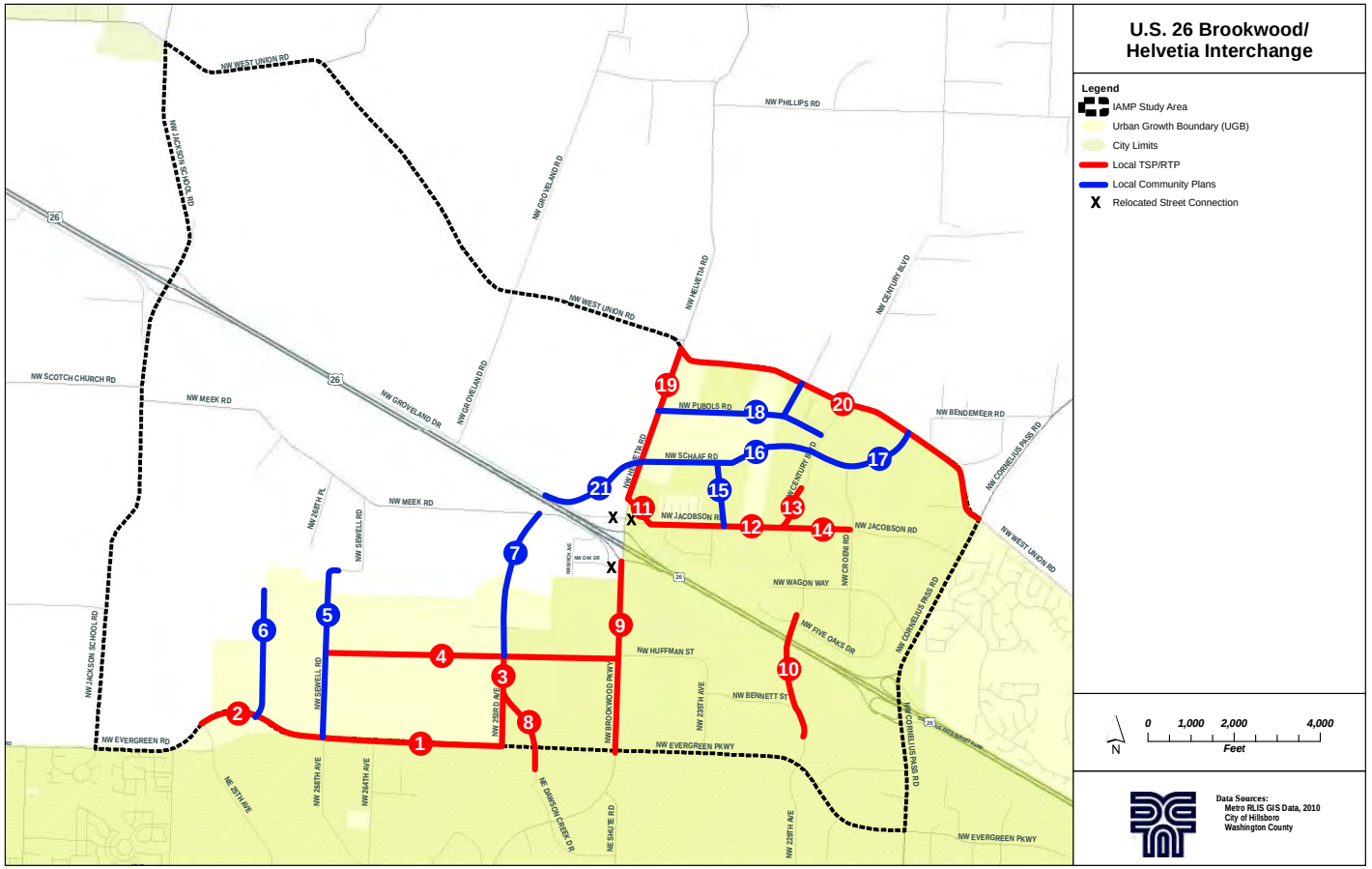
WASHINGTON COUNTY OREGON

Oregon Department of Transportation

CITY OF HILLSBORO

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

Proposed Local Improvements



Washington County Oregon

Oregon Department of Transportation

CITY OF HILLSBORO

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

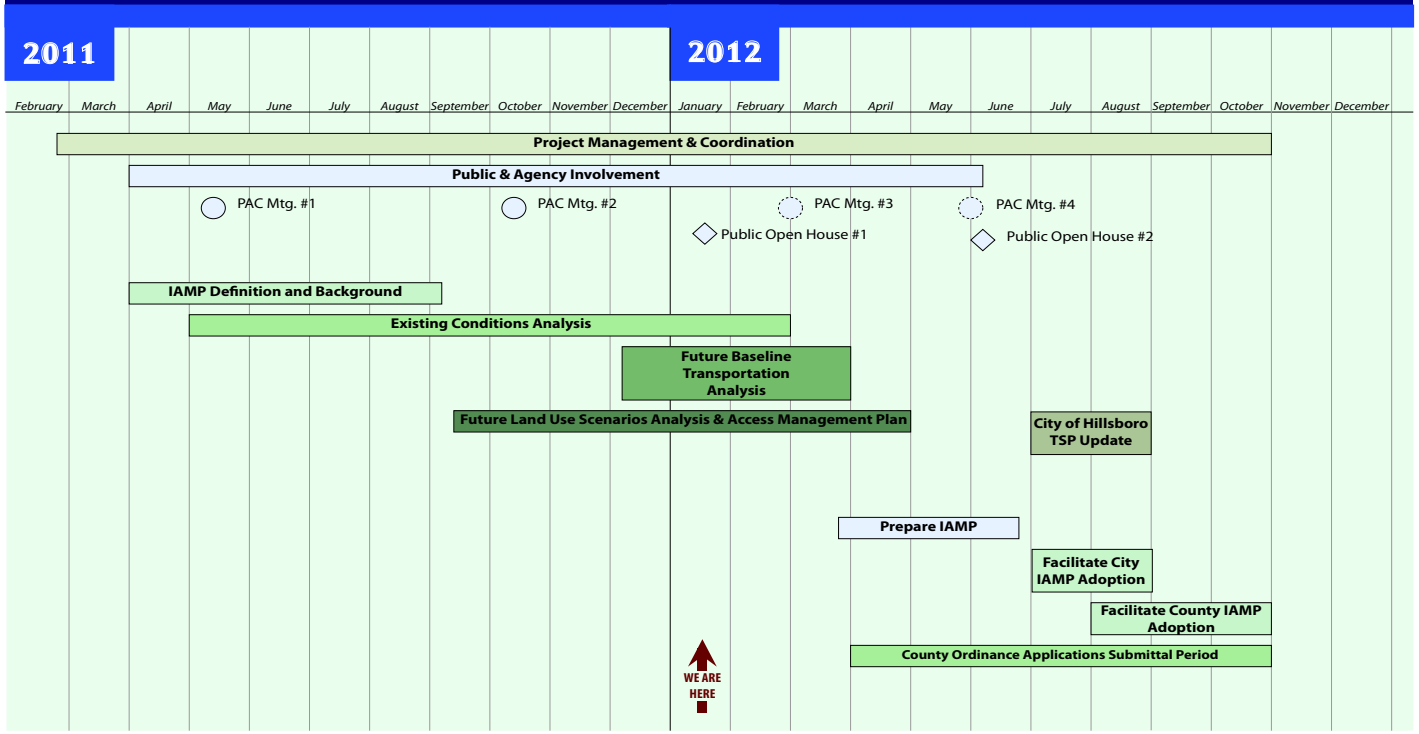
IAMP Schedule

U.S. 26 Brookwood/Helvetia Interchange

DRAFT

IAMP Schedule

January 2012



Washington County Oregon

Oregon Department of Transportation

CITY OF HILLSBORO

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

U.S. 26: Brookwood Parkway/ Helvetia IAMP & Brookwood JTA Interchange Project

Open House
June 25, 2012
Hillsboro Civic Center

Name	Affiliation *(if applicable)*	Mailing Address	Email	Would you like to receive updates by mail/ email? (Y/N)
Donna Thompson	Rice Museum		dnathpn28@aol.com	yes
Gary Shurtz		3421 SW Meek Rd	lordq@comcast.net	y
Evelyn Hiles				
Bob Hiles		24435 N.W. Oak Dr. Hillsboro, OR 97124		Mail
Kevin O'Donnell	CPO 7	on file		
Mary Manseau	CPO 7	5230 NW 137th Ave PTLD OR 97229	marymanseau@gmail.com	Yes, email
Marty Moyer	CPO 7	16638 NW GRAFS PTLD 97229	mhmoyer@yahoo.com	YES
Don Schoen Christine Anne Hoffa-Schoen	CPO #8	7380 N.W. GROVELAND RD HILLSBORO 97124	DON.SCHOEN@HOTMAIL.COM	YES
Paula & Dave Sherden		5265 NW Sewell Rd Hillsboro 97124	sherdens@frontier.com	YES
James & Donna Burns		5840 N.W Sewell Rd Hillsboro 97124		by mail
Linda Peters	CPO8 & WC CAN	25440 NW Dairy Creek Rd., N Plains 97133	lindabpeters@gmail.com	email
Dennis & Krystal Laas		6140 N.W. Birch Ave. Hillsboro, 97123	don166@Comcast.net	e mail
Chet & Pat Wolter	CPO8	9555 NW 316th Pl. HILLSBORO 97124	chetw@aracom.com	Y
MARYBETH COTTLE & (KEN POTTER)	CPO7	19070 NW ATHENA ST. PDX 97229	MBCOTTLE58@YAHOO.COM	YES

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

U.S. 26: Brookwood Parkway/ Helvetia IAMP & Brookwood JTA Interchange Project

Open House
June 25, 2012
Hillsboro Civic Center

Name	Affiliation *(if applicable)*	Mailing Address	Email	Would you like to receive updates by mail/ email? (Y/N)
Lynn Park (get info from PAC sign in)				
Cheryl Amabisca	↓			
Alan Rudwick				
Robert Bailey				

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

U.S. 26: Brookwood Parkway/ Helvetia Interchange
Public Comment Form

Please give us your feedback on the JTA and IAMP projects. If you would like a response from the project team, please include your contact information.

Name _____

Address _____

_____

Phone _____

E-mail marymanseau@gmail.com

☒ ***Check if you would like a response***

☐ ***Check if you would like to receive updates by mail/ email***

Comments: _____

Send excess money from interchange back to State for redistribution. #s should not be used for local Hillsboro streets.

You may make additional comments on the back of this card.

Open House: June 25, 2012

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

U.S. 26: Brookwood Parkway/ Helvetia Interchange

Public Comment Form

Please give us your feedback on the JTA and IAMP projects. If you would like a response from the project team, please include your contact information.

Name KEN POTTER

Address 4325 NW 192ND PORTLAND, OR 97229

Phone 503-729-9540

E-mail KENYAN.POTTER@GMAIL.COM

Comments: PEDESTRIAN ACCESS TO HELVETIA RD FOLLOWING OLD (EXISTING) JACOBSON ROADWAY SHOULD NOT BE CUT OFF. (STAIRWAY?)

☐ ***Check if you would like a response***

☐ ***Check if you would like to receive updates by mail/ email***

You may make additional comments on the back of this card.

Open House: June 25, 2012

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

U.S. 26: Brookwood Parkway/ Helvetia Interchange
Public Comment Form

Please give us your feedback on the JTA and IAMP projects. If you would like a response from the project team, please include your contact information.

Name Kevin O'Donnell

Address _____

_____

Phone _____

E-mail _____
kevinopublic@gmail.com

☒ ***Check if you would like a response***

☒ ***Check if you would like to receive updates by mail/ email***

Comments: The design for Jacobson is illogical — be more creative with design to fit those north of Hwy 26 that work in Hillsboro.

Groveland Dr should stub out & connect via existing Groveland Rd.

Extra ODOT funds should be used to make all of Hwy 26 better.

You may make additional comments on the back of this card.

Open House: June 25, 2012

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

U.S. 26: Brookwood Parkway/ Helvetia Interchange
Public Comment Form

Please give us your feedback on the JTA and IAMP projects. If you would like a response from the project team, please include your contact information.

Name Donnie Laas

Address 6140 NW Birch Ave
Hillsboro 97124

Phone 503 648 8291

E-mail donLde@comcast.net

☐ ***Check if you would like a response***

☐ ***Check if you would like to receive updates by mail/ email***

Comments: My concern is increased noise for the neighborhood at the SW corner of the overpass. The elevation of the Roadway to accomodate the South bound Loop will dramatically increase the noise washing down to our neighborhood. What are the projected noise abatement plans??

You may make additional comments on the back of this card.

Open House: June 25, 2012

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U.S. 26: Brookwood Parkway/ Helvetia Interchange
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Please give us your feedback on the JTA and IAMP projects. If you would like a response from the project team, please include your contact information.

Name _____

Address _____

_____

Phone _____

E-mail marynorsaw@gmail.com

☒ ***Check if you would like a response***

☐ ***Check if you would like to receive updates by mail/ email***

Comments: _____

excess funds should be used to widen highway 26 to 3 lanes from 185th to Brookwood/Helvetia State Interchange

You may make additional comments on the back of this card.

Open House: June 25, 2012

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

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Please give us your feedback on the JTA and IAMP projects. If you would like a response from the project team, please include your contact information.

Name _____

Address _____

_____

Phone _____

E-mail manyperson@gmail.com

☒ ***Check if you would like a response***

☐ ***Check if you would like to receive updates by mail/ email***

Comments: _____

move #6 to 173/174 TH

You may make additional comments on the back of this card.

Open House: June 25, 2012

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

U.S. 26: Brookwood Parkway/ Helvetia Interchange
Public Comment Form

Please give us your feedback on the JTA and IAMP projects. If you would like a response from the project team, please include your contact information.

Name Krystal Lamb

Address 6140 NW Birch Ave
Hillsboro 97124

Phone 503.648.8291

E-mail donLole@comcast.Net

☐ ***Check if you would like a response***

☐ ***Check if you would like to receive updates by mail/ email***

Comments: Speed southbound on Brookwood Parkway is too High @ 55. The sight distance at the Meek Rd - Brookwood exchange violates Oregon State Standards yet the County claims they are unable to lower the speed at that intersection. The speed needs to be adjusted to account for the dangerous conditions.

You may make additional comments on the back of this card.

Open House: June 25, 2012

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

U.S. 26: Brookwood Parkway/ Helvetia Interchange

Public Comment Form

Please give us your feedback on the JTA and IAMP projects. If you would like a response from the project team, please include your contact information.

Name DON SCHOEN

Address 7380 NW GROVELAND RD
HILLSBORO OR 97124

Phone 503 647-3518

E-mail DON.SCHOEN@HOTMAIL.COM

Comments: MY CONCERN IS THE NEW INTERSECTION OF SCHAFF RD AND THE CONNECTOR ROAD TO GROVELAND DRIVE. WILL THERE BE A TRAFFIC SIGNAL AT THIS INTERSECTION? MY CONCERN IS A LEFT HAND TURN TO GET TO MY FARM.

☐ ***Check if you would like a response***

☐ ***Check if you would like to receive updates by mail/ email***

You may make additional comments on the back of this card.

Open House: June 25, 2012

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

U.S. 26: Brookwood Parkway/ Helvetia Interchange
Public Comment Form

Please give us your feedback on the JTA and IAMP projects. If you would like a response from the project team, please include your contact information.

Name Marty Moyer

Address 16638 NW GRAF ST
PORTLAND 97229

Phone 503-629-9064

E-mail mhmoyer@yahoo.com

Comments: I am concerned that you do not realize the importance of Jackson St. as a major route from North Bethany + Central Bethany to jobs in Hillsboro. a right in / rt. out only on Jackson will not work well.

☐ *Check if you would like a response*

☒ *Check if you would like to receive updates by mail/email*

You may make additional comments on the back of this card.

Open House: June 25, 2012

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U.S. 26: Brookwood Parkway/ Helvetia Interchange
Public Comment Form

Please give us your feedback on the JTA and IAMP projects. If you would like a response from the project team, please include your contact information.

Name Mary Manzan

Address 5230 NW 137th Ave
Portland, OR 97229

Phone 503 645 1672

E-mail

☐ ***Check if you would like a response***

☐ ***Check if you would like to receive updates by mail/ email***

Comments: # not used on interchange should be returned to state for more worthy projects. Logical connection from Cornelius Pass to Helvetia need to be planned - roads #9, 10, 11 & 12 create a crosby mass of roads rather than logical transportation corridors.

You may make additional comments on the back of this card.

Open House: June 25, 2012

Jacobsen must remain as a logical transit corridor.

Planning for this area has been completed in a vacuum without adequate input from those using the roads in this area on a regular basis.

North bound impacts - residential areas serving as a bedroom ~~community~~ community for the Hillsboro jobs are not provided with logical connections to their jobs.

Improvised draft - I'll submit something coherent online

U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

U.S. 26: Brookwood Parkway/ Helvetia Interchange
Public Comment Form

Please give us your feedback on the JTA and IAMP projects. If you would like a response from the project team, please include your contact information.

Name Linda Peters

Address 25440 NW Dairy Ck. Rd. N. Plains, OR 97133

Phone 503-647-2301

E-mail lindabpeters@gmail.com

☐ ***Check if you would like a response***

☐ ***Check if you would like to receive updates by mail/ email***

Comments: I'm concerned that all road improvements seem designed to carry single-occupancy commuter vehicles between Bethany and Hillsboro. Little regard has been given to CPOS's citizen advisors' concerns about lack of hydrogeologic & cultural/anthropological sites' protections. Money leftover from original design, instead of being used for underpass

You may make additional comments on the back of this card. ↪

Open House: June 25, 2012

or other potential intersection fixes that would protect farmlands and natural areas, are planned to be used for adding capacity to ~~of~~ realigning feeder/connector roads. I agree with letter submitted for Helvetia Community Association by Robert Bailey and Cherry Amabisca. This plan does not seem particulary friendly to active transportation ~~of~~ including transit. The Jacobsen Rd. realignment is problematic for all the reasons many others have cited in comments.

Additional observation: the first presentation we were given about this project emphasized that the design was to better serve current traffic – it wasn't to be designed, they told us, for "future development." Somehow the purpose migrated (mission creep?) to the second bullet "Support the ongoing and future City of Hillsboro and Washington County transportation, land use, and economic development planning efforts in and around the study area..."

Although the plan presented tonight doesn't include a Meek Road Flyover, it clears the way for it – a very dangerous facility in terms of protection for natural areas and prime farmland. [illegible] is absurd.

Helvetia Community Association (HCA)
13260 NW Bishop Road
Helvetia, OR 97124

www.HelvetiaCommunity.org

June 25, 2012

To: Project Advisory Commitee for the U.S. 26/Brookwood Parkway/Helvetia Road Interchange Interchange Area Management Plan (IAMP) Advisory Council

I am Robert Bailey and I have been representing the Helvetia Community Association on the U.S. 26/ Brookwood Parkway/Helvetia Road Interchange Project Advisory Committee. Cherry Amabisca is the Association's alternate representative to the PAC and she has also followed the process throughout. The Helvetia Community Association has voiced support for many aspects of the Interchange Project, funded substantially to facilitate traffic flow to and from ***south of U.S. 26***.

We have had multiple concerns about proposed impacts to the ***north of U.S. 26.*** We wrote letters to our congressional delegation and to the Federal Department of Transportation regarding Hillsboro's federal Tiger grant proposals for roadways north of Highway 26. We testified before the Hillsboro Transportation Committee. We voiced concern within the PAC meetings. We met with and corresponded with ODOT multiple times re our concerns.

Support for the Interchange Project

We are very familiar with the interchange and its functionality. Many in Helvetia use it daily. We are supportive of the improvements as they relate to the rationale for the $45 million in state JTA funds: to facilitate employment traffic south of U.S. 26, and north from Hillsboro back to U.S.26. We support the safety and access projects associated with the Meek Road Community.

We have participated in and support ODOT's approach to minimizing the footprint of the interchange design on the Groveland Oaks in the NW Quadrant of the interchange. This area contains many 250-year-old native Oregon white oaks and associated acorn woodpeckers. This is also a hydrologically sensitive area that has experienced significant flooding with 100 year FEMA floodplains. It is also the point where the water from the underground farm field drainage systems reaches the valley floor. We

appreciate the efforts of Andrew Johnson and his colleagues at ODOT in minimizing the footprint of the interchange on the surrounding sensitive area and his ongoing outreach to us as he and his team explore options to minimize the impact on the area's native Oregon white oaks and other natural resources.

We have assisted the Interchange Project by providing the ODOT team important hydrologic information, photos of historic flooding, and a count of the white oak, among other resources. The city and county have historically received these materials.

We provided CPO 8 regular updates and a panel of state, city, and county representatives presented to the CPO in the Fall of 2011. Our concerns have likewise been shared with the CPO.

Procedural Concerns for Projects North of U.S. 26

We have before us one part of a larger puzzle and we are being asked to approve one step that will lead to another, then another. The City of Hillsboro wants to build a "flyover" from the NW Meek Road area that would then connect with Schaaf Road, providing a "traffic shed" for employees from Hillsboro's employers to homes in Bethany. This is predicated on the county building the "realignment" road from Groveland Drive to Schaaf Road. The "flyover" is not referenced at all in the scope of this PAC. However, what we determine will lay the groundwork for subsequent projects. Do you have all of the information that you need to embrace this larger puzzle? We do not.

The City of Hillsboro has recently undertaken a hydrology assessment and master plan in this Waibel/ McKay Creek watershed. It will not be complete for one year. The area north of U.S. 26 has experienced significant hydrological events and the Waibel drainage is critical to farming in Central Helvetia. Changes to the hydrology north of U.S. 26 will also have impact on the Meek Road Community. We contend that this assessment and plan is foundational to planning for new roads in this area.

The City of Hillsboro wants to "switch" possible federal Tiger funds with state JTA Interchange funds/185th Interchange funds. We have heard the rationale that this would expedite/hasten/abbreviate NEPA requirements. We are not expert in the impacts of this trade practice of "supplanting" funds. Notwithstanding reassurances from ODOT, we remain concerned that this shifting might actually abbreviate environmental assessment of the critical hydrologic area of NW Schaaf and Helvetia roads, later, by the city and the county.

We advocated for an archeological study of the interchange area as the NW quadrant was a seasonal village of the Twality Indians and the water source for the historic, adjacent, 5 Oaks gathering place. One field study did occur but before the Groveland Drive and Helvetia Road re-alignment was proposed. This area was not studied and should be. The county staff report asserts that we do not need to focus on

this road and that they can proceed because it is a "realignment" between existing roads. However, this "realignment" will also impact the historic 1865 Chambers/Kilpatrick House, listed among Washington County's cultural resources, but not referenced in the materials before us.

Tax Dollar Efficiency

Taxpayers have an existing investment in Jacobson Road. We recognize that due to safety standards, a connection from Helvetia to Jacobson needs to be made further north of the interchange than at present and perhaps even further north than proposed, making it a full service junction. We recommend using Jacobson, an existing investment, to funnel traffic to the east. This would require a lighted junction at an appropriate distance north, then possibly a re-connection of Jacobson with what is now Mauzey Road near the West Union/Cornelius Pass junction. Intel no longer intends to use their property there and the Hillsboro School District owns to the south of this abandoned road.

The City of Hillsboro represented their Tiger grant proposal as a rural roads project when clearly it is an urban and industrial roads project. They based their representation on historic zoning of the area and apparently stand a better chance at tax dollars under "rural" than "urban". We do not support this representation and attempted access of tax dollars.

The taxpayers here are asked to fund road creation that eventually will primarily benefit corporations. They should not bear the burden. The City of Hillsboro will use these tax based improvements to lure corporate development. This is not a transparent use of tax funds. These road projects are predicated on property owners "aggregating" to sell their land to corporations. We do not see foreseeable signs of that. Thus, the roads will likely dissect working farmland but not serve any corporation for many years.

Preservation of Farm Land and Buffering for Agricultural Practices

While the land to the east of Helvetia Road has been zoned industrial, many acres remain in active agricultural use. At the later time when property owners decide to sell for aggregation into industrial plots, it would be more appropriate to consider these new roads.

Bringing urban traffic north up to NW West Union at NW Century would bring impacts right up to the proposed rural reserve lands in agricultural use. This would impact the movement of farm machinery, contribute to the spread of noxious weeds, and otherwise create a hard edge road between urban and rural.

Following from the above, we recommend that the county road system play a more creative role in the buffering between urban and rural and facilitating the continuation of farming practices. An urban road's edge is not a sufficient buffer between industrial and agricultural land. Agricultural practices need

more space than that. Concrete sidewalks intrude on plowing and equipment safety. Ditches are required for farm drainage. The movement of agricultural machinery does better in lower density traffic. Minimizing the importation of weeds helps farmers maintain the purity required to take seed crops to market.

Closing

We are being asked to approve one step that will lead to another, then to another. We do not have the information we need to embrace what is before us and do not think you do either. We have the time to get more perspective and learn the impacts.

Some of these projects are predicated on the implementation of the recent LCDC decision on the UGB, which must withstand appeals. But the UGB outcome is predicated on the implementation of the Reserves Process, whose order is not yet written and must also withstand appeals. In our judgement, much of the priorities of new road construction north of U.S. 26 is premature.

Thank you for your attention.

Robert Bailey, Secretary
For the Board of Directors
Helvetia Community Association

Cherry Amabisca, President
Helvetia Community Association

Appendix B:

Technical Memorandum #2: Existing Conditions Analysis

US 26/Brookwood Parkway/Helvetia Road
Interchange Area Management Plan

Hillsboro and Washington County, Oregon

Technical Memorandum #2:
Existing Conditions Analysis
Revised Draft

Prepared for

Oregon Department of Transportation, Region 1
123 NW Flanders Street
Portland, Oregon 97209-4012

Prepared by

David Evans and Associates, Inc.
2100 SW River Parkway
Portland, Oregon 97201

a l·ŇŎK 2012

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List of Acronyms

ADT	Average Daily Traffic
AF	Agriculture and Forest
API	Area of Potential Influence
ATR	automatic traffic recorder
BPA	Bonneville Power Administration
DPS	Distinct Population Segment
EBR	Shute Road Interchange Improvement Project Environmental Baseline Report
EFU	Exclusive Farm Use
ESH	Essential Salmonid Habitat
FD-20	Future development
FEMA	Federal Emergency Management Agency
GIS	geographic information system
HCM	Highway Capacity Manual
HCS	Highway Capacity Software
HUC	Hydrologic Unit Code
IAMP	Interchange Area Management Plan
JTA	Jobs and Transportation Act
LLC	limited liability corporation
LOS	Level of Service
LUST	Leaking Underground Storage Tank
LWCF	Land and Water Conservation Fund
mev	million vehicle miles
MP	mile point
mvm	million vehicle miles
NRHP	National Register of Historic Places
ODFW	Oregon Department of Fish and Wildlife
ODOT	Oregon Department of Transportation
OHP	Oregon Highway Plan
ORBIC	Oregon Biological Information Center
ORNHIC	Oregon Natural Heritage Information Center

PDO	property-damage-only
SHPO	State Historic Preservation Office
SID	Special Industrial District
SPIS	Safety Priority Index System
SV	Sensitive Vulnerable
T	Threatened
T&E	Threatened and Endangered
UGB	Urban Growth Boundary
URA	Urban Reserve Area
USFWS	United States Fish and Wildlife Service
UWR	Upper Willamette River
v/c	volume-to-capacity

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1. PURPOSE AND STUDY AREA

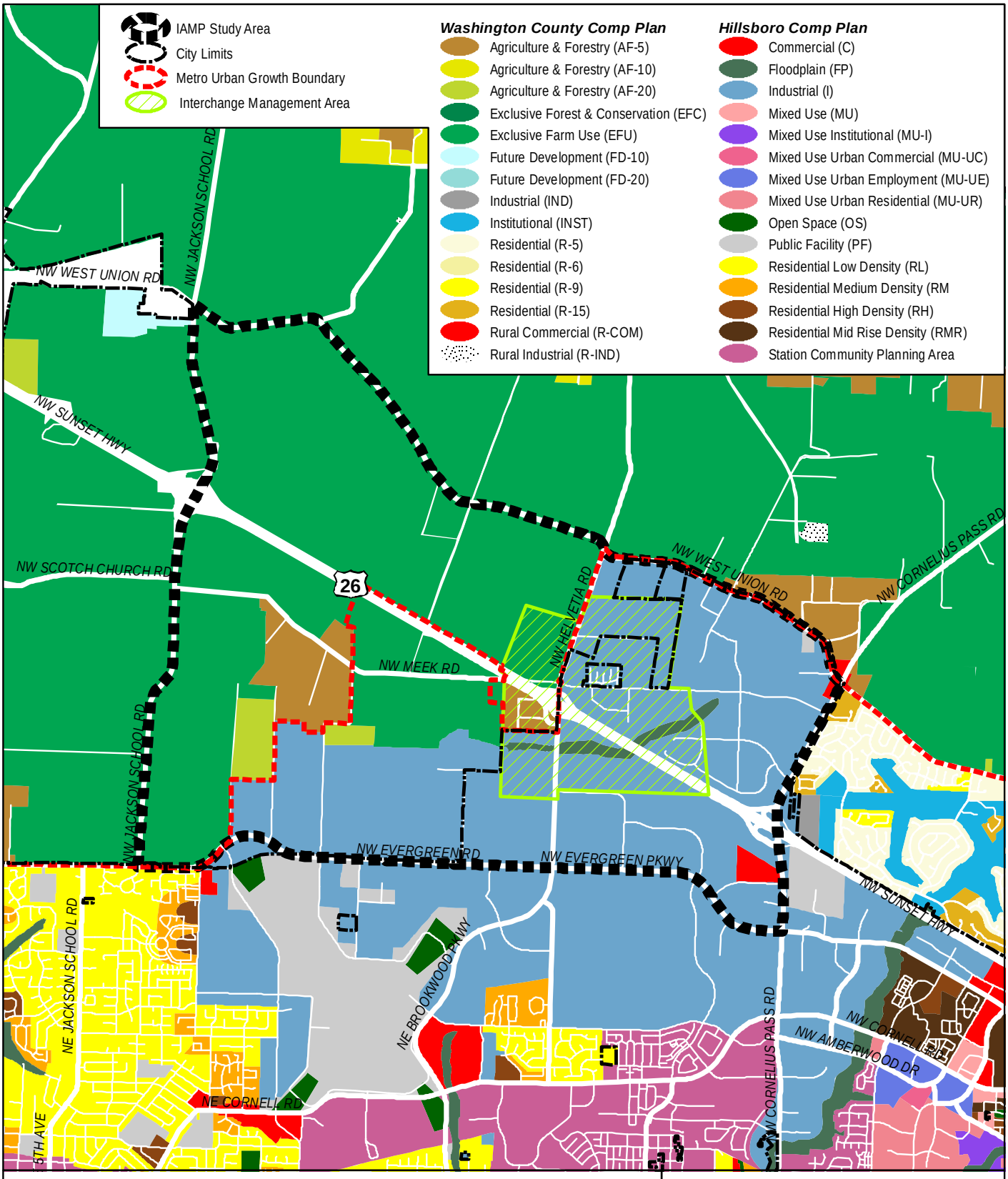
The Oregon Department of Transportation (ODOT) is modifying the Brookwood Parkway/Helvetia Road interchange on US 26 as part of the US 26/Brookwood Jobs and Transportation Act (JTA) Project; therefore, ODOT is required to adopt an Interchange Area Management Plan (IAMP) for the interchange. US 26 is locally and regionally significant in moving people, goods, and services through North Hillsboro and throughout the metropolitan region and the state. The US 26/Brookwood Parkway/Helvetia Road interchange has been serving and will continue to serve as a major entry point to large high-technology employment centers based throughout North Hillsboro.

The US 26/Brookwood Parkway/Helvetia Road interchange is currently approaching or exceeding the mobility standards identified in the Oregon Highway Plan (OHP) for this facility. The heavy westbound off-ramp traffic during the AM peak hour heading southbound and the corresponding northbound-to-eastbound movement in the PM peak hour are of primary concern. Local road connections to Brookwood Parkway and Helvetia Road near the interchange do not meet OHP access spacing standards, and the proximity of the local road connections to the interchange make local road access difficult and contribute to traffic congestion at and near the interchange during peak travel times. Traffic at the US 26/ Brookwood Parkway/Helvetia Road interchange is projected to increase as new industrial development is attracted to North Hillsboro.

The purpose of the IAMP is to:

- Support the ongoing and future City of Hillsboro and Washington County transportation, land use, and economic development planning efforts in and around the Study Area, as described below (North Hillsboro); and
- Protect the future function of the interchange.

This technical memorandum identifies existing land use, transportation, and natural and historic resources within the Study Area. The Study Area includes the segment of US 26, accompanying local road networks, and land encompassed by Cornelius Pass Road (at US 26 mile point [MP] 62.53) on the east, Evergreen Road on the south, Jackson School Road (at US 26 MP 58.42) on the west, and West Union Road on the north, as shown in **Figure 1**.



US 26/Brookwood Parkway/ Helvetia Road IAMP

Figure 1
Comprehensive Plan Designations

Data Sources:
Metro RLIS GIS Data, 2011

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2. EXISTING LAND USE ANALYSIS

Introduction

This section summarizes existing land use conditions within the Study Area. The information in this section is taken primarily from published documents, maps, geographic information system (GIS) data, city and county websites, and other resource websites. **Figure 1** shows the comprehensive plan designations in the study area. **Figure 2** shows the zoning designations.

The Study Area represents the western developed edge of the Portland Metropolitan area, with large areas of farmland mostly to the west, and which is adjacent to industrial areas and residential development to the east. The interchange is a critical access point, serving the mobility needs for high-tech and supporting companies located both inside and outside of the Study Area including Intel, Genentech, SolarWorld, TriQuint Semiconductor, Tokai Carbon USA, and Tokyo Ohka Kogyo America (TOK America). Hillsboro Airport, Oregon's second busiest airport, is just south of the Study Area.

Jurisdictions

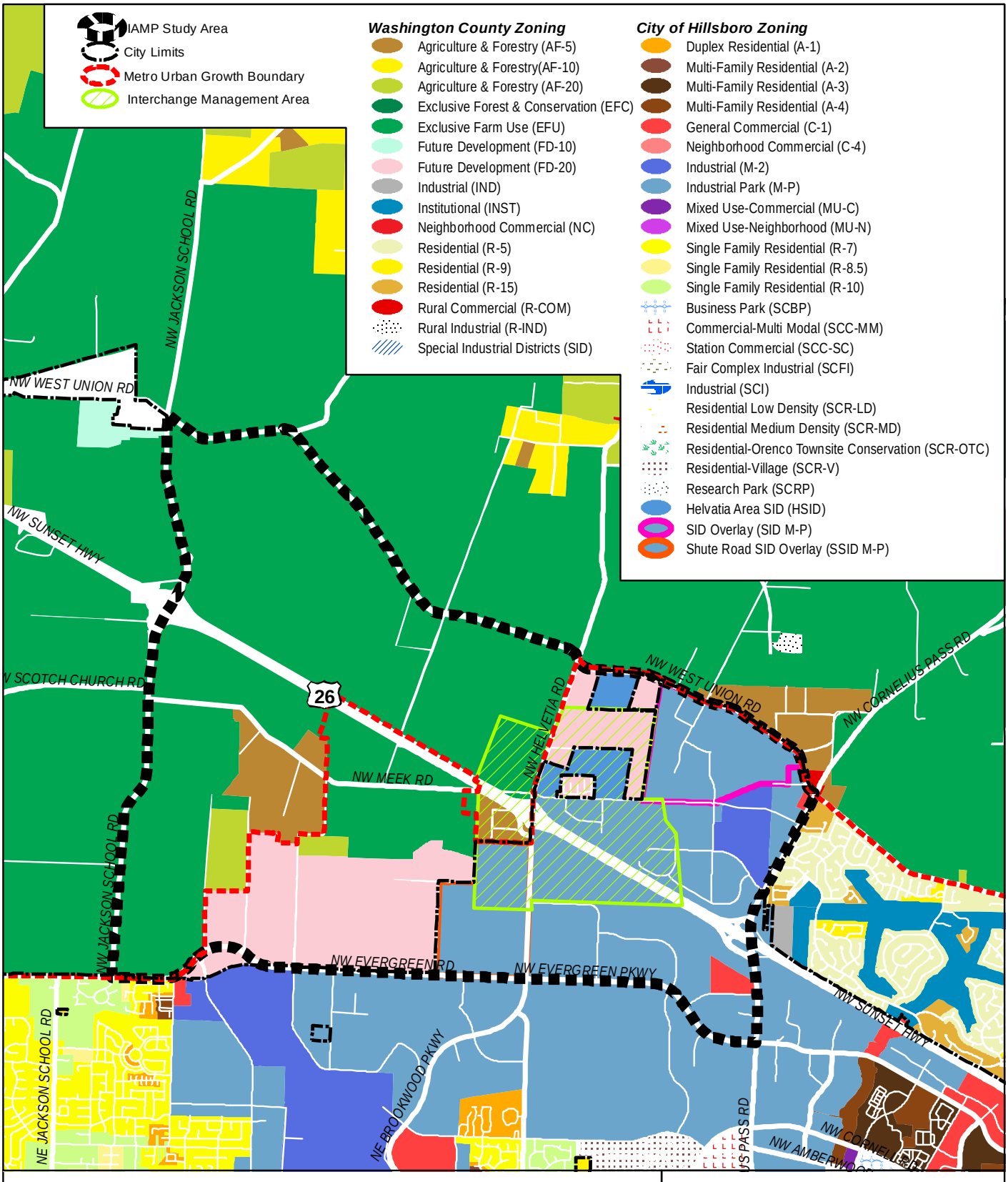
The US 26/Brookwood Parkway/Helvetia Road interchange is located within both the City of Hillsboro and Washington County jurisdictional boundaries. The majority of the west Study Area is within Washington County jurisdiction, except for a southern portion of the Study Area east of 253rd Avenue and south of Birch Avenue, which is in the City of Hillsboro jurisdiction. The east Study Area is within City of Hillsboro jurisdiction, except for several parcels north of the interchange that are adjacent to or near Helvetia Road.

Urban Growth Boundary

The current western edge of the Urban Growth Boundary (UGB) north of US 26 (which is within the Study Area) follows Helvetia Road, with the northern edge following West Union Road. South of US 26, the western edge of the UGB zigzags around parcel lines south and west of Birch Avenue. There are two Urban Reserve Areas (URAs) in the Study Area. One area is north of the interchange adjacent to US 26 and west of Helvetia Road, and one area is south of the interchange, adjacent to and south of US 26, and follows the eastern edge of McKay Creek. The URA north of the interchange was recently expanded to include an additional 352 acres south of West Union Road and east of Groveland Road (see **Figure 3**).

Metro requires that, before adding land into the UGB, the local jurisdiction must meet Urban Growth Management Functional Plan Title 14: Urban Growth Boundary criteria and procedures for amendments to the UGB. The City of Hillsboro currently has submitted Title 14 documentation to request that 310 acres be added to the UGB in the URA south of US 26 in the Study Area.

Once an area is added to the UGB, the local jurisdiction must provide documentation that the comprehensive plan amendment is consistent with all applicable titles of the Urban Growth Management Functional Plan. Title 11 of the Urban Growth Management Functional Plan lists



US 26/Brookwood Parkway/ Helvetia Road IAMP

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Data Sources:
Metro RLIS GIS Data, 2011

Figure 2
Zoning Designations

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US 26/Brookwood Parkway/ Helvetia Road IAMP

Figure 3
Hillsboro Planning Areas

Legend

- IAMP Study Area
- Urban Growth Boundary (UGB)
- City Limits
- BPA Easement
- North Eco-Industrial District
- Hillsboro Enterprize Zone
- Evergreen/Helvetia/Shute Road Concept Plan Areas
- Urban Reserve Area
- Undesignated Reserve Area

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Helvetia Concept Plan Area

Shute Road Concept Plan Area

Evergreen Concept Plan Area

Jackson School Road Interchange

Brookwood Interchange

Cornelius Pass Road Interchange

26

26

CITY OF HILLSBORO

Data Sources:
Metro RLIS GIS Data, 2010
Oregon Imagery Explorer, 2009

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provisions that need to be addressed in the comprehensive plan amendment, including an urban growth plan diagram and policies consistent with the Regional Framework Plan and adopted 2040 Growth Concept design types. The City of Hillsboro has completed concept planning for the Evergreen, Shute, and Helvetia areas within the Study Area, as required under Metro's Title 11 of the Urban Growth Management Functional Plan. The majority of the Evergreen, Shute, and Helvetia concept planning areas are now within incorporated Hillsboro and are designated for industrial uses. These areas retain their rural character and many properties are actively farmed.

Existing Land Use and Zoning

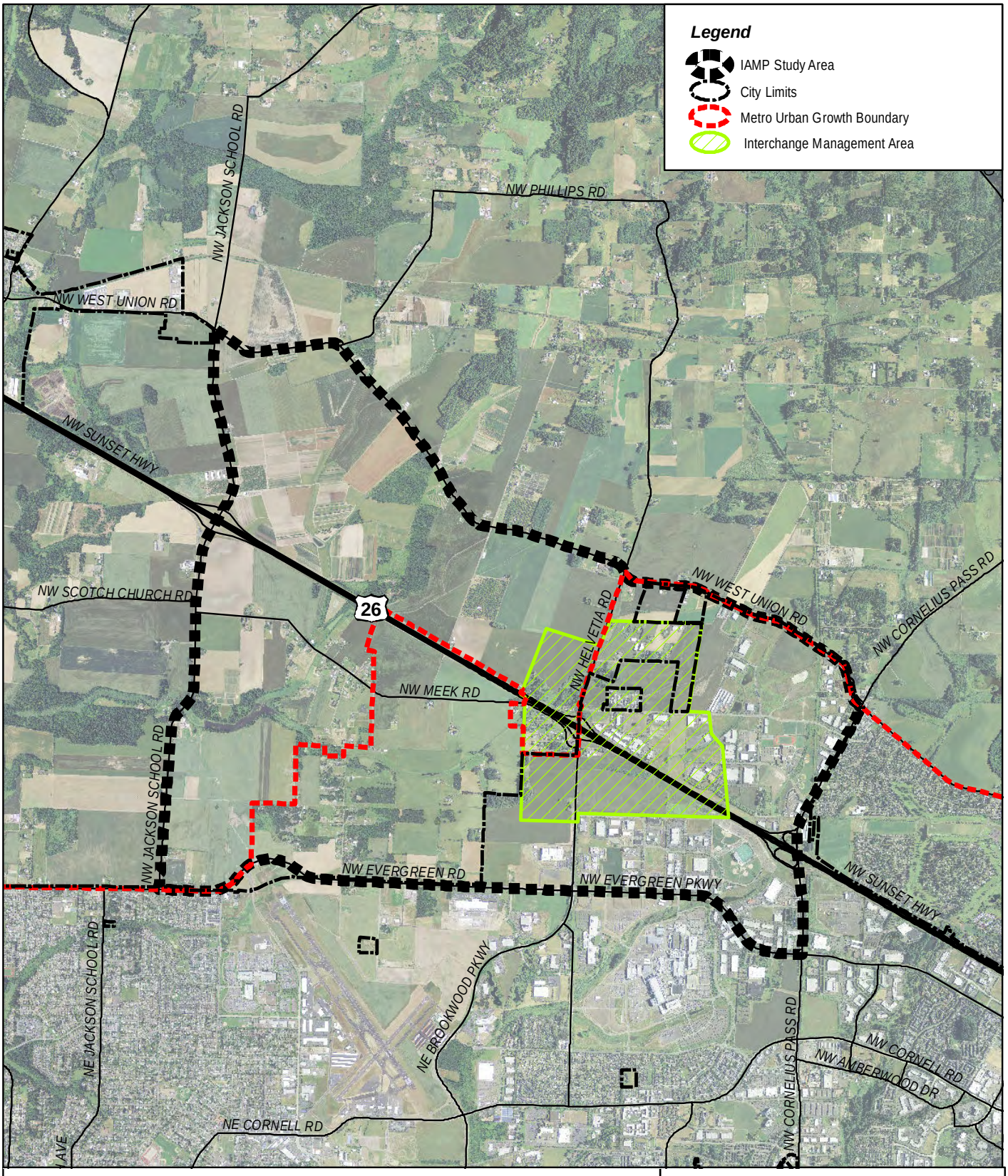
Washington County—Northwest Quadrant

Within the northwest quadrant of the interchange Study Area, current land use is primarily rural agricultural. There is some rural residential, mostly adjacent to Groveland Drive and between Groveland Drive and US 26. Aerial photography (see **Figure 4**) indicates that most of this area is currently actively farmed. West Union Elementary School is at the southwest corner of Helvetia Road and West Union Road, an automotive repair shop is at the corner of Groveland Drive and Groveland Road, and Rice Museum of Rocks and Minerals is north of Groveland Drive near its termination. Standring Groveland/Investment Co. LLC is a major owner closer to the interchange and north of smaller rural residential parcels along Groveland Drive. Farther from the interchange, major landowners are farming limited liability corporations (LLCs) such as Pasley Farms and Batchelder Farms.

Zoning in the northwest quadrant of the interchange Study Area is entirely Exclusive Farm Use. The intent of the Exclusive Farm Use District, according to the Washington County Community Development Code, is to "*preserve and maintain commercial agricultural land within the County*." The area between Helvetia Road, Groveland Drive, US 26, and West Union Road is designated Urban Reserve, with the intent that it will become employment area and housing when needed in the future. Adjacent to and to the west of the URA is an undesignated area that is available to potentially accommodate urban growth if the nearby URAs are exhausted.

Washington County—Southwest Quadrant

The portion of the southwest quadrant of the Study Area within Washington County jurisdictional boundaries consists of rural residential uses between Meek Road, Oak Drive, and Birch Avenue. Zoning within this area supports rural residential uses (Agriculture and Forest-5 [AF-5]). Most of the parcels are owned by families or individuals, except for a parcel at the intersection of Oak Drive and Meek Road that is owned by a religious organization. Further from the interchange along US 26 and outside of the UGB is mostly rural agricultural uses west of Birch Avenue, with some areas of rural residential around 268th Place and Sewell Road mostly south of Meek Road. Parcels in this area are owned by individuals or families, and the largest single property ownership is 81.89 acres. Zoning within the area includes Exclusive Farm Use (EFU), Agriculture and Forest- 20 (AF-20), and AF-5 uses in the northern section of the Study Area around Meek Road. Agricultural and Forest areas are intended to retain an area's



US 26/Brookwood Parkway/ Helvetia Road IAMP

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Data Sources:
Metro RLIS GIS Data, 2011
Aerial Photograph:
Oregon Imagery Explorer, 2009

Figure 4
Aerial

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rural character and conserve the natural resources while providing for rural residential use in areas so designated by the Comprehensive Plan. Zoning is consistent with these uses. Much of this area is also within a City of Hillsboro UGB expansion proposal, as referenced in Appendix A of Technical Memorandum #1. Most of the parcels in the area are privately owned by individuals or families. The remaining portion of the southwest quadrant of the Study Area within the UGB and Washington County jurisdiction (west of 253rd Avenue/Meier-Jurgen Road) has rural agricultural and residential uses. However, the area's comprehensive plan designation is Industrial, and it is zoned Future Development (FD-20). It also is within the Evergreen Concept Plan Area to help provide industrial land supply and future employment growth. The intent of the FD-20 District is as follows:

> *The FD-20 District applies to the unincorporated urban lands added to the urban growth boundary by Metro through a Major or Legislative Amendment process after 1998. The FD-20 District recognizes the desirability of encouraging and retaining limited interim uses until the urban comprehensive planning for future urban development of these areas is complete. The provisions of this District are also intended to implement the requirements of Metro's Urban Growth Management Functional Plan.*

Portland General Electric owns approximately 30 acres on two sites: one west of Sewell Road and one west of 253rd Avenue. The Port of Portland owns a small tract of land near 273rd Avenue.

The only parcels within Washington County jurisdiction east of the interchange and Helvetia Road are zoned FD-20.

City of Hillsboro—Northeast Quadrant

The northeast quadrant of the Study Area between Jacobson Road and US 26 is mostly commercial/industrial uses. North of Jacobson Road is mostly agricultural uses and vacant land, with a mobile home park directly off of Jacobson Road. The rest of the northeastern section of the Study Area is a mix of rural agricultural and commercial/industrial uses, and has more developed and mostly commercial/industrial uses closer to Cornelius Pass Road. Liberty High School is off of Wagon Way and covers a large area that includes multiple sports fields.

Land use designations for the area are entirely industrial, with a band of floodplain designation for Waibel Creek. Zoning is also industrial-based. However, the Helvetia area and most of the area along West Union Road has a Special Industrial District (SID) Overlay to "*protect and enhance development opportunities for industrial uses….*"

Parcels in the northeast quadrant of the Study Area close to the interchange are mostly parcels between 1 acre and 8 acres and are owned by individuals, families, or LLCs, including investment LLCs. Of the three largest parcels in the area, the Bonneville Power Administration (BPA) owns one that is south of Jacobson Road, between Century Boulevard and Pinefarm Place (22.09 acres); the Development Services of America owns the other large parcel (30 acres)

south of Pubols Road and west and adjacent to Century Boulevard; and Weston Investment Company LLC owns another just south of the Development Services of America parcel (16 acres). Parcels in the Study Area farther from the interchange are mostly commercially owned for industrial/commercial uses, except for one large parcel of private ownership along West Union Road close to Helvetia Road. The largest parcel owners in the area are Intel for its West Union Campus off of West Union Road and the Hillsboro School District for Liberty High School.

City of Hillsboro—Southeast Quadrant

The southeast corner of the Study Area adjacent to the interchange and north of Huffman Street is agricultural uses. The southeast Study Area beyond the agricultural area is mostly commercial/industrial uses south of Huffman Street and along 235th Avenue and Bennett Street east to Cornelius Pass Road, and is interspersed with a few smaller, undeveloped parcels. Gordon Faber recreation complex occupies a large area east of Bennett Street and west of Cornelius Pass Road adjacent to US 26.

Comprehensive Plan Map Designations for the Study Area within City of Hillsboro jurisdiction are entirely Industrial, except for a band of area designated Floodplain from Century Drive under US 26 and then to Brookwood Parkway just south of the interchange, and an area designated commercial off of Cornelius Pass Road. Zoning for the Study Area is consistent with the designations and is entirely Industrial Park (M-P), with a small area of Shute Road SID Overlay and an area of general commercial off of Cornelius Pass Road. The City of Hillsboro has also implemented a Significant Natural Resource Overlay to protect natural resources located along portions of the floodplains in the area. The Nike Foundation owns much of the land north of Huffman Street (approximately 75 acres), with one parcel owned by Ruth Berger between the Nike parcel and the interchange. Further from the interchange, the City of Hillsboro is the largest property owner for Gordon Faber Park. Other parcels are owned in support of the industrial uses and commercial and business parks.

City of Hillsboro—Southwest Quadrant

Land in the southwest quadrant is undeveloped and used for agricultural uses, except for the parcel owned by Genentech Incorporated, which is approximately 75 acres on the corner of Evergreen Parkway and Brookwood Parkway. This area is designated and zoned Industrial, with a Shute Road SID Overlay, and is within the Shute Road Concept Area.

Community Features

In the Study Area, community features include:

- Chinese Evangelical Church in the northeast quadrant at 5529 Five Oaks Drive.
- Rice Northwest Museum of Rocks and Minerals in the northwest quadrant. The museum facility (Richard and Helen Rice Residence) is listed on the National Register of Historic Places. It is recognized for its unique architectural style, use of natural stone, and native Oregon woodwork.

- West Union Elementary School at the southwest corner of Helvetia Road and West Union Road.
- Liberty High School off of Wagon Way.
- Community of Christ Church in the northeast quadrant off of Five Oaks Drive.
- Oregon Department of Environmental Quality Sunset/Hillsboro Vehicle Emission Testing Station in the northeast quadrant off of Five Oaks Drive.
- The Gordon Faber Recreation Complex west of Cornelius Pass Road, off of Bennett Road in the southeast quadrant. The complex is an athletic facility for softball, soccer, football, baseball, lacrosse, running, walking, and bicycling. The Hillsboro Airport and Hillsboro Public Library are just south of the Study Area off of Brookwood Parkway.

Adjacent Tax Lot Summary

A review of property and tax lots on Brookwood Parkway/Helvetia Road within one-quarter mile south and north of the interchange was conducted as part of the existing conditions report, and the results can be seen in **Appendix A**. A map showing the tax lots and zoning is shown in **Figure 5**.

The analysis includes a summary of existing public and private approaches, type of use, tax lot, address, estimated approach width and location, zoning, and ownership.

Right-of-Way

BPA north-to-south transmission lines run through the northwest quadrant of the Study Area, then cross US 26 west of Gordon Faber Park, and run parallel and adjacent to US 26 to connect with the Keeler Substation just west of Cornelius Pass Road. East-to-west lines providing power to Tillamook and other Oregon coast communities run parallel to the north of Huffman Street in the Study Area.

Canals and Culverts

An existing culvert that carries Waibel Creek under Brookwood Parkway includes two 99-inch-diameter pipes. The North Hillsboro Industrial Strategy (March 2011) identifies these culverts as raising the flood level on the east side of Brookwood Parkway.

US 26/Brookwood Parkway/ Helvetia Road IAMP

Figure 5

IAMP Area Taxlots and Zoning

Legend

- IAMP Study Area
- Interchange Management Area
- JTA Project

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Data Sources:
Metro RLIS GIS Data, 2010
Oregon Imagery Explorer, 2009

NW WEST UNION RD

NW HELVETIA RD

NW MEEK RD

NW SUNSET HWY

NE BROOKWOOD PKWY

NW EVERGREEN PKWY

26

Brookwood Interchange

Cornelius Pass Road Interchange

EFU (Exclusive Farm Use)

FD-20 (Future Development 20 Acre Minimum)

HSID (Helvetia Area Special Industrial District)

M-P (Industrial Park Zone)

SSID M-P (Shute Road Site Special Industrial District)

EFU (Exclusive Farm Use)

1N2150000603

1N2150000607

1N2150000600

1N2150000901

1N2150000900

1N215CC00500

1N215CC00600

1N215CC00300

1N2150001400

1N221AA01200

1N221AA01100

1N2220002900

1N2220000200

1N2220002800

1N2210003100

1N2210002601

CITY OF HILLSBORO

Legend

- General Commercial
- Agriculture or Forestry
- Light Industrial
- Mixed Use Employment
- Mixed Use Residential (11-15 Dwelling Units per acre)
- Rural Residential or Future Urban
- Single Family (5 Dwelling Units per acre)

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3. EXISTING TRANSPORTATION ANALYSIS

This section provides the description, methodology, and results of the existing conditions transportation analysis of the US 26/Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP). The existing conditions transportation analysis provides a physical feature summary, a safety summary, traffic volumes, and traffic operations.

Physical Features Summary

The following are descriptions of the major roadways in the IAMP study area. The types of information summarized for each major roadway include functional classification, number of lanes and the presence or absence of sidewalks, bicycle lanes and school zones.

Appendix B provides additional information about some of the roadways in the study area in a tabular format; including City of Hillsboro and Washington County functional classification, posted speed, width of the paved surface, and whether or not sidewalks, bicycle lane, and on-street parking are present. **Figure 6** shows the City of Hillsboro and Washington County functional classifications of the roadway network.

US 26

In the Study Area US 26 has two lanes in each direction, with interchanges at Cornelius Pass Road, Brookwood Parkway/Helvetia Road and Jackson School Road. The Cornelius Pass Road interchange has directional (northbound and southbound) off-ramps for westbound US 26 traffic and northbound and southbound on-ramps for traffic going eastbound on US 26. The eastbound on-ramps are metered during peak hours.

The Brookwood Parkway/Helvetia Road interchange is a standard diamond interchange with an approximately 2,000-foot deceleration lane for the westbound off-ramp. The eastbound on-ramp is metered during peak hours.

The Jackson School Road interchange is also a standard diamond interchange, although its design is newer than the Brookwood Parkway/Helvetia Road interchange. Unlike the other two interchanges in the Study Area, the Jackson School Road interchange ramp terminals are not signalized, and there is no urban development near the interchange. The eastbound on-ramp is metered during peak hours.

Brookwood Parkway

Brookwood Parkway is a five-lane roadway that runs north-south through Hillsboro, from US 26 south past Hillsboro Airport, and ends at West Baseline Road. The road is classified as an arterial. Brookwood Parkway has a treed median south of the interchange for most of its length. Sidewalks are present south of the intersection of Huffman Street, but there are no bicycle lanes at any point along its length.

US 26/Brookwood Parkway/ Helvetia Road IAMP

Figure 6
Roadway Functional Classification

Legend

- IAMP Study Area
- Interchange Management Area
- JTA Project
- City of Hillsboro

N

0 2,000 4,000
Feet

Data Sources:
Metro RLIS GIS Data, 2010
Oregon Imagery Explorer, 2009

Interchange Management Area

Jackson School Road Interchange

Brookwood Interchange

Cornelius Pass Road Interchange

NW SUNSET HWY

26

NW WEST UNION RD

NW HELVETIA RD

NW MEEK RD

NW CORNELIUS PASS RD

NE BROOKWOOD PKWY

NW EVERGREEN PKWY

NW EVERGREEN RD

NW SCOTCH CHURCH RD

NW JACKSON SCHOOL RD

CITY OF HILLSBORO

Hillsboro Airport

Legend

Roadway Functional Class

- Freeway
- Arterial
- Collector
- Neighborhood Route
- Local Street

Path: P:\O\ODOT00000701\0600INFO\GS\arcmap\Hillsboro_Functional_Classification_07182011.mxd
Date: 7/26/2011 Time: 2:16:06 PM User: ala

Helvetia Road

Helvetia Road is a rural north-south roadway that begins at the interchange with US 26 and continues north past the limits of the Study Area. At Meier Road, the roadway turns left and continues westbound to the intersection of Jackson Quarry Road. Helvetia Road is classified through the city of Hillsboro and Washington County as an arterial roadway. For the majority of its length, Helvetia Road is two lanes without shoulders or sidewalks. Near the US 26 interchange, the road widens into a four-lane cross-section.

Cornelius Pass Road

Cornelius Pass Road is a five-lane arterial roadway with a two-way center left-turn lane. The roadway carries large traffic volumes to and from US 26. North of the interchange, Cornelius Pass Road provides access to businesses on the west side of the road and to residential areas on east side. South of US 26, Cornelius Pass Road provides access to businesses on both sides. The roadway has both sidewalks and bicycle lanes on both sides. The north end of Cornelius Pass Road is within in a school zone, but there is no 20 MPH posted school speed limit.

Jackson School Road

Jackson School Road is in unincorporated Washington County, outside the City of Hillsboro. Jackson School Road is a rural roadway that runs north-south from Shadybrook Road to NE Grant Street. The roadway generally has two lanes, but there are stretches where a left-turn lane is present. Jackson School Road is classified as an arterial by Washington County.

Sewell Road

Sewell Road is classified as a local street and lies outside the City of Hillsboro. Sewell Road is a two-lane road that provides access to the residential areas between Evergreen Road and Meek Road. There are no sidewalks or bicycle lanes on Sewell Road.

Evergreen Parkway/Road

Evergreen Parkway is a major east-west roadway that runs from Glencoe Road to Cornell Road. Evergreen Parkway has two lanes of traffic in each direction. A fifth lane in the center is composed of, in various parts of the corridor, a treed median, opposing left-turn lanes, and a two-way center left-turn lane. Evergreen Parkway is classified as an arterial roadway.

Meek Road

Meek Road runs east-west immediately south of and parallel to US 26 from Brookwood Parkway to Jackson School Road. Meek Road is two-way roadway with an approximate paved width between 22 and 24 feet. Meek Road is classified as a collector and has no sidewalks or bicycle lanes.

Jacobson Road

Jacobson Road is a three-lane collector roadway with a two-way center left-turn lane. It runs east-west from Cornelius Pass Road to Helvetia Road. Jacobson Road has sidewalks and bicycle

lanes on both sides east of Croeni Road. West of Croeni Road, there are intermittent sidewalks and bicycle lanes, generally on the south side.

West Union Road

West Union Road is an east-west two-lane road and is classified as an arterial roadway by Washington County. The roadway widens on the approach to Cornelius Pass Road, and sidewalks and an eastbound bicycle lane are present near that intersection. West Union Road is within a school zone that requires a 20 mph speed during school hours.

Century Boulevard

Classified as a collector roadway, Century Boulevard has three-lanes with a two-way center left-turn lane. Century Boulevard runs north-south from West Union Road to Five Oaks Drive with a gap in the road north of Jacobson Road. Century Boulevard has sidewalks and bicycle lanes.

Croeni Road

Croeni Road is a three-lane local roadway as classified by the City of Hillsboro. Croeni Road runs from Century Boulevard, across Jacobson Road and continues to Five Oaks Drive. There are sidewalks, but bicycle lanes are not present. Croeni Road south of Jacobson Road until Wagon Way is within a school zone that requires a 20 mph speed during school hours.

Groveland Drive

Groveland Drive is a two-lane local roadway. Groveland Drive runs parallel to US 26 from the Rice Northwest Museum of Rocks & Minerals to Helvetia Road. There are no sidewalks or bicycle lanes present.

Groveland Road

Groveland Road is a two-lane local roadway. Groveland Road runs north-south from north of West Union Road to Groveland Drive. There are no sidewalks or bicycle lanes present, and the majority of the section south of West Union Road is unpaved.

Pubols Road

Pubols Road is a two-lane local roadway as classified by Washington County. Pubols Road extends east from Helvetia Road and serves as a residential access. There are no sidewalks or bicycle lanes present.

Schaaf Road

Schaaf Road is a two-lane local roadway as classified by Washington County. Signage in place indicates Schaaf Road as a private drive, and there are no sidewalks or bicycle lanes present. Schaaf Road extends east from Helvetia Road and serves as residential access.

253rd Avenue

The north leg of 253rd Avenue is a two-lane local roadway as classified by Washington County. 253rd Avenue is unpaved and extends north of Evergreen Parkway, serving as a residential access. There are no sidewalks or bicycle lanes present. The south leg of 253rd Avenue is a driveway access to a private commercial business.

Eggiman Road/273rd Avenue

Eggiman Road/273rd Avenue is a two-lane local roadway as classified by Washington County. There are no sidewalks or bicycle lanes present. Eggiman Road/273rd Avenue extends north from Evergreen Parkway and serves as residential access.

Huffman Street

Classified as collector by Washington County, Huffman Street is a three-lane road with a two-way center left-turn lane. Huffman Street extends east from Brookwood Parkway until it becomes 235th Avenue. Huffman Street has both sidewalks and bicycle lanes.

235th Avenue

Classified as collector by Washington County, 235th Avenue varies between a two-lane road and a three-lane road. 235th Avenue travels north-south from just south of Evergreen Parkway to Huffman Street. North of Evergreen Parkway, 235th Avenue has both sidewalks and bicycle lanes, with only intermittent sidewalks present south of Evergreen Parkway.

Bennett Street

Classified as collector by Washington County, Bennett Street is a three-lane road with a two-way center left-turn lane. Bennett Street extends east from 235th Avenue until it becomes 229th Avenue. Bennett Street has both sidewalks and bicycle lanes.

229th Avenue

Classified as collector by Washington County, 229th Avenue is a three-lane road with a two-way center left-turn lane. 229th Avenue runs north-south from Cornell Road to Bennett Street. Within the Study Area, 229th Avenue has both sidewalks and bicycle lanes.

Imbrie Drive

Classified as collector by Washington County, Imbrie Drive is a three-lane road with a two-way center left-turn lane. Imbrie Drive runs east-west between Evergreen Parkway and Cornelius Pass Road. Imbrie Drive has sidewalks but no bicycle lanes.

Wagon Way

Wagon Way is an east-west road that extends west from Cornelius Pass Road. From Cornelius Pass Road to Croeni Road, Wagon Way is a three-lane road with a two-way center left-turn lane and is classified as a neighborhood route by Washington County. West of Croeni Road, Wagon Way is a two-lane local road. Sidewalks are consistently present on the north side of the road,

but are intermittently present on the south side. Wagon Way is within a school zone that requires a 20 mph speed during school hours.

Five Oaks Drive

Five Oaks Drive is a two-lane local road extending between Century Boulevard and Wagon Way. Sidewalks are present on the south side of the road between Croeni Road and Wagon Way, and there are no bicycle lanes.

Safety Summary

Traffic and roadway design engineers are continually engaged in working to ensure that a system is designed and operated such that the frequency and severity of crashes can be reduced for all modes of travel. Improving roadway safety (reducing the frequency and/or severity of crashes) requires consideration of several elements that influence traffic operations; in addition to design aspects of a roadway, driver education, enforcement, and emergency medical services are also essential.

A crash analysis was conducted to determine whether any significant, documented safety issues exist within the Study Area and to identify specific measures or general strategies for improving overall safety. As part of the crash analysis, historical crash data was reviewed, intersection crash rates were calculated, and the state's Safety Priority Index System (SPIS) was examined.

Crash History

The crash analysis included a review of crash history data supplied by the ODOT Crash Analysis and Reporting Unit for the period between January 1, 2008, and December 31, 2010, which were the three most recent full years for which crash data were available at the time of the analysis. **Figure 7** illustrates the breakdown of the crash types within the Study Area, and **Figure 8** breaks down the study area crashes by severity.

Figure 7. Crash Type[1]

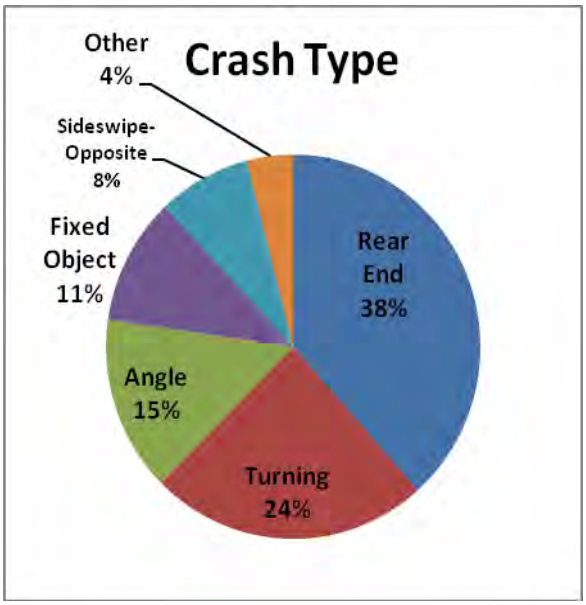
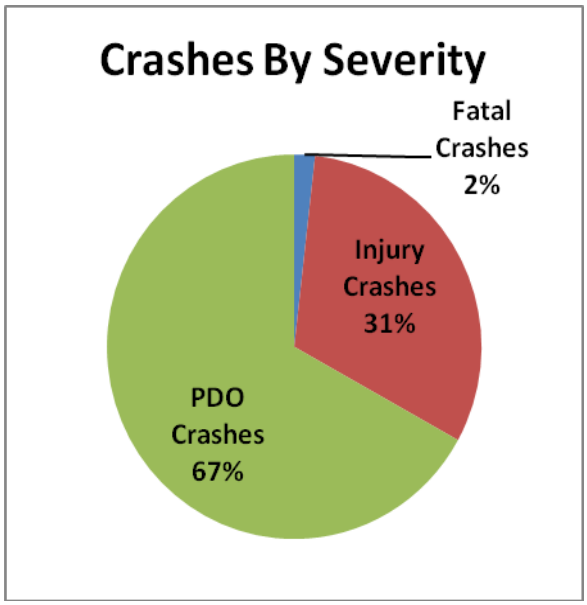


Figure 8. Crashes by Severity[1]



[1]These figures represent the combined total mainline and intersection crashes

For the study intersections, the ODOT database includes records for 182 crashes. The data highlights the Study Area as having high incidences of traffic crashes, and two reported serious injuries or fatalities. Approximately 30 percent (55 crashes) of all reported intersection crashes involved minor injuries, and 69 percent (125 crashes) were property-damage-only (PDO). The majority of crashes (63) were rear-end related crashes, which are frequently attributed to congestion and queuing. The next most frequent (53 crashes) type of crash was turning related. There were only two reported bicycle or pedestrian crashes within the Study Area. Although there are a high number of crashes, there are no obvious crash trends that would warrant mitigation, though modifications to the geometry at the unsignalized intersection of Jackson School Road at West Union Road have the potential to improve safety.

Crashes along US 26 are primarily rear-end, fixed-object, and sideswipe related. For the segment of US 26 surrounding the interchange, the ODOT database includes records for 42 crashes. The data highlight the corridor as having a low incidence of traffic crashes (with a crash rate significantly lower than the statewide average). One fatality and one serious injury were reported (5 percent of the freeway crashes). Approximately 36 percent of all reported crashes involved minor injuries, and the remaining 59 percent were property-damage-only (PDO). The majority of crashes (23) were rear-end related. There are no obvious crash trends that would warrant mitigation.

Crash Rates

Crash rates were calculated for the Study Area intersections and for the segment of US 26 surrounding the interchange. At intersections, the crash rate is calculated as the number of crashes per million vehicles entering the intersection. Intersections with a crash rate greater than 1.0 crashes per million entering vehicles (crashes/mev) generally warrant closer investigation but are not necessarily indicative of safety concerns.

Of the Study Area intersections, only one intersection warrants further investigation. The intersection of Jackson School Road at West Union Road has a crash rate above 2.0 crashes/mev, with an average of at least five crashes per year for the last three years. Almost all of the crashes were angle crashes, with the remaining being attributed to turning. For the US 26 segment within the Study Area (MP 59.00-MP 62.00), the crash rate is calculated as the number of crashes per million vehicle miles traveled (crashes/mvm). Along the US 26 segment surrounding the Study Area, the three-year average crash rate is 0.15 crashes/mev. This is approximately one-fourth of the most recent three-year (2007-2009) statewide average for similar facilities within the urban highway system of approximately 0.67 crashes/mev.[1]

Looking at each major roadway within the Study Area roads, two of the roads show crash rates above 1.0 crashes/mvm, including Cornelius Pass Road and Jackson School Road. In the case of Jackson School Road, the crash rate for the segment is likely high because of the high crash rate at the intersection with West Union Road. Similarly, Cornelius Pass Road has several reported crashes surrounding the connections at the US 26 interchange, most of which were rear-end crashes. Rear-end collisions commonly occur at signalized intersections because so many vehicles are required to stop with signalized traffic control.

The crash data is summarized in **Table 1**, with the detailed reports contained in **Appendix C**.

Table 1. Summary of Collision Types within the Study Area (January 1, 2008 through December 31, 2010)

Study Location	Collision Type										Total	Severity			3-Year Crash Rate (crashes/mev)
	Rear End	Fixed Object	Angle	Other	Backing	Turning	Sideswipe-Opposite	Sideswipe-Meeting	Non-Collision	Pedestrian		Fatal & Serious Injury Crashes	Injury Crashes	PDO Crashes	
Cornelius Pass Road - From West Union Road to Evergreen Parkway	27	2	5	0	0	14	8	0	0	1	57	0	17	40	1.22
Evergreen Parkway - From Cornelius Pass Rd to Jackson School Rd.	6	4	5	0	0	12	1	1	0	1	30	0	10	20	0.38
Brookwood Parkway / Helvetia Road - From West Union Road to Evergreen Parkway	19	3	6	0	0	7	1	2	1	0	39	2	9	28	0.71
Jackson School Road - From West Union Road to Evergreen Parkway	9	5	9	0	0	15	0	1	0	0	39	0	10	29	1.80
Jacobson Road - From Cornelius Pass Rd to Helvetia Road	2	0	3	0	0	1	0	0	0	0	6	0	2	4	0.56
West Union Road - From Jackson School Road to Evergreen Parkway	0	1	5	0	1	4	0	0	0	0	11	0	7	4	0.44
Total Roadway Crashes	63	15	33	0	1	53	10	4	1	2	182	2	55	125	

[1] 2009 Oregon State Highway Crash Rate Tables, Table 4, ODOT, August 2010.

Study Location	Collision Type										Total	Severity			3-Year Crash Rate (crashes/mev)
	Rear End	Fixed Object	Angle	Other	Backing	Turning	Sideswipe-Opposite	Sideswipe-Meeting	Non-Collision	Pedestrian		Fatal & Serious Injury Crashes	Injury Crashes	PDO Crashes	
US 26	23	9	0	1	0	1	8	0	0	0	42	2	15	25	0.15
Total Study Area Crashes	86	24	33	1	1	54	18	4	1	2	224	4	70	150	

Safety Priority Index System (SPIS)

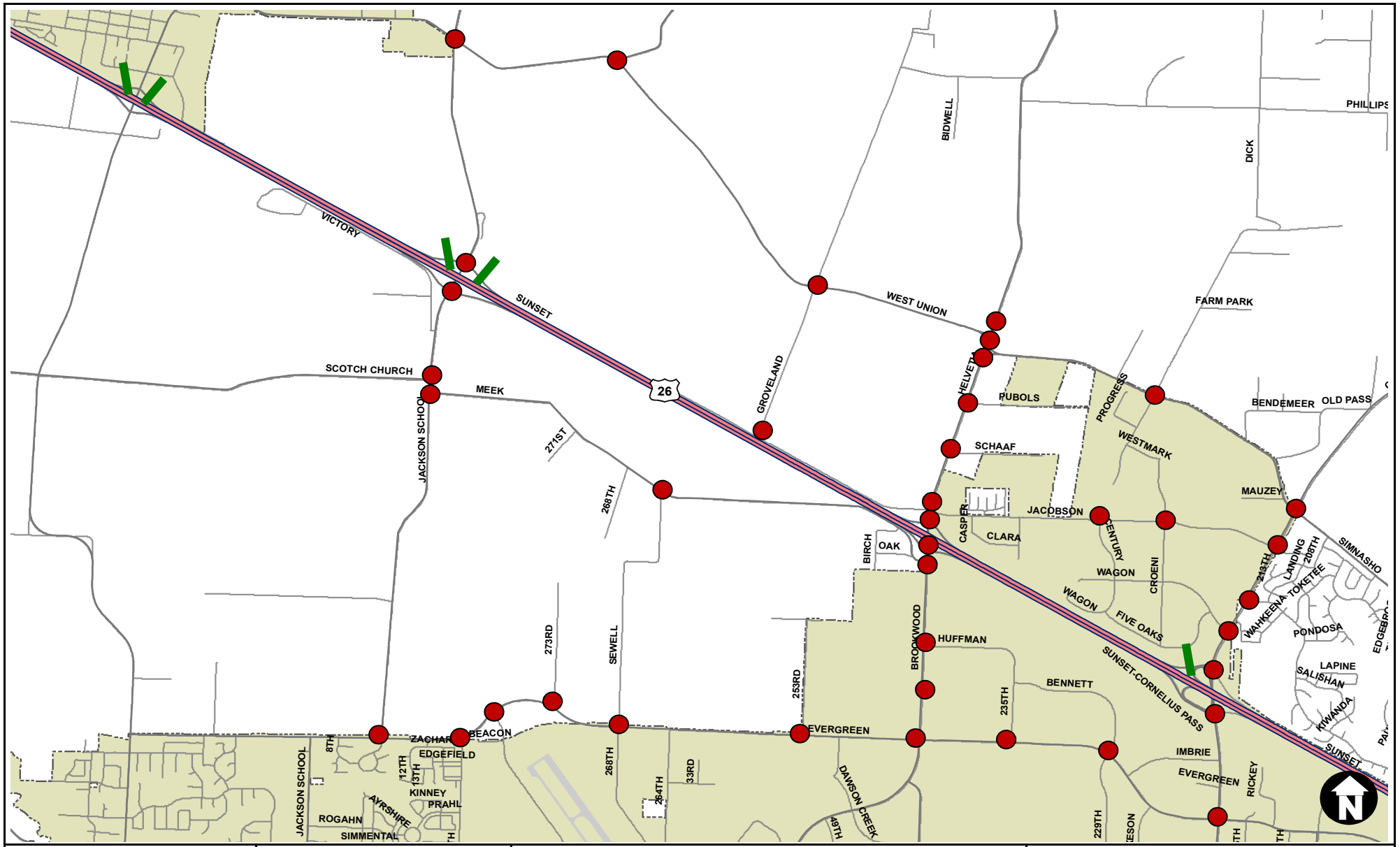
The SPIS is a method used in Oregon to identify safety problem areas along state highways. Highways are evaluated in approximately one-tenth-mile increments (often grouped into larger segments). Each year these segments are ranked by assigning a SPIS score based on the frequency and severity crashes observed, while taking traffic volume into account. When a segment is ranked in the top 10 percent of the index, a crash analysis is typically warranted, and corrective actions are considered. Along US 26 within the Study Area, there are no segments identified in the top 10 percent of the most recent (2010) SPIS rankings.

Traffic Volumes

This section summarizes the traffic data collection, and identifies any traffic count data inconsistencies and resolutions. It includes analysis of traffic count information, historical adjustments of traffic counts to the existing year, application of adjustment factors to account for seasonal variation, and developed volumes for the 30th highest hour and the Average Daily Traffic (ADT) volume. Traffic count information includes vehicle classification shown as truck percentages for locations that used manual classification counts.

Traffic Data Collection

Traffic volume data collected for this project primarily consisted of new intersection turn movement counts, though there was a number of historical turn movement counts used. There were 39 intersections where data were collected. **Appendix D (Sec. D-1)** lists all the intersection turn movement count locations and their individual AM and PM peak hours, along with the year they were counted. **Figure 9** is a map of the 39 turn movement and five 24-hour classification count locations. The traffic volume data were examined to determine the weekday common (average) AM and PM peak hours among the intersections. The common peak hour for the intersections was 7:30 to 8:30 in the AM and 4:45 to 5:45 in the PM. The peak hour at each intersection may or may not correspond to the common peak hour, but all individual peak hours generally overlap within at least a portion of the common peak hour.



DRAFT

DAVID EVANS AND ASSOCIATES INC.

Oregon Department of Transportation

Legend

- Turn Movement data collection location
- 24-hour classification count location

FIGURE 9

Data Collection Map

US 26 / Brookwood / Helvetia IAMP

Seasonal Volume Adjustment

As specified in ODOT's Analysis Procedures Manual (APM)[2] and briefly described here, the traffic counts, which were collected at varying times of the year, must be adjusted using a seasonal factor to reflect volume during the peak month of the year. The seasonal factor is determined from automatic traffic recorders (ATRs), which are electronic counting sites on roadways that count vehicles continuously. It is desirable to obtain data from ATRs that (1) are within the IAMP study area, (2) are on similar roadway types or within similar area types, or (3) have similar seasonal trend characteristics. The seasonal adjustment factors for the IAMP study area are based on two similar ATRs located within similar area types elsewhere in Oregon. The seasonal factors used for the IAMP project are shown in **Table 2**. The data used in calculating the seasonal factors are included in **Appendix D (Sec. D-2)**.

Table 2. Seasonal Adjustment Factors for US 26/Brookwood Parkway/Helvetia Road IAMP Project

Month	Seasonal Factor
March	1.11
May	1.05
July (peak month)	1.00
October	1.07

Annual Volume Adjustment

The counts used for this analysis are also from varying years and must be adjusted to a common year for analysis. Typically traffic counts from past years would be adjusted to the most current year. However, after consultation with ODOT staff about the current state of the economy, which has caused volumes to decrease in recent years, it was determined that counts should be adjusted to the year with the highest ADT. Comparisons of ADT volumes on Cornelius Pass Road show that peak volumes occurred in 2007. Although existing conditions are being evaluated for year 2011, all traffic volumes are adjusted to the peak year of 2007. The annual adjustment factors used are shown in **Table 3**. The data used in calculating the annual factors are included in **Appendix D (Sec. D-2)**.

[2] Analysis Procedures Manual, Oregon Department of Transportation, Transportation Development Division Planning Section, Transportation Planning and Analysis Unit, Salem, Oregon, April 2006, Section 4.3.

Table 3. Annual Adjustment Factors for US 26/Brookwood Parkway/Helvetia Road IAMP Project

Year	Annual Factor
2007	1.00
2010	0.98
2011 (year of analysis)	1.00

Peak Hour Volumes

After annual and seasonal adjustments were made, the volumes were balanced to achieve a uniform dataset for analysis. The final AM and PM peak hour volumes for all study intersections are shown for the US 26/Brookwood Parkway/Helvetia Road IAMP in **Figure 10** through **Figure 12**. Peak hour volumes were calculated for a total of 39 intersections in the PM peak hour. AM peak hour volumes are shown for only 15 locations. The AM peak hour locations are locations were the total entering AM peak hour volume is higher than the PM peak hour or AM peak hour operations are anticipated to be more congested then the PM peak hour. The calculations used to balance the AM and PM peak hour volumes can be seen in **Appendix D (Sec. D-3)**.

ADT Volumes

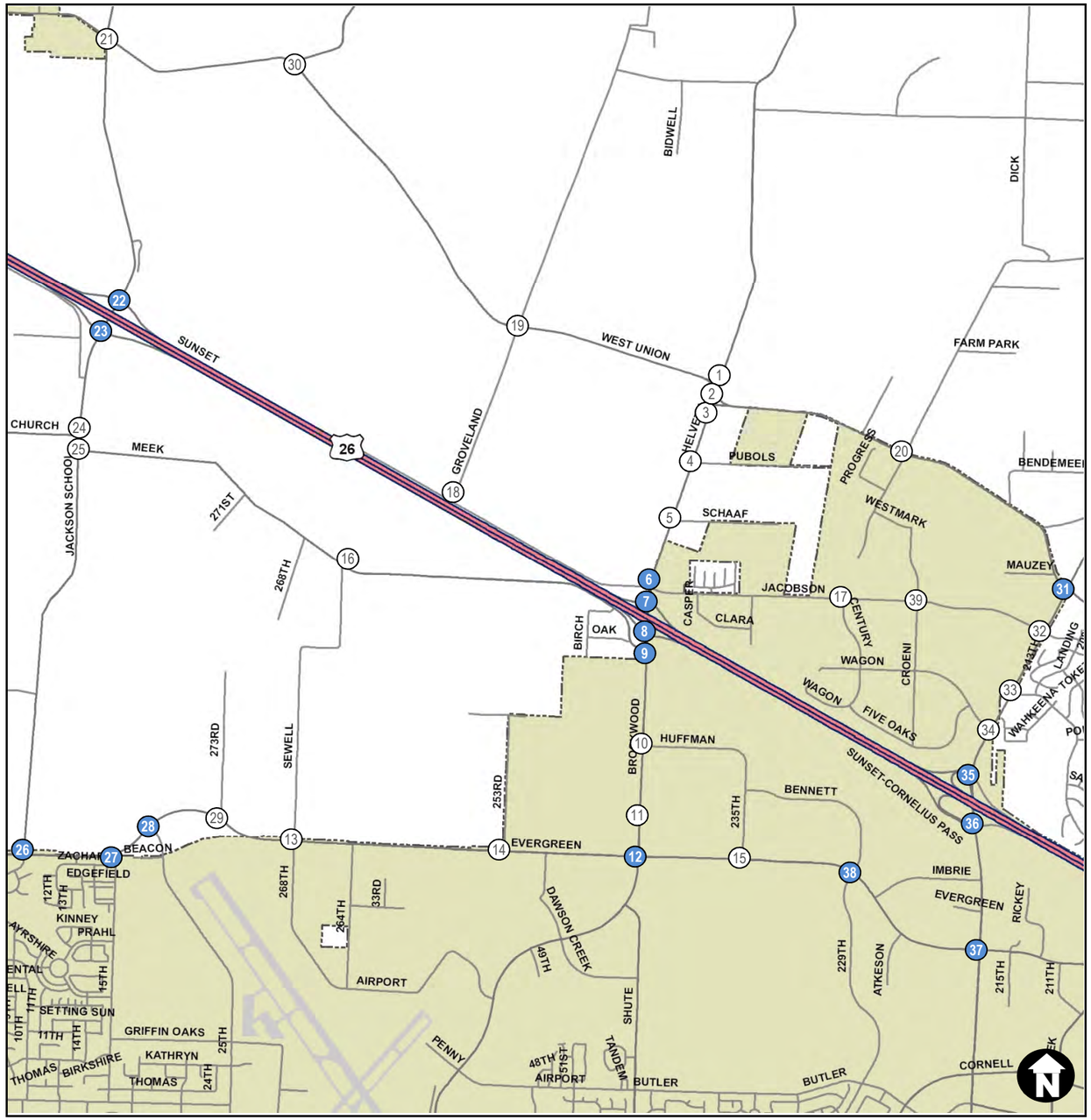
Average daily traffic (ADT) volumes were calculated at several points in the Study Area. The volumes were developed using the following methodology.

First, Study Area K-factors were created. The K-factor is defined as the percent of the 24-hour volume that occurs during the daily peak hour. Twenty-four-hour tube counts collected during 2010 and 2011 at 22 locations in the Study Area were used to determine the Study Area K-factors. For the Study Area, the K-factors were determined using the PM peak hour volumes, because they were the highest hourly volumes during the day. For areas outside of the Brookwood interchange management area, the K-factor was determined to be 0.095; the K-factor for areas within the interchange management area was calculated to be 0.10; and the K-factors for the US 26 mainline were calculated to be 0.08 east of Brookwood Parkway, and 0.096 west of Brookwood Parkway. ADT volumes were determined for 36 locations in the Study Area by taking the PM peak hourly volume and dividing it by the K-factor. The calculations used can be seen in **Appendix D (Sec. D-4)**.The ADT volumes are shown in **Figure 13**.

Traffic Operations

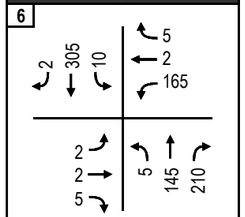
Operational Criteria

Transportation engineers have established various methods for measuring traffic operations of roadways and intersections. Most jurisdictions use either volume-to-capacity (v/c) ratio or level of service (LOS) to establish performance criteria. Both the LOS and v/c ratio concepts require consideration of factors that include traffic demand, capacity of the intersection or roadway, delay, frequency of interruptions in traffic flow, relative freedom for traffic maneuvers, driving comfort, convenience, and operating cost.



Helvetia Rd @ Jacobson Rd

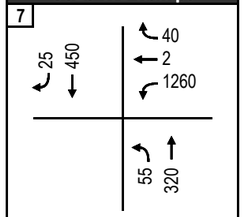
6



TEV = 858

Brookwood Pkwy @ US26 WB Ramps

7



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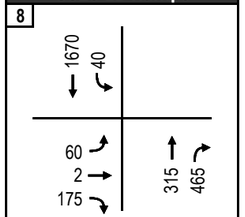
Brookwood Pkwy @ US26 EB Ramps

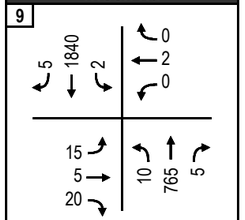
8



TEV = 2727

Brookwood Pkwy @ Meek Rd

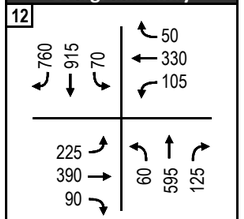
9



TEV = 2669

Brookwood Pkwy @ Evergreen Pkwy

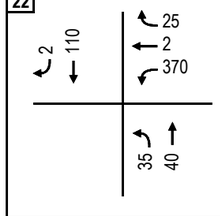
12



TEV = 3715

Jackson Sch Rd @ US26 WB Ramps

22



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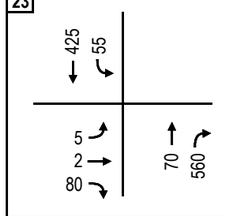
Jackson Sch Rd @ US26 EB Ramps

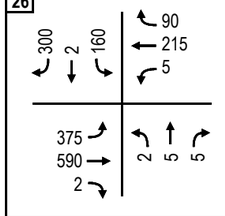
23



TEV = 1197

Jackson Sch Rd @ Evergreen Pkwy

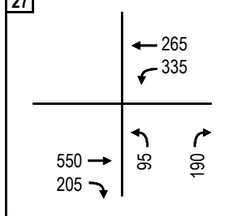
26



TEV = 1751

15th Avenue @ Evergreen Pkwy

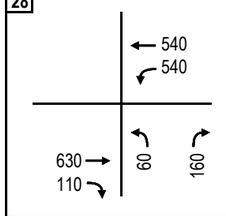
27



TEV = 1640

25th Avenue @ Evergreen Pkwy

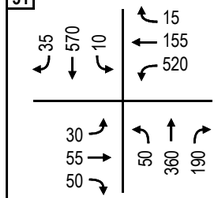
28



TEV = 2040

Cornelius Pass Rd @ West Union Rd

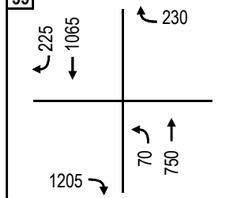
31



TEV = 2040

Cornelius Pass Rd @ US26 WB Ramps

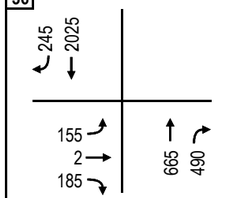
35



TEV = 3090

Cornelius Pass Rd @ US26 EB Ramps

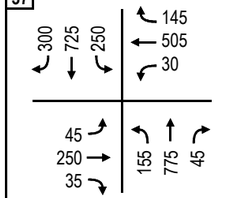
36



TEV = 3522

Cornelius Pass Rd @ Evergreen Pkwy

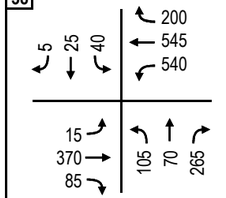
37



TEV = 3260

229th Avenue @ Evergreen Pkwy

38



TEV = 2265

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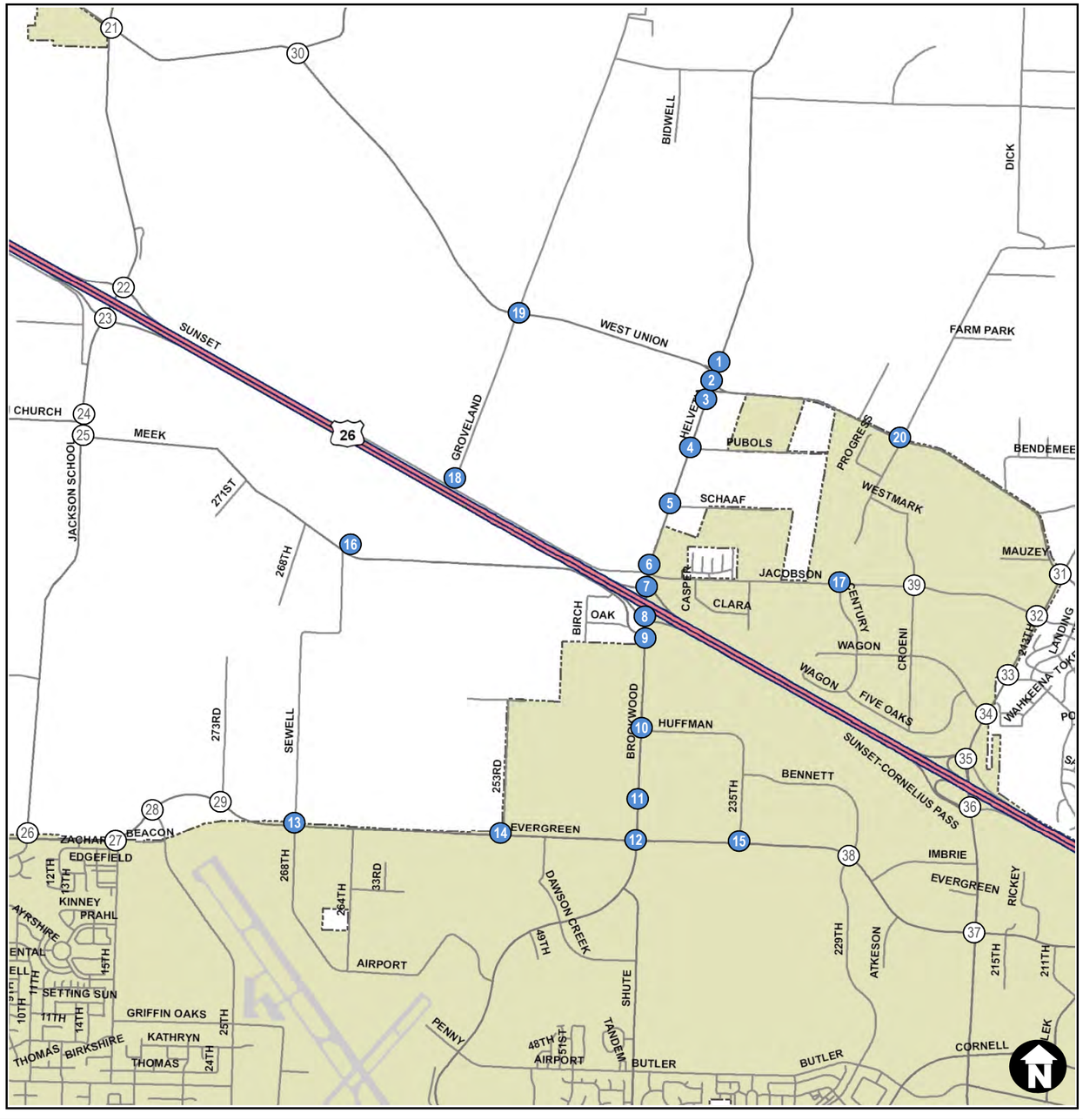
Legend

123	Peak Hour Volume	##	Intersection evaluated
→	Turning Movement	(##)	Intersection not evaluated in AM Peak Hour
TEV:	Total Entering Volume		

FIGURE 10

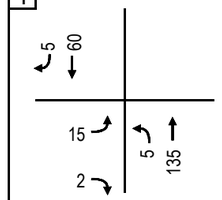
2011 Existing Conditions
Turning Movement Traffic Volumes
AM Peak Hour

US 26 / Brookwood / Helvetia IAMP



Helvetia Rd North @ West Union Rd

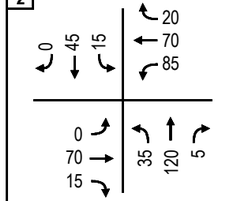
1



Overall = 222

Helvetia Rd Middle @ West Union Rd

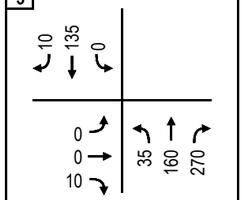
2



Overall = 480

Helvetia Rd South @ West Union Rd

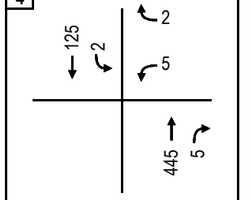
3



Overall = 620

Helvetia Rd @ Pubols Rd

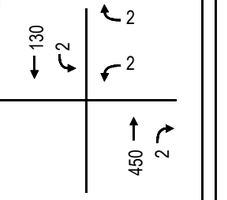
4



Overall = 584

Helvetia Rd @ Schaff Rd

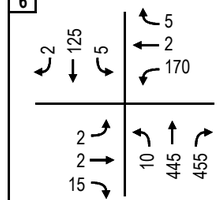
5



Overall = 588

Helvetia Rd @ Jacobson Rd

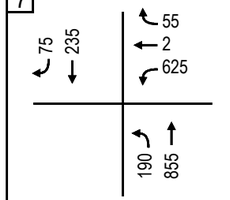
6



Overall = 1238

Brookwood Pkwy @ US26 WB Ramps

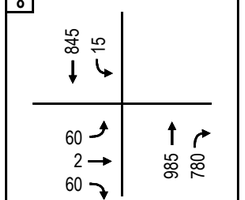
7



Overall = 2037

Brookwood Pkwy @ US26 EB Ramps

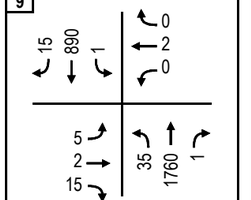
8



Overall = 2747

Brookwood Pkwy @ Meek Rd

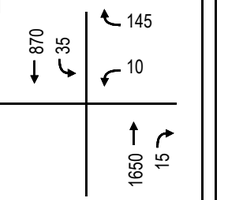
9



Overall = 2726

Brookwood Pkwy @ Huffman Street

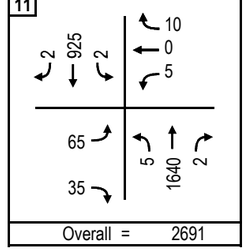
10



Overall = 2725

Brookwood Pkwy @ Genentech Access

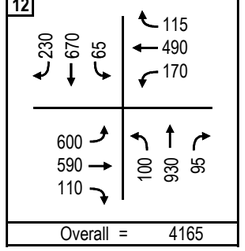
11



Overall = 2691

Brookwood Pkwy @ Evergreen Pkwy

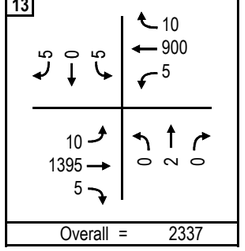
12



Overall = 4165

Sewell Rd @ Evergreen Pkwy

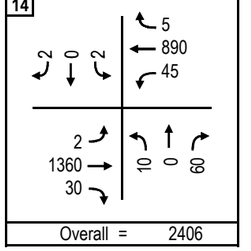
13



Overall = 2337

Meier-Jurgen Rd @ Evergreen Pkwy

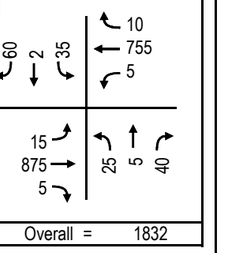
14



Overall = 2406

235th Avenue @ Evergreen Pkwy

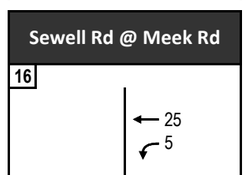
15



Overall = 1832

Sewell Rd @ Meek Rd

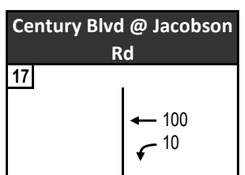
16



Overall = 60

Century Blvd @ Jacobson Rd

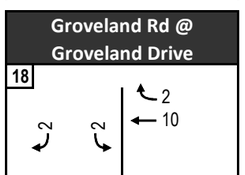
17



Overall = 665

Groveland Rd @ Groveland Drive

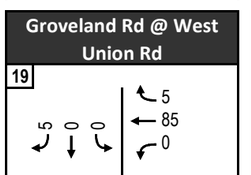
18



Overall = 28

Groveland Rd @ West Union Rd

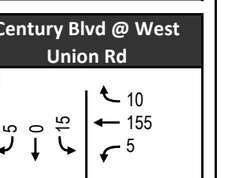
19



Overall = 192

Century Blvd @ West Union Rd

20



Overall = 572

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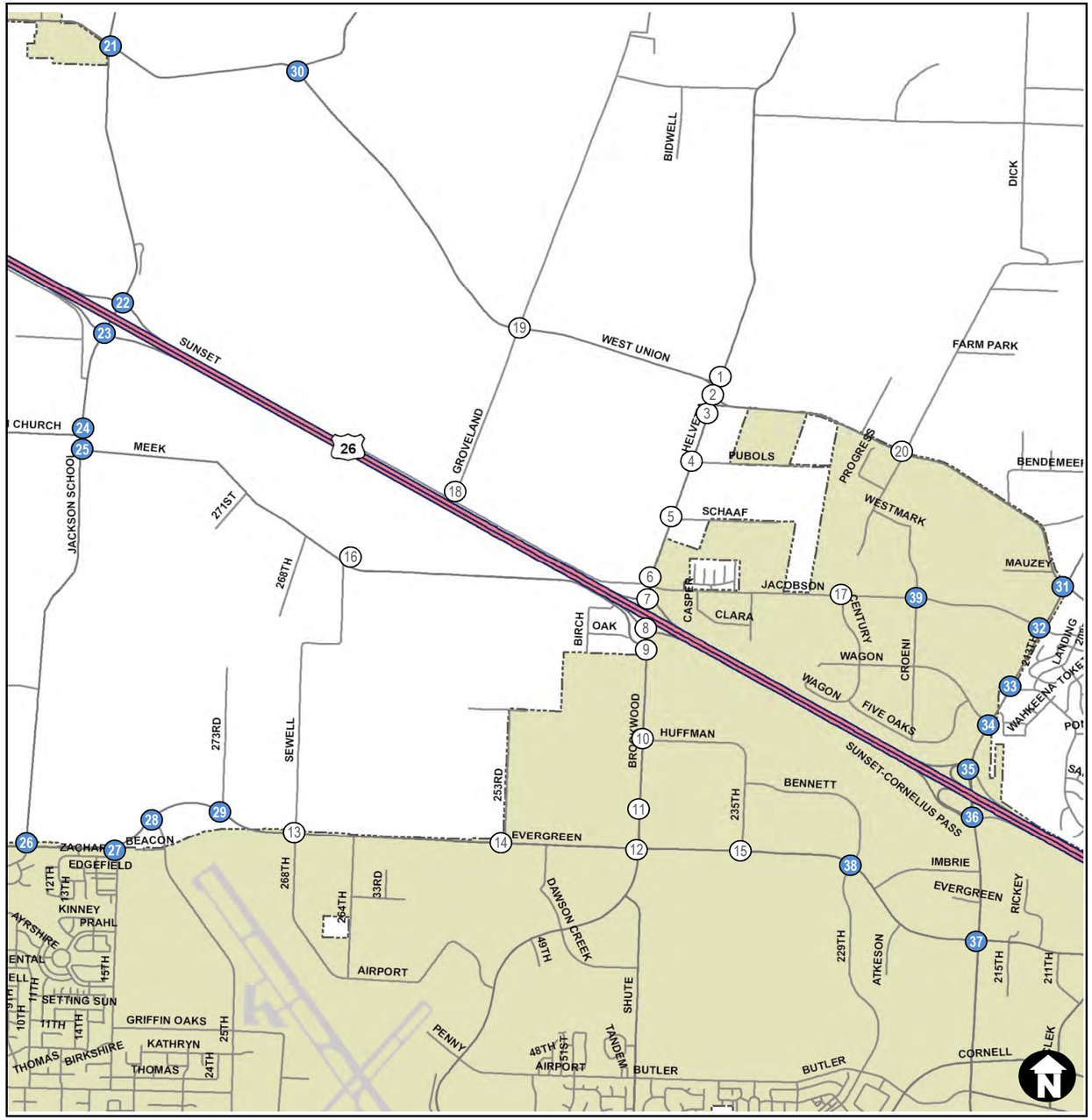
Legend

123	Peak Hour Volume	##	Intersection volumes shown
→	Turning Movement	##	Intersection volumes shown on separate figure
TEV:	Total Entering Volume		

FIGURE 11

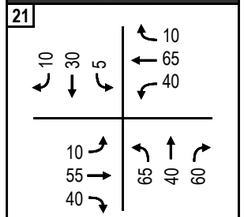
2011 Existing Conditions
Turning Movement Traffic Volumes
PM Peak Hour

US 26 / Brookwood / Helvetia IAMP



Jackson Sch Rd @ West Union Rd

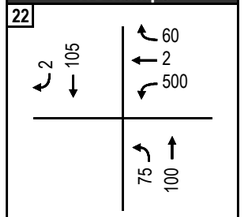
21



Overall = 430

Jackson Sch Rd @ US26 WB Ramps

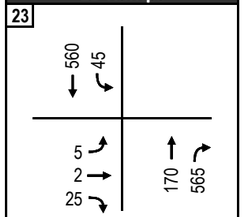
22



Overall = 844

Jackson Sch Rd @ US26 EB Ramps

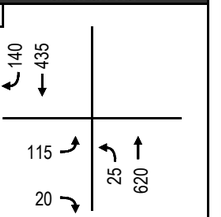
23



Overall = 1372

Jackson Sch Rd @ Scotch Church Rd

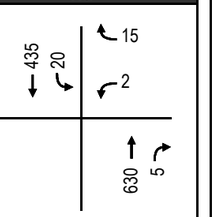
24



Overall = 1355

Jackson Sch Rd @ Meek Rd

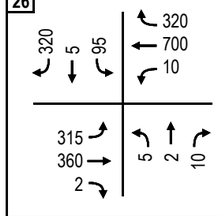
25



Overall = 1107

Jackson Sch Rd @ Evergreen Pkwy

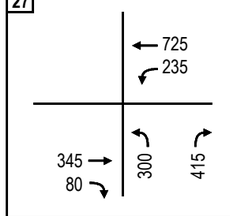
26



Overall = 2144

15th Avenue @ Evergreen Pkwy

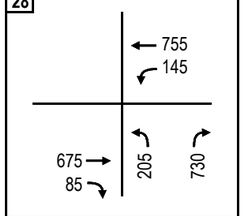
27



Overall = 2100

25th Avenue @ Evergreen Pkwy

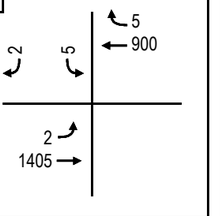
28



Overall = 2595

Eggiman Rd @ Evergreen Pkwy

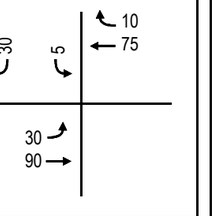
29



Overall = 2319

Jackson Quarry Rd @ West Union Rd

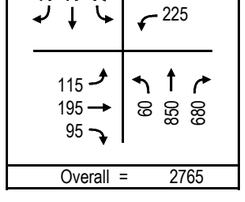
30



Overall = 240

Cornelius Pass Rd @ West Union Rd

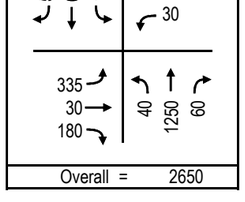
31



Overall = 2765

Cornelius Pass Rd @ Jacobson Rd

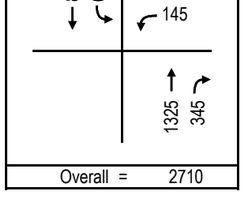
32



Overall = 2650

Cornelius Pass Rd @ Rock Creek Blvd

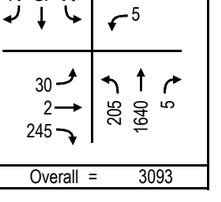
33



Overall = 2710

Cornelius Pass Rd @ Wagon Way

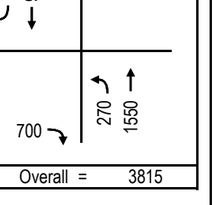
34



Overall = 3093

Cornelius Pass Rd @ US26 WB Ramps

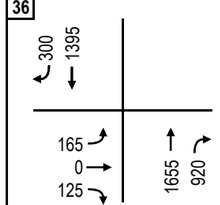
35



Overall = 3815

Cornelius Pass Rd @ US26 EB Ramps

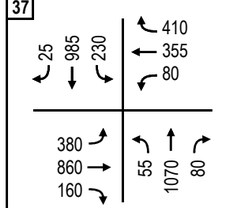
36



Overall = 4260

Cornelius Pass Rd @ Evergreen Pkwy

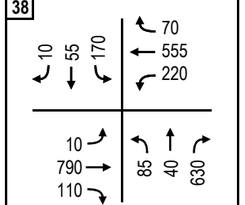
37



Overall = 4690

229th Avenue @ Evergreen Pkwy

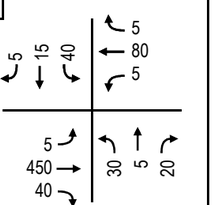
38



Overall = 2745

Croeni Rd @ Jacobson Rd

39



Overall = 700

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Oregon Department of Transportation

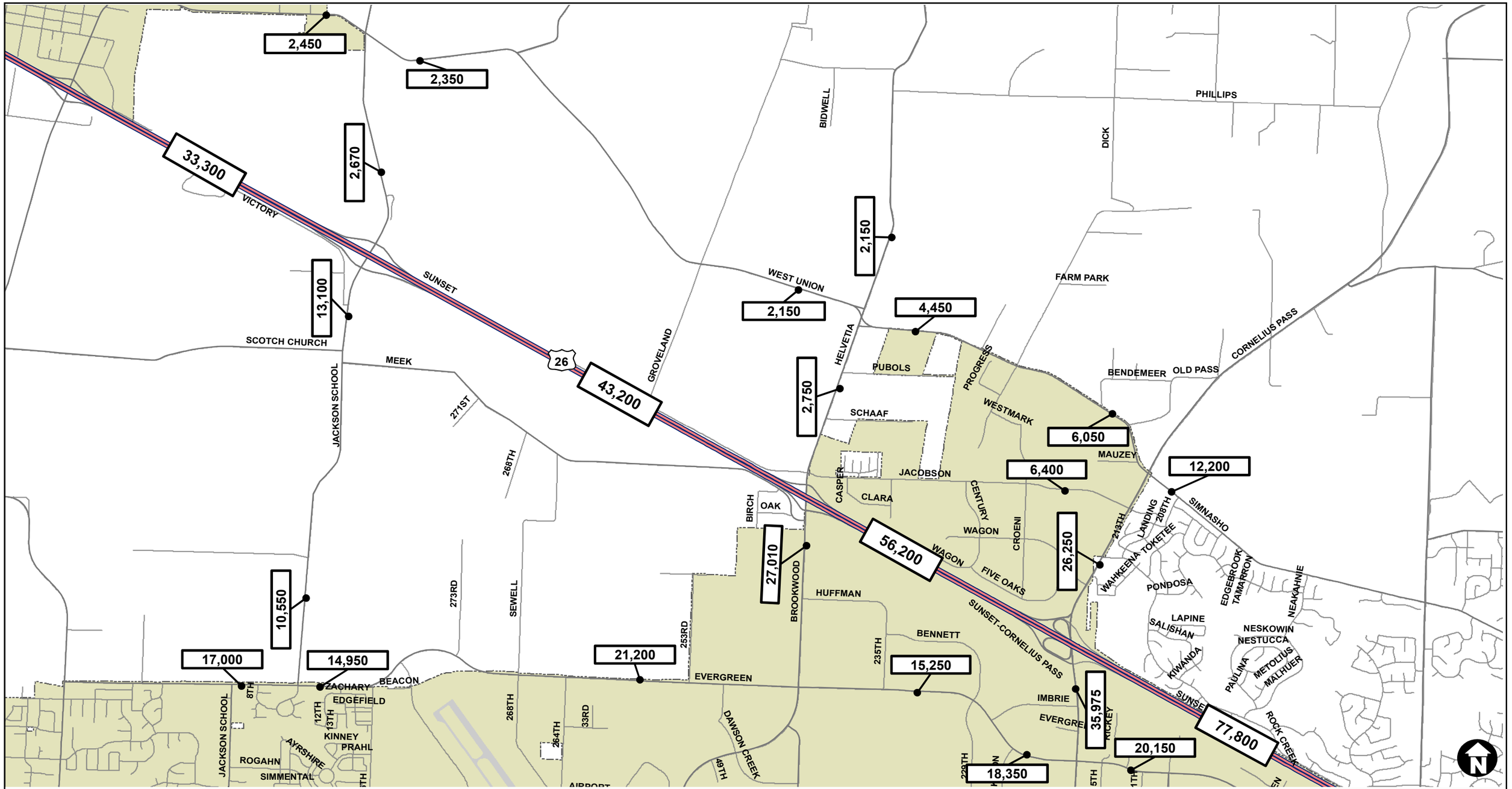
Legend

123	Peak Hour Volume	##	Intersection volumes shown
→	Turning Movement	(##)	Intersection volumes shown on separate figure
TEV:	Total Entering Volume		

FIGURE 12

2011 Existing Conditions
Turning Movement Traffic Volumes
PM Peak Hour

US 26 / Brookwood / Helvetia IAMP



DAVID EVANS AND ASSOCIATES INC.

Oregon Department of Transportation

Legend

15,000 — 2011 Average Daily Traffic (ADT)

FIGURE 13

2011 Existing Conditions Average Daily Traffic

US 26 / Brookwood / Helvetia IAMP

Volume-to-Capacity (V/C) Ratio

A comparison of traffic volume demand to intersection capacity is one method of evaluating how well an intersection is operating. This comparison is presented as a v/c ratio. A v/c ratio of less than 1.00 indicates that the volume is less than capacity. When the v/c ratio is closer to zero, traffic conditions are generally good, with little congestion and low delays for most intersection movements. As the v/c ratio approaches 1.00, traffic becomes more congested and unstable, with longer delays.

Level of Service (LOS)

LOS is also a widely recognized and accepted measure and descriptor of traffic operations. At both STOP-controlled and signalized intersections, LOS is a function of control delay, which includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. Six standards have been established, ranging from LOS A, where there is little or no delay, to LOS F, where there is delay of more than 50 seconds at unsignalized intersections, or more than 80 seconds at signalized intersections.

It should be noted that, although delays can sometimes be long for some movements at a STOP-controlled intersection, the v/c ratio may indicate that there is adequate capacity to process the demand for that movement. Similarly, at signalized intersections, some movements, particularly side street approaches or left turns onto side streets, may experience longer delays because they receive only a small portion of the green time during a signal cycle, but their v/c ratio may be relatively low. For these reasons, it is important to examine both v/c ratio and LOS when evaluating overall intersection operations. Both are reported in the following section.

Operational Standards

The OHP has established several policies that enforce general objectives and approaches for maintaining highway mobility. Of these policies, the Highway Mobility Standards (Policy 1F) establish maximum v/c ratio standards for peak hour operating conditions for all highways in Oregon based on the location and classification of the highway segment being examined. The OHP policy also specifies that the v/c ratio standards be maintained for ODOT facilities through a 20-year horizon.

Hillsboro, Washington County, and Metro also have their own performance standards. Hillsboro uses LOS as a performance standard, while Washington County and Metro use v/c ratio standards. For the existing conditions, **Table 4** below provides a summary of applicable operational standards for each jurisdiction. These standards are outlined in their corresponding Transportation System Plans and master plans. Generally, where approaches are maintained by different jurisdictions, the more restrictive of the performance standards is applied.

Table 4. Summary of Operational Standards for Existing Conditions

Jurisdiction	Operational Standard
ODOT	
Outside Metro UGB and not within another UGB[1]	0.70 v/c
US 26, west of Sylvan, inside Metro UGB[2]	0.99 v/c (1st hour)
US 26 Ramp Terminals, inside Metro UGB	0.85
US 26 Ramp Terminals, outside Metro UGB	0.70
City of Hillsboro[3]	LOS D
Washington County[4]	
Inside UGB	0.99 v/c
Outside UGB	0.90 v/c
Metro[5]	0.99 v/c

1. Existing requirements outlined in 2009 OHP Mobility Standard Guidelines Table 6 and based on v/c.
2. Existing requirements outlined in 2009 OHP Mobility Standard Guidelines Table 6 and based on v/c and Metro interim regional mobility policy standards as outlined in the 2035 RTP, Table 2.4.
3. City of Hillsboro operating standards outlined in the Hillsboro Comprehensive Plan, Section 13.D.
4. Washington County operating standards outlined in Washington County Comprehensive Plan.
5. Metro 2035 Regional Transportation Plan.

Traffic Operations Analysis Procedures

All operations were evaluated using the methodology outlined in the *2000 Highway Capacity Manual* (HCM) along with the procedures outlined in ODOT's Analysis Procedures Manual (APM). The Synchro/SimTraffic analysis software was selected to perform the intersection analysis, since it can provide the v/c ratio and LOS output of an HCM analysis as well as consider the systematic interaction of the intersections with regard to queuing and delays.

Synchro is a macroscopic model similar to the Highway Capacity Software (HCS), and like the HCS, is based on the 2000 HCM. The Synchro model explicitly evaluates traffic operations under coordinated and uncoordinated systems of signalized and unsignalized intersections. The v/c ratios and LOS presented in this report are based on the Synchro model output.

SimTraffic animates traffic flow based on input volumes and signal timing and allows viewing of traffic flow under saturated traffic conditions, where traffic may spill over from one intersection to another. It is particularly effective at evaluating closely spaced intersections. For locations were HCM is not applicable, the SimTraffic model was run multiple times using different arrival patterns to determine how sensitive traffic operations are in response to subtle variations in traffic flows. If it is determined that SimTraffic is needed, the 95th percentile queues from the SimTraffic model are also evaluated.

As noted above, the results from both Synchro and SimTraffic may be considered in this report. Because these programs evaluate operations using different methodologies, the analysis results sometimes vary; however, the differences are generally minor unless saturated or congested conditions are present. Under saturated conditions, SimTraffic queuing and delays present results that reflect how congested intersections impact each other, while Synchro represents intersection performance in isolation and may reflect better performance results.

Existing Intersection Operations

Traffic operations were evaluated at all 39 Study Area intersections during the PM peak hour and at the 15 key AM peak hour intersections. **Figures 14** through **16** present the v/c ratios and LOS performance by lane group for the Study Area intersections. These findings reflect the current signal timing plans implemented at all signalized intersections. **Table 5** below summarizes the intersections that exceed operational standards. Four of the seven intersections fail because the intersection is operating at capacity given the current demand volume during peak periods. The other three intersections do not meet standards because the overall delay is too high for the City standard or the demand volume is too close to the capacity of the intersection to meet operational standards. Detailed analysis worksheets are presented in **Appendix E-1**.

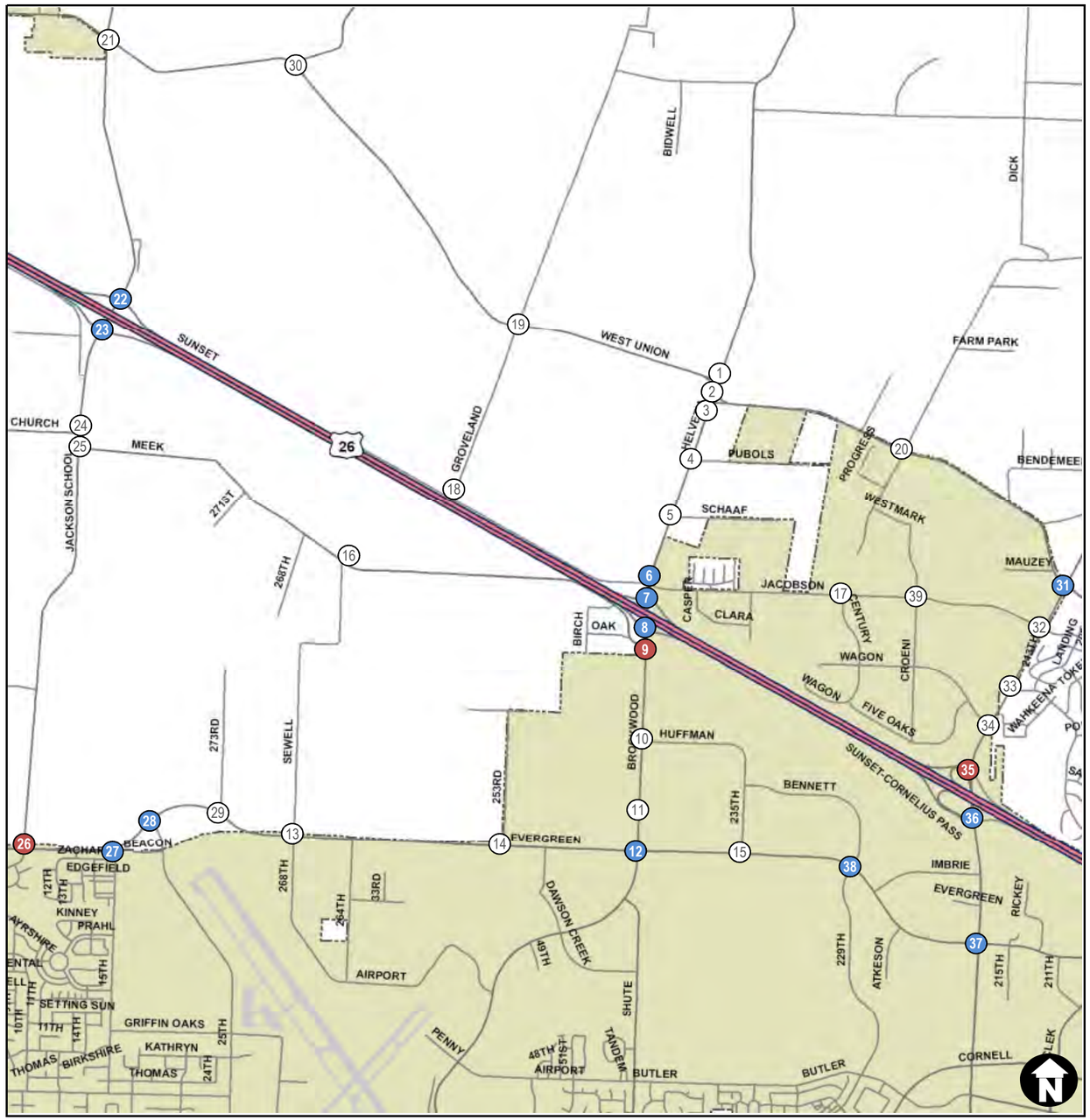
Table 5. Intersections Where Operational Standards Are Not Met

Location	AM		PM		Jurisdiction Where Operational
	v/c	LOS	v/c	LOS	
9. Brookwood Pkwy at Meek Rd	**>1.0**	**F**	0.33	**F**	All
11. Brookwood Pkwy at Genentech Access	Not analyzed in AM Peak Hour		**>1.0**	**F**	County & City
22. Jackson School Rd at US-26 Westbound Ramps	0.63	C	0.98	**F**	ODOT & County
24. Jackson School Rd at Scotch Church Rd	Not analyzed in AM Peak Hour		0.83	**F**	City
26. Jackson School Rd at Evergreen Pkwy	0.85	**E**	0.89	D	City
35. Cornelius Pass Rd at US-26 Westbound Ramps	**>1.0**	**F**	0.91	**D**	All
37. Cornelius Pass Rd at Evergreen Pkwy	0.79	D	**>1.0**	**E**	All

Notes:
1. **SHADED** cell indicates intersection that fails to meet operational standards.
2. "All" indicates the following jurisdictions: ODOT, City of Hillsboro, Washington County, and Metro.
3. For a signalized intersection, the overall operation of the intersection is reported. For an unsignalized intersection, the worst stopped (or yield) movement is reported.

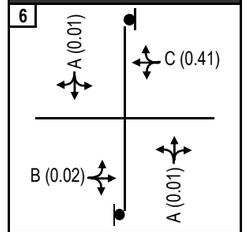
Existing Freeway Operations

HCS was used to determine freeway operations along US 26 between the Jackson School Road interchanges and the Cornelius Pass Road interchange. **Figure 17** summarizes the v/c ratios for US 26 in the Study Area mainline, merge, and diverge areas. As shown in **Figure 17**, US 26 within the Study Area is operating within ODOT standards. Detailed analysis worksheets are presented in **Appendix E-2**.



Helvetia Rd @ Jacobson Rd

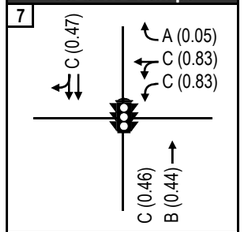
6



V/C: 0.41	LOS: C

Brookwood Pkwy @ US26 WB Ramps

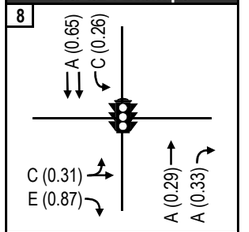
7



V/C: 0.64	LOS: C

Brookwood Pkwy @ US26 EB Ramps

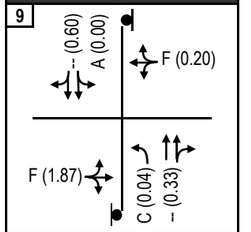
8



V/C: 0.68	LOS: A

Brookwood Pkwy @ Meek Rd

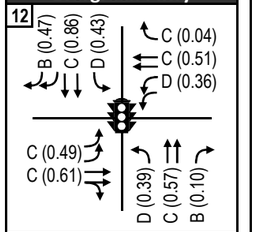
9



V/C: >1.0	LOS: F

Brookwood Pkwy @ Evergreen Pkwy

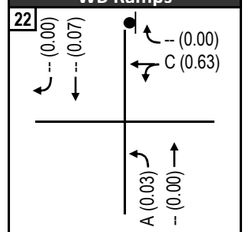
12



V/C: 0.62	LOS: C

Jackson Sch Rd @ US26 WB Ramps

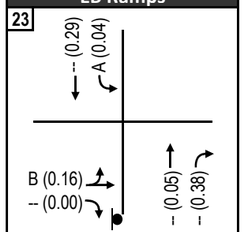
22



V/C: 0.63	LOS: C

Jackson Sch Rd @ US26 EB Ramps

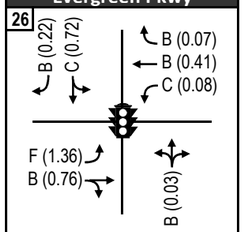
23



V/C: 0.16	LOS: B

Jackson Sch Rd @ Evergreen Pkwy

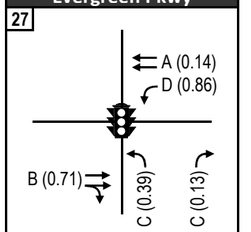
26



V/C: 0.85	LOS: E

15th Avenue @ Evergreen Pkwy

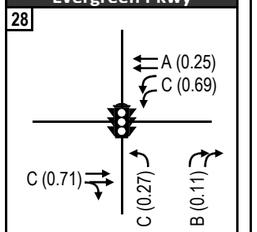
27



V/C: 0.69	LOS: C

25th Avenue @ Evergreen Pkwy

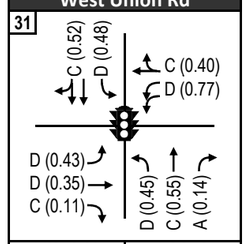
28



V/C: 0.62	LOS: B

Cornelius Pass Rd @ West Union Rd

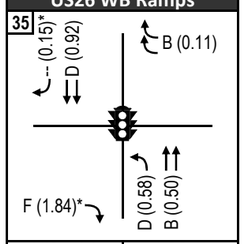
31



V/C: 0.60	LOS: C

Cornelius Pass Rd @ US26 WB Ramps

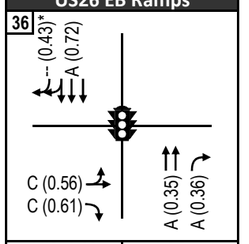
35



V/C: >1.0	LOS: F

Cornelius Pass Rd @ US26 EB Ramps

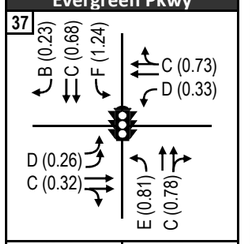
36



V/C: 0.69	LOS: A

Cornelius Pass Rd @ Evergreen Pkwy

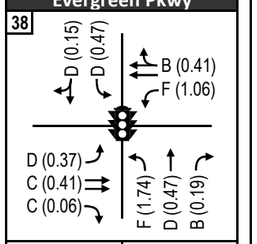
37



V/C: 0.79	LOS: D

229th Avenue @ Evergreen Pkwy

38



V/C: 0.72	LOS: D

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Legend

- Signalized inersection
- STOP Controlled Approach
- Lane Configuration
- **V/C:** Volume-to-Capacity Ratio
- **LOS:** Level of Service
- **A (0.01)** Lane Group LOS (V/C)
- (#) Intersection evaluated
- (#) Intersection fails operational standard
- (#) Intersection volumes shown on separate figure
- -- LOS not reported for free movements
- V/C: 0.01 | LOS: A Overall Intersection Operations**

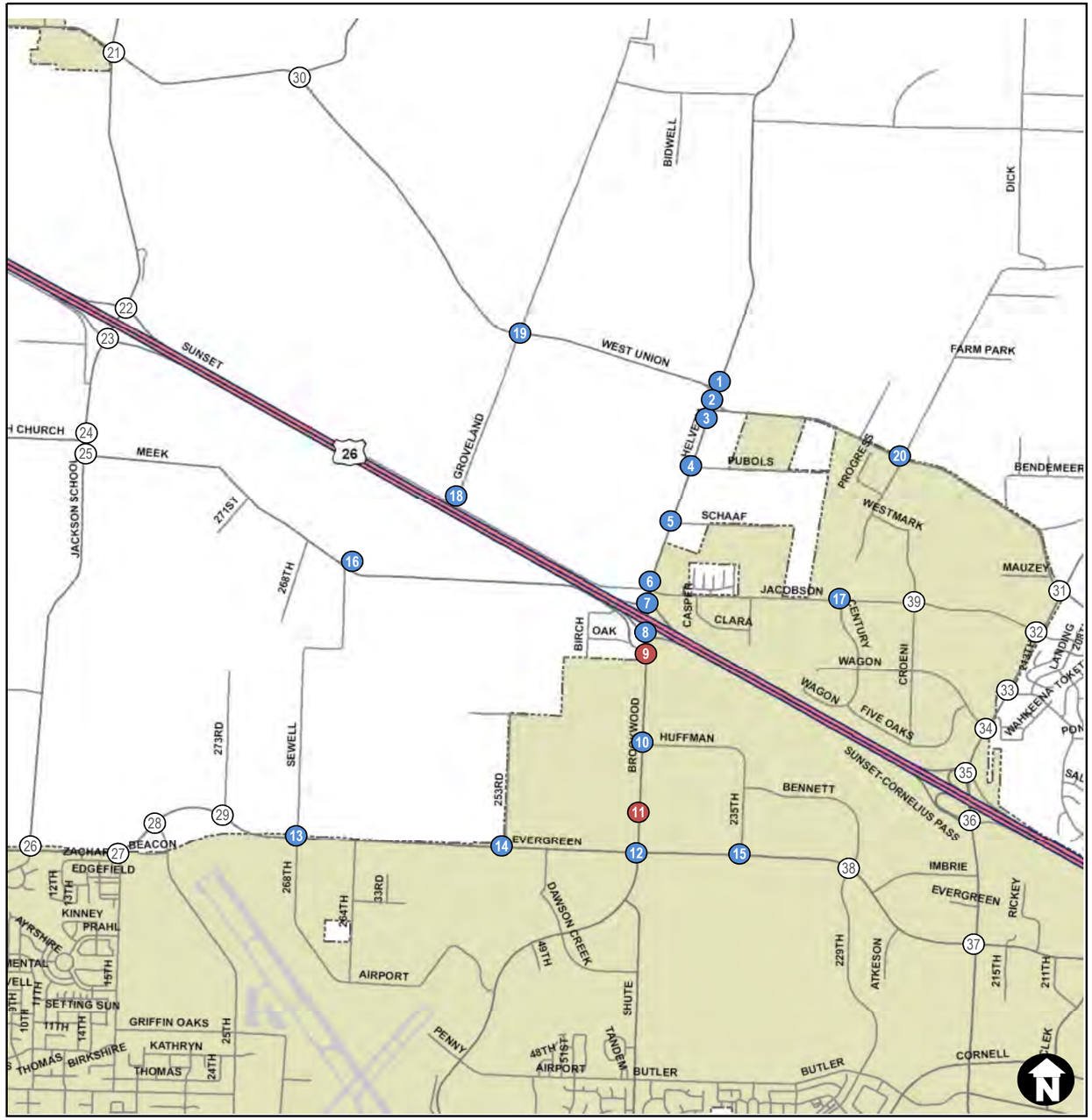
* V/C for unsignalized movement not accounted for in overall signalized intersection operations

**Overall stop-controlled intersection operations reported for worst stopped movement

FIGURE 14

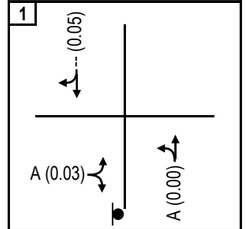
2011 Existing Conditions Operations AM Peak Hour

US 26 / Brookwood / Helvetia IAMP



Helvetia Rd North @ West Union Rd

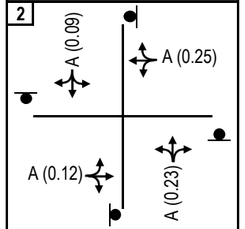
1



V/C: 0.00 | LOS: --

Helvetia Rd Middle @ West Union Rd

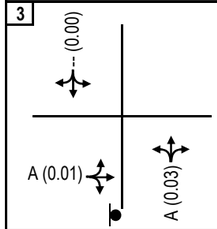
2



V/C: 0.25 | LOS: A

Helvetia Rd South @ West Union Rd

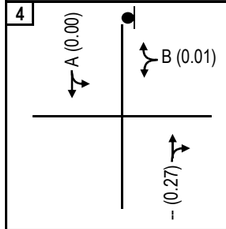
3



V/C: 0.01 | LOS: A

Helvetia Rd @ Pubols Rd

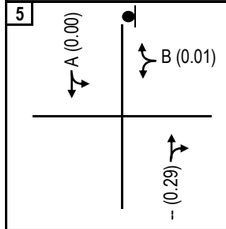
4



V/C: 0.01 | LOS: B

Helvetia Rd @ Schaff Rd

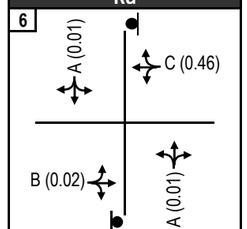
5



V/C: 0.01 | LOS: B

Helvetia Rd @ Jacobson Rd

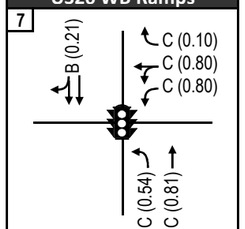
6



V/C: 0.46 | LOS: C

Brookwood Pkwy @ US26 WB Ramps

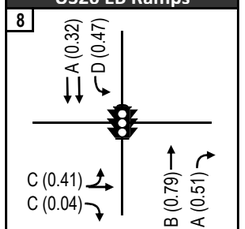
7



V/C: 0.81 | LOS: C

Brookwood Pkwy @ US26 EB Ramps

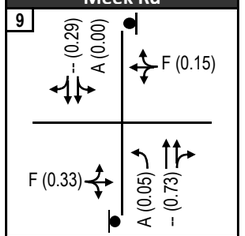
8



V/C: 0.76 | LOS: A

Brookwood Pkwy @ Meek Rd

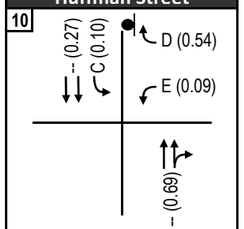
9



V/C: 0.33 | LOS: F

Brookwood Pkwy @ Huffman Street

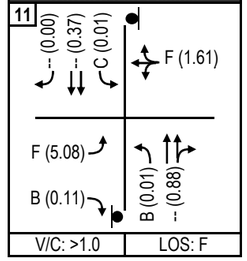
10



V/C: 0.54 | LOS: D

Brookwood Pkwy @ Genentech Access

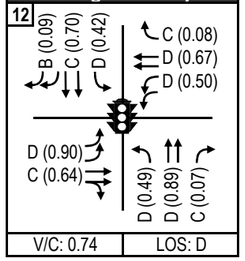
11



V/C: >1.0 | LOS: F

Brookwood Pkwy @ Evergreen Pkwy

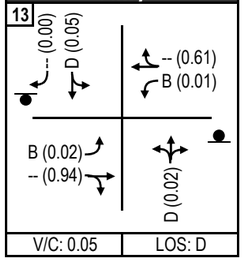
12



V/C: 0.74 | LOS: D

Sewell Rd @ Evergreen Pkwy

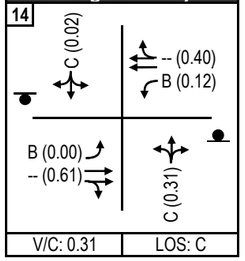
13



V/C: 0.05 | LOS: D

Meier-Jurgen Rd @ Evergreen Pkwy

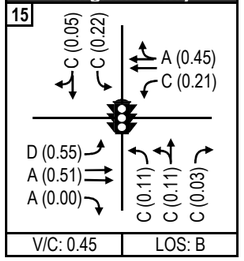
14



V/C: 0.31 | LOS: C

235th Avenue @ Evergreen Pkwy

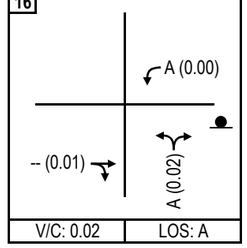
15



V/C: 0.45 | LOS: B

Sewell Rd @ Meek Rd

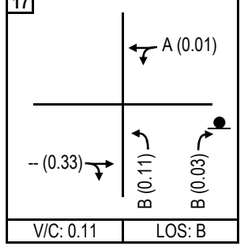
16



V/C: 0.02 | LOS: A

Century Blvd @ Jacobson Rd

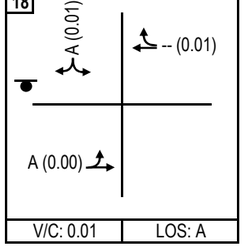
17



V/C: 0.11 | LOS: B

Groveland Rd @ Groveland Drive

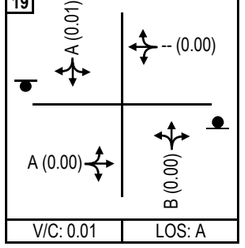
18



V/C: 0.01 | LOS: A

Groveland Rd @ West Union Rd

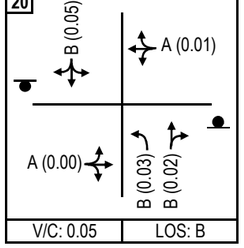
19



V/C: 0.01 | LOS: A

Century Blvd @ West Union Rd

20



V/C: 0.05 | LOS: B

DAVID EVANS AND ASSOCIATES INC.

Oregon Department of Transportation

Legend

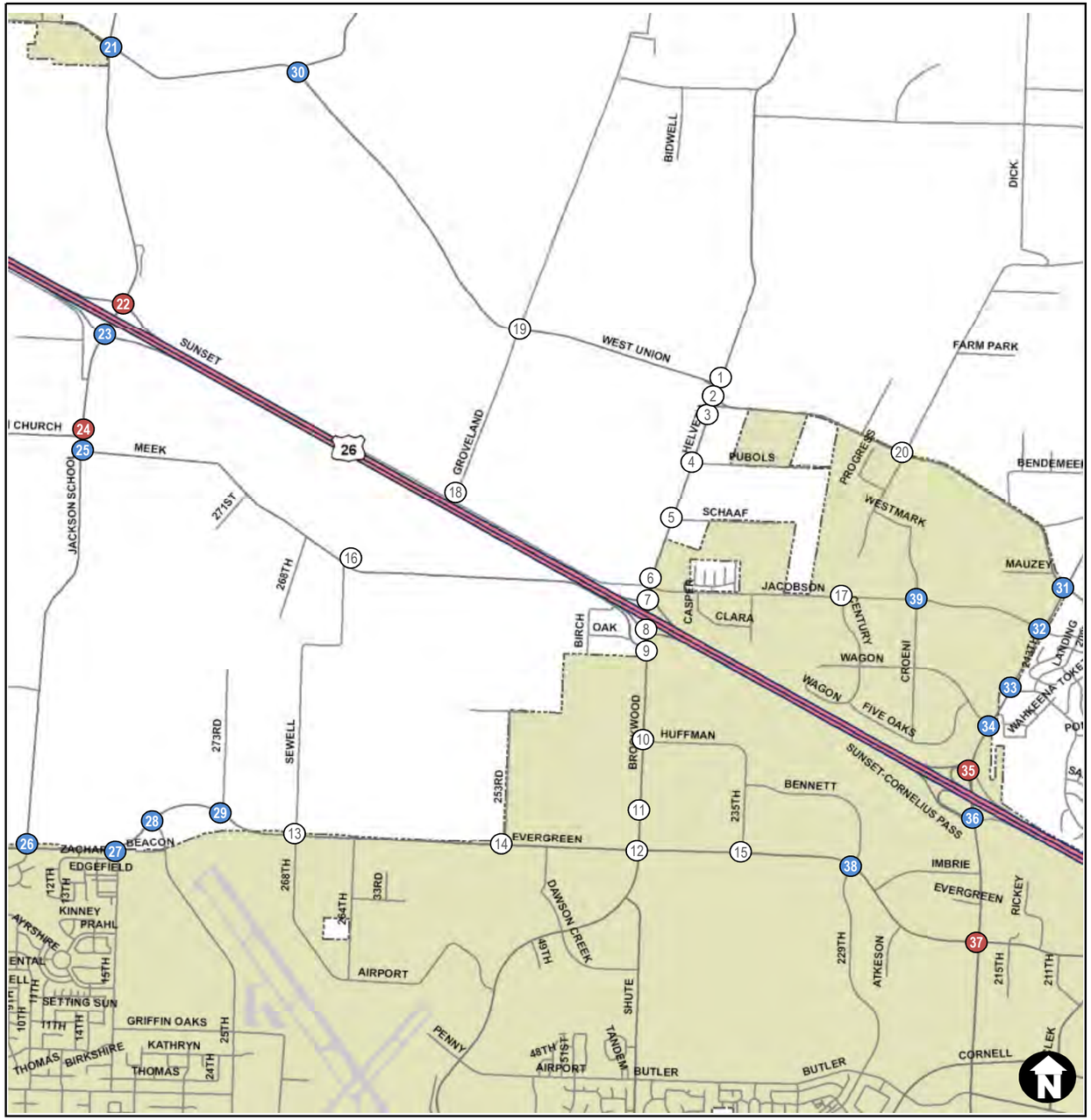
- Signalized inersection
- STOP Controlled Approach
- Lane Configuration
- **V/C:** Volume-to-Capacity Ratio
- **LOS:** Level of Service
- **A (0.01)** Lane Group LOS (V/C)
- (##) Intersection evaluated
- (##) Intersection fails operational standard
- (##) Intersection volumes shown on separate figure
- V/C: 0.01 | LOS: A Overall Intersection Operations**
- -- LOS not reported for free movements

**Overall stop-controlled intersection operations reported for worst stopped movement*

FIGURE 15

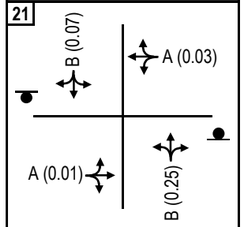
2011 Existing Conditions Operations PM Peak Hour

US 26 / Brookwood / Helvetia IAMP



Jackson Sch Rd @ West Union Rd

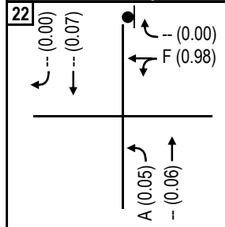
21



V/C: 0.25	LOS: B

Jackson Sch Rd @ US26 WB Ramps

22



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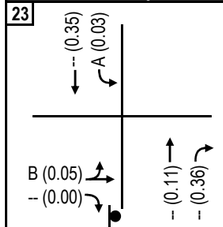
Jackson Sch Rd @ US26 EB Ramps

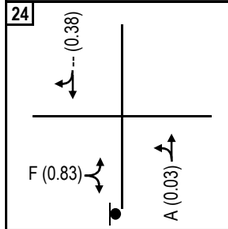
23



V/C: 0.05	LOS: B

Jackson Sch Rd @ Scotch Church Rd

24



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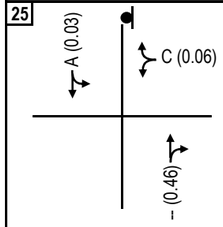
Jackson Sch Rd @ Meek Rd

25



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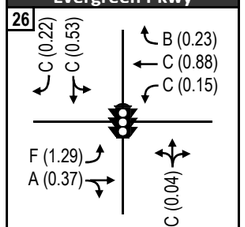
Jackson Sch Rd @ Evergreen Pkwy

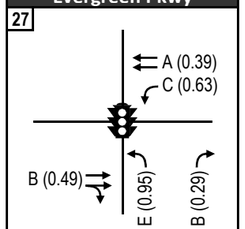
26



V/C: 0.89	LOS: D

15th Avenue @ Evergreen Pkwy

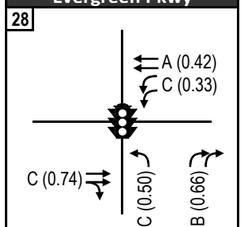
27



V/C: 0.67	LOS: B

25th Avenue @ Evergreen Pkwy

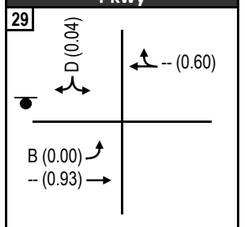
28



V/C: 0.71	LOS: B

Eggiman Rd @ Evergreen Pkwy

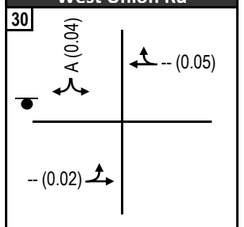
29



V/C: 0.04	LOS: D

Jackson Quarry Rd @ West Union Rd

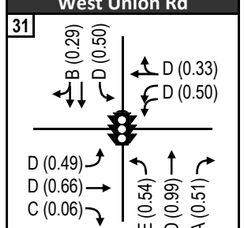
30



V/C: 0.04	LOS: A

Cornelius Pass Rd @ West Union Rd

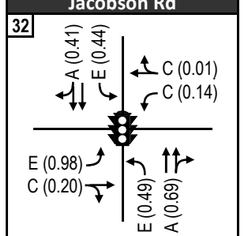
31



V/C: 0.92	LOS: C

Cornelius Pass Rd @ Jacobson Rd

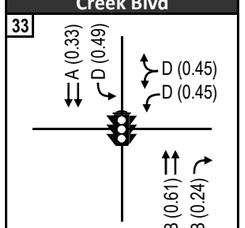
32



V/C: 0.78	LOS: B

Cornelius Pass Rd @ Rock Creek Blvd

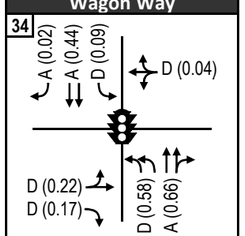
33



V/C: 0.58	LOS: B

Cornelius Pass Rd @ Wagon Way

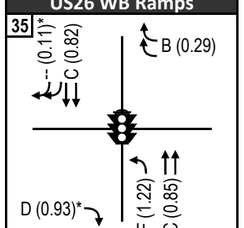
34



V/C: 0.62	LOS: B

Cornelius Pass Rd @ US26 WB Ramps

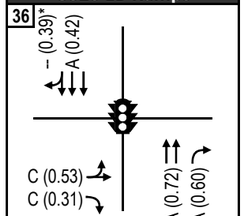
35



V/C: 0.91	LOS: D

Cornelius Pass Rd @ US26 EB Ramps

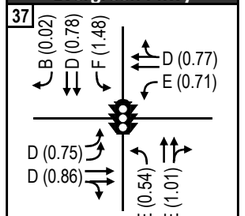
36



V/C: 0.68	LOS: A

Cornelius Pass Rd @ Evergreen Pkwy

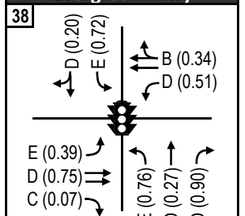
37



V/C: >1.0	LOS: E

229th Avenue @ Evergreen Pkwy

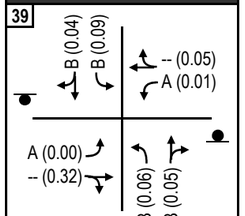
38



V/C: 0.82	LOS: D

Croeni Rd @ Jacobson Rd

39



V/C: 0.09	LOS: B

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Oregon Department of Transportation

Legend

- Signalized inersection
- STOP Controlled Approach
- Lane Configuration
- **V/C:** Volume-to-Capacity Ratio
- **LOS:** Level of Service
- **A (0.01)** Lane Group LOS (V/C)
- (##) Intersection evaluated
- (##) Intersection fails operational standard
- (##) Intersection volumes shown on separate figure
- V/C: 0.01 | LOS: A Overall Intersection Operations**
- -- LOS not reported for free movements

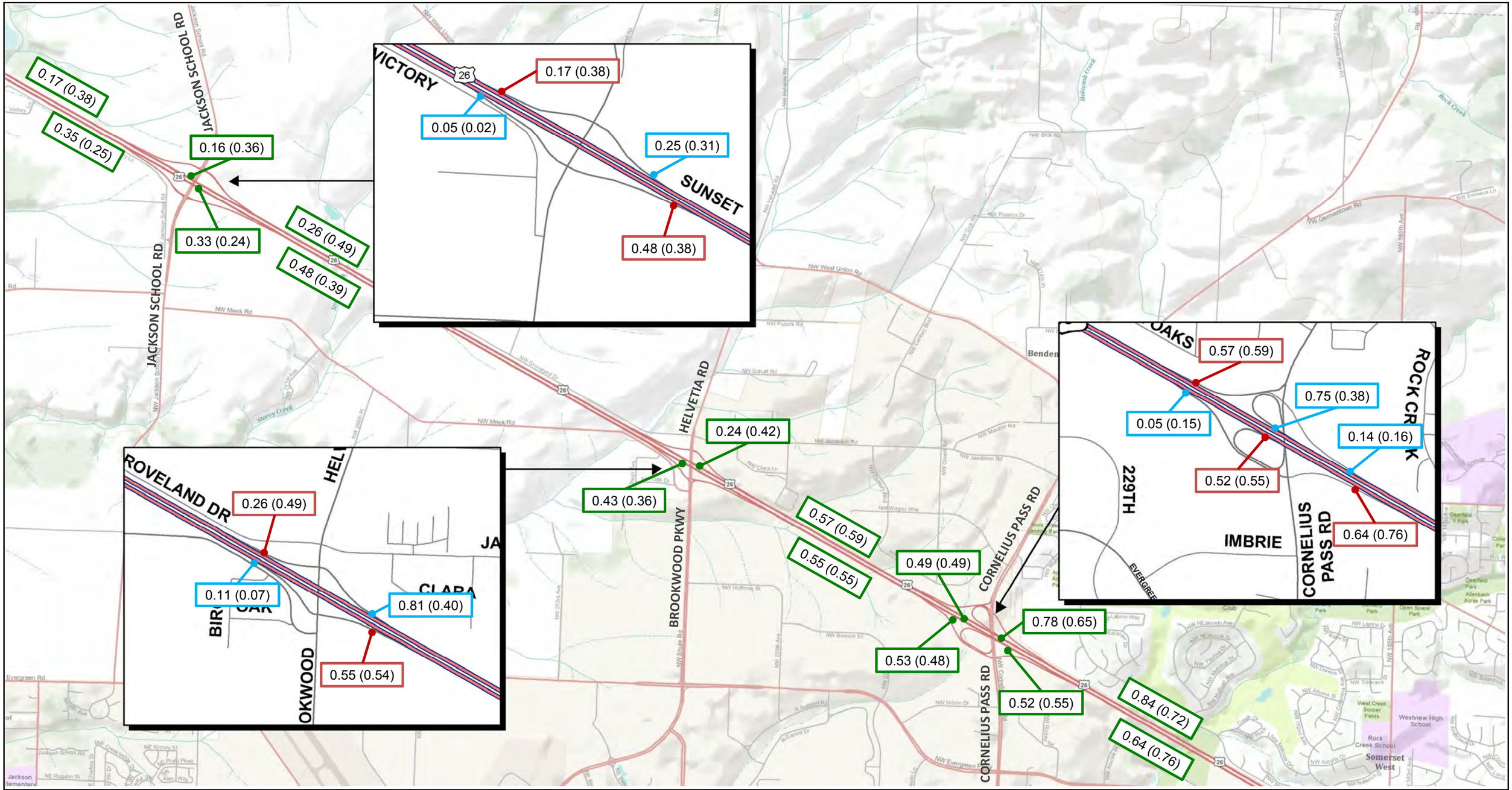
* V/C for unsignalized movement not accounted for in overall signalized intersection operations

**Overall stop-controlled intersection operations reported for worst stopped movement

FIGURE 16

2011 Existing Conditions Operations PM Peak Hour

US 26 / Brookwood / Helvetia IAMP



DAVID EVANS AND ASSOCIATES INC.

Oregon Department of Transportation

Legend

- Mainline
- Merge
- Diverge

0.50 (0.65) AM (PM) Volume-to-Capacity Ratio

FIGURE 17

2011 Existing Conditions
Freeway Operations
AM and PM Peak Hours

US 26 / Brookwood / Helvetia IAMP

4. EXISTING NATURAL AND HISTORIC RESOURCES ANALYSIS

Natural and historic resources were identified for this memorandum based on available map and database information from federal agencies, the State of Oregon, Metro, Washington County, the City of Hillsboro, and a neighborhood group called Save Helvetia. The information gathered was taken primarily from published documents and maps, agency websites, GIS data, and conversations with appropriate professional contacts. Information about wetlands, botanical resources, and aquatic resources also was taken from the Shute Road Interchange Improvement Project Environmental Baseline Report (EBR) (MB&G 2010). Although the EBR focused on an Area of Potential Influence (API) that was different from the IAMP Study Area, the areas overlap, and information common to both is included. The EBR API included more area to the west and south than the Study Area, as well as a long, narrow corridor along US 26.

For the EBR, the biological resources and issues within the API were identified based upon a review of existing database information, discussions with regulatory agency staff, and a field investigation conducted by Mason, Bruce & Girard, Inc. (MB&G) on February 3, 2010. At the time of the field investigation, ODOT did not have right-of-entry for areas outside of public rights-of-way. As such, areas outside of public rights-of-way were visually inspected from the road or highway. The field investigation was conducted to evaluate the baseline conditions for natural resources (i.e., aquatic/riparian conditions, presence of wetlands, habitat conditions, and noxious weed presence) within the EBR API. Before conducting the field investigation on February 3, 2010, MB&G obtained data regarding threatened and endangered species within the API from U.S. Fish and Wildlife Service (USFWS), StreamNet, and the Oregon Natural Heritage Information Center (ORNHIC, now Oregon Biological Information Center [ORBIC]). MB&G also contacted the Oregon Department of Fish and Wildlife (ODFW) to confirm current or historical native migratory fish presence within the API. **Table 6** summarizes identified resources, including key natural resources along Waibel Creek and potential cultural resource areas along Waibel Creek and the Five Oaks area.

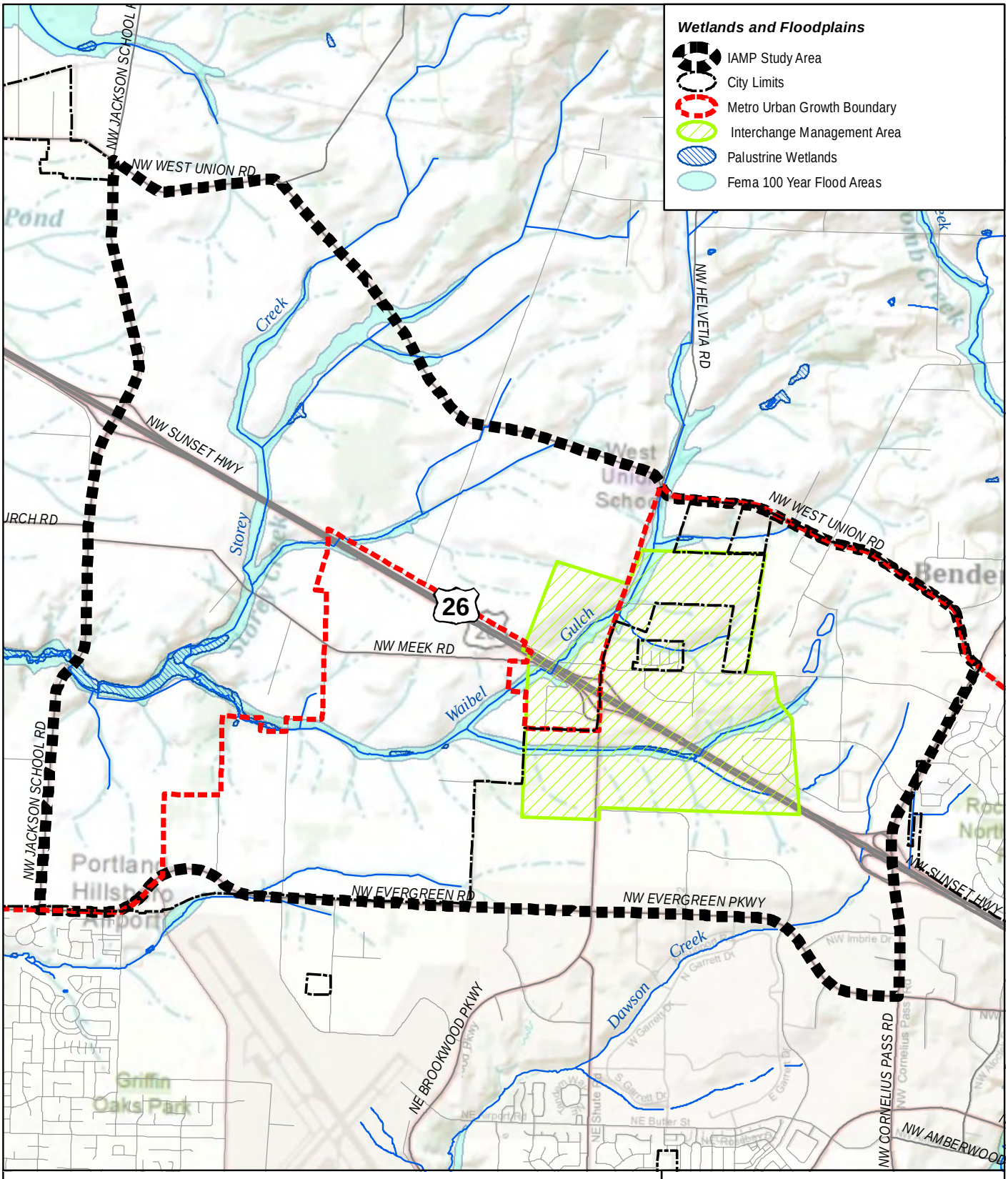
Table 6. Summary of Identified Resources

Resource Type	Resource	Location	Regulatory Authority
Parks and Recreation	Gordon Faber Park	South of US 26 and adjacent to Cornelius Pass Road	Local governments
Culverts	Culverts	Brookwood Parkway near interchange	Oregon Department of Fish and Wildlife U.S. Army Corps of Engineers
Floodplains	Waibel and Storey Creeks 100-year floodplains	Waibel Creek and tributaries near interchange	Federal Emergency Management Agency regulations administered through local governments
Goal 5 Resources*	Waibel, Storey, Dawson and Glencoe Creeks and tributaries riparian corridor	Waibel Creek and tributaries near interchange	Local governments
Wetlands	Unidentified wetlands associated with creeks and their tributaries	Waibel Creek and tributaries near interchange	U.S. Army Corps of Engineers Oregon Department of State Lands
Threatened and Endangered Species	Steelhead	Waibel and Storey Creeks	Oregon Department of Fish and Wildlife
Hazardous Materials	RCRA Generators, ERNS, ECSI, Fire Marshall Spill, Landfills, LUSTs, USTs*	Throughout Study Area	Oregon Department of Environmental Quality
Historic and Archaeological Resources	Historic and cultural resources	Along Waibel Creek and potential sites in various locations in Study Area	Local governments
Section 4(f) Resources*	Parks and Historic/Cultural Resources	Along Waibel Creek and potential sites in various locations in Study Area	Federal Highway Administration
Section 6(f) Resources*	None identified - Parks funded by Land and Conservation Funds	N/A	N/A

* Resource Conservation and Recovery Act (RCRA), Emergency Response Notification System (ERNS), Environmental Cleanup Site Information (ECSI), leaking underground storage tanks (LUSTs), underground storage tanks (USTs)

Floodplains and Floodways

Acting through the local planning agencies, the Federal Emergency Management Agency (FEMA) regulates development within floodplains. FEMA-designated 100-year floodplains in the Study Area are displayed in **Figure 18** (FEMA Flood Insurance Rate Map panel 4102380350B, September 30, 1982). Waibel Creek parallels Helvetia Road north of US 26 and crosses under US 26. One of its tributaries crosses from north of US 26 and flows west under Brookwood Parkway, north of Huffman Street. Both Waibel Creek and its tributary have 100-year floodplains. West of the interchange, Storey Creek runs north to south in the Study Area west



US 26/Brookwood Parkway/ Helvetia Road IAMP

Data Sources:
Metro RLIS GIS Data, 2011

Figure 18
Wetlands and Floodplains

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of Groveland Road. Floodplains within the Study Area are designated Zone A: areas of 100-year flood and "flood hazard factors not determined".

Members of Save Helvetia have several photos from February 1996 of flooding along Helvetia Road in the Study Area near the intersection of Groveland Road and Schaaf Road. In addition, drain tiles (perforated pipes that lie under the fields) that farmers have installed over the years drain south to this area.

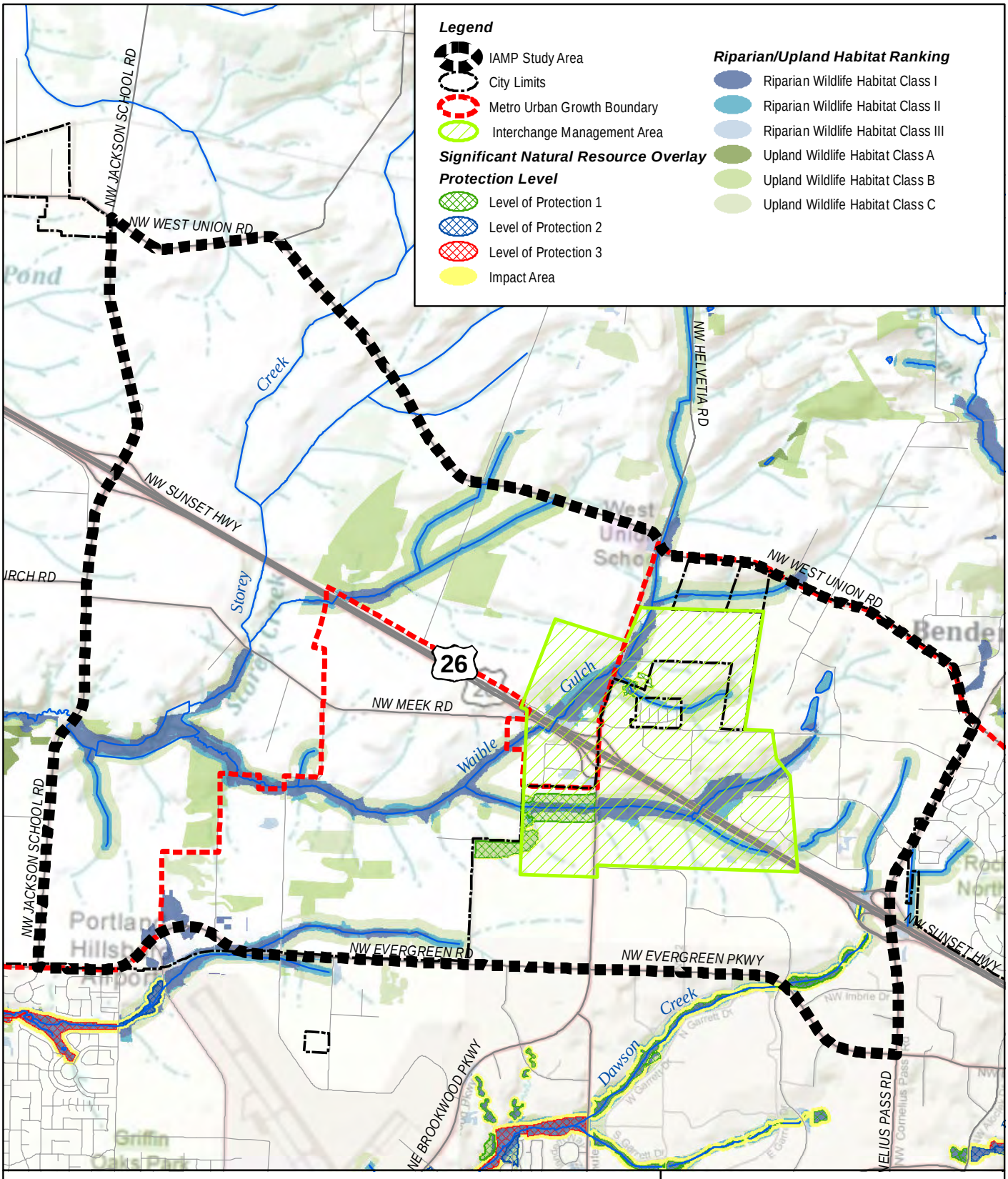
Goal 5 Resources

Statewide Planning Goal 5 requires local jurisdictions to inventory natural resources such as riparian corridors and wildlife habitat. Metro-documented Goal 5 riparian corridors and upland wildlife habitat resources areas in the Study Area are shown in **Table 7** and on **Figure 19**. The Study Area is in the Lower McKay Creek streamshed.

Table 7. Goal 5 Riparian Corridors and Upland Wildlife Habitat Resources Areas

Location	Classification	Classification Definition
Adjacent to Waibel Creek and its tributaries (close to the interchange)	Riparian Wildlife Habitat Class I	Rivers, streams, stream-associated wetlands, undeveloped floodplains, forest canopy within 100 feet of a stream, and forest canopy within 200 feet of a stream with adjacent steep slopes (highest quality habitat)
Storey Creek and its tributaries (west of the interchange)	Riparian Wildlife Habitat Class I	Rivers, streams, stream-associated wetlands, undeveloped floodplains, forest canopy within 100 feet of a stream, and forest canopy within 200 feet of a stream with adjacent steep slopes (highest quality habitat)
Dawson Creek east of the interchange and a tributary of Glencoe Creek in the southern portion of the Study Area	Riparian Wildlife Habitat Class I	Rivers, streams, stream-associated wetlands, undeveloped floodplains, forest canopy within 100 feet of a stream, and forest canopy within 200 feet of a stream with adjacent steep slopes (highest quality habitat)
Adjacent to the creeks, mostly beyond the Class 1 Riparian areas	Class II riparian/wildlife corridors and Upland Wildlife Habitat Class C	Rivers, streams, 50-foot area along developed streams, forest canopy, or low structure vegetation within 200 feet of streams, and portions of undeveloped floodplains extending beyond 300 feet of streams and forest patches and smaller connector patches along streams and rivers
South of US 26, south of Birch Avenue	Upland Wildlife Habitat Class B	Forest patches with low structure connector patches along streams and rivers
Along the eastern tributary of Storey Creek	Upland Wildlife Habitat Class B	Forest patches with low structure connector patches along streams and rivers
Near 273rd Avenue and Sewell Road	Upland Wildlife Habitat Class B	Forest patches with low structure connector patches along streams and rivers

Source: Metro.



US 26/Brookwood Parkway/ Helvetia Road IAMP

0 3,000 6,000
Feet
N

Data Sources:
Metro RLIS GIS Data, 2011
City of Hillsboro, Oregon, May 2010

Figure 19
Goal 5 Resources

Path: P:\O\ODOT00000701\0600INFO\GS\arcmap\Existing Conditions\Fig_19_Goal_5_Resources_011112.mxd
Date: 3/6/2012 Time: 3:40:28 PM User: mmf

Wetlands

According to U.S. Fish and Wildlife Service National Wetlands Inventory data, one small area of palustrine wetland associated with the Waibel Creek tributary is located just south of where the tributary passes under US 26. Farther from the interchange, there are palustrine wetlands along Waibel and Storey Creeks south of US 26 and a small area along a tributary of Storey Creek north of US 26. Wetlands are displayed on **Figure 18**.

U.S. Department of Agriculture Natural Resources Conservation Service Soil Maps show hydric soils in the Study Area. Hydric soils indicate potential unmapped wetlands along and adjacent to Storey and Waibel Creeks and their tributaries, Dawson Creek and its tributaries in the eastern portion of the Study Area, and a tributary to Glencoe Creek in the southern portion of the Study Area along Evergreen Parkway.

Threatened and Endangered Species

Plant Species

The EBR API contains three general vegetation communities: riparian forest/wetland fringe, oak woodland, and disturbed/maintained grassland/highway right-of-way. The riparian forest/wetland fringe vegetation community is located adjacent to both unnamed tributaries to McKay Creek. The oak woodland vegetation community is located adjacent to Helvetia Road in the northern part of the API. The disturbed/maintained grassland/highway right-of-way vegetation community is located on both sides of US 26 and in the vicinity of the highway on- and off-ramps.

Data from the USFWS and ORNHIC within a two-mile radius of the proposed API indicate that several federal and state listed threatened and endangered plant species have the potential to occur within the API. A listing of these species, including their federal and state listing status, whether critical habitat is designated, blooming period, and habitat requirements, is shown in **Table 8**.

Table 8. Rare Plant Species with the Potential to Inhabit the API

Scientific Name	Common Name	Federal Status	State Status	Critical Habitat (Y/N)	Blooming Period	Habitat
Lupinus sulphureus ssp. *kincaidii*	Kincaid's lupine	T	T	Yes*	April–July	Upland prairie grasslands, oak savanna, and woodland edges
Sidalcea nelsoniana	Nelson's sidalcea	T	T	No	May–September	Open areas on damp soil, in meadows, wet prairie remnants, fencerows, roadsides, deciduous forest edges, and occasionally Oregon ash wetlands
Aster curtus	White-topped aster	T	T	No	July–August	Low elevation, moist native prairies, on well-drained upland soils in oak savannas
Castilleja levisecto	Golden Indian paintbrush	E	E	No	May–June	Moist or wet meadows and native prairies at low elevations
Delphinium leucophaem	White rock larkspur	E	E	No	May–August	Dry roadside ditches, cliffs, rocky slopes and lowland meadows, at cliff bases, and basaltic ledges
Dephinium pavonaceum	Peacock larkspur	E	E	No	April–mid-July	Well drained areas of native prairie, roadsides with no development
Erigeron decumbens var. *decumbens*	Willamette daisy	E	E	No	May–mid-August	Native wetland and upland prairie, oak savanna, heavier soils, restricted to native prairie grassland

E = Endangered; T = Threatened; SOC = Species of Concern
*The designated Critical Habitat for Kincaid's lupine is not located within the vicinity of the API.

The EBR API contains potentially suitable habitat for all the species listed in **Table 8**. In particular, suitable habitat is located within the open grass fields, fencerows, and oak groves of the EBR API.

Terrestrial Wildlife Species

Review of data available from the USFWS and ORNHIC within a two-mile radius of the EBR API indicates that several federal and state listed terrestrial wildlife species have the potential to occur within the EBR API. A listing of these species, as well as their federal and state listing status, whether critical habitat is designated, and habitat requirements, is shown in **Table 9**.

Table 9. Terrestrial Wildlife Species with the Potential to Inhabit the API

Scientific Name	Common Name	Federal Status	State Status	Critical Habitat (Y/N)	Habitat
Strix occidentalis caurina	Northern spotted owl	T	T	Yes	Inhabits forests characterized by dense canopy closure of mature and old-growth trees, abundant logs, standing stags, and live trees with broken tops
Brachyramphus mamoratus	Marbled murrelet	T	T	Yes	Nests in forest stands with old growth forest characteristics; forests are generally characterized by large trees with large branches or deformities for use as nest platforms
Eremophila alpestris strigata	Streaked horned lark	C	N/A	No	Associated with bare ground or sparsely vegetated habitats; nests in grass seed fields, pastures, fallow fields and wetland mudflats

E = Endangered; T = Threatened; C = Candidate

The forested areas within the EBR API, which predominantly consist of small oak groves, do not have the habitat characteristics required by either the northern spotted owl or the marbled murrelet. Although critical habitat has been designated for both species, the closest occurrence of critical habitat for both species is located in the Coast Range, more than five miles to the west of the EBR API. Similarly, the EBR API does not contain suitable habitat for the streaked horned lark, which utilizes bare ground or sparsely vegetated habitats. No such habitats are present within the EBR API. The EBR API does contain potential habitat for nesting migratory birds since they may utilize trees and shrubs located throughout the EBR API.

Fish and Aquatic Resources

Review of data available from StreamNet and ORNHIC within a two-mile radius of the proposed EBR API indicates that steelhead (*Oncorhynchus mykiss*) of the Upper Willamette River (UWR) Distinct Population Segment (DPS) has the potential to occur within the proposed EBR API, but there is no designated critical habitat. This species is federally listed as Threatened (T) and state listed as Sensitive Vulnerable (SV). The distribution within the vicinity of the EBR API is the Tualatin River and its tributaries for rearing and migration.

Two unnamed tributaries to McKay Creek are located within or near the EBR API (170900100107 6th Field Hydrologic Unit Code [HUC]): the northern unnamed tributary and the southern unnamed tributary. The northern unnamed tributary flows southwest across the EBR API and underneath US 26 through a concrete box culvert that is approximately 8 feet by 8 feet in diameter. Within the EBR API, this tributary is approximately 10 feet wide and 5 feet deep. North of US 26, this tributary is bordered on either side by a wetland dominated by reed canarygrass. South of US 26, the riparian area consists of reed canarygrass in the understory, with red alder and Oregon ash in the overstory. The southern unnamed tributary to McKay Creek flows west south of the EBR API. The confluence of the unnamed tributaries with the mainstem of McKay Creek is located approximately 1.5 miles downstream (southwest) of the

EBR API. Approximately five miles downstream from this confluence, McKay Creek flows into Dairy Creek, which then flows into the Tualatin River within two miles of the McKay/Dairy Creek confluence. UWR DPS steelhead utilize McKay Creek for rearing and migration. The upstream extent of steelhead distribution is located approximately one mile downstream (southwest) of the EBR API. The unnamed tributaries to McKay Creek do not currently provide rearing and migration habitat for UWR steelhead. The habitat within these unnamed tributaries is considered low quality because of the following factors: (1) the streambed is composed largely of silt and sand, (2) there is minimal riparian vegetation, and (3) there is a general lack of channel complexity. McKay Creek is mapped as Essential Salmonid Habitat (ESH) according to the Oregon Department of State Lands. However, the ESH designation does not extend into the two unnamed tributaries of McKay Creek located within the EBR API.

Although steelhead and other native migratory fish do not currently utilize the tributaries within the EBR API, it is likely that steelhead and native migratory fish used these tributaries historically. This determination is based on an investigation of accessible portions of the two unnamed tributaries to McKay Creek within the EBR API on February 3, 2010, and a review of U.S. Geological Survey topographic maps (Hillsboro, Oregon Quadrangle, USGS 1986) for the area. In particular, the size of each unnamed tributary suggests that this system likely supported fish in its upper reaches. Additionally, although man-made barriers (i.e., culverts) to fish passage may have been constructed recently, there are no natural barriers to upstream fish passage within McKay Creek or its tributaries. Lack of current use by native migratory fish is likely due to degradation of stream habitat as a result of development of the surrounding areas. The Oregon Department of Fish and Wildlife (ODFW) has determined that there was historical use of these streams by native migratory fish. This determination was based upon the physical attributes of the tributaries, the lack of natural barriers downstream, and the size of the drainage basins.

Federal Species of Concern

In addition to the Threatened and Endangered (T&E) species information provided in the EBR, a non-profit community organization called Save Helvetia conducted wildlife and Oregon white oak studies in the area, and provided information regarding federal species of concern known to occur within or near the Study Area. The acorn woodpecker is known to occur within the API, and the Northern Pacific pond turtle is known to occur outside, but near, the API. This information is summarized in **Table 10**.

Table 10. Special Status Species Known to Occur within the EBR API

Common Name	Scientific Name	Status		Location
		Federal	State	
Northern Pacific pond turtle	*Actinemys marmorata marmorata*	Species of Concern	Sensitive-Critical	Ponds at 307th Street near intersection of US 26/Glencoe Road north at North Plains (outside Study Area)
Acorn woodpecker	*Melanerpes formicivorus*	Species of Concern	Sensitive-Vulnerable	Seen in Oregon white oak trees at the Five Oaks Meeting Place south of Jacobsen Road.

"Species of Concern" is an informal term under the federal listing that is not specifically defined in the federal Endangered Species Act. The term commonly refers to species that are declining or appear to be in need of conservation.

Under Oregon's Sensitive Species Rule (OAR 635-100-040), a "sensitive" species classification was created that focuses fish and wildlife management and research activities on species that need conservation attention. "Sensitive" refers to naturally reproducing fish and wildlife species, subspecies, or populations that are facing one or more threats to their populations and/or habitats. Implementation of appropriate conservation measures to address the threats may prevent them from declining to the point of qualifying for threatened or endangered status. Sensitive species are assigned one of two subcategories: critical or vulnerable. "Critical" sensitive species are imperiled with extirpation from a specific geographical area of the state because of small population sizes, habitat loss or degradation, and/or immediate threats. Critical sensitive species may decline to the point of qualifying for threatened or endangered status if conservation actions are not taken. "Vulnerable" sensitive species are facing one or more threats to their populations and/or habitats. Although not currently imperiled with extirpation from a specific geographical area of the state, vulnerable species could, however, become so with continued or increased threats to populations and/or habitats.

Non-Federally Listed Plant and Wildlife Species

In 2009, Save Helvetia conducted wildlife and Oregon white oak studies which showed that Oregon white oak trees are present in several locations within the IAMP Study Area. The species shown in **Table 11** below are listed as Sensitive-Vulnerable by the State of Oregon and are highly dependent upon oak for their life cycles. They are also listed as target species in the Oregon Conservation Strategy (ODFW 2006).

Table 11. Non-Federally Listed Species Likely to Occur Within the IAMP Study Area

Common Name	Scientific Name	Status		Location
		Federal	State	
White-breasted nuthatch	*Sitta carolinensis aculeata*	--	Sensitive-Vulnerable	Specific location not given.
Western bluebird	*Sialia mexicana*	--	Sensitive-Vulnerable	Specific location not given.
Western gray squirrel	*Sciurus griseus*	--	Sensitive-Vulnerable	Specific location not given.

Although specific locations were not provided by Save Helvetia, it is likely that these species may be present in some or all of the remnant oak patches. The wildlife study conducted by Save Helvetia also showed that Roosevelt elk herds utilize the IAMP Study Area as a wildlife corridor, which extends from Forest Park to the west of North Plains. The earliest reported sightings were from 1965. During the study, the size of the elk herd ranged from 20 to 82, with the majority of sightings in the 35 to 40 range. The IAMP Study Area also provides habitat for a variety of animals such as deer, elk, black bear, bobcat and cougar, and others.

The EBR identified three general vegetation communities in the API: riparian forest/wetland fringe along the McKay Creek unnamed tributaries, oak woodland adjacent to Helvetia Road, and disturbed/maintained grassland/highway right-of-way adjacent to the highway facilities.

Hazardous Materials

On April 5 and 6, 2011, federal and state databases were searched for identified hazardous waste sites within a radius of one mile from the approximate center of the US 26/Brookwood Parkway/Helvetia Road interchange (Leaking Underground Storage Tanks, or LUSTs, are identified within the Study Area or on adjacent properties).

Table 12 summarizes the databases searched and the total number of sites found. Background data files for each identified site are in **Appendix F**.

Table 12. Federal and State Hazardous Material Databases Reviewed and Sites Found

Database	Description	Total Sites Found
Federal		
National Priority List (NPL)	List of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants	0
Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS)	Abandoned hazardous waste sites—"Superfund"	0
Resource Conservation and Recovery Act (RCRA) Generators	Generate or store defined amount of hazardous waste in any one calendar month and are subject to regulatory control	10
Emergency Response Notification System (ERNS)	Releases or potential releases reported to the National Response Center, which acts as a reporting center for the Environmental Protection Agency and U.S. Coast Guard	3
State		
Environmental Cleanup Site Information System (ECSIS)	Sites that may be contaminated or require cleanup	3
Oregon State Fire Marshal's (OSFM) Hazardous Materials Incidents	All hazardous material emergency incidents to which Fire Marshal Hazardous Materials Response Teams have responded	6
Oregon Permitted Solid Waste Landfills	Current active permitted facilities including landfills, waste tire storage sites, and household hazardous waste sites	0
Department of Environmental Quality (DEQ) Facility Profiler Leaking Underground Storage Tanks (LUSTs)	Known sites where leaks in buried tanks have been reported	8
Underground Storage Tanks (USTs)	Registration, installation, operation, and removal of USTs; cleanup of soil and groundwater contamination from petroleum leaks	0

Table 13 lists reported sites and incidents.

Table 13. Hazardous Material Reported Sites and Incidents

Site Name	Location	Effective Date/Incident Date	Generator Type/Status/Release Type
RCRA			
Shinei USA Inc.	6220 NW Pinefarm Place, Hillsboro	12/03/2007	Conditionally Exempt Generator
Credence Systems Corporation	5975 NW Pinefarm Place, Hillsboro	12/31/2008	Conditionally Exempt Generator
Genentech Inc.	4625 NW Brookwood Parkway, Hillsboro	12/31/2010	Small Quantity Generator
SGL Carbon Corporation	4860 NW Shute Road, Hillsboro	01/15/2003	Conditionally Exempt Generator
Mohr Solutions Power	23780 NW Huffman Street, Door 112, Hillsboro		Treater, Storer, Disposer
Ohka America Inc.	4600 NW Brookwood Parkway, Hillsboro	12/31/2010	Large Quantity Generator
Tokai Carbon USA Inc.	4495 NW 235th Avenue, Hillsboro	12/13/2003	Conditionally Exempt Generator
AGPR, Inc.	4375 NW 235th Avenue, Hillsboro	01/0120/04	Conditionally Exempt Generator
Ashland Inc.	4605 NW 235th Avenue, Hillsboro	12/31/2007	Conditionally Exempt Generator
Intel Corporation Evergreen Campus	23225 NW Evergreen Parkway, Hillsboro	12/31/2006	Conditionally Exempt Generator
ERNS			
N/A	5775 NW Wagon Way	09/07/2004	Released hydraulic oil
N/A	23585 NW Jacobsen Road	06/14/2000	Released acid wash
N/A	25300 NW Evergreen Road	01/14/1997	Released oil (misc: transformer)
ECSIS			
Westmark Center	West Union Road & Jacobson Road, Hillsboro (Township 1N, Range 2W, Section 21, Tax Lots: 1600, 2601, 2700, 2800, 2801, 2802, 2900, 3000, 3001, and 3002)	01/18/2004	Requires No Further Action
Baker Site	East of Helvetia Road, south of Schaaf Road, Hillsboro (Township 1N, Range 2W, Section Tax Lot 1500)	02/10/2009	Requires No Further Action
Shute Road Property	Evergreen Parkway and Shute Road, Hillsboro (Township 1N, Range 2W, Section 21, Tax Lots: 1600, 2601, 2700, 2800, 2801, 2802, 2900, 3000, 3001, and 3002)	06/22/2005	Requires No Further Action

Site Name	Location	Effective Date/Incident Date	Generator Type/Status/Release Type
OSFM			
N/A	US 26 @ MP 61	09/16/1998	Released 30 gallons diesel
N/A	US 26 WB @ Shute Road	04/17/1997	Released 135 gallons diesel
N/A	22800 NW Evergreen Road	10/31/1988	Released 5 gallons unknown
N/A	24945 NW Evergreen Road	01/09/1988	Released 30 gallons diesel
N/A	2501 NW 229th Avenue	11/18/1996	Released 2 cubic feet of acetic acid
N/A	7431 Evergreen Parkway	04/16/1991	Released 15 gallons gasoline
LUSTs			
Standring Holdings LLC	5870 NW 242nd Avenue, Hillsboro	03/18/2003	Cleanup Completed
Baxter, B	27700 NW Meek Road, Hillsboro	03/09/2000	Cleanup Completed
Berger Farms	5888 NW Shute Road, Hillsboro	N/A	Cleanup Started
Berger Farms	5870 NW 242nd Avenue, Hillsboro	11/19/2001	Cleanup Completed
Laas, Donnie	6140 NW Birch Avenue, Hillsboro	09/12/2007	Cleanup Completed
Hagg, R	4825 NW 253rd Avenue, Hillsboro	08/27/2004	Cleanup Completed
West Union Elementary School	23870 NW West Union Road, Hillsboro	09/10/2001	Cleanup Completed
Severson Property	23265 Evergreen Parkway	08/31/2000	Cleanup Completed

Source: Federal and state hazardous material databases, 2011.

The identified sites and incidents have been remediated, are being monitored, have been investigated and found not to be contaminated to the point of needing further action, or are a permitted facility. The land within the Study Area has been previously disturbed by transportation uses that may include undocumented spills or an accumulation of many years of roadway runoff, has been historically disturbed by agricultural uses that may include the use of chemical pesticides, and contains industrial uses that generate hazardous materials, and there may be undocumented hazardous materials present. Mercury vapor lamps and treated timbers may be present in the Study Area and would require special handling if they need to be removed or replaced.

Historic and Archaeological Resources

This section summarizes the Oregon State Historic Preservation Office (SHPO) Oregon Historic Sites Database that documents National Register of Historic Places (NRHP) and locally identified historic, prehistoric, and cultural resources. The NRHP identifies and documents (in partnership with state, federal, and tribal preservation programs) districts, sites, buildings, structures, and objects that are significant in American history, architecture, archaeology, engineering, and culture. Copies of Oregon Historic Site Records for each site referenced in **Table 14** are in **Appendix G**. The following resources in the Study Area are in the SHPO database:

Table 14. Oregon Historic Sites Database Results for the Study Area

Resource Name	Address	Resource Type	Year Built
Listed on the NRHP Register			
Rice NW Museum of Rocks and Minerals (Richard and Helen Rice)	26385 NW Groveland Drive	Single dwelling, ranch	1953
West Union Baptist Church	22365 NW West Union Road	Religious facility, vernacular	1853
Eligible Contributing (potentially eligible for NRHP Register)			
James & Mary Chambers House*	24665 NW Groveland Drive	Single dwelling, vernacular	1865
T W & Lizzie Shute House & Barn*	4825 NW 253rd Avenue	Single dwelling, Queen Anne	1890
Imbrie Farm Agricultural Outbuilding	21860 NW Imbrie Drive	Italianate	1866
Farmstead House and Outbuildings	9220 NW Jackson School Road	Victorian Eclectic	1890
Resources in the database but unknown whether they are eligible for NRHP listing			
Five Oaks Meeting Place*	NW Casper Lane	Social	1830
Methodist Meeting House Site	east of 253rd Avenue	N/A	1843
Sewell Clay Works	Evergreen Road & Sewell Road	N/A	1880

* Also designated an historic landmark or resource by Washington County.

Historic maps and aerial photographs suggest additional historic resources may be present in the Study Area: two buildings, the Edward Constable homestead, an unnamed wagon road, and the Alexander Zachary stable.

The ODOT 2010 survey for the EBR identified three additional houses that may be eligible for listing on the NRHP: 5830 NW Shute Road, 5870 NW Shute Road, and 6160 NW Birch Avenue.

The Shute Road UGB Addition Concept Plan Cultural Resources Technical Memorandum (AINW, no date) identified these additional locations within the Study Area that may be eligible or listing on the NRHP:

- The Voges home, a residence at the intersection of Shute Road and Meek Road, is thought to date to 1914 but is probably older. The home is listed in the Washington County Cultural Resource Inventory.

- The historic Reilly residence on Evergreen Parkway, which probably dates to the 1890s, is extant. The house and some of the associated farm buildings may be significant historic resources.

The Shute Road UGB Addition Concept Plan Cultural Resources Technical Memorandum (AINW, no date) identified these additional locations within the Study Area that are of archaeological interest:

- The area along the Waibel Creek channel is considered to have a moderate potential for prehistoric archaeological resources. The creek channel has been modified in the EBR API but generally follows its natural course. Proximity to the creek enhances the likelihood of archaeological resources, but the EBR API does not offer significantly higher ground adjacent to the water source. Therefore the location is considered to be a moderate-probability rather than a high-probability location. The archaeological sensitivity area is defined as extending 30 meters (100 feet) on each side of the existing creek channel (total width of 60 meters) within the EBR API.
- Artifacts and other archaeological deposits may be associated with the reported location of a late-nineteenth-century residence behind a modern residence within the EBR API.

Archaeological resources have been found in the Study Area; two sites have been identified north of US 26 and four sites south of US 26. Locations of archaeological sites are kept confidential to avoid disturbance. An ODOT field investigation conducted on February 11, 2010, identified no archaeological resources for the EBR API. Ten previous cultural resources studies have been conducted in the Study Area vicinity. However, most of the Study Area has not been examined for archaeological resources. There may be additional historic and archaeological resources in the Study Area that have not been surveyed or evaluated for eligibility. Portions of the Study Area consist of flat ground with water resources—the two main components that archaeologists look for to identify high probability locations for potential archaeological sites. ODOT consulted local representatives from the Confederated Tribes of the Warm Springs, the Confederated Tribes of the Siletz Indians, and the Confederated Tribes of the Grand Ronde regarding the Shute Road Improvements Project. The representative from the Grand Ronde Tribes informed ODOT that there is a known archaeological site located on private property, but the exact location is unknown.

Section 4(f) Resources

Section 4(f) refers to a part of federal law (Title 23, USC, Section 138, Section 4(f) of the Department of Transportation Act of 1966, as amended) that protects public parks, recreation lands, wildlife and waterfowl refuges, and public or private historic sites. Section 4(f) applies only to Departments of Transportation and their agencies. Section 4(f) resource lands within the Study Area consist of the historic sites discussed previously in the section titled *Historic and Archaeological Resources* and the Gordon Faber Recreation Complex. In addition, structures eligible or potentially eligible for inclusion on the NRHP but not yet identified are potential

candidates for Section 4(f) status. No wildlife and waterfowl refuges are located within the EBR API.

A highway project is considered to "use" a public park when:

- Land is permanently incorporated into a transportation facility (actual conversion);
- There is a temporary occupancy of land that is adverse in terms of the statute's preservationist purpose; or
- There is constructive use of the land.

Constructive use means off-site impacts of the transportation project substantially impair the site's vital functions.

Section 6(f) Resources

The Land and Water Conservation Fund (LWCF) Act of 1965 established grants-in-aid funding to assist states in the planning, acquisition, and development of outdoor recreational land and water areas and facilities. Section 6(f) of the LWCF Act prohibits the conversion of property acquired or developed with the assistance of the fund to anything other than public outdoor recreation use without the approval of the Secretary of the U.S. Department of the Interior. No Section 6(f) properties are located in the Study Area.

5. REFERENCES

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Appendix！. Tax Lots within One-Quarter-Mile of the Interchange

Appendix B: Tax lots within one-quarter-mile of the interchange

North of US-26 (Helvetia Road)

Tax Lot #	Address	Ownership	Type of Use	Type of Approach	Location of Lot	Location of Approach	Estimated Approach Width (ft)	Zoning	Lot Size (Acres)
1N2150001400	24250 NW GROVELAND DR.	John Wassmer	Residential	Private	West	Groveland Dr	44	EFU	0.40
1N2150000900	24665 NW GROVELAND DR.	Standring Groveland	Agricultural	Private	West	Groveland Dr	17	EFU	21.51
1N2150000901	Undeveloped/No address	Standring Holdings LLC	Agricultural	Private	West	N/A	N/A	EFU	36.62
1N215CC00300	Undeveloped/No address	Pacific Realty Associates	Undeveloped	Private	East	N/A	N/A	M-P	1.60
1N215CC00600	Undeveloped/No address	Cindy C. Lee	Agricultural	Private	East	N/A	N/A	HSID	7.00
1N215CC00500	Undeveloped/No address	David M. Edwards	Agricultural	Private	East	N/A	N/A	HSID	2.24
1N2150000600	Undeveloped/No address	Dewayne & Daphne Wafford	Agricultural	Private	East	N/A	N/A	HSID	51.20
1N2150000607	6800 NW HELVETIA RD.	Junhi & Haesoon Hong	Residential	Private	East	Schaff Rd	20	FD-20	4.12
1N2150000603	6800 NW HELVETIA RD.	Junhi & Haesoon Hong	Residential	Private	East	Schaff Rd	20	FD-20	2.98

South of US-26 (Brookwood Parkway)

Tax Lot #	Address	Ownership	Type of Use	Type of Approach	Location of Lot	Location of Approach	Estimated Approach Width (ft)	Zoning	Lot Size (Acres)
1N221AA01200	24215 NW MEEK RD.	Garrold C. Shurtz - Living Trust	Residential	Private	West	Meek Rd	6	AF-5	1.34
1N221AA01100	Undeveloped/No address	PJ Properties LLC	Undeveloped	Private	West	Brookwood Pkwy	18	AF-5	1.14
1N2210003100	5455 NW BIRCH AVE.	Keith A. & Rebecca Berger	Agricultural	Private	West	N/A	N/A	SSID M- P	42.22
1N2210002601	Undeveloped/No address	Herbert L. & Hazel I. Moore - Trust	Undeveloped	Private	West	N/A	N/A	SSID M- P	0.54
1N2220000200	Undeveloped/No address	Nike Foundation	Agricultural	Private	East	N/A	N/A	M-P	75.43
1N2220002800	5830 NW BROOKWOOD PKWY.	Ruth I. Berger - Trust	Agricultural	Private	East	Meek Rd	21	M-P	6.23
1N2220002900	5870 NW BROOKWOOD PKWY.	Ruth I. Berger - Trust	Agricultural	Private	East	Meek Rd	21	M-P	13.15

Appendix . . Study Area Roadway Inventory

Appendix A: Project Area Roadway Inventory

Roadway	Washington County Functional Classification	City of Hillsboro Functional Classification	Posted Speed (mph)	On-Street Parking	Sidewalks	Bicycle Lanes	Paved Width (ft)
15th Ave	Collector	Collector	35	No	Yes	No	24-36
229th Ave	Collector	Collector	40	No	Yes	Yes	36
235th Ave	Collector	Collector	Basic Rule	No	Yes	No	24
25th Ave	Arterial	Arterial	45	No	No	No	24
Brookwood Parkway	Arterial	Arterial	55	No	Yes	No	60
Century Blvd	Collector	Collector	Basic Rule	No	Yes	Yes	36
Cornelius Pass Rd	Arterial	Arterial	45	No	Yes	Yes	60
Croeni Rd	Neighborhood Route	Local Street	Basic Rule	No	Yes	No	36
Dawson Creek Dr	Collector	Collector	Basic Rule	No	Yes	No	35
Dick Rd	Local Street	N/A	Basic Rule	No	No	No	22
Eggiman Rd / 273rd Ave	Local Street	N/A	25	No	No	No	23
Evergreen Parkway	Arterial	Arterial	45	No	Yes	Yes	75-90
Groveland Rd	Local Street	N/A	Basic Rule	No	No	No	22
Huffman St	Collector	Collector	Basic Rule	No	Yes	Yes	36
Jackson Quarry Rd	Local Street	N/A	Basic Rule	No	Yes	No	30
Jackson School Rd	Arterial	N/A	45	No	No	No	24-36
Jacobson Rd	Collector	Collector	40	No	Yes	Yes	36
Meek Rd	Collector	N/A	45	No	No	No	22
Meier-Jurgen Rd / 253rd Ave	Local Street	N/A	Basic Rule	No	No	No	18-24
Pubols Rd	Local Street	N/A	Basic Rule	No	No	No	22
Rock Creek Blvd	Collector	Collector	25	No	Yes	No	24-36
Schaaf Rd	Local Street	N/A	Private/None	No	No	No	24
Scotch Church Rd	Collector	N/A	45	No	No	No	24
Sewell Rd / 268th Ave	Local Street	N/A	25	No	No	No	20
Groveland Dr	Local Street	N/A	Basic Rule	No	No	No	22
Wagon Way	Neighborhood Route	Collector	35	No	Yes	No	36
West Union Rd	Arterial	Arterial	45	No	Yes	No	24

Data Sources:

Note 1: Functional classification data from:

Washiington County: http://www.co.washington.or.us/LUT/Divisions/LongRangePlanning/Publications/upload/TSP_10Maps.pdf

City of Hillsboro: http://www.ci.hillsboro.or.us/Planning/documents/Transportation_System_Plan_Update.pdf

Note 2: Posted speed data from Google maps, field observation and the following phone calls:

Washington County: Sarah Owens

City of Hillsboro: Brad Eckland

Note 3: On-street parking, sidewalks, bicycle lane and paved width data from: Google maps and field observation

Appendix C. Crash Evaluation

Summary of Collision Types within the Brookwood IAMP Study Area (January 1, 2008 through December 31, 2010)

Study Location	Collision Type														Severity		
	Rear End	Fixed Object	Angle	Other	Backing	Turning	Sideswipe-Opposite	Sideswipe-Meeting	Head On	Non-Collision	Parked	Bicycle	Pedestrian	Total	Fatal Crashes	Injury Crashes	PDO Crashes
Cornelius Pass Road - From West Union Road to Evergreen Parkway	**27**	**2**	**5**	**0**	**0**	**14**	**8**	**0**	**0**	**0**	**0**	**0**	**1**	**57**	**0**	**17**	**40**
West Union Road	*3*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*4*	0	2	2
Rock Creek Boulevard	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	0	0	1
Wagon Way	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	0	1	0
Interchange	*16*	*1*	*0*	*0*	*0*	*8*	*7*	*0*	*0*	*0*	*0*	*0*	*1*	*33*	0	8	25
Imbrie Drive	*1*	*0*	*0*	*0*	*0*	*2*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*3*	0	1	2
Evergreen Parkway	*5*	*0*	*5*	*0*	*0*	*4*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*15*	0	5	10
Evergreen Parkway - From Cornelius Pass Rd to Jackson School Rd.	**6**	**4**	**5**	**0**	**0**	**12**	**1**	**1**	**0**	**0**	**0**	**0**	**1**	**30**	**0**	**10**	**20**
Jackson School Road	*3*	*1*	*0*	*0*	*0*	*4*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*8*	0	3	5
Brookwood Parkway	*2*	*1*	*0*	*0*	*0*	*0*	*1*	*1*	*0*	*0*	*0*	*0*	*0*	*5*	0	3	2
Atkeson Lane	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	0	0	1
Cornelius Pass Road	*1*	*2*	*5*	*0*	*0*	*7*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*16*	0	4	12
Brookwood Parkway / Helvetia Road - From West Union Road to Evergreen Parkway	**19**	**3**	**6**	**0**	**0**	**7**	**1**	**2**	**0**	**1**	**0**	**0**	**0**	**39**	**2**	**9**	**28**
Interchange	*8*	*2*	*0*	*0*	*0*	*2*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*13*	0	4	9
Huffman St	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*2*	1	0	1
Evergreen Parkway	*11*	*1*	*6*	*0*	*0*	*4*	*1*	*1*	*0*	*0*	*0*	*0*	*0*	*24*	1	5	18
Jackson School Road - From West Union Road to Evergreen Parkway	**9**	**5**	**9**	**0**	**0**	**15**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**39**	**0**	**10**	**29**
West Union Road	*0*	*1*	*9*	*0*	*0*	*2*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*12*	0	3	9
Interchange	*8*	*3*	*0*	*0*	*0*	*13*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*24*	0	7	17
Evergreen Parkway	*1*	*1*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*3*	0	0	3
Jacobson Road - From Cornelius Pass Rd to Helvetia Road	**2**	**0**	**3**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**6**	**0**	**2**	**4**
Brookwood Parkway / Helvetia Road	*0*	*0*	*1*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*2*	0	1	1
Century Boulevard	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	0	1	0
Croeni Road	*0*	*0*	*2*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*2*	0	0	2
Cornelius Pass Road	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	0	0	1
West Union Road - From Jackson School Road to Evergreen Parkway	**0**	**1**	**5**	**0**	**1**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**11**	**0**	**7**	**4**
Jackson School Road	*0*	*0*	*5*	*0*	*0*	*3*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*8*	0	6	2
Jackson Quarry Road	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	0	0	1
Groveland Road	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	0	0	1
Century Boulevard	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	0	1	0
	63	**15**	**33**	**0**	**1**	**53**	**10**	**4**	**0**	**1**	**0**	**0**	**2**	**182**	**2**	**55**	**125**
	28%	7%	15%	0%	0%	24%	4%	2%	0%	0%	0%	0%	1%		**1%**	**30%**	**69%**
US 26	**23**	**9**	**0**	**1**	**0**	**1**	**8**	**0**	**0**	**0**	**0**	**0**	**0**	**42**	**2**	**15**	**25**
Mainline: M.P. 58.00-63.00	20	9	0	1	**0**	**1**	**8**	**0**	**0**	**0**	**0**	**0**	**0**	39	2	12	25
Ramp & Ramp Terminal	3	0	0	0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	3	0	3	0
Total Study Area Crashes	**86**	**24**	**33**	**1**	**1**	**54**	**18**	**4**	**0**	**1**	**0**	**0**	**2**	**224**	**4**	**70**	**150**
% Crashes by Type	38%	11%	15%	0%	0%	24%	8%	2%	0%	0%	0%	0%	1%		**2%**	**38%**	**82%**

Source: ODOT Crash Analysis and Reporting Unit, January 1, 2008 through December 31, 2010.

Note: Crashes listed in this table include all reported collisions within 265' of the listed facility along sidestreets.

Evergreen Road (Pkwy) from Cornelius Pass Rd to Jackson School Road plus 265 feet on all side streets and ramps
January 1, 2007 through December 31, 2010 **2010 data is preliminary and subject to change

WASHINGTON COUNTY

SERIAL NO	DATE	TIME	DAY	*COUNTY OR CITY NAME	CRASH LOCATION	COLL TYPE	EVENT	CAUSE	ERROR	SURF	TOT VEH	VEHICLE TYP/OWN #1	VEHICLE TYP/OWN #2	PEOPLE KILL	PEOPLE INJ	PEOPLE ALC	PEOPLE SPED
04384	07/31/2007	9P	TU	Hillsboro	NW 229TH AVE 100 FT SW OF NW EVERGREEN PKY	HEAD		05,33,30	039,080,050	DRY	2	011	011	0	5	Y	Y
06819	12/29/2009	5P	TU	Hillsboro	NW ATKESON LN AT NW EVERGREEN PKY	TURN		02	028	SNO	2	011	011	0	3	N	N
01663	03/28/2008	12P	FR	Hillsboro	NW CORNELIUS PASS RD AT NW EVERGREEN PKY	ANGL		04	020	WET	2	011	011	0	0	N	N
01834	04/01/2008	9P	TU	Hillsboro	NW CORNELIUS PASS RD AT NW EVERGREEN PKY	ANGL		04	020	DRY	2	011	011	0	0	N	N
04801	09/27/2009	12P	SU	Hillsboro	NW CORNELIUS PASS RD AT NW EVERGREEN PKY	ANGL	110	04	020	DRY	1	011		0	1	N	N
00592	02/07/2010	12P	SU	Hillsboro	NW CORNELIUS PASS RD AT NW EVERGREEN PKY	ANGL		04	020	DRY	2	011	011	0	1	N	N
05751	10/26/2010	9P	TU	Hillsboro	NW CORNELIUS PASS RD AT NW EVERGREEN PKY	ANGL	010	04	020	WET	2	011	011	0	1	N	N
05615	10/15/2008	UNK	WE	Hillsboro	NW CORNELIUS PASS RD AT NW EVERGREEN PKY	REAR		07	026	DRY	2	999	011	0	0	N	N
06948	06/26/2009	7A	FR	Hillsboro	NW CORNELIUS PASS RD AT NW EVERGREEN PKY	TURN		08	001,007,080	DRY	2	019	011	0	0	N	N
04604	09/04/2010	11A	SA	Hillsboro	NW CORNELIUS PASS RD AT NW EVERGREEN PKY	TURN		02	004,028	DRY	2	011	011	0	0	N	N
04622	09/05/2010	6A	SU	Hillsboro	NW CORNELIUS PASS RD AT NW EVERGREEN PKY	TURN		02	004,028	DRY	2	011	011	0	2	N	N
04748	09/12/2010	10A	SU	Hillsboro	NW CORNELIUS PASS RD AT NW EVERGREEN PKY	TURN		04	097,097	DRY	2	011	011	0	2	N	N
07071	12/18/2008	7P	TH	Hillsboro	NW EVERGREEN PKY 100 FT W OF NW CORNELIUS PASS RD	FIX	062,040,124	01	047,080	ICE	1	011		0	0	N	Y
02405	05/21/2009	1P	TH	Hillsboro	NW EVERGREEN PKY 160 FT W OF NW CORNELIUS PASS RD	TURN	040	02	004,028	DRY	2	011	019	0	0	N	N
07110	12/24/2008	8A	WE	Hillsboro	NW EVERGREEN PKY 200 FT W OF NW CORNELIUS PASS RD	FIX	062,040,124	01	047,080	SNO	1	011		0	0	N	Y
02074	04/17/2008	6P	TH	Hillsboro	NW EVERGREEN PKY 500 FT W OF NW CORNELIUS PASS RD	TURN		02	004,028	DRY	2	011	011	0	2	N	N
05982	11/03/2010	5P	WE	Hillsboro	NW EVERGREEN PKY 782 FT W OF NW CORNELIUS PASS RD	TURN		02	028	DRY	2	011	011	0	0	N	N
04858	09/16/2010	11A	TH	Hillsboro	NW EVERGREEN PKY 880 FT W OF NW CORNELIUS PASS RD	PED		02	029	WET	1	011		0	1	N	N
06060	11/05/2010	3P	FR	Hillsboro	NW EVERGREEN RD AT NW JACKSON SCHOOL RD	REAR	013	07	026	DRY	3	011	011	0	1	N	N
05518	10/07/2008	11P	TU	Hillsboro	NW EVERGREEN RD AT NW JACKSON SCHOOL RD	TURN		02	004,028	DRY	2	011	011	0	0	Y	N
05579	10/13/2008	9A	MO	Hillsboro	NW EVERGREEN RD AT NW JACKSON SCHOOL RD	TURN		02	004,028	DRY	2	011	011	0	0	N	N
00480	01/27/2010	2P	WE	Hillsboro	NW EVERGREEN RD AT NW JACKSON SCHOOL RD	TURN		04	020	DRY	2	011	011	0	1	N	N
04826	09/15/2010	9A	WE	Hillsboro	NW EVERGREEN RD AT NW JACKSON SCHOOL RD	TURN		02	004,028	DRY	2	011	011	0	2	N	N
04784	09/14/2010	6P	TU	Hillsboro	NW EVERGREEN RD 50 FT E OF NW JACKSON SCHOOL RD	REAR	013	07	026	DRY	3	011	011	0	1	N	N
02028	04/27/2010	8A	TU	Hillsboro	NW EVERGREEN RD 100 FT E OF NW JACKSON SCHOOL RD	REAR		07	026	WET	2	011	011	0	0	N	N
01036	03/05/2010	6A	FR	Hillsboro	NW EVERGREEN RD 100 FT E OF NW JACKSON SCHOOL RD	FIX	054,092	26	080	WET	1	011		0	0	N	N
02879	06/16/2009	4P	TU	Hillsboro	NW SHUTE RD 20 FT S OF NW EVERGREEN PKY	REAR		07	026	DRY	2	011	011	0	0	N	N
00490	01/22/2008	3P	TU	Hillsboro	NW SHUTE RD 50 FT N OF NW EVERGREEN PKY	REAR	092	07,26	026	DRY	2	011	011	0	2	N	N
02876	06/16/2009	3P	TU	Hillsboro	NW SHUTE RD 65 FT S OF NW EVERGREEN PKY	REAR	001	10	014,026	DRY	2	011	091	0	1	N	N
00397	01/16/2008	5A	WE	Hillsboro	NW SHUTE RD 100 FT N OF NW EVERGREEN PKY	SS-M	124	01	047,080	ICE	2	011	011	0	2	N	Y
00122	01/02/2009	8A	FR	Hillsboro	NW SHUTE RD 120 FT S OF NW EVERGREEN PKY	SS-O	124	01	047,080	ICE	3	011	011	0	1	N	Y
00210	01/11/2009	8A	SU	Hillsboro	NW SHUTE RD 20 FT N OF NW EVERGREEN RD	REAR		07	026	DRY	2	011	999	0	0	N	N
07019	12/17/2008	12P	WE	Hillsboro	NW SHUTE RD 25 FT N OF NW EVERGREEN RD	REAR		01	047,026	ICE	2	011	019	0	0	N	Y
01980	04/26/2010	2P	MO	Hillsboro	NW SHUTE RD 60 FT N OF NW EVERGREEN RD	REAR		07	043,026	WET	2	011	091	0	1	N	N
04005	07/28/2008	9A	MO	Hillsboro	NW SHUTE RD 100 FT N OF NW EVERGREEN RD	REAR		10	014,026	DRY	2	011	011	0	1	N	N
02406	05/06/2008	8A	TU	Hillsboro	NW SHUTE RD 150 FT S OF NW EVERGREEN RD	FIX	062,040	10	080,081	DRY	1	011		0	1	N	N

Helvetia Road/Shute Road from West Union Road to Evergreen Parkway plus 265 feet on all side streets
January 1, 2007 through December 31, 2010 **2010 data is preliminary and subject to change

SERIAL NO	DATE	TIME	DAY	*COUNTY OR CITY NAME	COMPNT	MLG TYP	CRASH LOCATION	COLL TYPE	EVENT	CAUSE	ERROR	SUR F	TOT VEH	VEHICLE TYP/OWN #1	VEHICLE TYP/OWN #2	--PEOPLE-- KILL	INJ	ALC	SPED
07447	12/06/2007	5P	TH	*Washington	CN	R HY	047, SUNSET AT MP 61.04	REAR		07	026	WET	2	011	011	0	1	N	N
04814	09/15/2010	4P	WE	Hillsboro	CN	R HY	047, SUNSET AT MP 61.04	REAR		07	026	WET	2	011	019	0	0	N	N
05422	10/11/2010	4P	MO	Hillsboro	CN	R HY	047, SUNSET AT MP 61.04	REAR	093	07,27	043,016,042	DRY	2	011	011	0	0	N	N
06958	11/13/2007	5P	TU	Hillsboro	CN	R HY	047, SUNSET AT MP 61.06	REAR	013	27,32	016,026,052	DRY	4	011	011	0	0	N	N
03611	07/08/2008	8A	TU	Hillsboro	CN	R HY	047, SUNSET AT MP 61.07	REAR		07	026	DRY	2	011	011	0	0	N	N
06294	11/13/2010	1A	SA	Hillsboro	CN	R HY	047, SUNSET AT MP 61.08	TURN	043,124	08,13	080,081,045,0	WET	2	011	011	0	0	N	Y
03414	06/29/2008	8P	SU	Hillsboro	CN	R HY	047, SUNSET AT MP 61.08	FIX	043,092,040	26	080,081	WET	1	011		0	0	N	N
01161	03/09/2010	4P	TU	Hillsboro	CN	R HY	047, SUNSET AT MP 61.09	REAR		07	026	ICE	2	011	011	0	0	N	N
03986	07/30/2008	9A	WE	Hillsboro	CN	R HY	047, SUNSET AT MP 61.09	NCOL	124	01	047,080	DRY	1	091		0	1	N	Y
06449	11/24/2008	8A	MO	Hillsboro	CN	R HY	047, SUNSET AT MP 61.10	REAR	013	07	026	DRY	3	011	011	0	1	N	N
03327	07/07/2010	5P	WE	Hillsboro	CN	R HY	047, SUNSET AT MP 61.10	REAR		07	026	DRY	2	011	019	0	0	N	N
02777	05/20/2007	9A	SU	Hillsboro	CN	R HY	047, SUNSET AT MP 61.21	TURN		02	004,028	WET	2	011	011	0	0	N	N
04903	09/14/2008	2P	SU	Hillsboro	CN	R HY	047, SUNSET AT MP 61.22	REAR		27	016,026	DRY	2	011	011	0	1	N	N
00260	01/14/2009	5P	WE	Hillsboro	CN	R HY	047, SUNSET AT MP 61.22	REAR	013	07	026	DRY	4	011	011	0	3	N	N
01303	03/17/2009	11A	TU	Hillsboro	CN	R HY	047, SUNSET AT MP 61.22	TURN		14	003	WET	2	011	011	0	0	N	N
92754	05/23/2008	12P	FR	Hillsboro	CN	R HY	047, SUNSET AT MP 61.22	FIX	047	01,08	047,001	WET	1	011		0	1	N	Y
04568	08/09/2007	4P	TH	Hillsboro	CN	R HY	047, SUNSET AT MP 61.49	REAR		07	026	DRY	2	011	011	0	0	N	N
00758	02/04/2007	8P	SU	Hillsboro	CN	R HY	047, SUNSET AT MP 61.50	REAR		07	026	DRY	2	011	011	0	1	N	N

TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT

CITY STREET LOCATIONS BY COUNTY - DRIVER BEHAVIOR FORMAT

Helvetia Road/Shute Road from West Union Road to Evergreen Parkway plus 265 feet on all side streets
January 1, 2007 through December 31, 2010 **2010 data is preliminary and subject to change

WASHINGTON COUNTY

SERIAL NO	DATE	TIME	DAY	*COUNTY OR CITY NAME	CRASH LOCATION	COLL TYPE	EVENT	CAUSE	ERROR	SURF	TOT VEH	VEHICLE TYP/OWN #1	VEHICLE TYP/OWN #2	PEOPLE KILL	PEOPLE INJ	PEOPLE ALC	PEOPLE SPED
03830	07/05/2007	12A	TH	Hillsboro	NW EVERGREEN PKY AT NW SHUTE RD	ANGL		04	020	DRY	2	011	011	0	0	N	N
00317	01/20/2010	8A	WE	Hillsboro	NW EVERGREEN PKY AT NW SHUTE RD	ANGL		04,02	024,020	WET	2	011	013	0	3	N	N
01238	03/15/2010	9A	MO	Hillsboro	NW EVERGREEN PKY AT NW SHUTE RD	ANGL		04	020	DRY	2	011	011	0	2	N	N
03247	07/03/2010	8P	SA	Hillsboro	NW EVERGREEN PKY AT NW SHUTE RD	ANGL		04	020	DRY	2	011	011	0	0	N	N
05458	10/14/2010	4P	TH	Hillsboro	NW EVERGREEN PKY AT NW SHUTE RD	ANGL	055	04	020	DRY	2	011	011	0	1	N	N
00106	01/03/2008	6P	TH	Hillsboro	NW EVERGREEN PKY AT NW SHUTE RD	TURN	092	07,26	026	WET	2	011	011	0	0	N	N
04517	08/23/2008	8P	SA	Hillsboro	NW EVERGREEN RD AT NW SHUTE RD	ANGL	013	04	020	DRY	3	011	011	0	1	N	N
01739	04/14/2010	8A	WE	Hillsboro	NW EVERGREEN RD AT NW SHUTE RD	ANGL		04	020	DRY	2	011	011	0	1	N	N
00748	02/05/2008	6A	TU	Hillsboro	NW EVERGREEN RD AT NW SHUTE RD	REAR		10	014,026	WET	2	011	019	0	0	N	N
06227	11/15/2008	4A	SA	Hillsboro	NW EVERGREEN RD AT NW SHUTE RD	REAR		32	052,026	DRY	2	011	011	0	2	N	N
02018	05/01/2009	2P	FR	Hillsboro	NW EVERGREEN RD AT NW SHUTE RD	REAR	013	32	052,026	DRY	3	011	011	0	2	N	N
02638	06/01/2009	11A	MO	Hillsboro	NW EVERGREEN RD AT NW SHUTE RD	REAR		07	026	DRY	2	011	991	0	0	N	N
05135	09/24/2008	8P	WE	Hillsboro	NW EVERGREEN RD AT NW SHUTE RD	TURN		02	028	DRY	2	011	011	0	0	N	N
06608	11/27/2010	5P	SA	Hillsboro	NW EVERGREEN RD AT NW SHUTE RD	TURN		04	020	WET	2	011	011	0	2	N	N
03209	06/17/2008	6A	TU	Hillsboro	NW HUFFMAN ST AT NW SHUTE RD	SS-M	087,092	01,26,07	026,026,047,(	DRY	4	011	011	0	4	N	Y
03688	07/25/2010	4P	SU	Hillsboro	NW HUFFMAN ST AT NW SHUTE RD	TURN		02	004,028	DRY	2	011	011	0	2	N	N
00490	01/22/2008	3P	TU	Hillsboro	NW SHUTE RD 50 FT N OF NW EVERGREEN PKY	REAR	092	07,26	026	DRY	2	011	011	0	2	N	N
00397	01/16/2008	5A	WE	Hillsboro	NW SHUTE RD 100 FT N OF NW EVERGREEN PKY	SS-M	124	01	047,080	ICE	2	011	011	0	2	N	Y
01061	03/02/2010	6P	TU	Hillsboro	NW SHUTE RD 500 FT N OF NW EVERGREEN PKY	REAR		07	026	WET	2	011	011	0	0	N	N
03351	06/15/2007	2P	FR	Hillsboro	NW SHUTE RD 1000 FT N OF NW EVERGREEN PKY	TURN		02	004,028	DRY	2	011	011	0	0	N	N
00869	02/11/2008	11A	MO	Hillsboro	NW SHUTE RD UNK FT N OF NW EVERGREEN RD	REAR		07	026	DRY	2	011	011	0	0	N	N
00210	01/11/2009	8A	SU	Hillsboro	NW SHUTE RD 20 FT N OF NW EVERGREEN RD	REAR		07	026	DRY	2	011	999	0	0	N	N
07019	12/17/2008	12P	WE	Hillsboro	NW SHUTE RD 25 FT N OF NW EVERGREEN RD	REAR		01	047,026	ICE	2	011	019	0	0	N	Y
01980	04/26/2010	2P	MO	Hillsboro	NW SHUTE RD 60 FT N OF NW EVERGREEN RD	REAR		07	043,026	WET	2	011	091	0	1	N	N
04005	07/28/2008	9A	MO	Hillsboro	NW SHUTE RD 100 FT N OF NW EVERGREEN RD	REAR		10	014,026	DRY	2	011	011	0	1	N	N
05123	09/29/2010	8A	WE	Hillsboro	NW SHUTE RD 292 FT N OF NW EVERGREEN RD	FIX	058,062	16	080,081	DRY	1	011		0	0	N	N
01245	03/15/2010	3P	MO	Hillsboro	NW SHUTE RD 500 FT N OF NW EVERGREEN RD	SS-O		07	043,042	DRY	2	011	011	0	0	N	N
03597	07/16/2010	6P	FR	Hillsboro	NW SHUTE RD 1000 FT N OF NW EVERGREEN RD	TURN		02	004,028	DRY	2	011	014	0	2	N	N

VEHICLE OWNERSHIP CODES

Code	Short Description	Long Description
1	PRVTE	Private
2	GOVMT	Government
3	PUBLC	Public
4	RENTL	Rental vehicle
5	STOLN	Stolen vehicle
9	UNKN	Unknown ownership

VEHICLE TYPE CODES

Code	Short Description	Long Description
01	PSNGR CAR	Passenger car, pickup, etc.
02	BOBTAIL	Truck tractor with no trailers (bobtail)
03	FARM TRCTR	Farm tractor or self-propelled farm equipment
04	SEMI TOW	Truck Tractor with trailer/mobile home in tow
05	TRUCK	Truck with non-detachable bed, panel, etc.
06	MOPED	Moped, minibike, motor scooter, or motor bicycle
07	SCHL BUS	School bus (includes van)
08	OTH BUS	Other bus
09	MTRCYCLE	Motorcycle
10	OTHER	Other: forklift, backhoe, etc.
11	MOTRHOME	Motorhome
12	TROLLEY	Motorized Street Car/Trolley (no rails/wires)
13	ATV	ATV
14	MTRSCTR	Motorized scooter
15	SNOWMOBILE	Snowmobile
99	UNKNOWN	Unknown vehicle type

CAUSE CODES

Code	Short Description	Medium Description	Long Description
00	NO CODE	NO CODE APPLICABLE	No cause associated at this level
01	TOO-FAST	TOO FAST FOR COND	Too fast for conditions (not exceed posted speed)
02	NO-YIELD	FAILED YIELD ROW	Did not yield right-of-way
03	PAS-STOP	PASSED STOP SIGN	Passed stop sign or red flasher
04	DIS--RAG	DISREGARD R-A-G	Disregarded R-A-G traffic signal.
05	LEFT-CTR	DROVE WRONG SIDE	Drove left of center on two-way road
06	IMP-OVER	IMPROPER PASSING	Improper overtaking
07	TOO-CLOS	FOLLOW TOO CLOSE	Followed too closely
08	IMP-TURN	IMPROPER TURN	Made improper turn
09	DRINKING	ALC OR DRUGS	Alcohol or Drug Involved
10	OTHR-IMP	OTHER DRIVE ERR	Other improper driving
11	MECH-DEF	MECH DEFECT	Mechanical defect
12	OTHER	OTHER	Other (not improper driving)
13	IMP LN C	IMP LANE CHANGE	Improper change of traffic lanes
14	DIS TCD	DISRG OTHR TCD	Disregarded other traffic control device
15	WRNG WAY	WRONG WAY/1 WAY	Wrong way on one-way roadway
16	FATIGUE	DRIVER FATIGUED	Driver drowsy/fatigued/sleepy
18	IN RDWY	ILLEGALLY IN RDWY	Non-motorist illegally in roadway
19	NT VISBL	NOT VISIBLE	Non-motorist clothing not visible
20	IMP PKNG	IMPROPER PARKING	Vehicle improperly parked
21	DEF STER	DEFECTIVE STEERING	Defective steering mechanism
22	DEF BRKE	DEFECTIVE BRAKES	Inadequate or no brakes
24	LOADSHFT	LOAD SHIFTED	Vehicle lost load or load shifted
25	TIREFAIL	TIRE FAILURE	Tire Failure
26	PHANTOM	PHANTOM VEHICLE	Phantom / Non-contact Vehicle
27	INATTENT	INATTENTION	Inattention
30	SPEED	EXCED POSTED SPEED	Driving in excess of posted speed
31	RACING	SPEED RACING	Speed Racing (per PAR)
32	CARELESS	CARELESS DRIVING	Careless Driving (citation issued)
33	RECKLESS	RECKLESS DRIVING	Reckless Driving (citation issued)
34	AGGRESV	AGGRESSIVE DRIVING	Aggressive Driving (per PAR)
35	RD RAGE	ROAD RAGE	Road Rage (per PAR)

ERR CODES

Code	Short Description	Medium Description	Long Description
000	NONE	NO ERROR	No error
001	WIDE TRN	WIDE TURN	Wide turn
002	CUT CORN	CUT CORNER	Cut corner on turn
003	FAIL TRN	F OBEY TRN	Failed to obey mandatory traffic turn signal, sign or lane markings
004	L IN TRF	LTRN FNT TRAF	Left turn in front of oncoming traffic
005	L PROHIB	LTRN PROHIB	Left turn where prohibited
006	FRM WRNG	T FRM WRNG LN	Turned from wrong lane
007	TO WRONG	T TO WRONG LN	Turned into wrong lane
008	ILLEG U	ILLEG U-TURN	U-turned illegally
009	IMP STOP	IMP STOP	Improperly stopped in traffic lane
010	IMP SIG	IMP/FAIL SIG	Improper signal or failure to signal
011	IMP BACK	IMP BACKING	Backing improperly (Not parking)
012	IMP PARK	IMP PARKED	Improperly parked
013	UNPARK	IMP STRT PARK	Improper start leaving parked position
014	IMP STRT	IMP STRT STOP	Improper start from stopped position
015	IMP LGHT	IMP/NO LIGHTS	Improper or no lights (vehicle in traffic)
016	INATTENT	INATTENTION	Failed to dim lights (until 4/1/97) / Inattention (after 4/1/97)
017	UNSF VEH	DR UNSAFE VEH	Driving unsafe vehicle (no other error apparent)
018	OTH PARK	PRK MAN N/CLR	Entering, exiting parked position with insufficient clearance or other improper parking maneuver
019	DIS DRIV	DISRG DR SIG	Disregarded other driver's signal
020	DIS SGNL	DISRG TRF SIG	Disregarded traffic signal
021	RAN STOP	DISRG STP SGN	Disregarded stop sign or flashing red
022	DIS SIGN	DISRG WRN SGN	Disregarded warning sign, flares or flashing amber
023	DIS OFCR	DISRG POL/FLG	Disregarded police officer or flagman
024	DIS EMER	DISRG SIR/EMR	Disregarded siren or warning of emergency vehicle
025	DIS RR	DISRG RR SIG	Disregarded RR signal, RR sign, or RR flagman
026	REAR-END	F AVOID STP V	Failed to avoid stopped or parked vehicle ahead other than school bus
027	BIKE ROW	F/YLD ROW BIK	Did not have right-of-way over pedalcyclist
028	NO ROW	NO R-O-W	Did not have right-of-way
029	PED ROW	F/YLD ROW PED	Failed to yield right-of-way to pedestrian
030	PAS CURV	PASS ON CURVE	Passing on a curve
031	PAS WRNG	PASS WRNG SID	Passing on the wrong side
032	PAS TANG	PASS TANGENT	Passing on straight road under unsafe conditions
033	PAS X-WK	PASS STP4PED	Passed vehicle stopped at crosswalk for pedestrian
034	PAS INTR	PASS AT INTER	Passing at intersection
035	PAS HILL	PASS ON HILL	Passing on crest of hill
036	N/PAS ZN	PASS N/PASSNG	Passing in "No Passing" zone
037	PAS TRAF	PASS ONC TRAF	Passing in front of oncoming traffic
038	CUT-IN	CUTTING IN	Cutting in (two lanes - two way only)
039	WRNGSIDE	DR WRONG SIDE	Driving on wrong side of the road
040	THRU MED	DR THRU MEDN	Driving through safety zone or over island
041	F/ST BUS	F/STP SCHLBUS	Failed to stop for school bus
042	F/SLO MV	F/SLO SLO VEH	Failed to decrease speed for slower moving vehicle
043	TO CLOSE	FOLLW TO CLOS	Following too closely (Must be on Officer's Report)
044	STRDL LN	STRD/DR WRNG	Straddling or driving on wrong lanes
045	IMP CHG	IMP LANE CHG	Improper change of traffic lanes

ERR CODES

Code	Short Description	Medium Description	Long Description
046	WRNG WAY	WRNG WY/1 WAY	Wrong way on one-way roadway (Vehicle is deliberately traveling on wrong side)
047	BASCRULE	V BASIC RULE	Driving too fast for conditions (Not exceeding posted speed)
048	OPN DOOR	OPN DOOR TRAF	Opened door into adjacent traffic lane
049	IMPEDING	IMPEDING TRAF	Impeding Traffic
050	SPEED	SPEED	Driving in excess of posted speed
051	RECKLESS	RECKLSS DRVNG	Reckless driving (per PAR)
052	CARELESS	CARELSS DRVNG	Careless driving (per PAR)
053	RACING	RACING	Speed Racing (per PAR)
054	X N/SGNL	X-INT NO SGNL	Crossing at intersection – no traffic signal present
055	X W/SGNL	X-INT W/ SGNL	Crossing at intersection – traffic signal present
056	DIAGONAL	X-INT DIAGNL	Crossing at intersection - diagonally
057	BTWN INT	X-BTWN INTER	Crossing between intersections
059	W/TRAF-S	W SHLD W/TRAF	Walking, running, riding, etc., on shoulder WITH traffic
060	A/TRAF-S	W SHLD A/TRAF	Walking, running, riding, etc., on shoulder FACING traffic
061	W/TRAF-P	W PAVE W/TRAF	Walking, running, riding, etc., on pavement WITH traffic
062	A/TRAF-P	W PAVE A/TRAF	Walking, running, riding, etc., on pavement FACING traffic
063	PLAYINRD	PLAY IN RDWY	Playing in street or road
064	PUSH MV	PUSH MV IN RD	Pushing or working on vehicle in road or on shoulder
065	WK IN RD	WORK IN RD	Working in roadway or along shoulder
070	LAYON RD	LYING IN RD	Standing or lying in roadway
073	DIS POL	DISRG POL/FLG	Disregarding Police (eluding)
080	FAIL LN	F MAINT LANE	Failed to maintain lane
081	OFF RD	RAN OFF RD	Ran off road
082	NO CLEAR	MISJUDGE CLR	Driver misjudged clearance
083	OVRSTEER	OVERSTEER	Over Correcting
084	NOT USED	NOT USED	Code not in use
085	OVRLOAD	OVERLOAD	Overloading or improper loading of vehicle with cargo or passengers
097	UNA DIS TC	UNA DISRG TCD	Unable to determine which driver disregarded traffic control device

EVENT CODES

Code	Short Description	Medium Description	Long Description
001	FEL/JUMP	FELL/JUMPED MV	Occupant fell, jumped or was ejected from moving vehicle
002	INTERFER	PSNGR INTERFERED	Passenger interfered with driver
003	BUG INTF	ANML INTERFERED	Animal or insect in vehicle interfered with driver
004	PED INV	PED INVOLVED	Pedestrian involved (Non-pedestrian accident)
005	SUB-PED	SUBSEQUENT PED	“Sub-Ped”: pedestrian injured subsequent to collision, etc.
006	BIKE INV	PEDALCYCLE INV	Tricycle-Bicycle involved
007	HITCHIKR	HITCHHIKER	Hitchhiker (soliciting a ride)
008	PSNGR TOW	PSNGR TOWED	Passenger being towed or pushed on conveyance
009	ON/OFF V	ON/OFF STOP VEH	Getting on or off stopped or parked vehicle (occupants only)
010	SUB OTRN	SUBSEQ OVERTURN	Overturned after first harmful event
011	MV PUSHD	VEH BEING PUSHED	Vehicle being pushed
012	MV TOWED	VEH TOWED/TOWING	Vehicle towed or had been towing another vehicle
013	FORCED	FORCED BY IMPACT	Vehicle forced by impact into another vehicle, pedalcyclist or pedestrian
014	SET MOTN	MV SET IN MOTION	Vehicle set in motion by non-driver (child released brakes, etc.)
015	RR ROW	RAILROAD ROW	At or on railroad right-of-way (not Light Rail)
016	LT RL ROW	LIGHT RAIL ROW	At or on Light-Rail right-of-way
017	RR HIT V	TRAIN HIT VEH	Train struck vehicle
018	V HIT RR	VEH HIT TRAIN	Vehicle struck train
019	HIT RR CAR	VEH HIT RR CAR	Vehicle struck railroad car on roadway
020	JACKNIFE	JACKKNIFE	Jackknife; trailer or towed vehicle struck towing vehicle
021	TRL OTRN	TRAILER O’TURN	Trailer or towed vehicle overturned
022	CN BROKE	TRLR CONN BROKE	Trailer connection broke
023	DETACH TRL	DETCHD TRLR STRKNG	Detached trailing object struck other vehicle, non-motorist, or object
024	V DOOR OPN	V DOOR OPN IN TRAF	Vehicle door opened into adjacent traffic lane
025	WHEELOFF	WHEEL CAME OFF	Wheel came off
026	HOOD UP	HOOD FLEW UP	Hood flew up
028	LOAD SHIFT	LOAD SHIFTED	Lost load, load moved or shifted
029	TIREFAIL	TIRE FAILURE	Tire Failure
030	PET	PET	Pet: cat, dog and similar
031	LVSTOCK	LIVESTOCK	Stock: cow, calf, bull, steer, sheep, etc.
032	HORSE	HORSE	Horse, mule, or donkey
033	HRSE&RID	HORSE & RIDER	Horse and rider
034	GAME	GAME NO DEER/ELK	Wild animal, game (includes birds; not deer or elk)
035	DEER ELK	DEER OR ELK	Deer or elk, wapiti
036	ANML VEH	ANIMAL-DRAWN VEH	Animal-drawn vehicle
037	CULVERT	CULVERT/MANHOLE	Culvert, open low or high manhole
038	ATENUATN	IMPACT CUSHION	Impact attenuator
039	PK METER	PARKING METER	Parking meter
040	CURB	CURB	Curb (also narrow sidewalks on bridges)
041	JIGGLE	JIGGLE BAR N/MED	Jiggle bars or traffic snake for channelization

EVENT CODES

Code	Short Description	Medium Description	Long Description
042	GDRL END	GUARDRAIL END	Leading edge of guardrail
043	GARDRAIL	GUARDRAIL	Guard rail (not metal median barrier)
044	BARRIER	MEDIAN BARRIER	Median barrier (raised or metal)
045	WALL	WALL	Retaining wall or tunnel wall
046	BR RAIL	BRIDGE RAIL	Bridge railing (on bridge and approach)
047	BR ABUT	BRIDGE ABUTMENT	Bridge abutment (approach ends)
048	BR COLMN	BRIDGE COLUMN	Bridge pillar or column (even though struck protective guard rail first)
049	BR GIRDR	BRIDGE GIRDER	Bridge girder (horizontal structure overhead)
050	ISLAND	TRAFFIC ISLAND	Traffic raised island
051	GORE	GORE	Gore
052	POLE UNK	POLE-UNKNOWN	Pole – type unknown
053	POLE UTL	POLE-UTILITY	Pole – power or telephone
054	ST LIGHT	POLE-ST LIGHT	Pole – street light only
055	TRF SGNL	POLE-TRAF SIGNAL	Pole – traffic signal and ped signal only
056	SGN BRDG	POLE-SIGN BRIDGE	Pole – sign bridge
057	STOPSIGN	STOP/YIELD SIGN	Stop or yield sign
058	OTH SIGN	OTHER SIGN	Other sign, including street signs
059	HYDRANT	HYDRANT	Hydrant
060	MARKER	DELINEATOR	Delineator or marker (reflector posts)
061	MAILBOX	MAILBOX	Mailbox
062	TREE	TREE/STUMP	Tree, stump or shrubs
063	VEG OHED	VEGTN OVER RDWY	Tree branch or other vegetation overhead, etc.
064	WIRE/CBL	CABLE ACROSS RD	Wire or cable across or over the road
065	TEMP SGN	TEMP SIGN/BARR	Temporary sign or barricade in road, etc.
066	PERM SGN	PERM SIGN/BARR	Permanent sign or barricade in/off road
067	SLIDE	SLIDE/ROCKS	Slides, rocks off or on road, falling rocks
068	FRGN OBJ	FOREIGN OBJECT	Foreign obstruction/debris in road (not gravel)
069	EQP WORK	EQUIP WORKING	Equipment working in/off road
070	OTH EQP	OTHER EQUIPMENT	Other equipment in or off road (includes parked trailer, boat)
071	MAIN EQP	MAINTNCE EQUIP	Wrecker, street sweeper, snow plow or sanding equipment
072	OTHER WALL	OTHER WALL	Rock, brick or other solid wall
073	IRRGL PVMT	IRREGULAR PAVEMENT	Speed bump, other bump, pothole or pavement irregularity (per PAR)
075	CAVE IN	CAVE IN	Bridge or road cave in
076	HI WATER	HIGH WATER	High Water
077	SNO BANK	SNOW BANK	Snow Bank
078	HOLE	HOLE/RDWY EDGE	Chuckhole in road, low or high shoulder at pavement edge
079	DITCH	CUT SLOPE/DITCH	Cut slope or ditch embankment
080	OBJ F MV	OBJ FRM OTHR VEH	Struck by rock or other object set in motion by other vehicle (incl. lost loads)
081	FLY-OBJ	OTHER MOVING OBJ	Struck by other moving or flying object
082	VEH HID	VEH OBSCURE VIEW	Vehicle obscured view
083	VEG HID	VEG OBSCURE VIEW	Vegetation obscured view
084	BLDG HID	BLD OBSCURE VIEW	View obscured by fence, sign, phone booth, etc.

EVENT CODES

Code	Short Description	Medium Description	Long Description
085	WIND GUST	WIND GUST	Wind Gust
086	IMMERSED	IMMERSION	Vehicle immersed in body of water
087	FIRE/EXP	FIRE/EXPLOSION	Fire or Explosion
088	FENC/BLD	FENCE/BUILDING	Fence or building, etc.
089	OTH ACDT	REFER OTHER ACDT	Accident related to another separate accident
090	TO 1 SIDE	TWO WAY ONE SIDE	Two-way traffic on divided roadway all routed to one side
092	PHANTOM	PHANTOM VEH	Other (phantom) non-contact vehicle (on PAR or report)
093	CELL-POL	CELLPHONE-POLICE	Cell phone (on PAR or driver in use)
094	VIOL GDL	VIOL GRAD DR LIC	Teenage driver in violation of graduated license pgm
095	GUY WIRE	GUY WIRE	Guy wire
096	BERM	BERM	Berm (earthen or gravel mound)
097	GRAVEL	GRAVEL IN RDWY	Gravel in roadway
098	ABR EDGE	ABRUPT EDGE	Abrupt edge
099	CELL-WTN	CELLPHONE-WITNSS	Cell Phone use witnessed by other participant
100	UNK FIXD	UNK FIX OBJ	Unknown type of fixed object
101	OTHER OBJ	OTHER OBJ NOT FIXED	Other or unknown object, not fixed
104	OUTSIDE V	PSGR OUTSIDE VEHICLE	Passenger riding on vehicle exterior
105	PEDAL PSGR	PSNGR ON PEDALCYCLE	Passenger riding on pedalcycle
106	MAN WHLCHR	NONMOTOR WHEELCHAIR	Pedestrian in non-motorized wheelchair
107	MTR WHLCHR	MOTORIZED WHEELCHAIR	Pedestrian in motorized wheelchair
110	N-MTR	NM STR VEH	Non-motorist struck vehicle
111	S CAR VS V	ST CAR STRUCK VEH	Street Car/Trolley (on rails and/or overhead wire system) struck vehicle
112	V VS S CAR	VEH STRUCK ST CAR	Vehicle struck Street Car/Trolley (on rails and/or overhead wire system)
113	S CAR ROW	STREET CAR ROW	At or on Street Car/Trolley right-of-way
114	RR EQUIP	VEH STRUCK RR EQUIP	Vehicle struck railroad equipment (not train) on tracks
120	WIRE BAR	WIRE BARRIER	Wire or cable median barrier
124	SLIPPERY	SLIPPERY SURFACE	Sliding or swerving due to wet, icy, slippery or loose surface
125	SHLDR	SHLDR GAVE	Shoulder gave way

Jackson School Road from Evergreen Road (Pkwy) to West Union Road plus 265 feet on all side streets and ramps
January 1, 2007 through December 31, 2010 **2010 data is preliminary and subject to change

SERIAL NO	DATE	TIME	DAY	*COUNTY OR CITY NAME	COMPNT	MLGTYP	CRASH LOCATION	COLL TYPE	EVENT	CAUSE	ERROR	SURF	TOT VEH	VEHICLE TYP/OWN #1	VEHICLE TYP/OWN #2	--PEOPLE-- KILL	INJ	ALC	SPED
00886	02/11/2007	1A	SU	*Washington	CN	R HY	047, SUNSET AT MP 58.08	FIX	043	01,08	047,001,081	WET	1	011		0	0	Y	Y
05204	10/15/2009	1P	TH	*Washington	CN	R HY	047, SUNSET AT MP 58.23	TURN		08,02	006,028	DRY	2	011	011	0	1	N	N
07073	12/18/2008	8A	TH	*Washington	CN	R HY	047, SUNSET AT MP 58.28	REAR		01	047,026	ICE	2	011	011	0	2	N	Y
02512	05/22/2010	3P	SA	*Washington	CN	R HY	047, SUNSET AT MP 58.29	REAR		01	047,042	WET	2	011	011	0	2	N	Y
01513	03/19/2007	4P	MO	*Washington	CN	R HY	047, SUNSET AT MP 58.29	TURN		02	028	DRY	2	011	011	0	1	N	N
00802	02/09/2008	2P	SA	*Washington	CN	R HY	047, SUNSET AT MP 58.29	TURN		02	028	DRY	2	011	011	0	1	N	N
03798	07/28/2010	8A	WE	*Washington	CN	R HY	047, SUNSET AT MP 58.29	TURN		02	028	DRY	2	011	011	0	4	N	N
03223	06/19/2008	2A	TH	*Washington	CN	R HY	047, SUNSET AT MP 58.29	FIX	079	30,33,03	050,051,021	DRY	1	011		0	2	Y	Y
04958	10/05/2009	2P	MO	*Washington	CN	R HY	047, SUNSET AT MP 58.29	REAR		07	026	DRY	2	011	011	0	3	N	N
00237	01/14/2010	10A	TH	*Washington	CN	R HY	047, SUNSET AT MP 58.36	FIX	029,070	25	080,081	DRY	1	011		0	0	N	N
01665	03/28/2008	10P	FR	*Washington	CN	R HY	047, SUNSET AT MP 58.68	REAR		06	031	DRY	2	011	011	0	0	N	N
01403	03/13/2008	7A	TH	*Washington	CN	R HY	047, SUNSET AT MP 58.70	TURN		02	004,028	WET	2	011	011	0	1	N	N
02819	06/13/2009	10A	SA	*Washington	CN	R HY	047, SUNSET AT MP 58.70	TURN		02	004,028	DRY	2	011	011	0	0	N	N
04681	09/19/2009	5P	SA	*Washington	CN	R HY	047, SUNSET AT MP 58.70	TURN		07	028	DRY	2	011	011	0	1	N	N
02047	04/29/2010	9A	TH	*Washington	CN	R HY	047, SUNSET AT MP 58.70	TURN		02	004,028	DRY	2	011	011	0	1	N	N
00966	02/19/2008	5P	TU	*Washington	CN	R HY	047, SUNSET AT MP 58.73	REAR	092,013	27,26	016,026	DRY	3	011	011	0	0	N	N
03953	08/14/2009	3P	FR	*Washington	CN	R HY	047, SUNSET AT MP 58.75	REAR		07	026	DRY	2	011	011	0	2	N	N
07123	12/17/2010	3P	FR	*Washington	CN	R HY	047, SUNSET AT MP 58.76	FIX	079,088	01	047	DRY	1	011		0	0	N	Y
02582	05/08/2007	1P	TU	*Washington	CN	R HY	047, SUNSET AT MP 58.81	TURN		02	004,028	DRY	2	011	011	0	2	N	N
04578	08/10/2007	3P	FR	*Washington	CN	R HY	047, SUNSET AT MP 58.81	TURN	012	02	028	DRY	2	011	011	0	0	N	N
02033	05/02/2009	12P	SA	*Washington	CN	R HY	047, SUNSET AT MP 58.81	TURN		02	028	DRY	2	011	011	0	2	N	N
03668	07/29/2009	7A	WE	*Washington	CN	R HY	047, SUNSET AT MP 58.81	TURN		02	004,028	DRY	2	011	011	0	1	N	N
01159	03/09/2010	7A	TU	*Washington	CN	R HY	047, SUNSET AT MP 58.81	TURN	079	02	028	WET	2	999	011	0	0	N	N
03121	06/29/2010	3P	TU	*Washington	CN	R HY	047, SUNSET AT MP 58.81	TURN		08	008	DRY	2	011	011	0	1	N	N
02253	04/26/2008	3P	SA	*Washington	CN	R HY	047, SUNSET AT MP 59.30	REAR		01	047,026	DRY	2	011	011	0	0	N	Y
03110	06/01/2007	2P	FR	*Washington	CN	R HY	047, SUNSET AT MP 59.31	REAR		07	026	DRY	2	011	011	0	0	N	N
01537	04/02/2009	12P	TH	*Washington	CN	R HY	047, SUNSET AT MP 59.31	REAR	013	07	026	DRY	3	011	999	0	0	N	N
04765	09/05/2008	4P	FR	*Washington	CN	R HY	047, SUNSET AT MP 59.31	TURN		07	026	DRY	2	011	011	0	0	N	N
04821	09/28/2009	5P	MO	*Washington	CN	R HY	047, SUNSET AT MP 59.31	TURN		07	026	DRY	2	011	011	0	0	N	N

Jackson School Road from Evergreen Road (Pkwy) to West Union Road plus 265 feet on all side streets and ramps
January 1, 2007 through December 31, 2010 **2010 data is preliminary and subject to change

SERIAL NO	DATE	TIME	DAY	*COUNTY OR CITY NAME	CRASH LOCATION	COLL TYPE	EVENT	CAUSE	ERROR	SUR F	TOT VE	VEHICLE TYP/OWN #1	VEHICLE TYP/OWN #2	PEOPLE KIL L	PEOPLE INJ	PEOPLE ALC	PEOPLE SPE C
00801	02/08/2007	6P	TH	*Washington	JACKSON SCHOOL RD 50/100ths MI N OF EVERGREEN RD	TURN		02	028	WET	2	011	011	0	1	N	N
08014	12/25/2007	5P	TU	*Washington	NW JACKSON SCHOOL RD 19/100ths MI N OF NE EVERGREEN RD	FIX	079,010,124	01	047,080	ICE	1	011		0	2	N	Y
05922	11/17/2009	1A	TU	*Washington	NW JACKSON SCHOOL RD 50/100ths MI N OF NE EVERGREEN RD	FIX	092,043	26	080	WET	1	011		0	3	N	N
06810	12/29/2009	3P	TU	*Washington	NW JACKSON SCHOOL RD 100/100ths MI N OF NE EVERGREEN RD	SS-M		05	044	SNO	2	011	011	0	0	N	N
00051	01/03/2007	7P	WE	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	ANGL	013	02	028	DRY	3	011	011	0	2	N	N
00981	02/16/2007	2P	FR	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	ANGL	057,052,100	02	028	WET	2	011	011	0	1	N	N
02924	05/23/2007	12P	WE	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	ANGL		02	028	DRY	2	011	011	0	1	N	N
03694	06/29/2007	8A	FR	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	ANGL	057,028	02	028	WET	2	011	011	0	0	N	N
03299	06/25/2008	11P	WE	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	ANGL		03	021	DRY	2	011	011	0	2	N	N
06868	12/15/2008	4P	MO	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	ANGL		02	028	ICE	2	011	011	0	0	N	N
01990	05/27/2009	10A	WE	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	ANGL		02	028	DRY	2	011	011	0	1	N	N
02593	06/02/2009	5P	TU	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	ANGL	057	02	028	DRY	2	011	011	0	0	N	N
02678	06/05/2009	4P	FR	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	ANGL		02	028	DRY	2	011	011	0	2	N	N
03211	07/05/2009	5P	SU	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	ANGL	001	02	028	DRY	2	011	091	0	2	N	N
04597	09/12/2009	1P	SA	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	ANGL		02	028	DRY	2	011	011	0	0	N	N
06174	12/05/2009	12P	SA	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	ANGL		02	028	DRY	2	011	011	0	0	N	N
04555	09/01/2010	4P	WE	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	ANGL		02	028	DRY	2	011	011	0	0	N	N
04623	08/08/2007	6P	WE	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	TURN		02	028	DRY	2	011	011	0	1	N	N
06499	10/29/2007	11A	MO	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	TURN		02	028	DRY	2	011	011	0	1	N	N
01955	04/29/2009	4P	WE	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	TURN		02	028	DRY	2	011	011	0	1	N	N
01521	03/28/2010	7P	SU	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	TURN		02	028	WET	2	011	011	0	2	N	N
01905	04/10/2008	10P	TH	*Washington	NW JACKSON SCHOOL RD 19/100ths MI S OF NW WEST UNION RD	FIX	062,010	01	080,081	DRY	1	011		0	1	N	Y

Jackson School Road from Evergreen Road (Pkwy) to West Union Road plus 265 feet on all side streets and ramps
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WASHINGTON COUNTY

SERIAL NO	DATE	TIME	DAY	*COUNTY OR CITY NAME	CRASH LOCATION	COLL TYPE	EVENT	CAUSE	ERROR	SURF	TOT VEH	VEHICLE TYP #1	VEHICLE OWN #1	VEHICLE TYP #2	VEHICLE OWN #2	PEOPLE KIL L	PEOPLE INJ	PEOPLE ALC	PEOPLE SPED
06542	11/23/2010	10A	TU	Hillsboro	NW EVERGREEN RD AT NW JACKSON SCHOOL RD	REAR	124	01,07	047,026	ICE	2	011	011			0	0	N	Y
05518	10/07/2008	11P	TU	Hillsboro	NW EVERGREEN RD AT NW JACKSON SCHOOL RD	TURN		02	004,028	DRY	2	011	011			0	0	Y	N
05579	10/13/2008	9A	MO	Hillsboro	NW EVERGREEN RD AT NW JACKSON SCHOOL RD	TURN		02	004,028	DRY	2	011	011			0	0	N	N
00480	01/27/2010	2P	WE	Hillsboro	NW EVERGREEN RD AT NW JACKSON SCHOOL RD	TURN		04	020	DRY	2	011	011			0	1	N	N
04826	09/15/2010	9A	WE	Hillsboro	NW EVERGREEN RD AT NW JACKSON SCHOOL RD	TURN		02	004,028	DRY	2	011	011			0	2	N	N

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
MULTNOMAH / WASHINGTON COUNTY ROAD CRASH LOCATIONS - DRIVER BEHAVIOR FORMAT

Jacobson Road from Cornelius Pass Road to Helvetia Road plus 265 feet on all side streets
January 1, 2007 through December 31, 2010 **2010 data is preliminary and subject to change

SERIAL NO	DATE	TIME	DAY	*COUNTY OR CITY NAME	CRASH LOCATION	COLL TYPE	EVENT	CAUSE	ERROR	SUR F	TOT VE	PEOPLE				SPEC
												VEHICLE TYP/OWN #1	VEHICLE TYP/OWN #2	KILL	INJ	ALC
05878	11/20/2009	4P	FR	*Washington	NW HELVETIA RD AT NW JACOBSON RD	ANGL		02	028	WET	2	011	011	0	1	N N

Jacobson Road from Cornelius Pass Road to Helvetia Road plus 265 feet on all side streets
January 1, 2007 through December 31, 2010 **2010 data is preliminary and subject to change

WASHINGTON COUNTY

SERIAL NO	DATE	TIME	DAY	*COUNTY OR CITY NAME	CRASH LOCATION	COLL TYPE	EVENT	CAUSE	ERROR	SURF	TOT VEH	VEHICLE TYP #1	VEHICLE OWN #2	PEOPLE KILL	PEOPLE INJ	PEOPLE ALC	PEOPLE SPED
07036	12/14/2010	4P	TU	Hillsboro	NW CENTURY BLVD AT NW JACOBSON RD	REAR	079	07	043,026	WET	2	011	011	0	1	N	N
01118	02/21/2007	9P	WE	Hillsboro	NW CORNELIUS PASS RD AT NW JACOBSON RD	ANGL	100,093	04	097,097	WET	2	011	011	0	2	N	N
01319	03/19/2009	5P	TH	Hillsboro	NW CORNELIUS PASS RD AT NW JACOBSON RD	REAR		07	026	DRY	2	011	011	0	0	N	N
05737	10/21/2008	4P	TU	Hillsboro	NW CROENI RD AT NW JACOBSON RD	ANGL		02	028	DRY	2	011	019	0	0	N	N
05811	10/22/2008	4P	WE	Hillsboro	NW CROENI RD AT NW JACOBSON RD	ANGL		02	028	DRY	2	019	011	0	0	N	N
05019	10/09/2009	9A	FR	Hillsboro	NW HELVETIA RD AT NW JACOBSON RD	TURN		02	028	DRY	2	011	011	0	0	N	N
00041	01/02/2007	4P	TU	Hillsboro	NW JACOBSON RD 500 FT E OF NW HELVETIA RD	REAR		07	026	WET	2	011	011	0	1	N	N

US 26 (Hwy 047) MP 58.00 to 63.00 plus 265 feet on all on/off ramps
January 1, 2007 through December 31, 2010 **2010 data is preliminary and subject to change

SERIAL NO	DATE	TIME	DAY	*COUNTY OR CITY NAME	COMPNT	MLG TYP	CRASH LOCATION	COLL TYPE	EVENT	CAUSE	ERROR	SURF	TOT VEH	VEHICLE TYP/OWN #1	VEHICLE TYP/OWN #2	--PEOPLE-- KILL	INJ	ALC	SPED
05900	10/26/2008	8P	SU	*Washington	MN	R	HY 047, SUNSET AT MP 58.00	FIX	028,081	12	085	DRY	2	999	011	0	0	N	N
02554	05/31/2009	4P	SU	*Washington	MN	R	HY 047, SUNSET AT MP 58.24	REAR	001	30	050,042	DRY	2	011	091	0	2	N	Y
05020	10/10/2009	6A	SA	*Washington	MN	R	HY 047, SUNSET AT MP 58.50	REAR		32,16	052	DRY	2	011	011	0	2	N	Y
03966	08/07/2010	9P	SA	*Washington	MN	R	HY 047, SUNSET AT MP 58.55	SS-O		33,06	051,031,032	DRY	2	011	011	0	0	Y	N
02953	06/18/2010	5A	FR	*Washington	MN	R	HY 047, SUNSET AT MP 58.93	FIX	120	12	080,081	DRY	1	011		0	1	N	N
04209	07/23/2007	5P	MO	*Washington	MN	R	HY 047, SUNSET AT MP 59.00	FIX	079,010	01	047,081	DRY	1	011		0	1	N	Y
08041	12/27/2007	9A	TH	*Washington	MN	R	HY 047, SUNSET AT MP 59.31	SS-O		01	047,080,081	WET	2	051	011	0	1	N	Y
03350	06/15/2007	8P	FR	*Washington	MN	R	HY 047, SUNSET AT MP 59.47	FIX	043	33	051,080,081	DRY	1	011		0	0	N	N
02801	05/24/2008	6P	SA	*Washington	MN	R	HY 047, SUNSET AT MP 59.49	REAR	079	30,07	050,043	DRY	2	011	011	0	6	N	Y
04352	09/01/2009	6P	TU	*Washington	MN	R	HY 047, SUNSET AT MP 59.52	SS-O		01	080,047	DRY	2	011	011	0	0	N	Y
02178	05/09/2009	7A	SA	*Washington	MN	R	HY 047, SUNSET AT MP 59.74	REAR		01	047,042	DRY	2	011	011	0	2	N	Y
06384	10/23/2007	9A	TU	*Washington	MN	R	HY 047, SUNSET AT MP 59.83	FIX	092,043	26	080,081	DRY	1	011		0	0	N	N
06403	10/23/2007	9A	TU	*Washington	MN	R	HY 047, SUNSET AT MP 59.86	HEAD	089	15,33,30	046,051,050	DRY	2	011	011	0	2	N	Y
96403	10/23/2007	9A	TU	*Washington	MN	R	HY 047, SUNSET AT MP 59.88	NCOL	092,079,089	26	080,081	DRY	1	011		0	0	N	N
04170	08/18/2010	6P	WE	*Washington	MN	R	HY 047, SUNSET AT MP 60.06	OTH	028,068,080	24	085	DRY	4	011	011	0	0	N	N
01514	03/19/2008	3P	WE	*Washington	MN	R	HY 047, SUNSET AT MP 60.77	FIX	079,010,093	27,30	016,050,081	DRY	1	011		0	1	N	Y
04208	08/28/2009	4P	FR	*Washington	MN	R	HY 047, SUNSET AT MP 60.81	FIX	079,092	26	080,081,083	WET	1	011		0	1	N	N
02200	04/20/2009	4P	MO	*Washington	MN	R	HY 047, SUNSET AT MP 60.85	REAR	013	07	026	DRY	3	011	011	0	1	N	N
08111	12/26/2007	5A	WE	*Washington	MN	R	HY 047, SUNSET AT MP 61.00	FIX	079,124	01	047,080	ICE	1	011		0	1	N	Y
01127	03/08/2010	7P	MO	*Washington	MN	R	HY 047, SUNSET AT MP 61.02	FIX	124,120	01	047,080	ICE	1	011		0	0	N	Y
05111	09/28/2010	7A	TU	Hillsboro	MN	R	HY 047, SUNSET AT MP 61.05	REAR	013	07	026,042	DRY	4	011	011	0	1	N	N
04534	08/06/2007	9A	MO	Hillsboro	MN	R	HY 047, SUNSET AT MP 61.29	SS-O		13	045	DRY	2	011	051	0	0	N	N
01825	04/14/2010	8A	WE	Hillsboro	MN	R	HY 047, SUNSET AT MP 61.31	REAR	002	27,07	016,026	DRY	2	011	059	0	2	N	N
05753	10/26/2010	5P	TU	Hillsboro	MN	R	HY 047, SUNSET AT MP 62.00	REAR		27,07	016,043,026	DRY	2	011	011	0	0	N	N
07361	12/29/2010	9P	WE	Hillsboro	MN	R	HY 047, SUNSET AT MP 62.00	FIX	124,120	10	080	ICE	1	011		0	2	N	N
00748	02/12/2009	7A	TH	Hillsboro	MN	R	HY 047, SUNSET AT MP 62.08	REAR	013	07	026	DRY	3	011	011	0	3	N	N
05592	11/02/2009	7A	MO	Hillsboro	MN	R	HY 047, SUNSET AT MP 62.10	REAR		07	026	DRY	2	011	011	0	0	N	N
01469	03/18/2008	2A	TU	Hillsboro	MN	R	HY 047, SUNSET AT MP 62.10	FIX	054	01	047,080,081	WET	1	011		0	1	N	Y
03203	07/05/2010	7A	MO	Hillsboro	MN	R	HY 047, SUNSET AT MP 62.11	SS-O		13,33	051,045	DRY	2	011	011	0	1	N	N
02249	05/13/2009	4P	WE	Hillsboro	MN	R	HY 047, SUNSET AT MP 62.12	REAR		07	043,042	WET	2	011	011	0	0	N	N
05845	10/28/2010	5P	TH	Hillsboro	MN	R	HY 047, SUNSET AT MP 62.21	REAR	010	01	047,080,081	WET	2	011	011	0	1	N	Y
06161	10/17/2007	7A	WE	Hillsboro	MN	R	HY 047, SUNSET AT MP 62.25	REAR		07	026	DRY	2	011	011	0	1	N	N
03367	07/09/2010	10P	FR	Hillsboro	MN	R	HY 047, SUNSET AT MP 62.41	FIX	002,079,053	10	081	DRY	1	011		0	2	N	N
05446	10/06/2008	7A	MO	Hillsboro	MN	R	HY 047, SUNSET AT MP 62.44	REAR		07	026	WET	2	011	011	0	1	N	N
05114	09/28/2010	9A	TU	Hillsboro	MN	R	HY 047, SUNSET AT MP 62.44	REAR		07	026	DRY	2	011	999	0	0	N	N
05120	09/01/2007	5P	SA	Hillsboro	MN	R	HY 047, SUNSET AT MP 62.44	REAR		07	042	DRY	2	011	011	0	0	N	N
04987	10/07/2009	4P	WE	Hillsboro	MN	R	HY 047, SUNSET AT MP 62.44	SS-O		13	045	DRY	2	011	011	0	0	N	N
02535	05/13/2008	9A	TU	Hillsboro	MN	R	HY 047, SUNSET AT MP 62.45	REAR	013	07	042	WET	3	011	011	0	1	N	N
06349	10/24/2007	12A	WE	Hillsboro	MN	R	HY 047, SUNSET AT MP 62.45	SS-O	012,062	13	045	DRY	2	019	011	0	4	N	N
00948	02/26/2009	5A	TH	Hillsboro	MN	R	HY 047, SUNSET AT MP 62.47	SS-O	124	01	047,080	ICE	2	011	999	0	0	N	Y
06303	12/08/2009	5P	TU	Hillsboro	MN	R	HY 047, SUNSET AT MP 62.48	REAR		07	043,026	DRY	2	011	011	0	1	N	N
04325	07/30/2007	1P	MO	Hillsboro	MN	R	HY 047, SUNSET AT MP 62.48	SS-O	092	26	080	DRY	2	011	011	0	1	N	N
07764	12/17/2007	1A	MO	Hillsboro	MN	R	HY 047, SUNSET AT MP 62.51	NCOL		10	080	WET	1	011		0	0	Y	N
05308	10/24/2009	8P	SA	Hillsboro	MN	R	HY 047, SUNSET AT MP 62.55	SS-O	079,010	32,13	052,045	WET	2	011	011	0	1	N	N
00867	02/18/2010	4P	TH	Hillsboro	MN	R	HY 047, SUNSET AT MP 62.56	REAR	092	07,26	026	DRY	2	011	011	0	1	N	N
03283	06/09/2007	7A	SA	Hillsboro	MN	R	HY 047, SUNSET AT MP 62.71	REAR		07	026	DRY	2	019	011	0	0	N	N
07419	12/04/2007	9A	TU	Hillsboro	MN	R	HY 047, SUNSET AT MP 62.71	SS-O	012	13	045	WET	3	011	041	0	1	N	N
03913	08/05/2010	5P	TH	Hillsboro	MN	R	HY 047, SUNSET AT MP 62.74	REAR		07	043,042	DRY	2	011	011	0	0	N	N
04473	09/10/2009	9A	TH	Hillsboro	MN	R	HY 047, SUNSET AT MP 62.75	REAR		07	026	DRY	2	011	011	0	0	N	N
05707	11/07/2009	12P	SA	Hillsboro	MN	R	HY 047, SUNSET AT MP 62.83	TURN	124,120	01	047,080	WET	2	011	011	0	0	N	Y

US 26 (Hwy 047) MP 58.00 to 63.00 plus 265 feet on all on/off ramps
January 1, 2007 through December 31, 2010 **2010 data is preliminary and subject to change

SERIAL NO	DATE	TIME	DAY	*COUNTY OR CITY NAME	COMPNT	MLG TYP	CRASH LOCATION	COLL TYPE	EVENT	CAUSE	ERROR	SURF	TOT VEH	VEHICLE TYP/OWN #1	VEHICLE TYP/OWN #2	--PEOPLE-- KIL	INJ	ALC	SPED
05515	10/15/2010	8A	FR	Hillsboro	MN	R	HY 047, SUNSET AT MP 62.92	REAR		27,07	016,042	DRY	2	011	011	0	0	N	N
04477	08/28/2008	8P	TH	Hillsboro	MN	R	HY 047, SUNSET AT MP 62.97	FIX	062,101	10	080,081	DRY	1	011		1	0	Y	N
04527	09/02/2010	7A	TH	Hillsboro	MN	R	HY 047, SUNSET AT MP 63.00	SS-O		13,02	045,028	DRY	2	041	011	0	0	N	N
02233	04/21/2007	4A	SA	Hillsboro	MN	R	HY 047, SUNSET AT MP 63.00	FIX	079	01,16	047,081	DRY	1	011		0	0	N	Y
02400	05/06/2008	8A	TU	*Washington	CN	R	HY 047, SUNSET AT MP 60.90	REAR		07	043,026	DRY	2	011	011	0	1	N	N
04652	09/07/2010	5A	TU	Hillsboro	CN	R	HY 047, SUNSET AT MP 62.52	SS-O		13,02	045,028	DRY	2	041	011	0	0	N	N
00032	01/02/2008	2P	WE	Hillsboro	CN	R	HY 047, SUNSET AT MP 62.53	REAR		07	026	WET	2	011	011	0	0	N	N
06622	11/01/2007	6A	TH	Hillsboro	CN	R	HY 047, SUNSET AT MP 62.54	TURN	050	14,08	003,005	DRY	2	011	011	0	2	N	N
03405	06/27/2008	6A	FR	Hillsboro	CN	R	HY 047, SUNSET AT MP 62.80	REAR		32	052,042	DRY	2	091	019	0	1	N	N

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
MULTNOMAH / WASHINGTON COUNTY ROAD CRASH LOCATIONS - DRIVER BEHAVIOR FORMAT

West Union Road from Cornelius Pass Road to Jackson School Road plus 265 feet on all side streets
January 1, 2007 through December 31, 2010 **2010 data is preliminary and subject to change

SERIAL NO	DATE	TIME	DAY	*COUNTY OR CITY NAME	CRASH LOCATION	COLL TYPE	EVENT	CAUSE	ERROR	SURF	TOTVE	VEHICLE TYP/OWN #1	VEHICLE TYP/OWN #2	PEOPLE KILL	PEOPLE INJ	PEOPLE ALC	SPEED
02267	04/25/2007	1A	WE	*Washington	NW DICK RD AT NW WEST UNION RD	TURN		02	028	DRY	2	011	041	0	1	N	N
03397	07/14/2009	7A	TU	*Washington	NW GROVELAND RD AT NW WEST UNION RD	BACK		10	011,026	DRY	2	011	011	0	0	N	N
01178	03/11/2009	2P	WE	*Washington	NW JACKSON QUARRY RD 25/100ths MI E OF NW WEST UNION RD	FIX	079,010	01	047,080,081	DRY	1	011		0	0	N	Y
00051	01/03/2007	7P	WE	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	ANGL	013	02	028	DRY	3	011	011	0	2	N	N
00981	02/16/2007	2P	FR	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	ANGL	057,052,100	02	028	WET	2	011	011	0	1	N	N
02924	05/23/2007	12P	WE	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	ANGL		02	028	DRY	2	011	011	0	1	N	N
03694	06/29/2007	8A	FR	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	ANGL	057,028	02	028	WET	2	011	011	0	0	N	N
03299	06/25/2008	11P	WE	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	ANGL		03	021	DRY	2	011	011	0	2	N	N
06868	12/15/2008	4P	MO	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	ANGL		02	028	ICE	2	011	011	0	0	N	N
01990	05/27/2009	10A	WE	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	ANGL		02	028	DRY	2	011	011	0	1	N	N
02593	06/02/2009	5P	TU	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	ANGL	057	02	028	DRY	2	011	011	0	0	N	N
02678	06/05/2009	4P	FR	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	ANGL		02	028	DRY	2	011	011	0	2	N	N
03211	07/05/2009	5P	SU	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	ANGL	001	02	028	DRY	2	011	091	0	2	N	N
04597	09/12/2009	1P	SA	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	ANGL		02	028	DRY	2	011	011	0	0	N	N
06174	12/05/2009	12P	SA	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	ANGL		02	028	DRY	2	011	011	0	0	N	N
04555	09/01/2010	4P	WE	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	ANGL		02	028	DRY	2	011	011	0	0	N	N
04623	08/08/2007	6P	WE	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	TURN		02	028	DRY	2	011	011	0	1	N	N
06499	10/29/2007	11A	MO	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	TURN		02	028	DRY	2	011	011	0	1	N	N
01955	04/29/2009	4P	WE	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	TURN		02	028	DRY	2	011	011	0	1	N	N
01521	03/28/2010	7P	SU	*Washington	NW JACKSON SCHOOL RD AT NW WEST UNION RD	TURN		02	028	WET	2	011	011	0	2	N	N
03758	07/20/2008	11A	SU	*Washington	NW WEST UNION RD 2/100ths MI SE OF NW JACKSON SCHOOL RD	TURN		06	032	DRY	2	011	011	0	1	N	N

TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT

CITY STREET LOCATIONS BY COUNTY - DRIVER BEHAVIOR FORMAT

West Union Road from Cornelius Pass Road to Jackson School Road plus 265 feet on all side streets
January 1, 2007 through December 31, 2010 **2010 data is preliminary and subject to change

WASHINGTON COUNTY

SERIAL NO	DATE	TIME	DAY	*COUNTY OR CITY NAME	CRASH LOCATION	COLL TYPE	EVENT	CAUSE	ERROR	SURF	TOT VEH	VEHICLE TYP/OWN #1	VEHICLE TYP/OWN #2	PEOPLE KIL L	PEOPLE INJ	PEOPLE ALC	PEOPLE SPED
03464	07/13/2010	7P	TU	Hillsboro	BENDEMEER RD AT WEST UNION RD	TURN	001	06,02	034,027	DRY	1	011		0	1	N	N

Appendix D. Traffic Volume Development

Appendix D-1. Intersection Turn Movement Counts

Appendix D: Intersection Turn Movement Counts

#	Location	Peak Hour		Date Collected
		AM	PM	
1	Jackson School Road at West Union Road	6:45 - 7:45	4:45 - 5:45	5/25/2011
2	Jackson Quarry Road at West Union Road	Not counted	4:30 - 5:30	5/25/2011
3	Jackson School Road at US-26 WB Ramps	7:15 - 8:15	5:00 - 6:00	5/25/2011
4	Jackson School Road at US-26 EB Ramps	7:00 - 8:00	4:30 - 5:30	5/25/2011
5	Jackson School Road at Scotch Church Road	Not counted	4:45 - 5:45	10/19/2010
6	Jackson School Road at Meek Road	7:00 - 8:00	4:45 - 5:45	5/25/2011
7	Jackson School Road at Evergreen Road	7:15 - 8:15	5:00 - 6:00	5/25/2011
8	15th Avenue at Evergreen Road	7:30 - 8:30	4:45 - 5:45	10/19/2010
9	25th Avenue at Evergreen Road	7:45 - 8:45	5:00 - 6:00	10/19/2010 - AM 03/21/2007 - PM
10	Eggiman Road/273rd Avenue at Evergreen Road	Not counted	5:00 - 6:00	5/25/2011
11	Groveland Road at West Union Road	Not counted	4:15 - 5:15	5/25/2011
12	Groveland Road at Groveland Drive	Not counted	4:45 - 5:45	5/25/2011
13	Sewell Road at Meek Road	Not counted	4:30 - 5:30	5/25/2011
14	Sewell Road at Evergreen Road	7:45 - 8:45	5:00 - 6:00	10/19/2010 - AM 03/21/2007 - PM
15	Meier-Jurgen Road at Evergreen Road	Not counted	5:00 - 6:00	5/25/2011
16	Helvetia Rd North at West Union Road	7:15 - 8:15	4:45 - 5:45	5/25/2011
17	Helvetia Rd Middle at West Union Road	7:15 - 8:15	4:45 - 5:45	5/25/2011
18	Helvetia Rd South at West Union Road	7:15 - 8:15	4:45 - 5:45	5/25/2011
19	Helvetia Road at Pubols Road	Not counted	4:30 - 5:30	5/25/2011
20	Helvetia Road at Schaff Road	7:15 - 8:15	4:30 - 5:30	5/25/2011
21	Helvetia Road at Groveland Drive/Jacobson Road	7:15 - 8:15	4:30 - 5:30	5/25/2011
22	Brookwood Parkway/Helvetia Road at US-26 WB Ramps	7:30 - 8:30	4:30 - 5:30	7/20/2011
23	Brookwood Parkway/Helvetia Road at US-26 EB Ramps	7:15 - 8:15	4:30 - 5:30	7/20/2011
24	Brookwood Parkway at Meek Road	7:30 - 8:30	4:30 - 5:30	5/25/2011
25	Brookwood Parkway at Huffman Street	7:30 - 8:30	4:30 - 5:30	5/25/2011
26	Brookwood Parkway at Genentech Access	7:30 - 8:30	4:30 - 5:30	5/25/2011

#	Location	Peak Hour		Date Collected
27	Brookwood Parkway at Evergreen Road	7:30 - 8:30	5:00 - 6:00	5/25/2011
28	Century Blvd/Dick Road at West Union Road	Not counted	4:30 - 5:30	5/25/2011
29	Century Blvd at Jacobson Road	7:45 - 8:45	4:30 - 5:30	5/25/2011
30	Croeni Road at Jacobson Road	7:30 - 8:30	4:30 - 5:30	5/25/2011
31	235th Avenue at Evergreen Parkway	Not counted	5:00 - 6:00	5/25/2011
32	229th Avenue at Evergreen Parkway	7:15 - 8:15	5:15 - 6:15	10/19/2010
33	Cornelius Pass Road at West Union Road	7:15 - 8:15	4:45 - 5:45	5/25/2011
34	Cornelius Pass Road at Jacobson Road	Not counted	4:45 - 5:45	5/25/2011
35	Cornelius Pass Road at Rock Creek Blvd	Not counted	4:45 - 5:45	5/25/2011
36	Cornelius Pass Road at US-26 WB Ramps	7:00 - 8:00	4:30 - 5:30	5/25/2011
37	Cornelius Pass Road at US-26 EB Ramps	7:00 - 8:00	4:30 - 5:30	5/25/2011
38	Cornelius Pass Road at Evergreen Parkway	7:15 - 8:15	4:45 - 5:45	5/25/2011
39	Cornelius Pass Road at Wagon Way	7:00 - 8:00	4:30 - 5:30	5/25/2011
A	Glencoe Road WB On-ramp to US-26	7:45 - 8:45	3:15 - 4:15	5/25/2011
B	US-26 WB Off-ramp to Glencoe Road	6:45 - 7:45	4:45 - 5:45	5/25/2011
C	Jackson School Road WB On-ramp to US-26	7:30 - 8:30	4:45 - 5:45	5/25/2011
D	US-26 WB Off-ramp to Jackson School Road	7:15 - 8:15	4:45 - 5:45	5/25/2011
E	Cornelius Pass Road WB On-ramp to US-26	7:15 - 8:15	4:30 - 5:30	5/25/2011

Appendix D-2. Adjustment Factors

Seasonal Adjustment for March

Bend-Empire (09-007) US97; MP 135.95; THE DALLES-CALIFORNIA HIGHWAY NO. 4; 0.49 mile south of Empire Avenue

Peak Month

Year	Month	% ADT	AWT
2009	Aug	118	50,000
2008	Jul	118	51,366
2007	Aug	117	54,739
2006	Aug	117	54,043
2005	Aug	121	52,537
		117.7	**52,035**

Count Month (Mar)

Year	Month	% ADT	AWT
2009	Mar	103	43,401
2008	Mar	107	46,419
2007	Mar	107	49,682
2006	Mar	102	47,191
2005	Mar	103	44,772
		104.3	**46,758**

Seasonal Factor **1.13**

Beltline (20-011) OR569; MP 12.00; BELTLINE HIGHWAY NO. 69; 0.76 mile west of Pacific Highway No. 1 (I-5)

Peak Month

Year	Month	% ADT	AWT
2009	Aug	118	57,413
2008	June	112	50,600
2007	Aug	110	52,000
2006	June	112	55,584
2005	June	127	66,607
		114.0	**54,532**

Count Month (Mar)

Year	Month	% ADT	AWT
2009	Mar	103	50,000
2008	Mar	108	48,800
2007	Mar	107	50,691
2006	Mar	105	52,374
2005	Mar	101	52,667
		105.0	**50,622**

Seasonal Factor **1.09**

2 ATR Average **1.11**

Note: Data shown in gray was removed from calculation as per APM

Seasonal Adjustment for May

Bend-Empire (09-007) US97; MP 135.95; THE DALLES-CALIFORNIA HIGHWAY NO. 4; 0.49 mile south of Empire Avenue

Peak Month

Year	Month	% ADT	AWT
2009	Aug	118	50,000
2008	Jul	118	51,366
2007	Aug	117	54,739
2006	Aug	117	54,043
2005	Aug	121	52,537
		117.7	**52,035**

Count Month (May)

Year	Month	% ADT	AWT
2009	May	112	47,067
2008	May	113	49,172
2007	May	110	51,388
2006	May	109	50,069
2005	May	110	47,796

Count Month (June)

Year	Month	% ADT	AWT
2009	June	116	49,000
2008	June	117	50,599
2007	June	116	54,126
2006	June	115	52,992
2005	June	112	48,800

Count Month Average

Year	Month	% ADT	AWT
2009	May-Jun	114	48,034
2008	May-Jun	115	49,886
2007	May-Jun	113	52,757
2006	May-Jun	112	51,531
2005	May-Jun	111	48,298
		113.0	**50,774**

Seasonal Factor **1.04**

Beltline (20-011) OR569; MP 12.00; BELTLINE HIGHWAY NO. 69; 0.76 mile west of Pacific Highway No. 1 (I-5)

Peak Month

Year	Month	% ADT	AWT
2009	Aug	118	57,413
2008	June	112	50,600
2007	Aug	110	52,000
2006	June	112	55,584
2005	June	127	66,607
		114.0	**54,532**

Count Month (May)

Year	Month	% ADT	AWT
2009	May	103	50,000
2008	May	106	48,200
2007	May	106	50,100
2006	May	107	53,195
2005	May	112	58,336

Count Month (June)

Year	Month	% ADT	AWT
2009	June	107	52,000
2008	June	112	50,600
2007	June	107	50,500
2006	June	112	55,584
2005	June	127	66,607

Count Month Average

Year	Month	% ADT	AWT
2009	May-Jun	105	51,000
2008	May-Jun	109	49,400
2007	May-Jun	106.5	50,300
2006	May-Jun	109.5	54,390
2005	May-Jun	119.5	62,472
		108.3	**51,363**

Seasonal Factor **1.05**

2 ATR Average **1.05**

Note: Data shown in gray was removed from calculation as per APM

Seasonal Adjustment for October

Bend-Empire (09-007) US97; MP 135.95; THE DALLES-CALIFORNIA HIGHWAY NO. 4; 0.49 mile south of Empire Avenue

Peak Month

Year	Month	% ADT	AWT
2009	Aug	118	50,000
2008	Jul	118	51,366
2007	Aug	117	54,739
2006	Aug	117	54,043
2005	Aug	121	52,537
		117.7	**52,035**

Count Month (Oct)

Year	Month	% ADT	AWT
2009	Oct	109	45,800
2008	Oct	108	46,860
2007	Oct	108	50,245
2006	Oct	110	50,881
2005	Oct	111	48,076
		109.0	**48,975**

Seasonal Factor **1.08**

Beltline (20-011) OR569; MP 12.00; BELTLINE HIGHWAY NO. 69; 0.76 mile west of Pacific Highway No. 1 (I-5)

Peak Month

Year	Month	% ADT	AWT
2009	Aug	118	57,413
2008	June	112	50,600
2007	Aug	110	52,000
2006	June	112	55,584
2005	June	127	66,607
		114.0	**54,532**

Count Month (Oct)

Year	Month	% ADT	AWT
2009	Oct	114	55,393
2008	Oct	110	49,600
2007	Oct	107	50,700
2006	Oct	105	52,163
2005	Oct	103	53,645
		107.3	**50,821**

Seasonal Factor **1.06**

2 ATR Average **1.07**

Note: Data shown in gray was removed from calculation as per APM

2007 Annual factor development
Volume (vplph) at Cornelius Pass EB detector at MP 62.47
Summary of midweekday 24-hour counts

	Volume	# days	Daily average
June 2007	158,051	12	13,171
June 2011	184,033	14	13,145
Annual Factor			**1.00**

2010 Annual factor development
Volume (vplph) at Cornelius Pass EB detector at MP 62.47
Summary of midweekday 24-hour counts

June 2010	174,173	13	13,398
June 2011	184,033	14	13,145
Annual Factor			**0.98**

Note 1: Volumes taken from PORTAL data
Note 2: The Cornelius Pass detector was the only one in the study area that provided high fidelity data for all time periods.

Appendix D-3. Volume Development

Project: Brookwook IAMP
Job #: ODOT 701
Subject: ***AM Turning Movement Volumes***
Created: 6/27/2011
Rev. Date: 1/20/2012

Int #	Synchro ID	Intersection	Direction	Movement	Existing Counts 1-Hr Volume AM Peak	Existing Heavy Vehicle Count	Existing Heavy Vehicle Percentage	Seasonal Adjustment Factor	2011 Growth Adjustment Factor	Existing ROUNDED DHV 1-Hr Volume AM Peak	Existing BALANCED DHV 1-Hr Volume AM Peak
21	10	Jackson Sch Rd @ West Union Rd		EBL	2	1	50%	1.05	1.00	0	0
	10	16 hr Turning Movement Count	EB	EBT	45	6	13%	1.05	1.00	45	45
	10	Count Date: 5/25/2011		EBR	32	6	19%	1.05	1.00	35	35
	10	2011		WBL	35	3	9%	1.05	1.00	35	35
	10		WB	WBT	33	3	9%	1.05	1.00	35	35
	10			WBR	1	0	0%	1.05	1.00	0	0
	10	AM Peak Hour: 6:45 AM-7:45 AM		NBL	21	1	5%	1.05	1.00	20	20
	10	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	16	2	13%	1.05	1.00	15	15
	10			NBR	19	1	5%	1.05	1.00	20	20
	10			SBL	6	0	0%	1.05	1.00	5	5
	10	PHF:	SB	SBT	43	0	0%	1.05	1.00	45	45
	10	0.79		SBR	3	0	0%	1.05	1.00	5	5
			TEV		**256**	**23**	9%			**260**	**260**
30	20	Jackson Quarry Rd @ West Union Rd		EBL	0	0	0%	1.05	1.00	0	0
	20	3 hr PM Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	20	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	20	2011		WBL	0	0	0%	1.05	1.00	0	0
	20		WB	WBT	0	0	0%	1.05	1.00	0	0
	20			WBR	0	0	0%	1.05	1.00	0	0
	20	AM Peak Hour: 10:30 AM-11:30 AM		NBL	0	0	0%	1.05	1.00	0	0
	20	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	0	0	0%	1.05	1.00	0	0
	20			NBR	0	0	0%	1.05	1.00	0	0
	20			SBL	0	0	0%	1.05	1.00	0	0
	20	PHF:	SB	SBT	0	0	0%	1.05	1.00	0	0
	20	#DIV/0!		SBR	0	0	0%	1.05	1.00	0	0
			TEV		**0**	**0**	0%			**0**	**0**
22	30	Jackson Sch Rd @ US26 WB Ramps		EBL	0	0	0%	1.05	1.00	0	0
	30	16 hr Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	30	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	30	2011		WBL	352	16	5%	1.05	1.00	370	370
	30		WB	WBT	1	0	0%	1.05	1.00	0	0
	30			WBR	22	2	9%	1.05	1.00	25	25
	30	AM Peak Hour: 7:15 AM-8:15 AM		NBL	35	2	6%	1.05	1.00	35	35
	30	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	35	1	3%	1.05	1.00	35	40
	30			NBR	0	0	0%	1.05	1.00	0	0
	30			SBL	0	0	0%	1.05	1.00	0	0
	30	PHF:	SB	SBT	103	5	5%	1.05	1.00	110	110
	30	0.87		SBR	2	0	0%	1.05	1.00	0	0
			TEV		**550**	**26**	5%			**575**	**580**
23	40	Jackson Sch Rd @ US26 EB Ramps		EBL	3	1	33%	1.05	1.00	5	5
	40	16 hr Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	40	Count Date: 5/25/2011		EBR	77	2	3%	1.05	1.00	80	80
	40	2011		WBL	0	0	0%	1.05	1.00	0	0
	40		WB	WBT	0	0	0%	1.05	1.00	0	0
	40			WBR	0	0	0%	1.05	1.00	0	0
	40	AM Peak Hour: 7:00 AM-8:00 AM		NBL	0	0	0%	1.05	1.00	0	0
	40	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	66	4	6%	1.05	1.00	70	70
	40			NBR	531	30	6%	1.05	1.00	560	560
	40			SBL	52	5	10%	1.05	1.00	55	55
	40	PHF:	SB	SBT	394	19	5%	1.05	1.00	415	425
	40	0.86		SBR	0	0	0%	1.05	1.00	0	0
			TEV		**1123**	**61**	5%			**1185**	**1195**
24	50	Jackson Sch Rd @ Scotch Church Rd		EBL	0	0	0%	1.05	1.00	0	0
	50	2 hr PM Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	50	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	50	2011		WBL	0	0	0%	1.05	1.00	0	0
	50		WB	WBT	0	0	0%	1.05	1.00	0	0
	50			WBR	0	0	0%	1.05	1.00	0	0
	50	AM Peak Hour: 10:30 AM-11:30 AM		NBL	0	0	0%	1.05	1.00	0	0
	50	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	0	0	0%	1.05	1.00	0	0
	50			NBR	0	0	0%	1.05	1.00	0	0
	50			SBL	0	0	0%	1.05	1.00	0	0
	50	PHF:	SB	SBT	0	0	0%	1.05	1.00	0	0
	50	#DIV/0!		SBR	0	0	0%	1.05	1.00	0	0
			TEV		**0**	**0**	0%			**0**	**0**
25	60	Jackson Sch Rd @ Meek Rd		EBL	0	0	0%	1.05	1.00	0	0
	60	3 hr AM/2 hr PM Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	60	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	60	2011		WBL	3	0	0%	1.05	1.00	5	5

Project: Brookwook IAMP
Job #: ODOT 701
Subject: *AM Turning Movement Volumes*
Created: 6/27/2011
Rev. Date: 1/20/2012

Int #	Synchro ID	Intersection	Direction	Movement	Existing Counts 1-Hr Volume AM Peak	Existing Heavy Vehicle Count	Existing Heavy Vehicle Percentage	Seasonal Adjustment Factor	2011 Growth Adjustment Factor	Existing ROUNDED DHV 1-Hr Volume AM Peak	Existing BALANCED DHV 1-Hr Volume AM Peak
	60		WB	WBT	0	0	0%	1.05	1.00	0	0
	60			WBR	11	0	0%	1.05	1.00	10	10
	60	AM Peak Hour: 7:00 AM-8:00 AM		NBL	0	0	0%	1.05	1.00	0	0
	60	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	424	11	3%	1.05	1.00	445	445
	60			NBR	3	0	0%	1.05	1.00	5	5
	60			SBL	12	3	25%	1.05	1.00	15	15
	60	PHF:	SB	SBT	433	11	3%	1.05	1.00	455	455
	60	0.86		SBR	0	0	0%	1.05	1.00	0	0
			TEV		**886**	**25**	3%			**935**	**935**
26	70	Jackson Sch Rd @ Evergreen Rd		EBL	355	11	3%	1.05	1.00	375	375
	70	16 hr Turning Movement Count	EB	EBT	564	26	5%	1.05	1.00	590	590
	70	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	70	2011		WBL	3	0	0%	1.05	1.00	5	5
	70		WB	WBT	205	19	9%	1.05	1.00	215	215
	70			WBR	84	2	2%	1.05	1.00	90	90
	70	AM Peak Hour: 7:15 AM-8:15 AM		NBL	1	0	0%	1.05	1.00	0	0
	70	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	3	0	0%	1.05	1.00	5	5
	70			NBR	3	0	0%	1.05	1.00	5	5
	70			SBL	152	4	3%	1.05	1.00	160	160
	70	PHF:	SB	SBT	0	0	0%	1.05	1.00	0	0
	70	0.87		SBR	285	3	1%	1.05	1.00	300	300
			TEV		**1655**	**65**	4%			**1745**	**1745**
27	80	15th Avenue @ Evergreen Rd		EBL	0	0	0%	1.07	0.98	0	0
	80	2 hr AM/PM Turning Movement Count	EB	EBT	518	20	4%	1.07	0.98	545	550
	80	Count Date: 10/19/2010		EBR	196	2	1%	1.07	0.98	205	205
	80	2010		WBL	298	2	1%	1.07	0.98	310	335
	80		WB	WBT	234	20	9%	1.07	0.98	245	265
	80			WBR	0	0	0%	1.07	0.98	0	0
	80	AM Peak Hour: 7:30 AM-8:30 AM		NBL	92	5	5%	1.07	0.98	95	95
	80	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	0	0	0%	1.07	0.98	0	0
	80			NBR	177	1	1%	1.07	0.98	185	190
	80			SBL	0	0	0%	1.07	0.98	0	0
	80	PHF:	SB	SBT	0	0	0%	1.07	0.98	0	0
	80	0.89		SBR	0	0	0%	1.07	0.98	0	0
			TEV		**1515**	**50**	3%			**1585**	**1640**
28	90	25th Avenue @ Evergreen Rd		EBL	0	0	0%	1.07	0.98	0	0
	90	2 hr AM/PM Turning Movement Count	EB	EBT	603	14	2%	1.07	0.98	630	630
	90	Count Date: 10/19/2010		EBR	104	1	1%	1.07	0.98	110	110
	90	2010		WBL	513	13	3%	1.07	0.98	540	540
	90		WB	WBT	487	13	3%	1.07	0.98	510	540
	90			WBR	0	0	0%	1.07	0.98	0	0
	90	AM Peak Hour: 7:45 AM-8:45 AM		NBL	55	5	9%	1.07	0.98	60	60
	90	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	0	0	0%	1.07	0.98	0	0
	90			NBR	153	9	6%	1.07	0.98	160	160
	90			SBL	0	0	0%	1.07	0.98	0	0
	90	PHF:	SB	SBT	0	0	0%	1.07	0.98	0	0
	90	0.89		SBR	0	0	0%	1.07	0.98	0	0
			TEV		**1915**	**55**	3%			**2010**	**2040**
29	100	Eggiman Rd @ Evergreen Rd		EBL	0	0	0%	1.05	1.00	0	0
	100	3 hr PM Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	100	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	100	2011		WBL	0	0	0%	1.05	1.00	0	0
	100		WB	WBT	0	0	0%	1.05	1.00	0	0
	100			WBR	0	0	0%	1.05	1.00	0	0
	100	AM Peak Hour: 10:30 AM-11:30 AM		NBL	0	0	0%	1.05	1.00	0	0
	100	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	0	0	0%	1.05	1.00	0	0
	100			NBR	0	0	0%	1.05	1.00	0	0
	100			SBL	0	0	0%	1.05	1.00	0	0
	100	PHF:	SB	SBT	0	0	0%	1.05	1.00	0	0
	100	#DIV/0!		SBR	0	0	0%	1.05	1.00	0	0
			TEV		**0**	**0**	0%			**0**	**0**
19	110	Groveland Rd @ West Union Rd		EBL	0	0	0%	1.05	1.00	0	0
	110	3 hr PM Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	110	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	110	2011		WBL	0	0	0%	1.05	1.00	0	0
	110		WB	WBT	0	0	0%	1.05	1.00	0	0
	110			WBR	0	0	0%	1.05	1.00	0	0
	110	AM Peak Hour: 10:30 AM-11:30 AM		NBL	0	0	0%	1.05	1.00	0	0
	110	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	0	0	0%	1.05	1.00	0	0

Project: Brookwook IAMP
Job #: ODOT 701
Subject: *AM Turning Movement Volumes*
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Int #	Synchro ID	Intersection	Direction	Movement	Existing Counts 1-Hr Volume AM Peak	Existing Heavy Vehicle Count	Existing Heavy Vehicle Percentage	Seasonal Adjustment Factor	2011 Growth Adjustment Factor	Existing ROUNDED DHV 1-Hr Volume AM Peak	Existing BALANCED DHV 1-Hr Volume AM Peak
	110			NBR	0	0	0%	1.05	1.00	0	0
	110			SBL	0	0	0%	1.05	1.00	0	0
	110	PHF:	SB	SBT	0	0	0%	1.05	1.00	0	0
	110	#DIV/0!		SBR	0	0	0%	1.05	1.00	0	0
			TEV		**0**	**0**	0%			**0**	**0**
18	120	Groveland Rd @ Groveland Drive		EBL	0	0	0%	1.05	1.00	0	0
	120	3 hr PM Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	120	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	120	2011		WBL	0	0	0%	1.05	1.00	0	0
	120		WB	WBT	0	0	0%	1.05	1.00	0	0
	120			WBR	0	0	0%	1.05	1.00	0	0
	120	AM Peak Hour: 10:30 AM-11:30 AM		NBL	0	0	0%	1.05	1.00	0	0
	120	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	0	0	0%	1.05	1.00	0	0
	120			NBR	0	0	0%	1.05	1.00	0	0
	120			SBL	0	0	0%	1.05	1.00	0	0
	120	PHF:	SB	SBT	0	0	0%	1.05	1.00	0	0
	120	#DIV/0!		SBR	0	0	0%	1.05	1.00	0	0
			TEV		**0**	**0**	0%			**0**	**0**
16	130	Sewell Rd @ Meek Rd		EBL	0	0	0%	1.05	1.00	0	0
	130	3 hr PM Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	130	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	130	2011		WBL	0	0	0%	1.05	1.00	0	0
	130		WB	WBT	0	0	0%	1.05	1.00	0	0
	130			WBR	0	0	0%	1.05	1.00	0	0
	130	AM Peak Hour: 10:30 AM-11:30 AM		NBL	0	0	0%	1.05	1.00	0	0
	130	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	0	0	0%	1.05	1.00	0	0
	130			NBR	0	0	0%	1.05	1.00	0	0
	130			SBL	0	0	0%	1.05	1.00	0	0
	130	PHF:	SB	SBT	0	0	0%	1.05	1.00	0	0
	130	#DIV/0!		SBR	0	0	0%	1.05	1.00	0	0
			TEV		**0**	**0**	0%			**0**	**0**
13	140	Sewell Rd @ Evergreen Rd		EBL	8	3	38%	1.07	0.98	10	10
	140	2 hr AM/PM Turning Movement Count	EB	EBT	744	27	4%	1.07	0.98	780	780
	140	Count Date: 10/19/2010		EBR	1	1	100%	1.07	0.98	0	0
	140	2010		WBL	2	2	100%	1.07	0.98	0	0
	140		WB	WBT	970	24	2%	1.07	0.98	1015	1015
	140			WBR	7	1	14%	1.07	0.98	5	5
	140	AM Peak Hour: 7:45 AM-8:45 AM		NBL	2	1	50%	1.07	0.98	0	0
	140	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	0	0	0%	1.07	0.98	0	0
	140			NBR	1	1	100%	1.07	0.98	0	0
	140			SBL	5	2	40%	1.07	0.98	5	5
	140	PHF:	SB	SBT	1	1	100%	1.07	0.98	0	0
	140	0.85		SBR	10	2	20%	1.07	0.98	10	10
			TEV		**1751**	**65**	4%			**1825**	**1825**
14	150	Meier-Jurgen Rd @ Evergreen Rd		EBL	0	0	0%	1.05	1.00	0	0
	150	3 hr PM Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	150	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	150	2011		WBL	0	0	0%	1.05	1.00	0	0
	150		WB	WBT	0	0	0%	1.05	1.00	0	0
	150			WBR	0	0	0%	1.05	1.00	0	0
	150	AM Peak Hour: 10:30 AM-11:30 AM		NBL	0	0	0%	1.05	1.00	0	0
	150	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	0	0	0%	1.05	1.00	0	0
	150			NBR	0	0	0%	1.05	1.00	0	0
	150			SBL	0	0	0%	1.05	1.00	0	0
	150	PHF:	SB	SBT	0	0	0%	1.05	1.00	0	0
	150	#DIV/0!		SBR	0	0	0%	1.05	1.00	0	0
			TEV		**0**	**0**	0%			**0**	**0**
1	160	Helvetia Rd North @ West Union Rd		EBL	11	0	0%	1.05	1.00	10	10
	160	3 hr AM/PM Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	160	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	160	2011		WBL	0	0	0%	1.05	1.00	0	0
	160		WB	WBT	0	0	0%	1.05	1.00	0	0
	160			WBR	0	0	0%	1.05	1.00	0	0
	160	AM Peak Hour: 7:15 AM-8:15 AM		NBL	0	0	0%	1.05	1.00	0	0
	160	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	23	0	0%	1.05	1.00	25	25
	160			NBR	0	0	0%	1.05	1.00	0	0
	160			SBL	0	0	0%	1.05	1.00	0	0
	160	PHF:	SB	SBT	64	0	0%	1.05	1.00	65	65
	160	0.74		SBR	18	1	6%	1.05	1.00	20	20

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Int #	Synchro ID	Intersection	Direction	Movement	Existing Counts 1-Hr Volume AM Peak	Existing Heavy Vehicle Count	Existing Heavy Vehicle Percentage	Seasonal Adjustment Factor	2011 Growth Adjustment Factor	Existing ROUNDED DHV 1-Hr Volume AM Peak	Existing BALANCED DHV 1-Hr Volume AM Peak
		TEV			**116**	**1**	1%			**120**	**120**
2	170	Helvetia Rd Middle @ West Union Rd		EBL	1	0	0%	1.05	1.00	0	0
	170	16 hr Turning Movement Count	EB	EBT	51	2	4%	1.05	1.00	55	55
	170	Count Date: 5/25/2011		EBR	78	0	0%	1.05	1.00	80	80
	170	2011		WBL	163	1	1%	1.05	1.00	170	170
	170		WB	WBT	47	1	2%	1.05	1.00	50	50
	170			WBR	6	0	0%	1.05	1.00	5	5
	170	AM Peak Hour: 7:15 AM-8:15 AM		NBL	70	0	0%	1.05	1.00	75	75
	170	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	20	1	5%	1.05	1.00	20	20
	170			NBR	1	0	0%	1.05	1.00	0	0
	170			SBL	15	0	0%	1.05	1.00	15	15
	170	PHF:	SB	SBT	50	0	0%	1.05	1.00	55	50
	170	0.71		SBR	1	0	0%	1.05	1.00	0	0
		TEV			**503**	**5**	1%			**525**	**520**
3	180	Helvetia Rd South @ West Union Rd		EBL	3	0	0%	1.05	1.00	5	5
	180	3 hr AM/PM Turning Movement Count	EB	EBT	1	0	0%	1.05	1.00	0	0
	180	Count Date: 5/25/2011		EBR	4	0	0%	1.05	1.00	5	5
	180	2011		WBL	0	0	0%	1.05	1.00	0	0
	180		WB	WBT	0	0	0%	1.05	1.00	0	0
	180			WBR	0	0	0%	1.05	1.00	0	0
	180	AM Peak Hour: 7:15 AM-8:15 AM		NBL	4	0	0%	1.05	1.00	5	5
	180	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	88	1	1%	1.05	1.00	90	90
	180			NBR	66	2	3%	1.05	1.00	70	70
	180			SBL	0	0	0%	1.05	1.00	0	0
	180	PHF:	SB	SBT	282	0	0%	1.05	1.00	295	300
	180	0.70		SBR	0	0	0%	1.05	1.00	0	0
		TEV			**448**	**3**	1%			**470**	**475**
4	190	Helvetia Rd @ Pubols Rd		EBL	0	0	0%	1.05	1.00	0	0
	190	3 hr PM Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	190	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	190	2011		WBL	0	0	0%	1.05	1.00	0	0
	190		WB	WBT	0	0	0%	1.05	1.00	0	0
	190			WBR	0	0	0%	1.05	1.00	0	0
	190	AM Peak Hour: 10:30 AM-11:30 AM		NBL	0	0	0%	1.05	1.00	0	0
	190	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	0	0	0%	1.05	1.00	0	0
	190			NBR	0	0	0%	1.05	1.00	0	0
	190			SBL	0	0	0%	1.05	1.00	0	0
	190	PHF:	SB	SBT	0	0	0%	1.05	1.00	0	0
	190	#DIV/0!		SBR	0	0	0%	1.05	1.00	0	0
		TEV			**0**	**0**	0%			**0**	**0**
5	200	Helvetia Rd @ Schaff Rd		EBL	0	0	0%	1.05	1.00	0	0
	200	3 hr AM/PM Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	200	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	200	2011		WBL	3	0	0%	1.05	1.00	5	5
	200		WB	WBT	0	0	0%	1.05	1.00	0	0
	200			WBR	3	1	33%	1.05	1.00	5	5
	200	AM Peak Hour: 7:15 AM-8:15 AM		NBL	0	0	0%	1.05	1.00	0	0
	200	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	153	2	1%	1.05	1.00	160	145
	200			NBR	1	1	100%	1.05	1.00	0	5
	200			SBL	2	0	0%	1.05	1.00	0	5
	200	PHF:	SB	SBT	293	0	0%	1.05	1.00	310	310
	200	0.64		SBR	0	0	0%	1.05	1.00	0	0
		TEV			**455**	**4**	1%			**480**	**475**
6	210	Helvetia Rd @ Jacobson Rd		EBL	0	0	0%	1.05	1.00	0	0
	210	3 hr AM/PM Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	210	Count Date: 5/25/2011		EBR	4	0	0%	1.05	1.00	5	5
	210	2011		WBL	193	1	1%	1.05	1.00	205	165
	210		WB	WBT	0	0	0%	1.05	1.00	0	0
	210			WBR	3	1	33%	1.05	1.00	5	5
	210	AM Peak Hour: 7:15 AM-8:15 AM		NBL	5	0	0%	1.05	1.00	5	5
	210	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	152	2	1%	1.05	1.00	160	145
	210			NBR	219	3	1%	1.05	1.00	230	230
	210			SBL	10	0	0%	1.05	1.00	10	10
	210	PHF:	SB	SBT	281	0	0%	1.05	1.00	295	305
	210	0.79		SBR	0	0	0%	1.05	1.00	0	0
		TEV			**867**	**7**	1%			**915**	**870**
7	220	Brookwood Pkwy @ US26 WB Ramps		EBL	0	0	0%	1.05	1.00	0	0
	220	16 hr Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0

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	220	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	220	2011		WBL	1260	22	2%	1.05	1.00	1325	1260
	220		WB	WBT	0	0	0%	1.05	1.00	0	0
	220			WBR	41	0	0%	1.05	1.00	45	40
	220	AM Peak Hour: 7:30 AM-8:30 AM		NBL	31	15	48%	1.05	1.00	35	55
	220	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	245	6	2%	1.05	1.00	255	320
	220			NBR	0	0	0%	1.05	1.00	0	0
	220			SBL	0	0	0%	1.05	1.00	0	0
	220	PHF:	SB	SBT	386	1	0%	1.05	1.00	405	450
	220	0.82		SBR	26	0	0%	1.05	1.00	25	25
			TEV		**1989**	**44**	2%			**2090**	**2150**
8	230	Brookwood Pkwy @ US26 EB Ramps		EBL	61	0	0%	1.05	1.00	65	60
	230	16 hr Turning Movement Count	EB	EBT	1	0	0%	1.05	1.00	0	0
	230	Count Date: 5/25/2011		EBR	175	21	12%	1.05	1.00	185	175
	230	2011		WBL	0	0	0%	1.05	1.00	0	0
	230		WB	WBT	0	0	0%	1.05	1.00	0	0
	230			WBR	0	0	0%	1.05	1.00	0	0
	230	AM Peak Hour: 7:30 AM-8:30 AM		NBL	0	0	0%	1.05	1.00	0	0
	230	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	320	21	7%	1.05	1.00	335	315
	230			NBR	445	19	4%	1.05	1.00	465	465
	230			SBL	36	0	0%	1.05	1.00	40	40
	230	PHF:	SB	SBT	1655	21	1%	1.05	1.00	1740	1670
	230	0.91		SBR	0	0	0%	1.05	1.00	0	0
			TEV		**2693**	**82**	3%			**2830**	**2725**
9	240	Brookwood Pkwy @ Meek Rd		EBL	16	0	0%	1.05	1.00	15	15
	240	3 hr AM/PM Turning Movement Count	EB	EBT	3	0	0%	1.05	1.00	5	5
	240	Count Date: 5/25/2011		EBR	19	0	0%	1.05	1.00	20	20
	240	2011		WBL	0	0	0%	1.05	1.00	0	0
	240		WB	WBT	0	0	0%	1.05	1.00	0	0
	240			WBR	0	0	0%	1.05	1.00	0	0
	240	AM Peak Hour: 7:30 AM-8:30 AM		NBL	9	0	0%	1.05	1.00	10	10
	240	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	763	36	5%	1.05	1.00	800	765
	240			NBR	2	0	0%	1.05	1.00	0	5
	240			SBL	0	0	0%	1.05	1.00	0	0
	240	PHF:	SB	SBT	1842	46	2%	1.05	1.00	1935	1840
	240	0.90		SBR	6	0	0%	1.05	1.00	5	5
			TEV		**2660**	**82**	3%			**2790**	**2665**
10	250	Brookwood Pkwy @ Huffman Street		EBL	0	0	0%	1.05	1.00	0	0
	250	3 hr AM/PM Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	250	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	250	2011		WBL	2	0	0%	1.05	1.00	0	5
	250		WB	WBT	0	0	0%	1.05	1.00	0	0
	250			WBR	38	0	0%	1.05	1.00	40	40
	250	AM Peak Hour: 7:30 AM-8:30 AM		NBL	0	0	0%	1.05	1.00	0	0
	250	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	798	28	4%	1.05	1.00	840	740
	250			NBR	30	1	3%	1.05	1.00	30	30
	250			SBL	129	1	1%	1.05	1.00	135	120
	250	PHF:	SB	SBT	1776	27	2%	1.05	1.00	1865	1740
	250	0.89		SBR	0	0	0%	1.05	1.00	0	0
			TEV		**2773**	**57**	2%			**2910**	**2675**
11	260	Brookwood Pkwy @ Genentech Access		EBL	5	0	0%	1.05	1.00	5	5
	260	3 hr AM/PM Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	260	Count Date: 5/25/2011		EBR	9	1	11%	1.05	1.00	10	10
	260	2011		WBL	1	0	0%	1.05	1.00	0	0
	260		WB	WBT	0	0	0%	1.05	1.00	0	0
	260			WBR	0	0	0%	1.05	1.00	0	0
	260	AM Peak Hour: 7:30 AM-8:30 AM		NBL	23	1	4%	1.05	1.00	25	25
	260	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	750	39	5%	1.05	1.00	790	835
	260			NBR	10	0	0%	1.05	1.00	10	10
	260			SBL	5	0	0%	1.05	1.00	5	5
	260	PHF:	SB	SBT	1547	42	3%	1.05	1.00	1625	1735
	260	0.89		SBR	73	1	1%	1.05	1.00	75	80
			TEV		**2423**	**84**	3%			**2545**	**2705**
12	270	Brookwood Pkwy @ Evergreen Rd		EBL	186	1	1%	1.05	1.00	195	225
	270	16 hr Turning Movement Count	EB	EBT	373	5	1%	1.05	1.00	390	390
	270	Count Date: 5/25/2011		EBR	84	18	21%	1.05	1.00	90	90
	270	2011		WBL	101	8	8%	1.05	1.00	105	105
	270		WB	WBT	316	2	1%	1.05	1.00	330	330
	270			WBR	38	3	8%	1.05	1.00	40	50

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	270	AM Peak Hour: 7:30 AM-8:30 AM		NBL	58	10	17%	1.05	1.00	60	60
	270	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	491	35	7%	1.05	1.00	515	595
	270			NBR	117	7	6%	1.05	1.00	125	125
	270			SBL	62	5	8%	1.05	1.00	65	70
	270	PHF:	SB	SBT	803	30	4%	1.05	1.00	845	915
	270	0.84		SBR	666	6	1%	1.05	1.00	700	760
			TEV		**3295**	**130**	4%			**3460**	**3715**
20	280	Century Blvd @ West Union Rd		EBL	0	0	0%	1.05	1.00	0	0
	280	3 hr PM Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	280	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	280	2011		WBL	0	0	0%	1.05	1.00	0	0
	280		WB	WBT	0	0	0%	1.05	1.00	0	0
	280			WBR	0	0	0%	1.05	1.00	0	0
	280	AM Peak Hour: 10:30 AM-11:30 AM		NBL	0	0	0%	1.05	1.00	0	0
	280	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	0	0	0%	1.05	1.00	0	0
	280			NBR	0	0	0%	1.05	1.00	0	0
	280			SBL	0	0	0%	1.05	1.00	0	0
	280	PHF:	SB	SBT	0	0	0%	1.05	1.00	0	0
	280	#DIV/0!		SBR	0	0	0%	1.05	1.00	0	0
			TEV		**0**	**0**	0%			**0**	**0**
17	290	Century Blvd @ Jacobson Rd		EBL	0	0	0%	1.05	1.00	0	0
	290	3 hr AM/PM Turning Movement Count	EB	EBT	214	6	3%	1.05	1.00	225	225
	290	Count Date: 5/25/2011		EBR	64	9	14%	1.05	1.00	65	65
	290	2011		WBL	13	0	0%	1.05	1.00	15	15
	290		WB	WBT	203	4	2%	1.05	1.00	215	215
	290			WBR	0	0	0%	1.05	1.00	0	0
	290	AM Peak Hour: 7:45 AM-8:45 AM		NBL	26	8	31%	1.05	1.00	25	25
	290	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	0	0	0%	1.05	1.00	0	0
	290			NBR	4	1	25%	1.05	1.00	5	5
	290			SBL	0	0	0%	1.05	1.00	0	0
	290	PHF:	SB	SBT	0	0	0%	1.05	1.00	0	0
	290	0.74		SBR	0	0	0%	1.05	1.00	0	0
			TEV		**524**	**28**	5%			**550**	**550**
39	300	Croeni Rd @ Jacobson Rd		EBL	5	1	20%	1.05	1.00	5	5
	300	3 hr AM/PM Turning Movement Count	EB	EBT	99	3	3%	1.05	1.00	105	105
	300	Count Date: 5/25/2011		EBR	114	1	1%	1.05	1.00	120	120
	300	2011		WBL	36	0	0%	1.05	1.00	40	40
	300		WB	WBT	185	2	1%	1.05	1.00	195	195
	300			WBR	37	2	5%	1.05	1.00	40	40
	300	AM Peak Hour: 7:30 AM-8:30 AM		NBL	25	1	4%	1.05	1.00	25	25
	300	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	9	1	11%	1.05	1.00	10	10
	300			NBR	9	1	11%	1.05	1.00	10	10
	300			SBL	8	2	25%	1.05	1.00	10	10
	300	PHF:	SB	SBT	20	1	5%	1.05	1.00	20	20
	300	0.71		SBR	3	1	33%	1.05	1.00	5	5
			TEV		**550**	**16**	3%			**585**	**585**
15	310	235th Avenue @ Evergreen Pkwy		EBL	0	0	0%	1.05	1.00	0	0
	310	3 hr PM Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	310	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	310	2011		WBL	0	0	0%	1.05	1.00	0	0
	310		WB	WBT	0	0	0%	1.05	1.00	0	0
	310			WBR	0	0	0%	1.05	1.00	0	0
	310	AM Peak Hour: 10:30 AM-11:30 AM		NBL	0	0	0%	1.05	1.00	0	0
	310	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	0	0	0%	1.05	1.00	0	0
	310			NBR	0	0	0%	1.05	1.00	0	0
	310			SBL	0	0	0%	1.05	1.00	0	0
	310	PHF:	SB	SBT	0	0	0%	1.05	1.00	0	0
	310	#DIV/0!		SBR	0	0	0%	1.05	1.00	0	0
			TEV		**0**	**0**	0%			**0**	**0**
38	320	229th Avenue @ Evergreen Pkwy		EBL	14	0	0%	1.07	0.98	15	15
	320	2 hr AM/PM Turning Movement Count	EB	EBT	353	20	6%	1.07	0.98	370	370
	320	Count Date: 10/19/2010		EBR	79	1	1%	1.07	0.98	85	85
	320	2010		WBL	515	3	1%	1.07	0.98	540	540
	320		WB	WBT	522	22	4%	1.07	0.98	545	545
	320			WBR	192	3	2%	1.07	0.98	200	200
	320	AM Peak Hour: 7:15 AM-8:15 AM		NBL	99	4	4%	1.07	0.98	105	105
	320	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	67	1	1%	1.07	0.98	70	70
	320			NBR	254	5	2%	1.07	0.98	265	265
	320			SBL	37	4	11%	1.07	0.98	40	40

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	320	PHF:	SB	SBT	26	1	4%	1.07	0.98	25	25
	320	0.89		SBR	7	0	0%	1.07	0.98	5	5
			TEV		**2165**	**64**	3%			**2265**	**2265**
31	330	Cornelius Pass Rd @ West Union Rd		EBL	29	7	24%	1.05	1.00	30	30
	330	16 hr Turning Movement Count	EB	EBT	52	2	4%	1.05	1.00	55	55
	330	Count Date: 5/25/2011		EBR	46	11	24%	1.05	1.00	50	50
	330	2011		WBL	493	1	0%	1.05	1.00	520	520
	330		WB	WBT	146	1	1%	1.05	1.00	155	155
	330			WBR	14	3	21%	1.05	1.00	15	15
	330	AM Peak Hour: 7:15 AM-8:15 AM		NBL	48	3	6%	1.05	1.00	50	50
	330	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	341	63	18%	1.05	1.00	360	360
	330			NBR	182	5	3%	1.05	1.00	190	190
	330			SBL	8	1	13%	1.05	1.00	10	10
	330	PHF:	SB	SBT	541	50	9%	1.05	1.00	570	570
	330	0.88		SBR	34	2	6%	1.05	1.00	35	35
			TEV		**1934**	**149**	8%			**2040**	**2040**
32	340	Cornelius Pass Rd @ Jacobson Rd		EBL	0	0	0%	1.05	1.00	0	0
	340	3 hr PM Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	340	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	340	2011		WBL	0	0	0%	1.05	1.00	0	0
	340		WB	WBT	0	0	0%	1.05	1.00	0	0
	340			WBR	0	0	0%	1.05	1.00	0	0
	340	AM Peak Hour: 10:30 AM-11:30 AM		NBL	0	0	0%	1.05	1.00	0	0
	340	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	0	0	0%	1.05	1.00	0	0
	340			NBR	0	0	0%	1.05	1.00	0	0
	340			SBL	0	0	0%	1.05	1.00	0	0
	340	PHF:	SB	SBT	0	0	0%	1.05	1.00	0	0
	340	#DIV/0!		SBR	0	0	0%	1.05	1.00	0	0
			TEV		**0**	**0**	0%			**0**	**0**
33	350	Cornelius Pass Rd @ Rock Creek Blvd		EBL	0	0	0%	1.05	1.00	0	0
	350	3 hr PM Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	350	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	350	2011		WBL	0	0	0%	1.05	1.00	0	0
	350		WB	WBT	0	0	0%	1.05	1.00	0	0
	350			WBR	0	0	0%	1.05	1.00	0	0
	350	AM Peak Hour: 10:30 AM-11:30 AM		NBL	0	0	0%	1.05	1.00	0	0
	350	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	0	0	0%	1.05	1.00	0	0
	350			NBR	0	0	0%	1.05	1.00	0	0
	350			SBL	0	0	0%	1.05	1.00	0	0
	350	PHF:	SB	SBT	0	0	0%	1.05	1.00	0	0
	350	#DIV/0!		SBR	0	0	0%	1.05	1.00	0	0
			TEV		**0**	**0**	0%			**0**	**0**
35	360	Cornelius Pass Rd @ US26 WB Ramps		EBL	0	0	0%	1.05	1.00	0	0
	360	16 hr Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	360	Count Date: 5/25/2011		EBR	1146	32	3%	1.05	1.00	1205	1205
	360	2011		WBL	0	0	0%	1.05	1.00	0	0
	360		WB	WBT	0	0	0%	1.05	1.00	0	0
	360			WBR	218	15	7%	1.05	1.00	230	230
	360	AM Peak Hour: 7:00 AM-8:00 AM		NBL	67	6	9%	1.05	1.00	70	70
	360	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	715	66	9%	1.05	1.00	750	750
	360			NBR	0	0	0%	1.05	1.00	0	0
	360			SBL	0	0	0%	1.05	1.00	0	0
	360	PHF:	SB	SBT	1022	52	5%	1.05	1.00	1075	1065
	360	0.90		SBR	215	35	16%	1.05	1.00	225	225
			TEV		**3383**	**206**	6%			**3555**	**3545**
36	370	Cornelius Pass Rd @ US26 EB Ramps		EBL	149	35	23%	1.05	1.00	155	155
	370	16 hr Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	370	Count Date: 5/25/2011		EBR	176	3	2%	1.05	1.00	185	185
	370	2011		WBL	0	0	0%	1.05	1.00	0	0
	370		WB	WBT	0	0	0%	1.05	1.00	0	0
	370			WBR	0	0	0%	1.05	1.00	0	0
	370	AM Peak Hour: 7:00 AM-8:00 AM		NBL	0	0	0%	1.05	1.00	0	0
	370	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	635	46	7%	1.05	1.00	665	665
	370			NBR	467	24	5%	1.05	1.00	490	490
	370			SBL	0	0	0%	1.05	1.00	0	0
	370	PHF:	SB	SBT	1928	64	3%	1.05	1.00	2025	2025
	370	0.88		SBR	231	25	11%	1.05	1.00	245	245
			TEV		**3586**	**197**	5%			**3765**	**3765**

Project: Brookwook IAMP
Job #: ODOT 701
Subject: ***AM Turning Movement Volumes***
Created: 6/27/2011
Rev. Date: 1/20/2012

Int #	Synchro ID	Intersection	Direction	Movement	Existing Counts 1-Hr Volume AM Peak	Existing Heavy Vehicle Count	Existing Heavy Vehicle Percentage	Seasonal Adjustment Factor	2011 Growth Adjustment Factor	Existing ROUNDED DHV 1-Hr Volume AM Peak	Existing BALANCED DHV 1-Hr Volume AM Peak
37	380	Cornelius Pass Rd @ Evergreen Pkwy		EBL	41	8	20%	1.05	1.00	45	45
	380	16 hr Turning Movement Count	EB	EBT	239	12	5%	1.05	1.00	250	250
	380	Count Date: 5/25/2011		EBR	31	10	32%	1.05	1.00	35	35
	380	2011		WBL	28	0	0%	1.05	1.00	30	30
	380		WB	WBT	481	10	2%	1.05	1.00	505	505
	380			WBR	137	2	1%	1.05	1.00	145	145
	380	AM Peak Hour: 7:15 AM-8:15 AM		NBL	147	9	6%	1.05	1.00	155	155
	380	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	736	44	6%	1.05	1.00	775	775
	380			NBR	44	1	2%	1.05	1.00	45	45
	380			SBL	236	1	0%	1.05	1.00	250	250
	380	PHF:	SB	SBT	689	36	5%	1.05	1.00	725	725
	380	0.85		SBR	285	13	5%	1.05	1.00	300	300
			TEV		**3094**	**146**	5%			**3260**	**3260**
34	390	Cornelius Pass Rd @ Wagon Way		EBL	9	1	11%	1.05	1.00	10	10
	390	3 hr AM/PM Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	390	Count Date: 5/25/2011		EBR	55	9	16%	1.05	1.00	60	60
	390	2011		WBL	4	3	75%	1.05	1.00	5	5
	390		WB	WBT	1	1	100%	1.05	1.00	0	0
	390			WBR	0	0	0%	1.05	1.00	0	0
	390	AM Peak Hour: 7:00 AM-8:00 AM		NBL	165	9	5%	1.05	1.00	175	180
	390	AM Peak Hour Used: 7:30 AM-8:30 AM	NB	NBT	729	65	9%	1.05	1.00	765	795
	390			NBR	5	0	0%	1.05	1.00	5	5
	390			SBL	1	1	100%	1.05	1.00	0	0
	390	PHF:	SB	SBT	1169	75	6%	1.05	1.00	1225	1225
	390	0.88		SBR	38	1	3%	1.05	1.00	40	40
			TEV		**2176**	**165**	8%			**2285**	**2320**

Project: Brookwook IAMP
Job #: ODOT 701
Subject: ***PM Turning Movement Volumes***
Created: 7/7/2011
Rev. Date: 1/20/2012

Count #	Synchro ID	Intersection	Direction	Movement	Existing Counts 1-Hr Volume PM Peak	Existing Heavy Vehicle Count	Existing Heavy Vehicle Percentage	Seasonal Adjustment Factor	2011 Growth Adjustment Factor	Existing ROUNDED DHV 1-Hr Volume PM Peak	Existing BALANCED DHV 1-Hr Volume PM Peak
21	10	Jackson Sch Rd @ West Union Rd		EBL	8	0	0%	1.05	1.00	10	10
	10	16 hr Turning Movement Count	EB	EBT	53	1	2%	1.05	1.00	55	55
	10	Count Date: 5/25/2011		EBR	39	0	0%	1.05	1.00	40	40
	10	2011		WBL	36	2	6%	1.05	1.00	40	40
	10		WB	WBT	60	7	12%	1.05	1.00	65	65
	10			WBR	9	0	0%	1.05	1.00	10	10
	10	AM Peak Hour: 4:45 PM-5:45 PM		NBL	62	7	11%	1.05	1.00	65	65
	10	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	36	0	0%	1.05	1.00	40	40
	10			NBR	56	0	0%	1.05	1.00	60	60
	10			SBL	3	0	0%	1.05	1.00	5	5
	10	PHF:	SB	SBT	28	0	0%	1.05	1.00	30	30
	10	0.94		SBR	9	2	22%	1.05	1.00	10	10
			TEV		**399**	**19**	5%			**430**	**430**
30	20	Jackson Quarry Rd @ West Union Rd		EBL	27	0	0%	1.05	1.00	30	30
	20	3 hr PM Turning Movement Count	EB	EBT	87	0	0%	1.05	1.00	90	90
	20	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	20	2011		WBL	0	0	0%	1.05	1.00	0	0
	20		WB	WBT	72	6	8%	1.05	1.00	75	75
	20			WBR	9	0	0%	1.05	1.00	10	10
	20	AM Peak Hour: 10:00 AM-11:00 AM		NBL	0	0	0%	1.05	1.00	0	0
	20	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	0	0	0%	1.05	1.00	0	0
	20			NBR	0	0	0%	1.05	1.00	0	0
	20			SBL	6	0	0%	1.05	1.00	5	5
	20	PHF:	SB	SBT	0	0	0%	1.05	1.00	0	0
	20	0.94		SBR	29	2	7%	1.05	1.00	30	30
			TEV		**230**	**8**	3%			**240**	**240**
22	30	Jackson Sch Rd @ US26 WB Ramps		EBL	0	0	0%	1.05	1.00	0	0
	30	16 hr Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	30	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	30	2011		WBL	478	11	2%	1.05	1.00	500	500
	30		WB	WBT	0	0	0%	1.05	1.00	0	0
	30			WBR	59	6	10%	1.05	1.00	60	60
	30	AM Peak Hour: 5:00 PM-6:00 PM		NBL	72	0	0%	1.05	1.00	75	75
	30	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	93	2	2%	1.05	1.00	100	100
	30			NBR	0	0	0%	1.05	1.00	0	0
	30			SBL	0	0	0%	1.05	1.00	0	0
	30	PHF:	SB	SBT	98	3	3%	1.05	1.00	105	105
	30	0.93		SBR	2	0	0%	1.05	1.00	0	0
			TEV		**802**	**22**	3%			**840**	**840**
23	40	Jackson Sch Rd @ US26 EB Ramps		EBL	7	0	0%	1.05	1.00	5	5
	40	16 hr Turning Movement Count	EB	EBT	1	0	0%	1.05	1.00	0	0
	40	Count Date: 5/25/2011		EBR	26	0	0%	1.05	1.00	25	25
	40	2011		WBL	0	0	0%	1.05	1.00	0	0
	40		WB	WBT	0	0	0%	1.05	1.00	0	0
	40			WBR	0	0	0%	1.05	1.00	0	0
	40	AM Peak Hour: 4:30 PM-5:30 PM		NBL	0	0	0%	1.05	1.00	0	0
	40	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	151	2	1%	1.05	1.00	160	170
	40			NBR	539	4	1%	1.05	1.00	565	565
	40			SBL	41	0	0%	1.05	1.00	45	45
	40	PHF:	SB	SBT	531	10	2%	1.05	1.00	560	560
	40	0.93		SBR	0	0	0%	1.05	1.00	0	0
			TEV		**1296**	**16**	1%			**1360**	**1370**
24	50	Jackson Sch Rd @ Scotch Church Rd		EBL	88	0	0%	1.07	0.98	90	115
	50	2 hr PM Turning Movement Count	EB	EBT	0	0	0%	1.07	0.98	0	0
	50	Count Date: 10/19/2010		EBR	22	1	5%	1.07	0.98	25	20
	50	2010		WBL	0	0	0%	1.07	0.98	0	0
	50		WB	WBT	0	0	0%	1.07	0.98	0	0
	50			WBR	0	0	0%	1.07	0.98	0	0
	50	AM Peak Hour: 4:45 PM-5:45 PM		NBL	30	0	0%	1.07	0.98	30	25
	50	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	645	5	1%	1.07	0.98	675	620
	50			NBR	0	0	0%	1.07	0.98	0	0
	50			SBL	0	0	0%	1.07	0.98	0	0
	50	PHF:	SB	SBT	400	10	3%	1.07	0.98	420	435
	50	0.88		SBR	123	5	4%	1.07	0.98	130	140
			TEV		**1308**	**21**	2%			**1370**	**1355**
25	60	Jackson Sch Rd @ Meek Rd		EBL	0	0	0%	1.05	1.00	0	0
	60	3 hr AM/2 hr PM Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	60	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	60	2011		WBL	2	0	0%	1.05	1.00	0	0

Project: Brookwook IAMP
Job #: ODOT 701
Subject: ***PM Turning Movement Volumes***
Created: 7/7/2011
Rev. Date: 1/20/2012

Count #	Synchro ID	Intersection	Direction	Movement	Existing Counts 1-Hr Volume PM Peak	Existing Heavy Vehicle Count	Existing Heavy Vehicle Percentage	Seasonal Adjustment Factor	2011 Growth Adjustment Factor	Existing ROUNDED DHV 1-Hr Volume PM Peak	Existing BALANCED DHV 1-Hr Volume PM Peak
	60		WB	WBT	0	0	0%	1.05	1.00	0	0
	60			WBR	13	0	0%	1.05	1.00	15	15
	60	AM Peak Hour: 4:45 PM-5:45 PM		NBL	0	0	0%	1.05	1.00	0	0
	60	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	576	9	2%	1.05	1.00	605	630
	60			NBR	7	0	0%	1.05	1.00	5	5
	60			SBL	12	1	8%	1.05	1.00	15	20
	60	PHF:	SB	SBT	384	12	3%	1.05	1.00	405	435
	60	0.82		SBR	0	0	0%	1.05	1.00	0	0
			TEV		**994**	**22**	2%			**1045**	**1105**
26	70	Jackson Sch Rd @ Evergreen Rd		EBL	301	3	1%	1.05	1.00	315	315
	70	16 hr Turning Movement Count	EB	EBT	344	12	3%	1.05	1.00	360	360
	70	Count Date: 5/25/2011		EBR	1	0	0%	1.05	1.00	0	0
	70	2011		WBL	11	0	0%	1.05	1.00	10	10
	70		WB	WBT	669	10	1%	1.05	1.00	700	700
	70			WBR	303	2	1%	1.05	1.00	320	320
	70	AM Peak Hour: 5:00 PM-6:00 PM		NBL	5	0	0%	1.05	1.00	5	5
	70	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	1	0	0%	1.05	1.00	0	0
	70			NBR	8	0	0%	1.05	1.00	10	10
	70			SBL	92	2	2%	1.05	1.00	95	95
	70	PHF:	SB	SBT	6	0	0%	1.05	1.00	5	5
	70	0.91		SBR	305	8	3%	1.05	1.00	320	320
			TEV		**2046**	**37**	2%			**2140**	**2140**
27	80	15th Avenue @ Evergreen Rd		EBL	0	0	0%	1.07	0.98	0	0
	80	2 hr AM/PM Turning Movement Count	EB	EBT	328	3	1%	1.07	0.98	345	345
	80	Count Date: 10/19/2010		EBR	77	1	1%	1.07	0.98	80	80
	80	2010		WBL	224	2	1%	1.07	0.98	235	235
	80		WB	WBT	692	4	1%	1.07	0.98	725	725
	80			WBR	0	0	0%	1.07	0.98	0	0
	80	AM Peak Hour: 4:45 PM-5:45 PM		NBL	285	3	1%	1.07	0.98	300	300
	80	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	0	0	0%	1.07	0.98	0	0
	80			NBR	395	0	0%	1.07	0.98	415	415
	80			SBL	0	0	0%	1.07	0.98	0	0
	80	PHF:	SB	SBT	0	0	0%	1.07	0.98	0	0
	80	0.88		SBR	0	0	0%	1.07	0.98	0	0
			TEV		**2001**	**13**	1%			**2100**	**2100**
28	90	25th Avenue @ Evergreen Rd		EBL	0	0	0%	1.11	1.00	0	0
	90	2 hr AM/PM Turning Movement Count	EB	EBT	659	5	1%	1.11	1.00	730	675
	90	Count Date: 03/21/2007		EBR	78	2	3%	1.11	1.00	85	85
	90	2007		WBL	129	5	4%	1.11	1.00	145	145
	90		WB	WBT	715	9	1%	1.11	1.00	795	755
	90			WBR	0	0	0%	1.11	1.00	0	0
	90	AM Peak Hour: 5:00 PM-6:00 PM		NBL	177	2	1%	1.11	1.00	195	205
	90	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	0	0	0%	1.11	1.00	0	0
	90			NBR	686	5	1%	1.11	1.00	760	730
	90			SBL	0	0	0%	1.11	1.00	0	0
	90	PHF:	SB	SBT	0	0	0%	1.11	1.00	0	0
	90	0.88		SBR	0	0	0%	1.11	1.00	0	0
			TEV		**2444**	**28**	1%			**2710**	**2595**
29	100	Eggiman Rd @ Evergreen Rd		EBL	1	0	0%	1.05	1.00	0	0
	100	3 hr PM Turning Movement Count	EB	EBT	1340	18	1%	1.05	1.00	1405	1405
	100	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	100	2011		WBL	0	0	0%	1.05	1.00	0	0
	100		WB	WBT	858	16	2%	1.05	1.00	900	900
	100			WBR	5	0	0%	1.05	1.00	5	5
	100	AM Peak Hour: 5:00 PM-6:00 PM		NBL	0	0	0%	1.05	1.00	0	0
	100	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	0	0	0%	1.05	1.00	0	0
	100			NBR	0	0	0%	1.05	1.00	0	0
	100			SBL	3	0	0%	1.05	1.00	5	5
	100	PHF:	SB	SBT	0	0	0%	1.05	1.00	0	0
	100	0.89		SBR	2	0	0%	1.05	1.00	0	0
			TEV		**2209**	**34**	2%			**2315**	**2315**
19	110	Groveland Rd @ West Union Rd		EBL	3	0	0%	1.05	1.00	5	5
	110	3 hr PM Turning Movement Count	EB	EBT	87	0	0%	1.05	1.00	90	90
	110	Count Date: 5/25/2011		EBR	1	0	0%	1.05	1.00	0	0
	110	2011		WBL	0	0	0%	1.05	1.00	0	0
	110		WB	WBT	79	7	9%	1.05	1.00	85	85
	110			WBR	2	0	0%	1.05	1.00	0	5
	110	AM Peak Hour: 4:15 PM-5:15 PM		NBL	0	0	0%	1.05	1.00	0	0
	110	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	0	0	0%	1.05	1.00	0	0

Project: Brookwook IAMP
Job #: ODOT 701
Subject: *PM Turning Movement Volumes*
Created: 7/7/2011
Rev. Date: 1/20/2012

Count #	Synchro ID	Intersection	Direction	Movement	Existing Counts 1-Hr Volume PM Peak	Existing Heavy Vehicle Count	Existing Heavy Vehicle Percentage	Seasonal Adjustment Factor	2011 Growth Adjustment Factor	Existing ROUNDED DHV 1-Hr Volume PM Peak	Existing BALANCED DHV 1-Hr Volume PM Peak
	110			NBR	1	0	0%	1.05	1.00	0	0
	110			SBL	1	0	0%	1.05	1.00	0	0
	110	PHF:	SB	SBT	1	0	0%	1.05	1.00	0	0
	110	0.95		SBR	3	0	0%	1.05	1.00	5	5
			TEV		**178**	**7**	4%			**185**	**190**
18	120	Groveland Rd @ Groveland Drive		EBL	0	0	0%	1.05	1.00	0	0
	120	3 hr PM Turning Movement Count	EB	EBT	5	0	0%	1.05	1.00	5	10
	120	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	120	2011		WBL	0	0	0%	1.05	1.00	0	0
	120		WB	WBT	1	0	0%	1.05	1.00	0	10
	120			WBR	2	0	0%	1.05	1.00	0	0
	120	AM Peak Hour: 4:45 PM-5:45 PM		NBL	0	0	0%	1.05	1.00	0	0
	120	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	0	0	0%	1.05	1.00	0	0
	120			NBR	0	0	0%	1.05	1.00	0	0
	120			SBL	2	0	0%	1.05	1.00	0	0
	120	PHF:	SB	SBT	0	0	0%	1.05	1.00	0	0
	120	0.63		SBR	0	0	0%	1.05	1.00	0	0
			TEV		**10**	**0**	0%			**5**	**20**
16	130	Sewell Rd @ Meek Rd		EBL	0	0	0%	1.05	1.00	0	0
	130	3 hr PM Turning Movement Count	EB	EBT	11	0	0%	1.05	1.00	10	10
	130	Count Date: 5/25/2011		EBR	6	0	0%	1.05	1.00	5	5
	130	2011		WBL	4	0	0%	1.05	1.00	5	5
	130		WB	WBT	24	2	8%	1.05	1.00	25	25
	130			WBR	0	0	0%	1.05	1.00	0	0
	130	AM Peak Hour: 4:30 PM-5:30 PM		NBL	9	1	11%	1.05	1.00	10	10
	130	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	0	0	0%	1.05	1.00	0	0
	130			NBR	6	0	0%	1.05	1.00	5	5
	130			SBL	0	0	0%	1.05	1.00	0	0
	130	PHF:	SB	SBT	0	0	0%	1.05	1.00	0	0
	130	0.88		SBR	0	0	0%	1.05	1.00	0	0
			TEV		**60**	**3**	5%			**60**	**60**
13	140	Sewell Rd @ Evergreen Rd		EBL	9	0	0%	1.11	1.00	10	10
	140	2 hr AM/PM Turning Movement Count	EB	EBT	1311	10	1%	1.11	1.00	1455	1395
	140	Count Date: 03/21/2007		EBR	4	0	0%	1.11	1.00	5	5
	140	2007		WBL	3	0	0%	1.11	1.00	5	5
	140		WB	WBT	842	13	2%	1.11	1.00	935	900
	140			WBR	9	0	0%	1.11	1.00	10	10
	140	AM Peak Hour: 5:00 PM-6:00 PM		NBL	1	0	0%	1.11	1.00	0	0
	140	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	0	0	0%	1.11	1.00	0	0
	140			NBR	2	0	0%	1.11	1.00	0	0
	140			SBL	5	0	0%	1.11	1.00	5	5
	140	PHF:	SB	SBT	0	0	0%	1.11	1.00	0	0
	140	0.88		SBR	6	0	0%	1.11	1.00	5	5
			TEV		**2192**	**23**	1%			**2430**	**2335**
14	150	Meier-Jurgen Rd @ Evergreen Rd		EBL	1	0	0%	1.05	1.00	0	0
	150	3 hr PM Turning Movement Count	EB	EBT	1295	16	1%	1.05	1.00	1360	1360
	150	Count Date: 5/25/2011		EBR	28	0	0%	1.05	1.00	30	30
	150	2011		WBL	42	1	2%	1.05	1.00	45	45
	150		WB	WBT	847	17	2%	1.05	1.00	890	890
	150			WBR	4	0	0%	1.05	1.00	5	5
	150	AM Peak Hour: 5:00 PM-6:00 PM		NBL	8	0	0%	1.05	1.00	10	10
	150	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	0	0	0%	1.05	1.00	0	0
	150			NBR	57	1	2%	1.05	1.00	60	60
	150			SBL	1	0	0%	1.05	1.00	0	0
	150	PHF:	SB	SBT	0	0	0%	1.05	1.00	0	0
	150	0.88		SBR	0	0	0%	1.05	1.00	0	0
			TEV		**2283**	**35**	2%			**2400**	**2400**
1	160	Helvetia Rd North @ West Union Rd		EBL	14	0	0%	1.05	1.00	15	15
	160	3 hr AM/PM Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	160	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	160	2011		WBL	0	0	0%	1.05	1.00	0	0
	160		WB	WBT	0	0	0%	1.05	1.00	0	0
	160			WBR	0	0	0%	1.05	1.00	0	0
	160	AM Peak Hour: 4:45 PM-5:45 PM		NBL	3	0	0%	1.05	1.00	5	5
	160	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	128	0	0%	1.05	1.00	135	135
	160			NBR	0	0	0%	1.05	1.00	0	0
	160			SBL	0	0	0%	1.05	1.00	0	0
	160	PHF:	SB	SBT	57	0	0%	1.05	1.00	60	60
	160	0.82		SBR	5	0	0%	1.05	1.00	5	5

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Job #: ODOT 701
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Count #	Synchro ID	Intersection	Direction	Movement	Existing Counts 1-Hr Volume PM Peak	Existing Heavy Vehicle Count	Existing Heavy Vehicle Percentage	Seasonal Adjustment Factor	2011 Growth Adjustment Factor	Existing ROUNDED DHV 1-Hr Volume PM Peak	Existing BALANCED DHV 1-Hr Volume PM Peak
		TEV			**207**	**0**	0%			**220**	**220**
2	170	Helvetia Rd Middle @ West Union Rd		EBL	1	0	0%	1.05	1.00	0	0
	170	16 hr Turning Movement Count	EB	EBT	65	0	0%	1.05	1.00	70	70
	170	Count Date: 5/25/2011		EBR	13	0	0%	1.05	1.00	15	15
	170	2011		WBL	81	0	0%	1.05	1.00	85	85
	170		WB	WBT	69	2	3%	1.05	1.00	70	70
	170			WBR	19	0	0%	1.05	1.00	20	20
	170	AM Peak Hour: 4:45 PM-5:45 PM		NBL	35	0	0%	1.05	1.00	35	35
	170	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	115	0	0%	1.05	1.00	120	120
	170			NBR	5	0	0%	1.05	1.00	5	5
	170			SBL	14	0	0%	1.05	1.00	15	15
	170	PHF:	SB	SBT	44	0	0%	1.05	1.00	45	45
	170	0.92		SBR	0	0	0%	1.05	1.00	0	0
		TEV			**461**	**2**	0%			**480**	**480**
3	180	Helvetia Rd South @ West Union Rd		EBL	1	0	0%	1.05	1.00	0	0
	180	3 hr AM/PM Turning Movement Count	EB	EBT	1	0	0%	1.05	1.00	0	0
	180	Count Date: 5/25/2011		EBR	11	0	0%	1.05	1.00	10	10
	180	2011		WBL	0	0	0%	1.05	1.00	0	0
	180		WB	WBT	0	0	0%	1.05	1.00	0	0
	180			WBR	0	0	0%	1.05	1.00	0	0
	180	AM Peak Hour: 4:45 PM-5:45 PM		NBL	32	0	0%	1.05	1.00	35	35
	180	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	151	0	0%	1.05	1.00	160	160
	180			NBR	257	0	0%	1.05	1.00	270	270
	180			SBL	2	0	0%	1.05	1.00	0	0
	180	PHF:	SB	SBT	127	0	0%	1.05	1.00	135	135
	180	0.92		SBR	13	0	0%	1.05	1.00	15	10
		TEV			**595**	**0**	0%			**625**	**620**
4	190	Helvetia Rd @ Pubols Rd		EBL	0	0	0%	1.05	1.00	0	0
	190	3 hr PM Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	190	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	190	2011		WBL	3	0	0%	1.05	1.00	5	5
	190		WB	WBT	0	0	0%	1.05	1.00	0	0
	190			WBR	0	0	0%	1.05	1.00	0	0
	190	AM Peak Hour: 10:00 AM-11:00 AM		NBL	0	0	0%	1.05	1.00	0	0
	190	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	436	3	1%	1.05	1.00	460	465
	190			NBR	7	0	0%	1.05	1.00	5	5
	190			SBL	0	0	0%	1.05	1.00	0	0
	190	PHF:	SB	SBT	142	2	1%	1.05	1.00	150	145
	190	0.97		SBR	0	0	0%	1.05	1.00	0	0
		TEV			**588**	**5**	1%			**620**	**620**
5	200	Helvetia Rd @ Schaff Rd		EBL	0	0	0%	1.05	1.00	0	0
	200	3 hr AM/PM Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	200	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	200	2011		WBL	2	0	0%	1.05	1.00	0	0
	200		WB	WBT	0	0	0%	1.05	1.00	0	0
	200			WBR	0	0	0%	1.05	1.00	0	0
	200	AM Peak Hour: 4:30 PM-5:30 PM		NBL	0	0	0%	1.05	1.00	0	0
	200	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	433	0	0%	1.05	1.00	455	450
	200			NBR	2	0	0%	1.05	1.00	0	0
	200			SBL	0	0	0%	1.05	1.00	0	0
	200	PHF:	SB	SBT	139	0	0%	1.05	1.00	145	130
	200	0.93		SBR	0	0	0%	1.05	1.00	0	0
		TEV			**576**	**0**	0%			**600**	**580**
6	210	Helvetia Rd @ Jacobson Rd		EBL	1	0	0%	1.05	1.00	0	0
	210	3 hr AM/PM Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	210	Count Date: 5/25/2011		EBR	10	0	0%	1.05	1.00	10	15
	210	2011		WBL	161	1	1%	1.05	1.00	170	170
	210		WB	WBT	1	0	0%	1.05	1.00	0	0
	210			WBR	5	0	0%	1.05	1.00	5	5
	210	AM Peak Hour: 4:30 PM-5:30 PM		NBL	9	0	0%	1.05	1.00	10	10
	210	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	432	0	0%	1.05	1.00	455	445
	210			NBR	478	5	1%	1.05	1.00	500	455
	210			SBL	5	0	0%	1.05	1.00	5	5
	210	PHF:	SB	SBT	132	0	0%	1.05	1.00	140	125
	210	0.91		SBR	1	0	0%	1.05	1.00	0	0
		TEV			**1235**	**6**	0%			**1295**	**1230**
7	220	Brookwood Pkwy @ US26 WB Ramps		EBL	0	0	0%	1.05	1.00	0	0
	220	16 hr Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0

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Count #	Synchro ID	Intersection	Direction	Movement	Existing Counts 1-Hr Volume PM Peak	Existing Heavy Vehicle Count	Existing Heavy Vehicle Percentage	Seasonal Adjustment Factor	2011 Growth Adjustment Factor	Existing ROUNDED DHV 1-Hr Volume PM Peak	Existing BALANCED DHV 1-Hr Volume PM Peak
	220	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	220	2011		WBL	589	1	0%	1.05	1.00	620	625
	220		WB	WBT	2	0	0%	1.05	1.00	0	0
	220			WBR	77	0	0%	1.05	1.00	80	55
	220	AM Peak Hour: 4:30 PM-5:30 PM		NBL	205	3	1%	1.05	1.00	215	190
	220	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	841	5	1%	1.05	1.00	885	855
	220			NBR	0	0	0%	1.05	1.00	0	0
	220			SBL	0	0	0%	1.05	1.00	0	0
	220	PHF:	SB	SBT	240	0	0%	1.05	1.00	250	235
	220	0.93		SBR	61	0	0%	1.05	1.00	65	75
			TEV		**2015**	**9**	0%			**2115**	**2035**
8	230	Brookwood Pkwy @ US26 EB Ramps		EBL	65	0	0%	1.05	1.00	70	60
	230	16 hr Turning Movement Count	EB	EBT	1	0	0%	1.05	1.00	0	0
	230	Count Date: 5/25/2011		EBR	58	0	0%	1.05	1.00	60	60
	230	2011		WBL	0	0	0%	1.05	1.00	0	0
	230		WB	WBT	0	0	0%	1.05	1.00	0	0
	230			WBR	0	0	0%	1.05	1.00	0	0
	230	AM Peak Hour: 5:00 PM-6:00 PM		NBL	0	0	0%	1.05	1.00	0	0
	230	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	975	8	1%	1.05	1.00	1025	985
	230			NBR	744	5	1%	1.05	1.00	780	780
	230			SBL	19	0	0%	1.05	1.00	20	15
	230	PHF:	SB	SBT	855	2	0%	1.05	1.00	900	845
	230	0.96		SBR	0	0	0%	1.05	1.00	0	0
			TEV		**2717**	**15**	1%			**2855**	**2745**
9	240	Brookwood Pkwy @ Meek Rd		EBL	4	0	0%	1.05	1.00	5	5
	240	3 hr AM/PM Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	240	Count Date: 5/25/2011		EBR	16	0	0%	1.05	1.00	15	15
	240	2011		WBL	2	0	0%	1.05	1.00	0	0
	240		WB	WBT	0	0	0%	1.05	1.00	0	0
	240			WBR	0	0	0%	1.05	1.00	0	0
	240	AM Peak Hour: 4:30 PM-5:30 PM		NBL	25	0	0%	1.05	1.00	25	35
	240	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	1713	13	1%	1.05	1.00	1800	1760
	240			NBR	0	0	0%	1.05	1.00	0	0
	240			SBL	0	0	0%	1.05	1.00	0	0
	240	PHF:	SB	SBT	894	2	0%	1.05	1.00	940	890
	240	0.94		SBR	12	0	0%	1.05	1.00	15	15
			TEV		**2666**	**15**	1%			**2800**	**2720**
10	250	Brookwood Pkwy @ Huffman Street		EBL	0	0	0%	1.05	1.00	0	0
	250	3 hr AM/PM Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	250	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	250	2011		WBL	9	0	0%	1.05	1.00	10	10
	250		WB	WBT	0	0	0%	1.05	1.00	0	0
	250			WBR	126	4	3%	1.05	1.00	130	130
	250	AM Peak Hour: 4:30 PM-5:30 PM		NBL	0	0	0%	1.05	1.00	0	0
	250	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	1637	9	1%	1.05	1.00	1720	1700
	250			NBR	12	0	0%	1.05	1.00	15	15
	250			SBL	27	0	0%	1.05	1.00	30	30
	250	PHF:	SB	SBT	873	1	0%	1.05	1.00	915	915
	250	0.94		SBR	0	0	0%	1.05	1.00	0	0
			TEV		**2684**	**14**	1%			**2820**	**2800**
11	260	Brookwood Pkwy @ Genentech Access		EBL	60	0	0%	1.05	1.00	65	65
	260	3 hr AM/PM Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	260	Count Date: 5/25/2011		EBR	31	0	0%	1.05	1.00	35	35
	260	2011		WBL	5	0	0%	1.05	1.00	5	5
	260		WB	WBT	0	0	0%	1.05	1.00	0	0
	260			WBR	9	0	0%	1.05	1.00	10	10
	260	AM Peak Hour: 4:30 PM-5:30 PM		NBL	4	0	0%	1.05	1.00	5	5
	260	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	1603	9	1%	1.05	1.00	1685	1640
	260			NBR	2	0	0%	1.05	1.00	0	0
	260			SBL	1	0	0%	1.05	1.00	0	0
	260	PHF:	SB	SBT	888	1	0%	1.05	1.00	930	925
	260	0.73		SBR	1	0	0%	1.05	1.00	0	0
			TEV		**2604**	**10**	0%			**2735**	**2685**
12	270	Brookwood Pkwy @ Evergreen Rd		EBL	544	3	1%	1.05	1.00	570	600
	270	16 hr Turning Movement Count	EB	EBT	561	2	0%	1.05	1.00	590	590
	270	Count Date: 5/25/2011		EBR	107	7	7%	1.05	1.00	110	110
	270	2011		WBL	163	0	0%	1.05	1.00	170	170
	270		WB	WBT	466	2	0%	1.05	1.00	490	490
	270			WBR	81	0	0%	1.05	1.00	85	115

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Count #	Synchro ID	Intersection	Direction	Movement	Existing Counts 1-Hr Volume PM Peak	Existing Heavy Vehicle Count	Existing Heavy Vehicle Percentage	Seasonal Adjustment Factor	2011 Growth Adjustment Factor	Existing ROUNDED DHV 1-Hr Volume PM Peak	Existing BALANCED DHV 1-Hr Volume PM Peak
	270	AM Peak Hour: 5:00 PM-6:00 PM		NBL	96	3	3%	1.05	1.00	100	100
	270	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	845	6	1%	1.05	1.00	885	930
	270			NBR	91	1	1%	1.05	1.00	95	95
	270			SBL	47	0	0%	1.05	1.00	50	65
	270	PHF:	SB	SBT	621	1	0%	1.05	1.00	650	670
	270	0.89		SBR	209	0	0%	1.05	1.00	220	230
			TEV		**3831**	**25**	1%			**4015**	**4165**
20	280	Century Blvd @ West Union Rd		EBL	3	1	33%	1.05	1.00	5	5
	280	3 hr PM Turning Movement Count	EB	EBT	335	2	1%	1.05	1.00	350	350
	280	Count Date: 5/25/2011		EBR	3	0	0%	1.05	1.00	5	5
	280	2011		WBL	4	1	25%	1.05	1.00	5	5
	280		WB	WBT	147	4	3%	1.05	1.00	155	155
	280			WBR	10	2	20%	1.05	1.00	10	10
	280	AM Peak Hour: 4:30 PM-5:30 PM		NBL	11	0	0%	1.05	1.00	10	10
	280	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	2	0	0%	1.05	1.00	0	0
	280			NBR	10	0	0%	1.05	1.00	10	10
	280			SBL	14	0	0%	1.05	1.00	15	15
	280	PHF:	SB	SBT	1	0	0%	1.05	1.00	0	0
	280	0.93		SBR	6	0	0%	1.05	1.00	5	5
			TEV		**546**	**10**	2%			**570**	**570**
17	290	Century Blvd @ Jacobson Rd		EBL	0	0	0%	1.05	1.00	0	0
	290	3 hr AM/PM Turning Movement Count	EB	EBT	437	9	2%	1.05	1.00	460	470
	290	Count Date: 5/25/2011		EBR	28	3	11%	1.05	1.00	30	30
	290	2011		WBL	8	4	50%	1.05	1.00	10	10
	290		WB	WBT	95	3	3%	1.05	1.00	100	100
	290			WBR	0	0	0%	1.05	1.00	0	0
	290	AM Peak Hour: 4:30 PM-5:30 PM		NBL	36	1	3%	1.05	1.00	40	40
	290	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	0	0	0%	1.05	1.00	0	0
	290			NBR	12	1	8%	1.05	1.00	15	15
	290			SBL	0	0	0%	1.05	1.00	0	0
	290	PHF:	SB	SBT	0	0	0%	1.05	1.00	0	0
	290	0.89		SBR	0	0	0%	1.05	1.00	0	0
			TEV		**616**	**21**	3%			**655**	**665**
39	300	Croeni Rd @ Jacobson Rd		EBL	4	0	0%	1.05	1.00	5	5
	300	3 hr AM/PM Turning Movement Count	EB	EBT	424	12	3%	1.05	1.00	445	450
	300	Count Date: 5/25/2011		EBR	38	0	0%	1.05	1.00	40	40
	300	2011		WBL	7	0	0%	1.05	1.00	5	5
	300		WB	WBT	78	7	9%	1.05	1.00	80	80
	300			WBR	7	1	14%	1.05	1.00	5	5
	300	AM Peak Hour: 4:30 PM-5:30 PM		NBL	28	0	0%	1.05	1.00	30	30
	300	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	7	0	0%	1.05	1.00	5	5
	300			NBR	11	0	0%	1.05	1.00	10	20
	300			SBL	30	1	3%	1.05	1.00	30	40
	300	PHF:	SB	SBT	15	0	0%	1.05	1.00	15	15
	300	0.91		SBR	7	2	29%	1.05	1.00	5	5
			TEV		**656**	**23**	4%			**675**	**700**
15	310	235th Avenue @ Evergreen Pkwy		EBL	15	1	7%	1.05	1.00	15	15
	310	3 hr PM Turning Movement Count	EB	EBT	835	8	1%	1.05	1.00	875	875
	310	Count Date: 5/25/2011		EBR	6	0	0%	1.05	1.00	5	5
	310	2011		WBL	5	0	0%	1.05	1.00	5	5
	310		WB	WBT	719	12	2%	1.05	1.00	755	755
	310			WBR	11	0	0%	1.05	1.00	10	10
	310	AM Peak Hour: 5:00 PM-6:00 PM		NBL	24	4	17%	1.05	1.00	25	25
	310	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	5	0	0%	1.05	1.00	5	5
	310			NBR	38	1	3%	1.05	1.00	40	40
	310			SBL	31	2	6%	1.05	1.00	35	35
	310	PHF:	SB	SBT	1	0	0%	1.05	1.00	0	0
	310	0.86		SBR	58	0	0%	1.05	1.00	60	60
			TEV		**1748**	**28**	2%			**1830**	**1830**
38	320	229th Avenue @ Evergreen Pkwy		EBL	9	0	0%	1.07	1.00	10	10
	320	2 hr AM/PM Turning Movement Count	EB	EBT	738	7	1%	1.07	1.00	790	790
	320	Count Date: 10/19/2010		EBR	103	0	0%	1.07	1.00	110	110
	320	2010		WBL	206	3	1%	1.07	1.00	220	220
	320		WB	WBT	520	5	1%	1.07	1.00	555	555
	320			WBR	64	3	5%	1.07	1.00	70	70
	320	AM Peak Hour: 5:15 PM-6:15 PM		NBL	78	0	0%	1.07	1.00	85	85
	320	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	36	2	6%	1.07	1.00	40	40
	320			NBR	587	6	1%	1.07	1.00	630	630
	320			SBL	160	6	4%	1.07	1.00	170	170

Project: Brookwook IAMP
Job #: ODOT 701
Subject: ***PM Turning Movement Volumes***
Created: 7/7/2011
Rev. Date: 1/20/2012

Count #	Synchro ID	Intersection	Direction	Movement	Existing Counts 1-Hr Volume PM Peak	Existing Heavy Vehicle Count	Existing Heavy Vehicle Percentage	Seasonal Adjustment Factor	2011 Growth Adjustment Factor	Existing ROUNDED DHV 1-Hr Volume PM Peak	Existing BALANCED DHV 1-Hr Volume PM Peak
	320	PHF:	SB	SBT	52	0	0%	1.07	1.00	55	55
	320	0.94		SBR	10	0	0%	1.07	1.00	10	10
			TEV		**2563**	**32**	1%			**2745**	**2745**
31	330	Cornelius Pass Rd @ West Union Rd		EBL	108	3	3%	1.05	1.00	115	115
	330	16 hr Turning Movement Count	EB	EBT	184	0	0%	1.05	1.00	195	195
	330	Count Date: 5/25/2011		EBR	79	2	3%	1.05	1.00	85	95
	330	2011		WBL	205	5	2%	1.05	1.00	215	225
	330		WB	WBT	72	6	8%	1.05	1.00	75	75
	330			WBR	17	1	6%	1.05	1.00	20	20
	330	AM Peak Hour: 4:45 PM-5:45 PM		NBL	52	7	13%	1.05	1.00	55	60
	330	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	797	28	4%	1.05	1.00	835	850
	330			NBR	640	1	0%	1.05	1.00	670	680
	330			SBL	24	2	8%	1.05	1.00	25	25
	330	PHF:	SB	SBT	360	26	7%	1.05	1.00	380	395
	330	0.97		SBR	29	0	0%	1.05	1.00	30	30
			TEV		**2567**	**81**	3%			**2700**	**2765**
32	340	Cornelius Pass Rd @ Jacobson Rd		EBL	317	6	2%	1.05	1.00	335	335
	340	3 hr PM Turning Movement Count	EB	EBT	27	0	0%	1.05	1.00	30	30
	340	Count Date: 5/25/2011		EBR	151	3	2%	1.05	1.00	160	180
	340	2011		WBL	21	0	0%	1.05	1.00	20	30
	340		WB	WBT	7	0	0%	1.05	1.00	5	5
	340			WBR	5	0	0%	1.05	1.00	5	5
	340	AM Peak Hour: 4:45 PM-5:45 PM		NBL	31	3	10%	1.05	1.00	35	40
	340	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	1189	26	2%	1.05	1.00	1250	1250
	340			NBR	51	0	0%	1.05	1.00	55	60
	340			SBL	9	0	0%	1.05	1.00	10	10
	340	PHF:	SB	SBT	592	23	4%	1.05	1.00	620	650
	340	0.92		SBR	52	3	6%	1.05	1.00	55	55
			TEV		**2452**	**64**	3%			**2580**	**2650**
33	350	Cornelius Pass Rd @ Rock Creek Blvd		EBL	0	0	0%	1.05	1.00	0	0
	350	3 hr PM Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	350	Count Date: 5/25/2011		EBR	0	0	0%	1.05	1.00	0	0
	350	2011		WBL	136	6	4%	1.05	1.00	145	145
	350		WB	WBT	0	0	0%	1.05	1.00	0	0
	350			WBR	23	1	4%	1.05	1.00	25	25
	350	AM Peak Hour: 4:45 PM-5:45 PM		NBL	0	0	0%	1.05	1.00	0	0
	350	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	1260	35	3%	1.05	1.00	1325	1325
	350			NBR	328	2	1%	1.05	1.00	345	345
	350			SBL	56	0	0%	1.05	1.00	60	60
	350	PHF:	SB	SBT	767	37	5%	1.05	1.00	805	810
	350	0.91		SBR	0	0	0%	1.05	1.00	0	0
			TEV		**2570**	**81**	3%			**2705**	**2710**
35	360	Cornelius Pass Rd @ US26 WB Ramps		EBL	0	0	0%	1.05	1.00	0	0
	360	16 hr Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	360	Count Date: 5/25/2011		EBR	665	14	2%	1.05	1.00	700	700
	360	2011		WBL	0	0	0%	1.05	1.00	0	0
	360		WB	WBT	0	0	0%	1.05	1.00	0	0
	360			WBR2	287	13	5%	1.05	1.00	300	300
	360	AM Peak Hour: 4:30 PM-5:30 PM		NBL	258	5	2%	1.05	1.00	270	270
	360	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	1452	27	2%	1.05	1.00	1525	1550
	360			NBR	0	0	0%	1.05	1.00	0	0
	360			SBL	0	0	0%	1.05	1.00	0	0
	360	PHF:	SB	SBT	947	26	3%	1.05	1.00	995	995
	360	0.97		SBR	172	14	8%	1.05	1.00	180	180
			TEV		**3781**	**99**	3%			**3970**	**3995**
36	370	Cornelius Pass Rd @ US26 EB Ramps		EBL	155	8	5%	1.05	1.00	165	165
	370	16 hr Turning Movement Count	EB	EBT	0	0	0%	1.05	1.00	0	0
	370	Count Date: 5/25/2011		EBR	117	5	4%	1.05	1.00	125	125
	370	2011		WBL	0	0	0%	1.05	1.00	0	0
	370		WB	WBT	0	0	0%	1.05	1.00	0	0
	370			WBR	0	0	0%	1.05	1.00	0	0
	370	AM Peak Hour: 4:30 PM-5:30 PM		NBL	0	0	0%	1.05	1.00	0	0
	370	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	1601	25	2%	1.05	1.00	1680	1655
	370			NBR	876	17	2%	1.05	1.00	920	920
	370			SBL	0	0	0%	1.05	1.00	0	0
	370	PHF:	SB	SBT	1352	31	2%	1.05	1.00	1420	1395
	370	0.97		SBR	287	14	5%	1.05	1.00	300	300
			TEV		**4388**	**100**	2%			**4610**	**4560**

Project: Brookwook IAMP
Job #: ODOT 701
Subject: ***PM Turning Movement Volumes***
Created: 7/7/2011
Rev. Date: 1/20/2012

Count #	Synchro ID	Intersection	Direction	Movement	Existing Counts 1-Hr Volume PM Peak	Existing Heavy Vehicle Count	Existing Heavy Vehicle Percentage	Seasonal Adjustment Factor	2011 Growth Adjustment Factor	Existing ROUNDED DHV 1-Hr Volume PM Peak	Existing BALANCED DHV 1-Hr Volume PM Peak
37	380	Cornelius Pass Rd @ Evergreen Pkwy		EBL	363	4	1%	1.05	1.00	380	380
	380	16 hr Turning Movement Count	EB	EBT	821	2	0%	1.05	1.00	860	860
	380	Count Date: 5/25/2011		EBR	151	3	2%	1.05	1.00	160	160
	380	2011		WBL	76	1	1%	1.05	1.00	80	80
	380		WB	WBT	340	3	1%	1.05	1.00	355	355
	380			WBR	392	6	2%	1.05	1.00	410	410
	380	AM Peak Hour: 4:45 PM-5:45 PM		NBL	54	1	2%	1.05	1.00	55	55
	380	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	1020	24	2%	1.05	1.00	1070	1070
	380			NBR	75	0	0%	1.05	1.00	80	80
	380			SBL	218	6	3%	1.05	1.00	230	230
	380	PHF:	SB	SBT	937	16	2%	1.05	1.00	985	985
	380	0.96		SBR	22	1	5%	1.05	1.00	25	25
			TEV		**4469**	**67**	1%			**4690**	**4690**
34	390	Cornelius Pass Rd @ Wagon Way		EBL	29	0	0%	1.05	1.00	30	30
	390	3 hr AM/PM Turning Movement Count	EB	EBT	1	0	0%	1.05	1.00	0	0
	390	Count Date: 5/25/2011		EBR	226	9	4%	1.05	1.00	235	245
	390	2011		WBL	6	1	17%	1.05	1.00	5	5
	390		WB	WBT	0	0	0%	1.05	1.00	0	0
	390			WBR	1	0	0%	1.05	1.00	0	0
	390	AM Peak Hour: 4:30 PM-5:30 PM		NBL	181	4	2%	1.05	1.00	190	205
	390	AM Peak Hour Used: 4:45 PM-5:45 PM	NB	NBT	1549	37	2%	1.05	1.00	1625	1640
	390			NBR	4	1	25%	1.05	1.00	5	5
	390			SBL	1	0	0%	1.05	1.00	0	0
	390	PHF:	SB	SBT	859	36	4%	1.05	1.00	900	925
	390	0.95		SBR	30	1	3%	1.05	1.00	30	30
			TEV		**2887**	**89**	3%			**3020**	**3085**

Appendix D-4. ADT Development

Road	Bi-Directional Volumes	Calculated ADT*
West Union		**4942**
West of Jackson School Rd	245	2450
East of Jackson School Rd	235	2350
West of Helvetia Rd	215	2150
East of Helvetia Rd	445	4450
West of Cornelius Pass Rd	605	6050
East of Cornelius Pass Rd	1220	12200
Evergreen		**17817**
West of Jackson School Rd	1700	17000
East of Jackson School Rd	1495	14950
West of Brookwood Pkwy	2120	21200
East of Brookwood Pkwy	1525	15250
West of Cornelius Pass Rd	1835	18350
East of Cornelius Pass Rd	2015	20150
Jackson School Road		**6320**
North of West Union	105	1050
South of West Union	275	2750
North of Ramps	267	2670
Between Ramps	780	7800
South of Ramps	1310	13100
North of Evergreen	1055	10550
Helvetia	**828.5**	**8285**
North of West Union	215	2150
South of West Union	610	6100
North of Ramps	584	5840
Ramps	1905	19050
Brookwood		**25065**
South of Ramps	2701	27010
South of Huffman	2640	26400
North of Evergreen	2610	26100
South of Evergreen	2075	20750
Cornelius Pass Road		**26650**
North of West Union	1435	14350
South of West Union	2305	23050
North of Wagon Way	2625	26250
South of Ramps	4095	40950
North of Evergreen	3100	31000
South of Evergreen	2430	24300
25th	1165	11650
Jacobson	640	6400

*ADT Calculated using a K-factor of 10%. ADT = peak hour bi-directional volume/.10

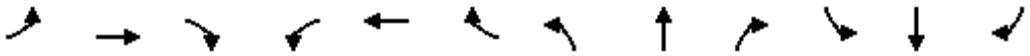
Appendix E. Traffic Operations Analysis

Appendix E-1. Intersection Operations and Queuing

AM Operations

HCM Unsignalized Intersection Capacity Analysis
10: West Union Rd & Jackson School Rd

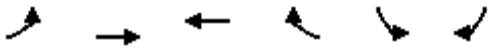
2/3/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	45	35	35	35	0	20	15	20	5	45	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	0	57	44	44	44	0	25	19	25	6	57	6
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	44			101			247	212	79	222	234	44
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	44			101			247	212	79	222	234	44
tC, single (s)	4.6			4.2			7.2	6.6	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.7			2.3			3.5	4.1	3.3	3.5	4.0	3.3
p0 queue free %	100			97			96	97	97	99	91	99
cM capacity (veh/h)	1305			1448			635	646	973	687	649	1031

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	101	89	70	70
Volume Left	0	44	25	6
Volume Right	44	0	25	6
cSH	1305	1448	731	675
Volume to Capacity	0.00	0.03	0.10	0.10
Queue Length 95th (ft)	0	2	8	9
Control Delay (s)	0.0	3.9	10.4	10.9
Lane LOS		A	B	B
Approach Delay (s)	0.0	3.9	10.4	10.9
Approach LOS			B	B

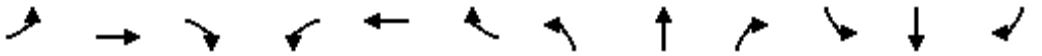
Intersection Summary			
Average Delay	5.6		
Intersection Capacity Utilization	25.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0				0	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				0	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1623				1023	1085

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	0	0	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1700
Volume to Capacity	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

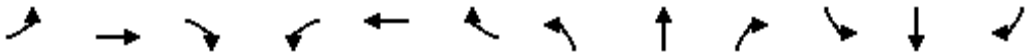
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	0.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	370	2	25	35	40	0	0	110	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	0	0	0	425	2	29	40	46	0	0	126	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						23						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	254	253	126	253	253	46	126			46		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	254	253	126	253	253	46	126			46		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.3	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.4	2.3			2.2		
p0 queue free %	100	100	100	37	100	97	97			100		
cM capacity (veh/h)	667	636	929	679	636	1004	1435			1575		

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	456	40	46	126	2
Volume Left	425	40	0	0	0
Volume Right	29	0	0	0	2
cSH	725	1435	1700	1700	1700
Volume to Capacity	0.63	0.03	0.03	0.07	0.00
Queue Length 95th (ft)	112	2	0	0	0
Control Delay (s)	18.2	7.6	0.0	0.0	0.0
Lane LOS	C	A			
Approach Delay (s)	18.2	3.5		0.0	
Approach LOS	C				

Intersection Summary				
Average Delay	12.8			
Intersection Capacity Utilization	51.3%	ICU Level of Service		A
Analysis Period (min)	15			



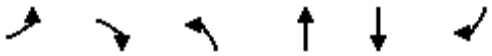
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	2	80	0	0	0	0	70	560	55	425	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	6	2	93	0	0	0	0	81	651	64	494	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			11									
Median type								TWLTL			None	
Median storage veh)								2				
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	703	703	494	705	703	81	494			81		
vC1, stage 1 conf vol	622	622		81	81							
vC2, stage 2 conf vol	81	81		623	622							
vCu, unblocked vol	703	703	494	705	703	81	494			81		
tC, single (s)	7.4	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)	6.4	5.5		6.1	5.5							
tF (s)	3.8	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	99	99	84	100	100	100	100			96		
cM capacity (veh/h)	394	444	573	370	445	984	1080			1467		

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	101	81	651	64	494
Volume Left	6	0	0	64	0
Volume Right	93	0	651	0	0
cSH	623	1700	1700	1467	1700
Volume to Capacity	0.16	0.05	0.38	0.04	0.29
Queue Length 95th (ft)	14	0	0	3	0
Control Delay (s)	12.6	0.0	0.0	7.6	0.0
Lane LOS	B			A	
Approach Delay (s)	12.6	0.0		0.9	
Approach LOS	B				

Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	51.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	615	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3374					
Flt Permitted	1.00					
Satd. Flow (perm)	3374					
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	715	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	715	0	0	0	0	0
Heavy Vehicles (%)	7%	0%	0%	0%	0%	0%
Turn Type						
Protected Phases	4					
Permitted Phases						
Actuated Green, G (s)	20.0					
Effective Green, g (s)	20.0					
Actuated g/C Ratio	1.00					
Clearance Time (s)	4.0					
Lane Grp Cap (vph)	3374					
v/s Ratio Prot	c0.21					
v/s Ratio Perm						
v/c Ratio	0.21					
Uniform Delay, d1	0.0					
Progression Factor	1.00					
Incremental Delay, d2	0.1					
Delay (s)	0.1					
Level of Service	A					
Approach Delay (s)	0.1			0.0	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM Average Control Delay	0.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	20.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	20.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	0	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0	0	0			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0	0			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	1023	1085	1623			

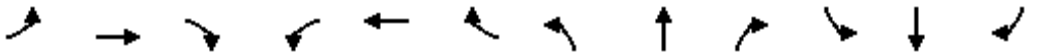
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	0	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1700
Volume to Capacity	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	0.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	5	10	445	5	15	455
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	6	12	517	6	17	529
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1084	520			523	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1084	520			523	
tC, single (s)	6.4	6.2			4.4	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.4	
p0 queue free %	98	98			98	
cM capacity (veh/h)	238	560			936	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	17	523	547
Volume Left	6	0	17
Volume Right	12	6	0
cSH	386	1700	936
Volume to Capacity	0.05	0.31	0.02
Queue Length 95th (ft)	4	0	1
Control Delay (s)	14.8	0.0	0.5
Lane LOS	B		A
Approach Delay (s)	14.8	0.0	0.5
Approach LOS	B		

Intersection Summary			
Average Delay		0.5	
Intersection Capacity Utilization		46.1%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	375	590	2	5	215	90	2	5	5	160	2	300
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1	4.7		4.8	4.7	4.7		5.2			5.6	5.6
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.94			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.95	1.00
Satd. Flow (prot)	1752	1809		1805	1743	1583		1777			1758	1599
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.94			0.72	1.00
Satd. Flow (perm)	1752	1809		1805	1743	1583		1686			1326	1599
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	431	678	2	6	247	103	2	6	6	184	2	345
RTOR Reduction (vph)	0	0	0	0	0	67	0	5	0	0	0	278
Lane Group Flow (vph)	431	680	0	6	247	36	0	9	0	0	186	67
Heavy Vehicles (%)	3%	5%	0%	0%	9%	2%	0%	0%	0%	3%	0%	1%
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases						6	8			4		4
Actuated Green, G (s)	8.7	26.1		1.0	18.1	18.1		9.9			9.5	9.5
Effective Green, g (s)	10.1	27.5		2.4	19.5	19.5		11.3			10.9	10.9
Actuated g/C Ratio	0.18	0.49		0.04	0.35	0.35		0.20			0.19	0.19
Clearance Time (s)	6.5	6.1		6.2	6.1	6.1		6.6			7.0	7.0
Vehicle Extension (s)	2.6	3.2		2.7	3.2	3.2		1.8			1.8	1.8
Lane Grp Cap (vph)	317	890		77	608	552		341			259	312
v/s Ratio Prot	c0.25	c0.38		0.00	0.14							
v/s Ratio Perm						0.02		0.01			c0.14	0.04
v/c Ratio	1.36	0.76		0.08	0.41	0.07		0.03			0.72	0.22
Uniform Delay, d1	22.9	11.6		25.7	13.8	12.1		17.9			21.1	18.9
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	181.0	4.0		0.4	0.5	0.1		0.0			7.7	0.1
Delay (s)	203.9	15.5		26.1	14.3	12.2		17.9			28.7	19.0
Level of Service	F	B		C	B	B		B			C	B
Approach Delay (s)		88.6			13.9			17.9			22.4	
Approach LOS		F			B			B			C	

Intersection Summary			
HCM Average Control Delay	57.4	HCM Level of Service	E
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	55.9	Sum of lost time (s)	10.7
Intersection Capacity Utilization	63.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	550	205	335	265	95	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.8		5.3	4.8	6.1	6.1
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frt	0.96		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3356		1787	3312	1719	1599
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3356		1787	3312	1719	1599
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	618	230	376	298	107	213
RTOR Reduction (vph)	64	0	0	0	0	179
Lane Group Flow (vph)	784	0	376	298	107	34
Heavy Vehicles (%)	4%	1%	1%	9%	5%	1%
Turn Type			Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	18.8		13.6	39.1	9.1	9.1
Effective Green, g (s)	20.2		15.0	40.5	9.6	9.6
Actuated g/C Ratio	0.33		0.25	0.66	0.16	0.16
Clearance Time (s)	6.2		6.7	6.2	6.6	6.6
Vehicle Extension (s)	3.2		2.6	3.2	2.0	2.0
Lane Grp Cap (vph)	1111		439	2199	271	252
v/s Ratio Prot	c0.23		c0.21	0.09	c0.06	
v/s Ratio Perm						0.02
v/c Ratio	0.71		0.86	0.14	0.39	0.13
Uniform Delay, d1	17.8		22.0	3.8	23.1	22.1
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	2.1		14.9	0.0	0.3	0.1
Delay (s)	19.9		36.9	3.8	23.4	22.2
Level of Service	B		D	A	C	C
Approach Delay (s)	19.9			22.3	22.6	
Approach LOS	B			C	C	

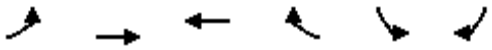
Intersection Summary			
HCM Average Control Delay	21.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	61.0	Sum of lost time (s)	16.2
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	630	110	540	540	60	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1		6.0	5.1	5.9	6.0
Lane Util. Factor	0.95		0.97	0.95	1.00	0.88
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3465		3400	3505	1656	2682
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3465		3400	3505	1656	2682
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	708	124	607	607	67	180
RTOR Reduction (vph)	17	0	0	0	0	53
Lane Group Flow (vph)	815	0	607	607	67	127
Heavy Vehicles (%)	2%	1%	3%	3%	9%	6%
Turn Type			Prot			custom
Protected Phases	2		1	6	3	
Permitted Phases						1 8
Actuated Green, G (s)	20.1		15.3	42.8	8.3	30.9
Effective Green, g (s)	21.5		16.7	44.2	9.7	27.2
Actuated g/C Ratio	0.33		0.26	0.68	0.15	0.42
Clearance Time (s)	6.5		7.4	6.5	7.3	
Vehicle Extension (s)	3.2		2.3	3.2	2.3	
Lane Grp Cap (vph)	1148		875	2387	248	1124
v/s Ratio Prot	c0.24		c0.18	0.17	c0.04	
v/s Ratio Perm						0.05
v/c Ratio	0.71		0.69	0.25	0.27	0.11
Uniform Delay, d1	19.0		21.8	4.0	24.5	11.5
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	2.1		2.1	0.1	0.3	0.0
Delay (s)	21.0		23.9	4.1	24.8	11.5
Level of Service	C		C	A	C	B
Approach Delay (s)	21.0			14.0	15.1	
Approach LOS	C			B	B	

Intersection Summary			
HCM Average Control Delay	16.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	64.9	Sum of lost time (s)	17.0
Intersection Capacity Utilization	53.9%	ICU Level of Service	A
Analysis Period (min)	15		

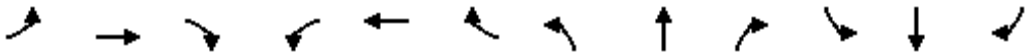
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0				0	0
vC1, stage 1 conf vol					0	
vC2, stage 2 conf vol					0	
vCu, unblocked vol	0				0	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1623				1023	1085

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	0	0	0	0
Volume Left	0	0	0	0
Volume Right	0	0	0	0
cSH	1700	1700	1700	1700
Volume to Capacity	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0
Lane LOS				A
Approach Delay (s)	0.0		0.0	0.0
Approach LOS				A

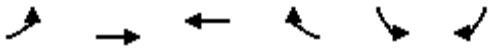
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	0.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	0			0			0	0	0	0	0	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			0			0	0	0	0	0	0
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	1623			1623			1023	896	1085	1023	896	1085

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	0	0	0
Volume Left	0	0	0	0
Volume Right	0	0	0	0
cSH	1700	1700	1700	1700
Volume to Capacity	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0
Lane LOS			A	A
Approach Delay (s)	0.0	0.0	0.0	0.0
Approach LOS			A	A

Intersection Summary				
Average Delay	0.0			
Intersection Capacity Utilization	0.0%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0				0	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				0	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1623				1023	1085

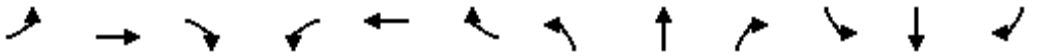
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	0	0	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1700
Volume to Capacity	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	0.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBL	NBR	SEL	SER
Lane Configurations						
Volume (veh/h)	0	0	0	0	0	0
Sign Control	Free		Stop		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None				None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0		0	0		
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0		0	0		
tC, single (s)	4.1		6.4	6.2		
tC, 2 stage (s)						
tF (s)	2.2		3.5	3.3		
p0 queue free %	100		100	100		
cM capacity (veh/h)	1623		1023	1085		

Direction, Lane #	WB 1	NB 1	SE 1
Volume Total	0	0	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1700
Volume to Capacity	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS		A	
Approach Delay (s)	0.0	0.0	0.0
Approach LOS		A	

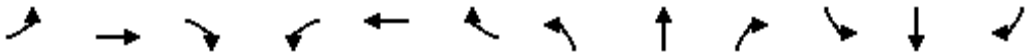
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	0.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	10	780	0	0	1015	5	0	0	0	5	0	10
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	12	918	0	0	1194	6	0	0	0	6	0	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												14
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1200			918			2141	2141	918	2138	2138	1197
vC1, stage 1 conf vol							941	941		1197	1197	
vC2, stage 2 conf vol							1200	1200		941	941	
vCu, unblocked vol	1200			918			2141	2141	918	2138	2138	1197
tC, single (s)	4.5			5.1			7.6	6.5	7.2	7.5	7.5	6.4
tC, 2 stage (s)							6.6	5.5		6.5	6.5	
tF (s)	2.5			3.1			4.0	4.0	4.2	3.9	4.9	3.5
p0 queue free %	98			100			100	100	100	96	100	94
cM capacity (veh/h)	472			458			132	199	223	151	135	208

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	12	918	0	1200	0	18
Volume Left	12	0	0	0	0	6
Volume Right	0	0	0	6	0	12
cSH	472	1700	1700	1700	1700	312
Volume to Capacity	0.02	0.54	0.00	0.71	0.00	0.06
Queue Length 95th (ft)	2	0	0	0	0	4
Control Delay (s)	12.8	0.0	0.0	0.0	0.0	25.5
Lane LOS	B				A	D
Approach Delay (s)	0.2		0.0		0.0	25.5
Approach LOS					A	D

Intersection Summary				
Average Delay	0.3			
Intersection Capacity Utilization	63.7%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	0			0			0	0	0	0	0	0
vC1, stage 1 conf vol							0	0		0	0	
vC2, stage 2 conf vol							0	0		0	0	
vCu, unblocked vol	0			0			0	0	0	0	0	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	1622			1622			1023	896	1084	1023	896	1084

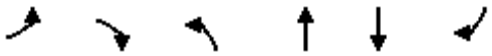
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	0	0	0	0	0	0	0	0
Volume Left	0	0	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0	0	0
cSH	1700	1700	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS							A	A
Approach Delay (s)	0.0			0.0			0.0	0.0
Approach LOS							A	A

Intersection Summary				
Average Delay	0.0			
Intersection Capacity Utilization	0.0%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	0	0	0	0	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			None		
Median storage veh)	2					
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			0		0	0
vC1, stage 1 conf vol					0	
vC2, stage 2 conf vol					0	
vCu, unblocked vol			0		0	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1622		1023	1084

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	0	0	0	0	0	0	0
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0	0
cSH	1700	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS						A	A
Approach Delay (s)	0.0		0.0			0.0	
Approach LOS						A	

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	0.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	10	0	0	25	65	20
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.74	0.74	0.74	0.74	0.74	0.74
Hourly flow rate (vph)	14	0	0	34	88	27
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	135	101	115			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	135	101	115			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	100	100			
cM capacity (veh/h)	863	959	1487			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	14	34	115
Volume Left	14	0	0
Volume Right	0	0	27
cSH	863	1487	1700
Volume to Capacity	0.02	0.00	0.07
Queue Length 95th (ft)	1	0	0
Control Delay (s)	9.2	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.2	0.0	0.0
Approach LOS	A		

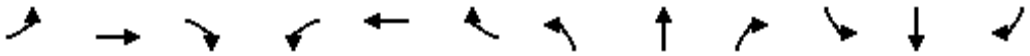
Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	14.6%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection Sign configuration not allowed in HCM analysis.

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	75	20	0	15	50	0	0	55	80	170	50	5
Peak Hour Factor	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Hourly flow rate (vph)	106	28	0	21	70	0	0	77	113	239	70	7

Direction, Lane #	NB 1	SB 1	SE 1	NW 1
Volume Total (vph)	134	92	190	317
Volume Left (vph)	106	21	0	239
Volume Right (vph)	0	0	113	7
Hadj (s)	0.18	0.05	-0.33	0.16
Departure Headway (s)	5.5	5.4	4.6	4.9
Degree Utilization, x	0.20	0.14	0.24	0.43
Capacity (veh/h)	587	591	721	696
Control Delay (s)	9.9	9.3	9.1	11.7
Approach Delay (s)	9.9	9.3	9.1	11.7
Approach LOS	A	A	A	B

Intersection Summary				
Delay	10.4			
HCM Level of Service	B			
Intersection Capacity Utilization	42.0%	ICU Level of Service	A	
Analysis Period (min)	15			

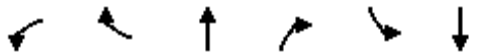


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	0	5	0	0	0	5	90	70	0	300	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Hourly flow rate (vph)	7	0	7	0	0	0	7	129	100	0	429	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	621	671	429	629	621	179	429			229		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	621	671	429	629	621	179	429			229		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	99	100	100	100	99			100		
cM capacity (veh/h)	400	378	631	392	403	870	1142			1351		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	14	236	429
Volume Left	7	7	0
Volume Right	7	100	0
cSH	490	1142	1351
Volume to Capacity	0.03	0.01	0.00
Queue Length 95th (ft)	2	0	0
Control Delay (s)	12.6	0.3	0.0
Lane LOS	B	A	
Approach Delay (s)	12.6	0.3	0.0
Approach LOS	B		

Intersection Summary			
Average Delay		0.4	
Intersection Capacity Utilization		25.8%	ICU Level of Service A
Analysis Period (min)		15	

Intersection Sign configuration not allowed in HCM analysis.



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	0	0	0	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0	0			0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0			0	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	1023	1085			1623	

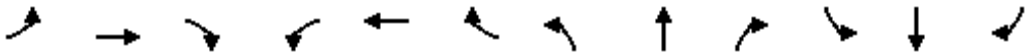
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	0	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1700
Volume to Capacity	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	0.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	5	5	145	5	5	310
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.64	0.64	0.64	0.64	0.64	0.64
Hourly flow rate (vph)	8	8	227	8	8	484
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	730	230			234	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	730	230			234	
tC, single (s)	6.4	6.5			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.6			2.2	
p0 queue free %	98	99			99	
cM capacity (veh/h)	390	738			1345	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	16	234	492
Volume Left	8	0	8
Volume Right	8	8	0
cSH	510	1700	1345
Volume to Capacity	0.03	0.14	0.01
Queue Length 95th (ft)	2	0	0
Control Delay (s)	12.3	0.0	0.2
Lane LOS	B		A
Approach Delay (s)	12.3	0.0	0.2
Approach LOS	B		

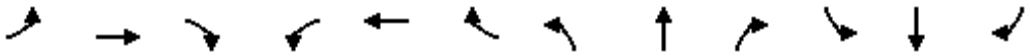
Intersection Summary			
Average Delay		0.4	
Intersection Capacity Utilization		30.3%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	2	5	165	2	5	5	145	210	10	305	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	3	3	6	209	3	6	6	184	266	13	386	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			None	
Median storage veh)								2				
Upstream signal (ft)								305				
pX, platoon unblocked	0.87	0.87		0.87	0.87	0.87				0.87		
vC, conflicting volume	749	875	387	749	743	316	389			449		
vC1, stage 1 conf vol	413	413		329	329							
vC2, stage 2 conf vol	337	462		420	414							
vCu, unblocked vol	634	779	387	634	627	135	389			288		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.5	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.6	2.2			2.2		
p0 queue free %	100	99	99	60	100	99	99			99		
cM capacity (veh/h)	533	466	665	527	514	726	1181			1114		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	11	218	456	401
Volume Left	3	209	6	13
Volume Right	6	6	266	3
cSH	578	531	1181	1114
Volume to Capacity	0.02	0.41	0.01	0.01
Queue Length 95th (ft)	2	50	0	1
Control Delay (s)	11.3	16.4	0.2	0.4
Lane LOS	B	C	A	A
Approach Delay (s)	11.3	16.4	0.2	0.4
Approach LOS	B	C		

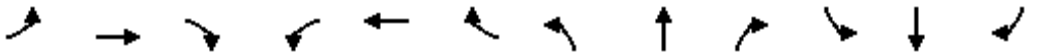
Intersection Summary				
Average Delay	3.6			
Intersection Capacity Utilization	45.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	1260	2	40	55	320	0	0	450	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.6	3.6	3.6	2.0	3.0			3.0	
Lane Util. Factor				0.95	0.95	1.00	1.00	1.00			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.99	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1686	1615	1421	1863			3581	
Flt Permitted				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (perm)				1681	1686	1615	1421	1863			3581	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	0	0	1355	2	43	59	344	0	0	484	27
RTOR Reduction (vph)	0	0	0	0	0	7	0	0	0	0	5	0
Lane Group Flow (vph)	0	0	0	677	680	36	59	344	0	0	506	0
Heavy Vehicles (%)	0%	0%	0%	2%	0%	0%	27%	2%	0%	0%	0%	0%
Turn Type				Perm		Perm	Prot					
Protected Phases					4		1	6			2	
Permitted Phases				4		4						
Actuated Green, G (s)				32.7	32.7	32.7	4.3	27.3			19.0	
Effective Green, g (s)				34.1	34.1	34.1	6.3	29.3			21.0	
Actuated g/C Ratio				0.49	0.49	0.49	0.09	0.42			0.30	
Clearance Time (s)				5.0	5.0	5.0	4.0	5.0			5.0	
Vehicle Extension (s)				2.3	2.3	2.3	2.3	3.0			5.2	
Lane Grp Cap (vph)				819	821	787	128	780			1074	
v/s Ratio Prot							c0.04	c0.18			0.14	
v/s Ratio Perm				0.40	0.40	0.02						
v/c Ratio				0.83	0.83	0.05	0.46	0.44			0.47	
Uniform Delay, d1				15.4	15.4	9.4	30.2	14.5			20.0	
Progression Factor				1.00	1.00	1.00	0.92	0.89			1.00	
Incremental Delay, d2				6.6	6.7	0.0	1.5	1.8			1.5	
Delay (s)				22.1	22.1	9.4	29.4	14.6			21.5	
Level of Service				C	C	A	C	B			C	
Approach Delay (s)		0.0			21.7			16.8			21.5	
Approach LOS		A			C			B			C	

Intersection Summary			
HCM Average Control Delay	20.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	5.6
Intersection Capacity Utilization	87.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	2	175	0	0	0	0	315	465	40	1670	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.6	3.6					3.0	3.0	2.0	3.0	
Lane Util. Factor		1.00	1.00					1.00	1.00	1.00	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1812	1442					1776	1553	1805	3574	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1812	1442					1776	1553	1805	3574	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	66	2	192	0	0	0	0	346	511	44	1835	0
RTOR Reduction (vph)	0	0	41	0	0	0	0	0	172	0	0	0
Lane Group Flow (vph)	0	68	151	0	0	0	0	346	339	44	1835	0
Heavy Vehicles (%)	0%	0%	12%	0%	0%	0%	0%	7%	4%	0%	1%	0%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		8						6		5	2	
Permitted Phases	8		8						6			
Actuated Green, G (s)		7.0	7.0					44.5	44.5	4.5	53.0	
Effective Green, g (s)		8.4	8.4					46.5	46.5	6.5	55.0	
Actuated g/C Ratio		0.12	0.12					0.66	0.66	0.09	0.79	
Clearance Time (s)		5.0	5.0					5.0	5.0	4.0	5.0	
Vehicle Extension (s)		2.3	2.3					4.7	4.7	2.3	4.7	
Lane Grp Cap (vph)		217	173					1180	1032	168	2808	
v/s Ratio Prot								0.19		0.02	c0.51	
v/s Ratio Perm		0.04	c0.10						0.22			
v/c Ratio		0.31	0.87					0.29	0.33	0.26	0.65	
Uniform Delay, d1		28.2	30.3					4.9	5.0	29.5	3.3	
Progression Factor		1.00	1.00					1.00	1.00	1.17	0.31	
Incremental Delay, d2		0.5	34.3					0.6	0.9	0.4	0.9	
Delay (s)		28.6	64.6					5.5	5.9	34.8	2.0	
Level of Service		C	E					A	A	C	A	
Approach Delay (s)		55.2			0.0			5.8			2.7	
Approach LOS		E			A			A			A	

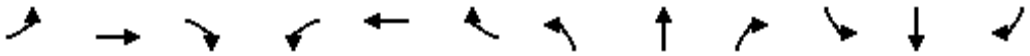
Intersection Summary			
HCM Average Control Delay	8.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	6.6
Intersection Capacity Utilization	87.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	505	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3539					
Flt Permitted	1.00					
Satd. Flow (perm)	3539					
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	549	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	549	0	0	0	0	0
Turn Type						
Protected Phases	4					
Permitted Phases						
Actuated Green, G (s)	20.0					
Effective Green, g (s)	20.0					
Actuated g/C Ratio	1.00					
Clearance Time (s)	4.0					
Lane Grp Cap (vph)	3539					
v/s Ratio Prot	c0.16					
v/s Ratio Perm						
v/c Ratio	0.16					
Uniform Delay, d1	0.0					
Progression Factor	1.00					
Incremental Delay, d2	0.1					
Delay (s)	0.1					
Level of Service	A					
Approach Delay (s)	0.1			0.0	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM Average Control Delay	0.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.16		
Actuated Cycle Length (s)	20.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	17.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	15	5	20	0	2	0	10	765	5	2	1840	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	17	6	22	0	2	0	11	850	6	2	2044	6
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											227	
pX, platoon unblocked	0.74	0.74	0.74	0.74	0.74		0.74					
vC, conflicting volume	2500	2929	1025	1927	2929	428	2050			856		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2328	2905	345	1557	2905	428	1723			856		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	51	95	100	80	100	96			100		
cM capacity (veh/h)	12	11	489	33	11	581	277			793		

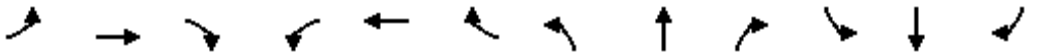
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	44	2	11	567	289	1024	1028
Volume Left	17	0	11	0	0	2	0
Volume Right	22	0	0	0	6	0	6
cSH	24	11	277	1700	1700	793	1700
Volume to Capacity	1.87	0.20	0.04	0.33	0.17	0.00	0.60
Queue Length 95th (ft)	139	13	3	0	0	0	0
Control Delay (s)	761.4	387.5	18.6	0.0	0.0	0.1	0.0
Lane LOS	F	F	C			A	
Approach Delay (s)	761.4	387.5	0.2			0.0	
Approach LOS	F	F					

Intersection Summary				
Average Delay	11.8			
Intersection Capacity Utilization	68.1%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	5	40	740	30	120	1740
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	6	45	831	34	135	1955
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			TWLTL
Median storage veh)						2
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2096	433			865	
vC1, stage 1 conf vol	848					
vC2, stage 2 conf vol	1247					
vCu, unblocked vol	2096	433			865	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	92			83	
cM capacity (veh/h)	173	577			780	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	6	45	554	311	135	978	978
Volume Left	6	0	0	0	135	0	0
Volume Right	0	45	0	34	0	0	0
cSH	173	577	1700	1700	780	1700	1700
Volume to Capacity	0.03	0.08	0.33	0.18	0.17	0.58	0.58
Queue Length 95th (ft)	3	6	0	0	16	0	0
Control Delay (s)	26.5	11.8	0.0	0.0	10.6	0.0	0.0
Lane LOS	D	B			B		
Approach Delay (s)	13.4		0.0		0.7		
Approach LOS	B						

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	58.1%	ICU Level of Service	B
Analysis Period (min)	15		

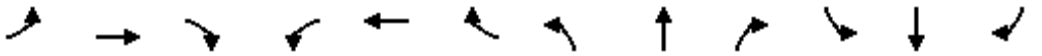


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	0	10	0	0	0	25	835	10	5	1735	80
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	6	0	11	0	0	0	28	938	11	6	1949	90
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1086				
pX, platoon unblocked	0.86	0.86		0.86	0.86	0.86				0.86		
vC, conflicting volume	2486	2966	975	1997	3051	475	2039			949		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2405	2961	975	1839	3059	75	2039			625		
tC, single (s)	7.5	6.5	7.1	7.5	6.5	6.9	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	60	100	95	100	100	100	89			99		
cM capacity (veh/h)	14	11	235	36	10	844	266			834		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	6	11	0	28	625	324	6	975	975	90
Volume Left	6	0	0	28	0	0	6	0	0	0
Volume Right	0	11	0	0	0	11	0	0	0	90
cSH	14	235	1700	266	1700	1700	834	1700	1700	1700
Volume to Capacity	0.40	0.05	0.00	0.11	0.37	0.19	0.01	0.57	0.57	0.05
Queue Length 95th (ft)	25	4	0	9	0	0	1	0	0	0
Control Delay (s)	380.8	21.1	0.0	20.1	0.0	0.0	9.3	0.0	0.0	0.0
Lane LOS	F	C	A	C			A			
Approach Delay (s)	141.0		0.0	0.6			0.0			
Approach LOS	F		A							

Intersection Summary				
Average Delay	1.0			
Intersection Capacity Utilization	58.0%	ICU Level of Service	B	
Analysis Period (min)	15			

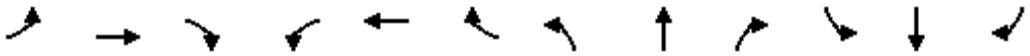
Intersection Sign configuration not allowed in HCM analysis.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	225	390	90	105	330	50	60	595	125	70	915	760
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.6	4.1		2.6	4.1	4.1	2.0	3.5	3.5	2.0	3.5	3.5
Lane Util. Factor	0.97	0.95		0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.88
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3461		3072	3610	1568	1719	3312	1495	1719	3312	2450
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3461		3072	3610	1568	1719	3312	1495	1719	3312	2450
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	268	464	107	125	393	60	71	708	149	83	1089	905
RTOR Reduction (vph)	0	20	0	0	0	47	0	0	92	0	0	234
Lane Group Flow (vph)	268	551	0	125	393	13	71	708	57	83	1089	671
Heavy Vehicles (%)	2%	1%	3%	14%	0%	3%	5%	9%	8%	5%	9%	16%
Turn Type	Prot			Prot		Perm	Prot		custom	Prot		custom
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases						4			2			2 3
Actuated Green, G (s)	12.3	21.0		8.3	17.0	17.0	7.1	30.3	30.8	7.6	30.8	48.6
Effective Green, g (s)	13.7	22.4		9.7	18.4	18.4	9.1	32.3	32.8	9.6	32.8	50.6
Actuated g/C Ratio	0.16	0.26		0.11	0.21	0.21	0.11	0.37	0.38	0.11	0.38	0.59
Clearance Time (s)	4.0	5.5		4.0	5.5	5.5	4.0	5.5	5.5	4.0	5.5	
Vehicle Extension (s)	2.3	3.1		2.3	3.1	3.1	2.4	3.1	3.1	2.4	3.1	
Lane Grp Cap (vph)	546	899		346	771	335	181	1241	569	191	1260	1438
v/s Ratio Prot	c0.08	c0.16		0.04	0.11		0.04	0.21		c0.05	c0.33	
v/s Ratio Perm						0.01			0.04			c0.27
v/c Ratio	0.49	0.61		0.36	0.51	0.04	0.39	0.57	0.10	0.43	0.86	0.47
Uniform Delay, d1	33.1	28.1		35.4	29.9	26.9	36.0	21.4	17.2	35.8	24.6	10.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	1.3		0.4	0.6	0.0	0.9	0.6	0.1	1.0	6.4	0.2
Delay (s)	33.5	29.3		35.8	30.5	26.9	36.9	22.1	17.3	36.8	31.1	10.4
Level of Service	C	C		D	C	C	D	C	B	D	C	B
Approach Delay (s)		30.7			31.2			22.4			22.3	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	25.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	86.2	Sum of lost time (s)	2.0
Intersection Capacity Utilization	60.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	0			0			0	0	0	0	0	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			0			0	0	0	0	0	0
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	1623			1623			1023	896	1085	1023	896	1085

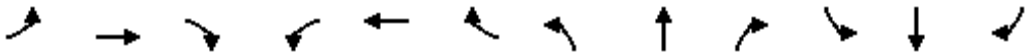
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total	0	0	0	0	0
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	0
cSH	1700	1700	1700	1700	1700
Volume to Capacity	0.00	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS			A	A	A
Approach Delay (s)	0.0	0.0	0.0		0.0
Approach LOS			A		A

Intersection Summary				
Average Delay	0.0			
Intersection Capacity Utilization	0.0%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	225	65	15	215	25	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.74	0.74	0.74	0.74	0.74	0.74
Hourly flow rate (vph)	304	88	20	291	34	7
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			392		679	348
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			392		679	348
tC, single (s)			4.1		6.7	6.4
tC, 2 stage (s)						
tF (s)			2.2		3.8	3.5
p0 queue free %			98		91	99
cM capacity (veh/h)			1178		369	646

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	392	311	34	7
Volume Left	0	20	34	0
Volume Right	88	0	0	7
cSH	1700	1178	369	646
Volume to Capacity	0.23	0.02	0.09	0.01
Queue Length 95th (ft)	0	1	7	1
Control Delay (s)	0.0	0.7	15.7	10.6
Lane LOS		A	C	B
Approach Delay (s)	0.0	0.7	14.9	
Approach LOS			B	

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	33.6%	ICU Level of Service	A
Analysis Period (min)	15		

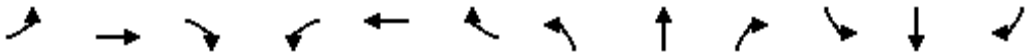


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	105	120	40	195	40	25	10	10	10	20	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Hourly flow rate (vph)	7	148	169	56	275	56	35	14	14	14	28	7
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	331			317			655	690	232	599	746	303
vC1, stage 1 conf vol							246	246		415	415	
vC2, stage 2 conf vol							408	444		183	331	
vCu, unblocked vol	331			317			655	690	232	599	746	303
tC, single (s)	4.3			4.1			7.1	6.6	6.3	7.4	6.6	6.5
tC, 2 stage (s)							6.1	5.6		6.4	5.6	
tF (s)	2.4			2.2			3.5	4.1	3.4	3.7	4.0	3.6
p0 queue free %	99			96			93	97	98	97	94	99
cM capacity (veh/h)	1134			1255			504	485	785	499	475	670

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	7	317	56	331	35	28	14	35
Volume Left	7	0	56	0	35	0	14	0
Volume Right	0	169	0	56	0	14	0	7
cSH	1134	1700	1255	1700	504	600	499	504
Volume to Capacity	0.01	0.19	0.04	0.19	0.07	0.05	0.03	0.07
Queue Length 95th (ft)	0	0	4	0	6	4	2	6
Control Delay (s)	8.2	0.0	8.0	0.0	12.7	11.3	12.4	12.7
Lane LOS	A		A		B	B	B	B
Approach Delay (s)	0.2		1.2		12.1		12.6	
Approach LOS					B		B	

Intersection Summary				
Average Delay	2.3			
Intersection Capacity Utilization	34.3%	ICU Level of Service		A
Analysis Period (min)	15			

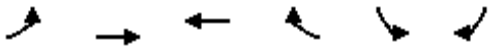
PM Operations



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	10	55	40	40	65	10	65	40	60	5	30	10
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	11	59	43	43	69	11	69	43	64	5	32	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	80			101			287	266	80	282	282	74
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	80			101			287	266	80	282	282	74
tC, single (s)	4.1			4.2			7.2	6.5	6.2	7.1	6.5	6.4
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.6	4.0	3.3	3.5	4.0	3.5
p0 queue free %	99			97			88	93	94	99	95	99
cM capacity (veh/h)	1531			1467			598	620	986	582	608	934

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	112	122	176	48
Volume Left	11	43	69	5
Volume Right	43	11	64	11
cSH	1531	1467	705	655
Volume to Capacity	0.01	0.03	0.25	0.07
Queue Length 95th (ft)	1	2	25	6
Control Delay (s)	0.8	2.8	11.8	10.9
Lane LOS	A	A	B	B
Approach Delay (s)	0.8	2.8	11.8	10.9
Approach LOS			B	B

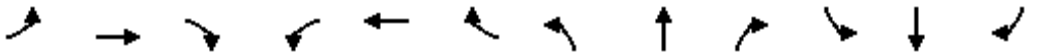
Intersection Summary				
Average Delay	6.6			
Intersection Capacity Utilization	35.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	30	90	75	10	5	30
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	32	95	79	11	5	32
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	89				242	84
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	89				242	84
tC, single (s)	4.1				6.4	6.3
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.4
p0 queue free %	98				99	97
cM capacity (veh/h)	1519				735	961

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	126	89	37
Volume Left	32	0	5
Volume Right	0	11	32
cSH	1519	1700	921
Volume to Capacity	0.02	0.05	0.04
Queue Length 95th (ft)	2	0	3
Control Delay (s)	2.0	0.0	9.1
Lane LOS	A		A
Approach Delay (s)	2.0	0.0	9.1
Approach LOS			A

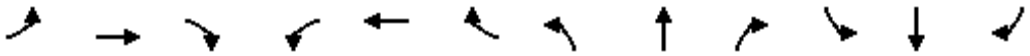
Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	23.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	500	2	60	75	100	0	0	105	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	0	0	538	2	65	81	108	0	0	113	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						23						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	383	382	113	382	382	108	113			108		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	383	382	113	382	382	108	113			108		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	100	100	100	3	100	93	95			100		
cM capacity (veh/h)	515	524	945	552	524	925	1489			1496		

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	604	81	108	113	2
Volume Left	538	81	0	0	0
Volume Right	65	0	0	0	2
cSH	618	1489	1700	1700	1700
Volume to Capacity	0.98	0.05	0.06	0.07	0.00
Queue Length 95th (ft)	355	4	0	0	0
Control Delay (s)	54.8	7.6	0.0	0.0	0.0
Lane LOS	F	A			
Approach Delay (s)	54.8	3.2		0.0	
Approach LOS	F				

Intersection Summary				
Average Delay	37.1			
Intersection Capacity Utilization	51.7%	ICU Level of Service		A
Analysis Period (min)	15			



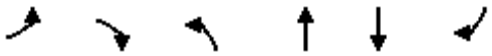
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	2	25	0	0	0	0	170	565	45	560	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	5	2	27	0	0	0	0	183	608	48	602	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			11									
Median type								TWLTL			None	
Median storage veh)								2				
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	882	882	602	883	882	183	602			183		
vC1, stage 1 conf vol	699	699		183	183							
vC2, stage 2 conf vol	183	183		700	699							
vCu, unblocked vol	882	882	602	883	882	183	602			183		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	99	95	100	100	100	100			97		
cM capacity (veh/h)	399	407	503	377	409	865	985			1404		

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	34	183	608	48	602
Volume Left	5	0	0	48	0
Volume Right	27	0	608	0	0
cSH	644	1700	1700	1404	1700
Volume to Capacity	0.05	0.11	0.36	0.03	0.35
Queue Length 95th (ft)	4	0	0	3	0
Control Delay (s)	12.9	0.0	0.0	7.7	0.0
Lane LOS	B			A	
Approach Delay (s)	12.9	0.0		0.6	
Approach LOS	B				

Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	51.7%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	610	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3574					
Flt Permitted	1.00					
Satd. Flow (perm)	3574					
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	709	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	709	0	0	0	0	0
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%
Turn Type						
Protected Phases	4					
Permitted Phases						
Actuated Green, G (s)	20.0					
Effective Green, g (s)	20.0					
Actuated g/C Ratio	1.00					
Clearance Time (s)	4.0					
Lane Grp Cap (vph)	3574					
v/s Ratio Prot	c0.20					
v/s Ratio Perm						
v/c Ratio	0.20					
Uniform Delay, d1	0.0					
Progression Factor	1.00					
Incremental Delay, d2	0.1					
Delay (s)	0.1					
Level of Service	A					
Approach Delay (s)	0.1			0.0	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM Average Control Delay	0.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	20.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	20.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	115	20	25	620	435	140
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	131	23	28	705	494	159
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1335	574	653			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1335	574	653			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	21	96	97			
cM capacity (veh/h)	166	513	943			

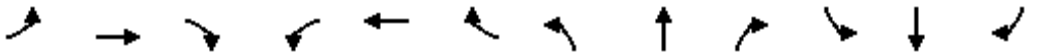
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	153	733	653
Volume Left	131	28	0
Volume Right	23	0	159
cSH	184	943	1700
Volume to Capacity	0.83	0.03	0.38
Queue Length 95th (ft)	147	2	0
Control Delay (s)	80.2	0.8	0.0
Lane LOS	F	A	
Approach Delay (s)	80.2	0.8	0.0
Approach LOS	F		

Intersection Summary			
Average Delay	8.4		
Intersection Capacity Utilization	67.2%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	2	15	630	5	20	435
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	2	18	768	6	24	530
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1351	771			774	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1351	771			774	
tC, single (s)	6.4	6.2			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.3	
p0 queue free %	98	95			97	
cM capacity (veh/h)	162	403			815	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	21	774	555
Volume Left	2	0	24
Volume Right	18	6	0
cSH	343	1700	815
Volume to Capacity	0.06	0.46	0.03
Queue Length 95th (ft)	5	0	2
Control Delay (s)	16.2	0.0	0.8
Lane LOS	C		A
Approach Delay (s)	16.2	0.0	0.8
Approach LOS	C		

Intersection Summary			
Average Delay		0.6	
Intersection Capacity Utilization		49.2%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	315	360	2	10	700	320	5	2	10	95	5	320
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1	4.7		4.8	4.7	4.7		5.2			5.6	5.6
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.92			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.95	1.00
Satd. Flow (prot)	1787	1844		1805	1881	1599		1719			1780	1568
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.90			0.72	1.00
Satd. Flow (perm)	1787	1844		1805	1881	1599		1565			1348	1568
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	346	396	2	11	769	352	5	2	11	104	5	352
RTOR Reduction (vph)	0	0	0	0	0	178	0	9	0	0	0	298
Lane Group Flow (vph)	346	398	0	11	769	174	0	9	0	0	109	54
Heavy Vehicles (%)	1%	3%	0%	0%	1%	1%	0%	0%	0%	2%	0%	3%
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases						6	8			4		4
Actuated Green, G (s)	8.5	36.7		1.2	29.1	29.1		9.1			8.7	8.7
Effective Green, g (s)	9.9	38.1		2.6	30.5	30.5		10.5			10.1	10.1
Actuated g/C Ratio	0.15	0.58		0.04	0.46	0.46		0.16			0.15	0.15
Clearance Time (s)	6.5	6.1		6.2	6.1	6.1		6.6			7.0	7.0
Vehicle Extension (s)	2.6	3.2		2.7	3.2	3.2		1.8			1.8	1.8
Lane Grp Cap (vph)	268	1066		71	871	740		249			207	240
v/s Ratio Prot	c0.19	0.22		0.01	c0.41							
v/s Ratio Perm						0.11		0.01			c0.08	0.03
v/c Ratio	1.29	0.37		0.15	0.88	0.23		0.04			0.53	0.22
Uniform Delay, d1	28.0	7.5		30.6	16.1	10.7		23.4			25.7	24.5
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	156.0	0.2		0.9	10.6	0.2		0.0			1.1	0.2
Delay (s)	184.0	7.7		31.4	26.7	10.8		23.4			26.8	24.6
Level of Service	F	A		C	C	B		C			C	C
Approach Delay (s)		89.7			21.8			23.4			25.2	
Approach LOS		F			C			C			C	

Intersection Summary			
HCM Average Control Delay	43.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	65.9	Sum of lost time (s)	15.4
Intersection Capacity Utilization	79.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	345	80	235	725	300	415
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.8		5.3	4.8	6.1	6.1
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frt	0.97		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3473		1787	3574	1787	1615
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3473		1787	3574	1787	1615
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	392	91	267	824	341	472
RTOR Reduction (vph)	37	0	0	0	0	377
Lane Group Flow (vph)	446	0	267	824	341	95
Heavy Vehicles (%)	1%	1%	1%	1%	1%	0%
Turn Type			Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	12.8		11.5	31.0	10.4	10.4
Effective Green, g (s)	14.2		12.9	32.4	10.9	10.9
Actuated g/C Ratio	0.26		0.24	0.60	0.20	0.20
Clearance Time (s)	6.2		6.7	6.2	6.6	6.6
Vehicle Extension (s)	3.2		2.6	3.2	2.0	2.0
Lane Grp Cap (vph)	910		425	2136	359	325
v/s Ratio Prot	c0.13		c0.15	0.23	c0.19	
v/s Ratio Perm						0.06
v/c Ratio	0.49		0.63	0.39	0.95	0.29
Uniform Delay, d1	16.9		18.5	5.7	21.4	18.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4		2.6	0.1	33.9	0.2
Delay (s)	17.4		21.1	5.8	55.3	18.6
Level of Service	B		C	A	E	B
Approach Delay (s)	17.4			9.6	33.9	
Approach LOS	B			A	C	

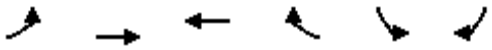
Intersection Summary			
HCM Average Control Delay	19.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	54.2	Sum of lost time (s)	16.2
Intersection Capacity Utilization	55.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	675	85	145	755	205	730
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1		6.0	5.1	5.9	6.0
Lane Util. Factor	0.95		0.97	0.95	1.00	0.88
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3506		3367	3574	1787	2814
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3506		3367	3574	1787	2814
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	767	97	165	858	233	830
RTOR Reduction (vph)	12	0	0	0	0	40
Lane Group Flow (vph)	852	0	165	858	233	790
Heavy Vehicles (%)	1%	3%	4%	1%	1%	1%
Turn Type			Prot			custom
Protected Phases	2		1	6	3	
Permitted Phases						1 8
Actuated Green, G (s)	20.0		8.4	35.8	15.5	31.2
Effective Green, g (s)	21.4		9.8	37.2	16.9	27.5
Actuated g/C Ratio	0.33		0.15	0.57	0.26	0.42
Clearance Time (s)	6.5		7.4	6.5	7.3	
Vehicle Extension (s)	3.2		2.3	3.2	2.3	
Lane Grp Cap (vph)	1153		507	2042	464	1189
v/s Ratio Prot	c0.24		0.05	0.24	0.13	
v/s Ratio Perm						c0.28
v/c Ratio	0.74		0.33	0.42	0.50	0.66
Uniform Delay, d1	19.4		24.7	7.9	20.5	15.1
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	2.6		0.2	0.2	0.5	1.2
Delay (s)	21.9		24.9	8.0	21.0	16.3
Level of Service	C		C	A	C	B
Approach Delay (s)	21.9			10.7	17.3	
Approach LOS	C			B	B	

Intersection Summary			
HCM Average Control Delay	16.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	65.1	Sum of lost time (s)	17.1
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	2	1405	900	5	5	2
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	2	1579	1011	6	6	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1017				2597	1014
vC1, stage 1 conf vol					1014	
vC2, stage 2 conf vol					1583	
vCu, unblocked vol	1017				2597	1014
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				97	99
cM capacity (veh/h)	690				161	292

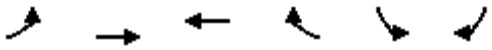
Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	2	1579	1017	8
Volume Left	2	0	0	6
Volume Right	0	0	6	2
cSH	690	1700	1700	185
Volume to Capacity	0.00	0.93	0.60	0.04
Queue Length 95th (ft)	0	0	0	3
Control Delay (s)	10.2	0.0	0.0	25.4
Lane LOS	B			D
Approach Delay (s)	0.0		0.0	25.4
Approach LOS				D

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	83.9%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	90	0	0	85	5	0	2	0	0	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	5	95	0	0	89	5	0	2	0	0	0	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	95			95			203	200	95	198	197	92
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	95			95			203	200	95	198	197	92
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	99
cM capacity (veh/h)	1512			1512			754	697	968	761	699	971

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	100	95	2	5
Volume Left	5	0	0	0
Volume Right	0	5	0	5
cSH	1512	1512	697	971
Volume to Capacity	0.00	0.00	0.00	0.01
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.4	0.0	10.2	8.7
Lane LOS	A		B	A
Approach Delay (s)	0.4	0.0	10.2	8.7
Approach LOS			B	A

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	18.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	2	10	10	2	2	2
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.63	0.63	0.63	0.63	0.63	0.63
Hourly flow rate (vph)	3	16	16	3	3	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	19				40	17
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	19				40	17
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1611				975	1067

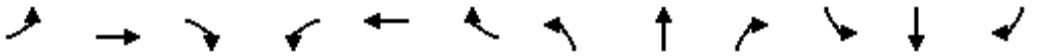
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	19	19	6
Volume Left	3	0	3
Volume Right	0	3	3
cSH	1611	1700	1019
Volume to Capacity	0.00	0.01	0.01
Queue Length 95th (ft)	0	0	0
Control Delay (s)	1.2	0.0	8.6
Lane LOS	A		A
Approach Delay (s)	1.2	0.0	8.6
Approach LOS			A

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	10	5	5	25	10	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	11	6	6	28	11	6
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			17		54	14
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			17		54	14
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			100		99	99
cM capacity (veh/h)			1613		929	1071

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	17	34	17
Volume Left	0	6	11
Volume Right	6	0	6
cSH	1700	1613	972
Volume to Capacity	0.01	0.00	0.02
Queue Length 95th (ft)	0	0	1
Control Delay (s)	0.0	1.2	8.8
Lane LOS		A	A
Approach Delay (s)	0.0	1.2	8.8
Approach LOS			A

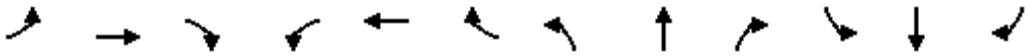
Intersection Summary			
Average Delay		2.8	
Intersection Capacity Utilization		15.6%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	10	1395	5	5	900	10	0	2	0	5	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	11	1585	6	6	1023	11	0	2	0	6	0	6
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												14
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1034			1591			2648	2656	1588	2649	2653	1028
vC1, stage 1 conf vol							1611	1611		1040	1040	
vC2, stage 2 conf vol							1037	1045		1609	1614	
vCu, unblocked vol	1034			1591			2648	2656	1588	2649	2653	1028
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			99			100	98	100	95	100	98
cM capacity (veh/h)	680			418			113	138	134	109	135	287

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	11	1591	6	1034	2	11
Volume Left	11	0	6	0	0	6
Volume Right	0	6	0	11	0	6
cSH	680	1700	418	1700	138	218
Volume to Capacity	0.02	0.94	0.01	0.61	0.02	0.05
Queue Length 95th (ft)	1	0	1	0	1	4
Control Delay (s)	10.4	0.0	13.7	0.0	31.5	28.8
Lane LOS	B		B		D	D
Approach Delay (s)	0.1		0.1		31.5	28.8
Approach LOS					D	D

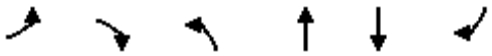
Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	84.5%	ICU Level of Service	E
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	1360	30	45	890	5	10	0	60	2	0	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	2	1545	34	51	1011	6	11	0	68	2	0	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1017			1580			2177	2686	790	1962	2701	509
vC1, stage 1 conf vol							1567	1567		1116	1116	
vC2, stage 2 conf vol							610	1119		845	1584	
vCu, unblocked vol	1017			1580			2177	2686	790	1962	2701	509
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			88			90	100	80	98	100	100
cM capacity (veh/h)	690			413			111	137	333	141	104	515

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	2	1030	549	51	674	343	80	5
Volume Left	2	0	0	51	0	0	11	2
Volume Right	0	0	34	0	0	6	68	2
cSH	690	1700	1700	413	1700	1700	259	221
Volume to Capacity	0.00	0.61	0.32	0.12	0.40	0.20	0.31	0.02
Queue Length 95th (ft)	0	0	0	11	0	0	32	2
Control Delay (s)	10.2	0.0	0.0	15.0	0.0	0.0	25.0	21.6
Lane LOS	B			B			C	C
Approach Delay (s)	0.0			0.7			25.0	21.6
Approach LOS							C	C

Intersection Summary				
Average Delay	1.1			
Intersection Capacity Utilization	49.6%	ICU Level of Service		A
Analysis Period (min)	15			

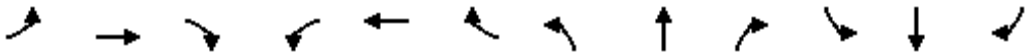


Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	15	2	5	135	60	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	18	2	6	165	73	6
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	253	76	79			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	253	76	79			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	100	100			
cM capacity (veh/h)	737	991	1532			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	21	171	79
Volume Left	18	6	0
Volume Right	2	0	6
cSH	760	1532	1700
Volume to Capacity	0.03	0.00	0.05
Queue Length 95th (ft)	2	0	0
Control Delay (s)	9.9	0.3	0.0
Lane LOS	A	A	
Approach Delay (s)	9.9	0.3	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	21.2%	ICU Level of Service	A
Analysis Period (min)	15		

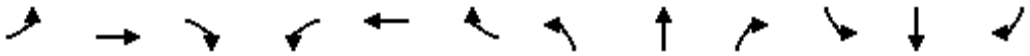
Intersection Sign configuration not allowed in HCM analysis.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	70	15	85	70	20	35	120	5	15	45	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	76	16	92	76	22	38	130	5	16	49	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	92	190	174	65
Volume Left (vph)	0	92	38	16
Volume Right (vph)	16	22	5	0
Hadj (s)	-0.11	0.05	0.02	0.05
Departure Headway (s)	4.6	4.7	4.7	4.9
Degree Utilization, x	0.12	0.25	0.23	0.09
Capacity (veh/h)	720	729	723	682
Control Delay (s)	8.2	9.2	9.1	8.3
Approach Delay (s)	8.2	9.2	9.1	8.3
Approach LOS	A	A	A	A

Intersection Summary				
Delay		8.9		
HCM Level of Service		A		
Intersection Capacity Utilization		33.9%	ICU Level of Service	A
Analysis Period (min)		15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	10	0	0	0	35	160	270	0	135	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	11	0	0	0	38	174	293	0	147	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	549	696	152	560	554	321	158			467		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	549	696	152	560	554	321	158			467		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	100	100	100	97			100		
cM capacity (veh/h)	440	358	899	428	431	725	1434			1105		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	11	505	158
Volume Left	0	38	0
Volume Right	11	293	11
cSH	899	1434	1105
Volume to Capacity	0.01	0.03	0.00
Queue Length 95th (ft)	1	2	0
Control Delay (s)	9.1	0.8	0.0
Lane LOS	A	A	
Approach Delay (s)	9.1	0.8	0.0
Approach LOS	A		

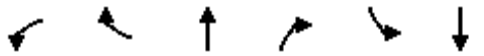
Intersection Summary				
Average Delay	0.8			
Intersection Capacity Utilization	48.0%	ICU Level of Service	A	
Analysis Period (min)	15			

Intersection Sign configuration not allowed in HCM analysis.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	5	2	445	5	2	125
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	5	2	459	5	2	129
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	594	461			464	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	594	461			464	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	470	604			1108	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	7	464	131
Volume Left	5	0	2
Volume Right	2	5	0
cSH	502	1700	1108
Volume to Capacity	0.01	0.27	0.00
Queue Length 95th (ft)	1	0	0
Control Delay (s)	12.3	0.0	0.1
Lane LOS	B		A
Approach Delay (s)	12.3	0.0	0.1
Approach LOS	B		

Intersection Summary			
Average Delay		0.2	
Intersection Capacity Utilization		33.7%	ICU Level of Service A
Analysis Period (min)		15	



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	2	2	450	2	2	130
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	2	2	484	2	2	140
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	629	485			486	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	629	485			486	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	449	586			1087	

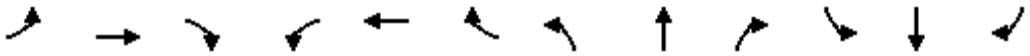
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	4	486	142
Volume Left	2	0	2
Volume Right	2	2	0
cSH	508	1700	1087
Volume to Capacity	0.01	0.29	0.00
Queue Length 95th (ft)	1	0	0
Control Delay (s)	12.1	0.0	0.1
Lane LOS	B		A
Approach Delay (s)	12.1	0.0	0.1
Approach LOS	B		

Intersection Summary			
Average Delay		0.1	
Intersection Capacity Utilization		33.8%	ICU Level of Service A
Analysis Period (min)		15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	2	15	170	2	5	10	445	455	5	125	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	2	2	16	187	2	5	11	489	500	5	137	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			None	
Median storage veh)								2				
Upstream signal (ft)								305				
pX, platoon unblocked	0.58	0.58		0.58	0.58	0.58				0.58		
vC, conflicting volume	917	1160	138	928	912	739	140			989		
vC1, stage 1 conf vol	149	149		761	761							
vC2, stage 2 conf vol	768	1011		167	151							
vCu, unblocked vol	500	918	138	519	491	195	140			624		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	99	98	56	99	99	99			99		
cM capacity (veh/h)	411	253	915	422	396	497	1456			564		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	21	195	1000	145
Volume Left	2	187	11	5
Volume Right	16	5	500	2
cSH	652	424	1456	564
Volume to Capacity	0.03	0.46	0.01	0.01
Queue Length 95th (ft)	2	59	1	1
Control Delay (s)	10.7	20.5	0.2	0.6
Lane LOS	B	C	A	A
Approach Delay (s)	10.7	20.5	0.2	0.6
Approach LOS	B	C		

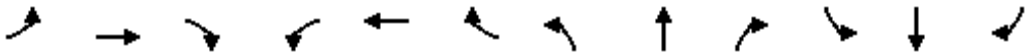
Intersection Summary				
Average Delay	3.3			
Intersection Capacity Utilization	78.4%	ICU Level of Service	D	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	625	2	55	190	855	0	0	235	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.6	3.6	3.6	2.0	7.0			3.0	
Lane Util. Factor				0.95	0.95	1.00	1.00	1.00			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.96	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1715	1720	1615	1787	1881			3479	
Flt Permitted				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (perm)				1715	1720	1615	1787	1881			3479	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	0	0	672	2	59	204	919	0	0	253	81
RTOR Reduction (vph)	0	0	0	0	0	18	0	0	0	0	33	0
Lane Group Flow (vph)	0	0	0	336	338	41	204	919	0	0	301	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%
Turn Type				Perm		Perm	Prot					
Protected Phases					4		1	6			2	
Permitted Phases				4		4						
Actuated Green, G (s)				15.8	15.8	15.8	12.7	44.2			27.5	
Effective Green, g (s)				17.2	17.2	17.2	14.7	42.2			29.5	
Actuated g/C Ratio				0.25	0.25	0.25	0.21	0.60			0.42	
Clearance Time (s)				5.0	5.0	5.0	4.0	5.0			5.0	
Vehicle Extension (s)				2.3	2.3	2.3	2.3	3.0			5.2	
Lane Grp Cap (vph)				421	423	397	375	1134			1466	
v/s Ratio Prot							0.11	c0.49			0.09	
v/s Ratio Perm				0.20	0.20	0.03						
v/c Ratio				0.80	0.80	0.10	0.54	0.81			0.21	
Uniform Delay, d1				24.8	24.8	20.4	24.7	10.8			12.8	
Progression Factor				1.00	1.00	1.00	0.79	1.45			1.00	
Incremental Delay, d2				9.7	9.7	0.1	0.8	4.8			0.3	
Delay (s)				34.5	34.5	20.5	20.3	20.4			13.1	
Level of Service				C	C	C	C	C			B	
Approach Delay (s)		0.0			33.3			20.4			13.1	
Approach LOS		A			C			C			B	

Intersection Summary			
HCM Average Control Delay	23.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	71.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



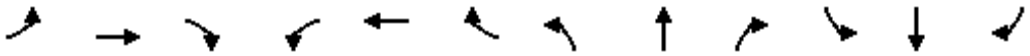
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	2	60	0	0	0	0	985	780	15	845	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0					5.0	5.0	4.0	5.0	
Lane Util. Factor		1.00	1.00					1.00	1.00	1.00	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1812	1615					1881	1599	1805	3610	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1812	1615					1881	1599	1805	3610	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	62	2	62	0	0	0	0	1026	812	16	880	0
RTOR Reduction (vph)	0	0	57	0	0	0	0	0	248	0	0	0
Lane Group Flow (vph)	0	64	5	0	0	0	0	1026	564	16	880	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		8						6		5	2	
Permitted Phases	8		8						6			
Actuated Green, G (s)		6.1	6.1					48.6	48.6	1.3	53.9	
Effective Green, g (s)		6.1	6.1					48.6	48.6	1.3	53.9	
Actuated g/C Ratio		0.09	0.09					0.69	0.69	0.02	0.77	
Clearance Time (s)		5.0	5.0					5.0	5.0	4.0	5.0	
Vehicle Extension (s)		2.3	2.3					4.7	4.7	2.3	4.7	
Lane Grp Cap (vph)		158	141					1306	1110	34	2780	
v/s Ratio Prot								c0.55		0.01	c0.24	
v/s Ratio Perm		0.04	0.00						0.35			
v/c Ratio		0.41	0.04					0.79	0.51	0.47	0.32	
Uniform Delay, d1		30.2	29.3					7.2	5.1	34.0	2.4	
Progression Factor		1.00	1.00					1.00	1.00	1.13	0.41	
Incremental Delay, d2		1.0	0.1					4.8	1.7	4.7	0.2	
Delay (s)		31.2	29.3					12.0	6.7	43.1	1.2	
Level of Service		C	C					B	A	D	A	
Approach Delay (s)		30.3			0.0			9.7			2.0	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM Average Control Delay	8.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	71.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	795	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3610					
Flt Permitted	1.00					
Satd. Flow (perm)	3610					
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	864	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	864	0	0	0	0	0
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%
Turn Type						
Protected Phases	4					
Permitted Phases						
Actuated Green, G (s)	20.0					
Effective Green, g (s)	20.0					
Actuated g/C Ratio	1.00					
Clearance Time (s)	4.0					
Lane Grp Cap (vph)	3610					
v/s Ratio Prot	c0.24					
v/s Ratio Perm						
v/c Ratio	0.24					
Uniform Delay, d1	0.0					
Progression Factor	1.00					
Incremental Delay, d2	0.2					
Delay (s)	0.2					
Level of Service	A					
Approach Delay (s)	0.2			0.0	0.0	
Approach LOS	A			A	A	

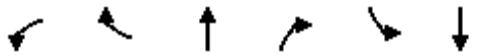
Intersection Summary			
HCM Average Control Delay	0.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	20.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	25.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	2	15	0	2	0	35	1760	1	1	890	15
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	5	2	16	0	2	0	37	1872	1	1	947	16
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											227	
pX, platoon unblocked	0.92	0.92	0.92	0.92	0.92		0.92					
vC, conflicting volume	1969	2905	481	2440	2912	937	963			1873		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1885	2897	277	2394	2905	937	797			1873		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	85	85	98	100	85	100	95			100		
cM capacity (veh/h)	35	14	672	14	14	270	771			325		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	23	2	37	1248	625	474	489
Volume Left	5	0	37	0	0	1	0
Volume Right	16	0	0	0	1	0	16
cSH	72	14	771	1700	1700	325	1700
Volume to Capacity	0.33	0.15	0.05	0.73	0.37	0.00	0.29
Queue Length 95th (ft)	30	10	4	0	0	0	0
Control Delay (s)	78.1	303.9	9.9	0.0	0.0	0.1	0.0
Lane LOS	F	F	A			A	
Approach Delay (s)	78.1	303.9	0.2			0.1	
Approach LOS	F	F					

Intersection Summary				
Average Delay	1.0			
Intersection Capacity Utilization	61.2%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	10	145	1650	15	35	870
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	11	154	1755	16	37	926
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			TWLTL
Median storage veh)						2
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2301	886			1771	
vC1, stage 1 conf vol	1763					
vC2, stage 2 conf vol	537					
vCu, unblocked vol	2301	886			1771	
tC, single (s)	6.8	7.0			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	91	46			90	
cM capacity (veh/h)	119	286			356	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	11	154	1170	601	37	463	463
Volume Left	11	0	0	0	37	0	0
Volume Right	0	154	0	16	0	0	0
cSH	119	286	1700	1700	356	1700	1700
Volume to Capacity	0.09	0.54	0.69	0.35	0.10	0.27	0.27
Queue Length 95th (ft)	7	74	0	0	9	0	0
Control Delay (s)	38.1	31.4	0.0	0.0	16.3	0.0	0.0
Lane LOS	E	D			C		
Approach Delay (s)	31.9		0.0		0.6		
Approach LOS	D						

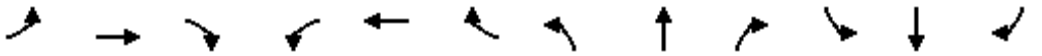
Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	61.7%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	65	0	35	5	0	10	5	1640	2	2	925	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Hourly flow rate (vph)	89	0	48	7	0	14	7	2247	3	3	1267	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1086				
pX, platoon unblocked	0.72	0.72		0.72	0.72	0.72				0.72		
vC, conflicting volume	2423	3536	634	2949	3537	1125	1270			2249		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2195	3748	634	2928	3750	382	1270			1952		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	89	0	100	97	99			99		
cM capacity (veh/h)	18	3	427	4	3	446	554			217		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	89	48	21	7	1498	752	3	634	634	3
Volume Left	89	0	7	7	0	0	3	0	0	0
Volume Right	0	48	14	0	0	3	0	0	0	3
cSH	18	427	13	554	1700	1700	217	1700	1700	1700
Volume to Capacity	5.08	0.11	1.61	0.01	0.88	0.44	0.01	0.37	0.37	0.00
Queue Length 95th (ft)	Err	9	83	1	0	0	1	0	0	0
Control Delay (s)	Err	14.5	894.2	11.6	0.0	0.0	21.8	0.0	0.0	0.0
Lane LOS	F	B	F	B			C			
Approach Delay (s)	6504.4		894.2	0.0			0.0			
Approach LOS	F		F							

Intersection Summary				
Average Delay	246.7			
Intersection Capacity Utilization	61.1%	ICU Level of Service		B
Analysis Period (min)	15			

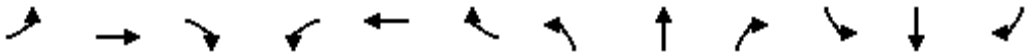
Intersection Sign configuration not allowed in HCM analysis.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	600	590	110	170	490	115	100	930	95	65	670	230
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.6	4.1		2.6	4.1	4.1	2.0	3.5	3.5	2.0	3.5	3.5
Lane Util. Factor	0.97	0.95		0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.88
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3303	3508		3502	3610	1615	1787	3574	1599	1805	3610	2842
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3303	3508		3502	3610	1615	1787	3574	1599	1805	3610	2842
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	674	663	124	191	551	129	112	1045	107	73	753	258
RTOR Reduction (vph)	0	14	0	0	0	99	0	0	75	0	0	113
Lane Group Flow (vph)	674	773	0	191	551	30	112	1045	32	73	753	145
Heavy Vehicles (%)	6%	0%	3%	0%	0%	0%	1%	1%	1%	0%	0%	0%
Turn Type	Prot			Prot		Perm	Prot		custom	Prot		custom
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases						4			2			2 3
Actuated Green, G (s)	21.4	33.5		9.6	21.7	21.7	11.0	31.3	27.9	7.6	27.9	54.8
Effective Green, g (s)	22.8	34.9		11.0	23.1	23.1	13.0	33.3	29.9	9.6	29.9	56.8
Actuated g/C Ratio	0.23	0.35		0.11	0.23	0.23	0.13	0.33	0.30	0.10	0.30	0.56
Clearance Time (s)	4.0	5.5		4.0	5.5	5.5	4.0	5.5	5.5	4.0	5.5	
Vehicle Extension (s)	2.3	3.1		2.3	3.1	3.1	2.4	3.1	3.1	2.4	3.1	
Lane Grp Cap (vph)	746	1212		381	826	369	230	1178	473	172	1069	1598
v/s Ratio Prot	c0.20	c0.22		0.05	0.15		c0.06	c0.29		0.04	0.21	
v/s Ratio Perm						0.02			0.02			0.05
v/c Ratio	0.90	0.64		0.50	0.67	0.08	0.49	0.89	0.07	0.42	0.70	0.09
Uniform Delay, d1	38.0	27.7		42.4	35.5	30.6	40.9	32.1	25.5	43.1	31.6	10.2
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	14.2	1.1		0.6	2.1	0.1	1.1	8.4	0.1	1.1	2.1	0.0
Delay (s)	52.2	28.9		43.0	37.5	30.7	42.0	40.4	25.6	44.2	33.8	10.2
Level of Service	D	C		D	D	C	D	D	C	D	C	B
Approach Delay (s)		39.6			37.7			39.3			28.9	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM Average Control Delay	36.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	101.0	Sum of lost time (s)	4.6
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	350	5	5	155	10	10	2	10	15	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	5	376	5	5	167	11	11	2	11	16	0	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	177			382			578	578	379	584	575	172
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	177			382			578	578	379	584	575	172
tC, single (s)	4.4			4.3			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.5			2.4			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			97	99	98	96	100	99
cM capacity (veh/h)	1232			1061			424	426	672	414	427	877

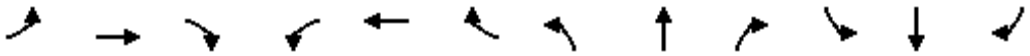
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total	387	183	11	13	22
Volume Left	5	5	11	0	16
Volume Right	5	11	0	11	5
cSH	1232	1061	424	613	477
Volume to Capacity	0.00	0.01	0.03	0.02	0.05
Queue Length 95th (ft)	0	0	2	2	4
Control Delay (s)	0.2	0.3	13.7	11.0	12.9
Lane LOS	A	A	B	B	B
Approach Delay (s)	0.2	0.3	12.2		12.9
Approach LOS			B		B

Intersection Summary				
Average Delay	1.1			
Intersection Capacity Utilization	35.3%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	470	30	10	100	40	15
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	528	34	11	112	45	17
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			562		680	545
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			562		680	545
tC, single (s)			4.6		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.7		3.5	3.4
p0 queue free %			99		89	97
cM capacity (veh/h)			809		409	527

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	562	124	45	17
Volume Left	0	11	45	0
Volume Right	34	0	0	17
cSH	1700	809	409	527
Volume to Capacity	0.33	0.01	0.11	0.03
Queue Length 95th (ft)	0	1	9	2
Control Delay (s)	0.0	1.0	14.9	12.1
Lane LOS		A	B	B
Approach Delay (s)	0.0	1.0	14.1	
Approach LOS			B	

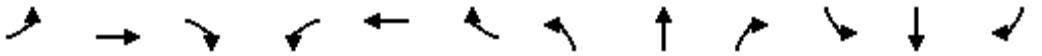
Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	450	40	5	80	5	30	5	20	40	15	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	5	495	44	5	88	5	33	5	22	44	16	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	93			538			640	632	516	632	651	91
vC1, stage 1 conf vol							527	527		102	102	
vC2, stage 2 conf vol							113	104		530	549	
vCu, unblocked vol	93			538			640	632	516	632	651	91
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.5
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.6
p0 queue free %	100			99			94	99	96	91	97	99
cM capacity (veh/h)	1514			1040			511	507	563	480	492	898

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	5	538	5	93	33	27	44	22
Volume Left	5	0	5	0	33	0	44	0
Volume Right	0	44	0	5	0	22	0	5
cSH	1514	1700	1040	1700	511	551	480	555
Volume to Capacity	0.00	0.32	0.01	0.05	0.06	0.05	0.09	0.04
Queue Length 95th (ft)	0	0	0	0	5	4	8	3
Control Delay (s)	7.4	0.0	8.5	0.0	12.5	11.9	13.3	11.8
Lane LOS	A		A		B	B	B	B
Approach Delay (s)	0.1		0.5		12.2		12.8	
Approach LOS					B		B	

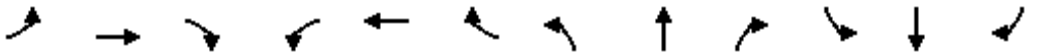
Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	41.7%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	15	875	5	5	755	10	25	5	40	35	2	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	5.2	5.2	7.3	5.2		6.7	6.7	6.7	6.7	6.7	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85	1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.97	1.00	0.95	1.00	
Satd. Flow (prot)	1687	3574	1615	1805	3533		1466	1569	1568	1703	1623	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.71	0.76	1.00	0.75	1.00	
Satd. Flow (perm)	1687	3574	1615	1805	3533		1096	1225	1568	1335	1623	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	17	1017	6	6	878	12	29	6	47	41	2	70
RTOR Reduction (vph)	0	0	3	0	1	0	0	0	40	0	60	0
Lane Group Flow (vph)	17	1017	3	6	889	0	17	18	7	41	12	0
Heavy Vehicles (%)	7%	1%	0%	0%	2%	0%	17%	0%	3%	6%	0%	0%
Turn Type	Prot		Perm	Prot			Perm		Perm	Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2				8		8	4		
Actuated Green, G (s)	1.2	36.2	36.2	1.0	36.8		9.1	9.1	9.1	9.1	9.1	
Effective Green, g (s)	1.2	36.2	36.2	1.0	36.8		9.1	9.1	9.1	9.1	9.1	
Actuated g/C Ratio	0.02	0.55	0.55	0.02	0.56		0.14	0.14	0.14	0.14	0.14	
Clearance Time (s)	6.5	5.2	5.2	7.3	5.2		6.7	6.7	6.7	6.7	6.7	
Vehicle Extension (s)	2.6	3.1	3.1	2.3	3.1		2.4	2.4	2.4	2.4	2.4	
Lane Grp Cap (vph)	31	1975	893	28	1985		152	170	218	185	225	
v/s Ratio Prot	c0.01	c0.28		0.00	0.25						0.01	
v/s Ratio Perm			0.00				0.02	0.01	0.00	c0.03		
v/c Ratio	0.55	0.51	0.00	0.21	0.45		0.11	0.11	0.03	0.22	0.05	
Uniform Delay, d1	31.9	9.2	6.6	31.9	8.4		24.7	24.6	24.4	25.1	24.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	15.5	0.2	0.0	2.2	0.2		0.2	0.2	0.0	0.4	0.1	
Delay (s)	47.3	9.4	6.6	34.1	8.6		24.9	24.8	24.4	25.5	24.5	
Level of Service	D	A	A	C	A		C	C	C	C	C	
Approach Delay (s)		10.0			8.7			24.6			24.9	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM Average Control Delay	10.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	65.5	Sum of lost time (s)	18.4
Intersection Capacity Utilization	48.0%	ICU Level of Service	A
Analysis Period (min)	15		

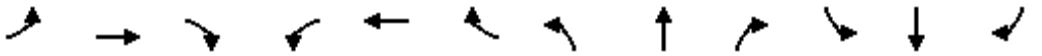
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	790	110	220	555	70	85	40	630	170	55	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	4.7	4.7	5.8	4.6		6.4	5.5	6.4	6.4	5.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	3574	1615	1787	3499		1805	1792	1599	1736	1855	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1805	3574	1615	1787	3499		1805	1792	1599	1736	1855	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	11	840	117	234	590	74	90	43	670	181	59	11
RTOR Reduction (vph)	0	0	80	0	6	0	0	0	177	0	7	0
Lane Group Flow (vph)	11	840	37	234	658	0	90	43	493	181	63	0
Heavy Vehicles (%)	0%	1%	0%	1%	1%	5%	0%	6%	1%	4%	0%	0%
Turn Type	Prot		Perm	Prot			Prot		custom	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						1 8			
Actuated Green, G (s)	0.4	34.8	34.8	28.4	62.9		6.8	9.4	44.1	16.0	18.6	
Effective Green, g (s)	1.8	36.2	36.2	29.8	64.3		7.6	10.2	39.4	16.8	19.4	
Actuated g/C Ratio	0.02	0.31	0.31	0.26	0.56		0.07	0.09	0.34	0.15	0.17	
Clearance Time (s)	7.2	6.1	6.1	7.2	6.0		7.2	6.3		7.2	6.3	
Vehicle Extension (s)	2.4	3.1	3.1	2.4	3.1		2.4	3.6		2.4	3.6	
Lane Grp Cap (vph)	28	1121	507	461	1950		119	158	546	253	312	
v/s Ratio Prot	0.01	c0.24		0.13	0.19		0.05	0.02		c0.10	0.03	
v/s Ratio Perm			0.02						c0.31			
v/c Ratio	0.39	0.75	0.07	0.51	0.34		0.76	0.27	0.90	0.72	0.20	
Uniform Delay, d1	56.3	35.5	27.8	36.5	13.9		53.0	49.1	36.2	47.0	41.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	5.9	2.8	0.1	0.6	0.1		22.3	1.1	18.1	8.5	0.4	
Delay (s)	62.1	38.3	27.9	37.1	14.0		75.3	50.3	54.3	55.5	41.7	
Level of Service	E	D	C	D	B		E	D	D	E	D	
Approach Delay (s)		37.3			20.1			56.4			51.7	
Approach LOS		D			C			E			D	

Intersection Summary			
HCM Average Control Delay	38.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	115.4	Sum of lost time (s)	23.9
Intersection Capacity Utilization	84.1%	ICU Level of Service	E
Analysis Period (min)	15		

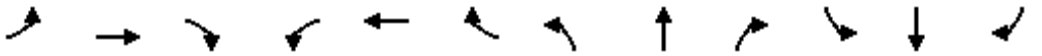
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	115	195	95	225	75	20	60	850	680	25	395	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5	4.0	4.0	5.5		4.0	5.5	5.5	4.0	5.5	
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00		1.00	1.00	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1752	1900	1568	3433	1709		1597	1827	1615	1671	3354	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1752	1900	1568	3433	1709		1597	1827	1615	1671	3354	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	119	201	98	232	77	21	62	876	701	26	407	31
RTOR Reduction (vph)	0	0	75	0	11	0	0	0	191	0	4	0
Lane Group Flow (vph)	119	201	23	232	87	0	62	876	510	26	434	0
Heavy Vehicles (%)	3%	0%	3%	2%	8%	6%	13%	4%	0%	8%	7%	0%
Turn Type	Prot		custom	Prot			Prot		custom	Prot		
Protected Phases	3			7	4		1	6		5	2	
Permitted Phases		8	1 8						6 7			
Actuated Green, G (s)	14.0	16.0	23.2	13.4	15.4		7.2	48.5	61.9	3.1	44.4	
Effective Green, g (s)	14.0	16.0	23.2	13.4	15.4		7.2	48.5	61.9	3.1	44.4	
Actuated g/C Ratio	0.14	0.16	0.23	0.13	0.15		0.07	0.48	0.62	0.03	0.44	
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	5.5		4.0	5.5	
Vehicle Extension (s)	2.4	3.2		2.5	3.2		2.3	3.2		2.2	3.2	
Lane Grp Cap (vph)	245	304	364	460	263		115	886	1000	52	1489	
v/s Ratio Prot	0.07			0.07	c0.05		c0.04	c0.48		0.02	0.13	
v/s Ratio Perm		c0.11	0.01						c0.32			
v/c Ratio	0.49	0.66	0.06	0.50	0.33		0.54	0.99	0.51	0.50	0.29	
Uniform Delay, d1	39.7	39.5	29.9	40.2	37.7		44.8	25.5	10.6	47.7	17.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.27	0.58	0.72	1.00	1.00	
Incremental Delay, d2	1.0	5.4	0.0	0.6	0.8		2.2	22.3	0.2	3.8	0.5	
Delay (s)	40.7	44.9	30.0	40.9	38.5		59.0	37.1	7.8	51.5	18.2	
Level of Service	D	D	C	D	D		E	D	A	D	B	
Approach Delay (s)		40.2			40.2			25.4			20.1	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	28.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	26.0
Intersection Capacity Utilization	79.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	335	30	180	30	5	5	40	1250	60	10	650	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	5.5		4.0	5.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.87		1.00	0.93		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1628		1805	1758		1641	3518		1805	3425	
Flt Permitted	0.75	1.00		0.46	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1399	1628		873	1758		1641	3518		1805	3425	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	364	33	196	33	5	5	43	1359	65	11	707	60
RTOR Reduction (vph)	0	144	0	0	4	0	0	3	0	0	6	0
Lane Group Flow (vph)	364	85	0	33	6	0	43	1421	0	11	761	0
Heavy Vehicles (%)	2%	0%	2%	0%	0%	0%	10%	2%	0%	0%	4%	6%
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8								
Actuated Green, G (s)	26.5	26.5		26.5	26.5		5.3	58.6		1.4	54.7	
Effective Green, g (s)	26.5	26.5		26.5	26.5		5.3	58.6		1.4	54.7	
Actuated g/C Ratio	0.26	0.26		0.26	0.26		0.05	0.59		0.01	0.55	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	5.5		4.0	5.5	
Vehicle Extension (s)	1.6	1.6		1.6	1.6		2.6	3.1		2.6	3.1	
Lane Grp Cap (vph)	371	431		231	466		87	2062		25	1873	
v/s Ratio Prot		0.05			0.00		c0.03	c0.40		0.01	0.22	
v/s Ratio Perm	c0.26			0.04								
v/c Ratio	0.98	0.20		0.14	0.01		0.49	0.69		0.44	0.41	
Uniform Delay, d1	36.5	28.5		28.1	27.1		46.0	14.4		48.9	13.2	
Progression Factor	1.00	1.00		1.00	1.00		1.37	0.41		1.31	0.51	
Incremental Delay, d2	41.4	0.1		0.1	0.0		2.8	1.5		9.1	0.6	
Delay (s)	77.9	28.6		28.2	27.1		66.1	7.4		73.0	7.4	
Level of Service	E	C		C	C		E	A		E	A	
Approach Delay (s)		58.9			27.9			9.1			8.3	
Approach LOS		E			C			A			A	

Intersection Summary			
HCM Average Control Delay	19.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	69.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	145	25	1325	345	60	810
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		5.0	4.0	4.0	5.5
Lane Util. Factor	0.97		0.95	1.00	1.00	0.95
Frt	0.98		1.00	0.85	1.00	1.00
Flt Protected	0.96		1.00	1.00	0.95	1.00
Satd. Flow (prot)	3325		3505	1599	1805	3438
Flt Permitted	0.96		1.00	1.00	0.95	1.00
Satd. Flow (perm)	3325		3505	1599	1805	3438
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	159	27	1456	379	66	890
RTOR Reduction (vph)	16	0	0	78	0	0
Lane Group Flow (vph)	170	0	1456	301	66	890
Heavy Vehicles (%)	4%	4%	3%	1%	0%	5%
Turn Type				custom	Prot	
Protected Phases	4		6		5	2
Permitted Phases				4 6		
Actuated Green, G (s)	11.5		68.0	84.5	7.5	79.0
Effective Green, g (s)	11.5		68.0	79.5	7.5	79.0
Actuated g/C Ratio	0.12		0.68	0.80	0.08	0.79
Clearance Time (s)	4.0		5.0		4.0	5.5
Vehicle Extension (s)	2.2		2.4		2.6	2.4
Lane Grp Cap (vph)	382		2383	1271	135	2716
v/s Ratio Prot	c0.05		c0.42		c0.04	0.26
v/s Ratio Perm				0.19		
v/c Ratio	0.45		0.61	0.24	0.49	0.33
Uniform Delay, d1	41.3		8.8	2.6	44.4	3.0
Progression Factor	1.00		1.26	5.52	0.76	1.21
Incremental Delay, d2	0.4		0.9	0.0	2.0	0.3
Delay (s)	41.7		12.0	14.3	35.9	3.9
Level of Service	D		B	B	D	A
Approach Delay (s)	41.7		12.5			6.1
Approach LOS	D		B			A

Intersection Summary			
HCM Average Control Delay	12.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBR	WBR2	NBL	NBT	SBT
Lane Configurations					
Volume (vph)	700	300	270	1550	995
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	5.0	5.0
Lane Util. Factor	1.00	0.88	1.00	0.95	0.95
Frt	0.86	0.85	1.00	1.00	1.00
Flt Protected	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1611	2707	1770	3539	3505
Flt Permitted	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1611	2707	1770	3539	3505
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	722	309	278	1598	1026
RTOR Reduction (vph)	178	20	0	0	0
Lane Group Flow (vph)	544	289	278	1598	1026
Heavy Vehicles (%)	2%	5%	2%	2%	3%
Turn Type	custom	custom	Prot		
Protected Phases			1	6	2
Permitted Phases	4	4			
Actuated Green, G (s)	31.8	31.8	11.2	46.5	31.3
Effective Green, g (s)	31.8	31.8	11.2	46.5	31.3
Actuated g/C Ratio	0.36	0.36	0.13	0.53	0.36
Clearance Time (s)	4.0	4.0	4.0	5.0	5.0
Vehicle Extension (s)	2.3	2.3	2.3	4.5	4.5
Lane Grp Cap (vph)	587	986	227	1885	1257
v/s Ratio Prot			c0.16	c0.45	0.29
v/s Ratio Perm	c0.34	0.11			
v/c Ratio	0.93	0.29	1.22	0.85	0.82
Uniform Delay, d1	26.6	19.8	38.0	17.4	25.4
Progression Factor	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	20.6	0.1	133.8	4.1	4.6
Delay (s)	47.3	19.8	171.8	21.4	30.0
Level of Service	D	B	F	C	C
Approach Delay (s)				43.7	30.0
Approach LOS				D	C

Intersection Summary			
HCM Average Control Delay	38.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	87.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	Err%	ICU Level of Service	H
Analysis Period (min)	15		

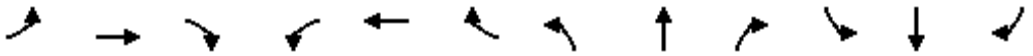
c Critical Lane Group

Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Volume (veh/h)	0	1850	995	180	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.97	0.97	0.90	0.90
Hourly flow rate (vph)	0	2056	1026	186	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		258	829			
pX, platoon unblocked	0.89				0.65	0.89
vC, conflicting volume	1211				2054	513
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	998				819	216
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	627				208	710

Direction, Lane #	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	1028	1028	513	513	186
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	186
cSH	1700	1700	1700	1700	1700
Volume to Capacity	0.60	0.60	0.30	0.30	0.11
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS					
Approach Delay (s)	0.0		0.0		
Approach LOS					

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	54.5%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection Sign configuration not allowed in HCM analysis.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	165	0	125	0	0	0	0	1655	920	0	1395	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					5.0	5.0		5.0	
Lane Util. Factor		1.00	1.00					0.95	1.00		0.91	
Frt		1.00	0.85					1.00	0.85		1.00	
Flt Protected		0.95	1.00					1.00	1.00		1.00	
Satd. Flow (prot)		1719	1553					3539	1583		5085	
Flt Permitted		0.95	1.00					1.00	1.00		1.00	
Satd. Flow (perm)		1719	1553					3539	1583		5085	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	170	0	129	0	0	0	0	1706	948	0	1438	0
RTOR Reduction (vph)	0	0	38	0	0	0	0	0	312	0	0	0
Lane Group Flow (vph)	0	170	91	0	0	0	0	1706	636	0	1438	0
Heavy Vehicles (%)	5%	0%	4%	0%	0%	0%	0%	2%	2%	0%	2%	0%
Turn Type	Perm		Perm						Perm			
Protected Phases		8						6			2	
Permitted Phases	8		8						6			
Actuated Green, G (s)		11.9	11.9					42.6	42.6		42.6	
Effective Green, g (s)		11.9	11.9					42.6	42.6		42.6	
Actuated g/C Ratio		0.19	0.19					0.67	0.67		0.67	
Clearance Time (s)		4.0	4.0					5.0	5.0		5.0	
Vehicle Extension (s)		2.3	2.3					4.5	4.5		4.5	
Lane Grp Cap (vph)		322	291					2374	1062		3411	
v/s Ratio Prot								c0.48			0.28	
v/s Ratio Perm		0.10	0.06						0.40			
v/c Ratio		0.53	0.31					0.72	0.60		0.42	
Uniform Delay, d1		23.3	22.3					6.6	5.7		4.8	
Progression Factor		1.00	1.00					1.00	1.00		1.00	
Incremental Delay, d2		1.0	0.4					1.2	1.2		0.1	
Delay (s)		24.3	22.6					7.9	7.0		4.9	
Level of Service		C	C					A	A		A	
Approach Delay (s)		23.6			0.0			7.5			4.9	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM Average Control Delay	7.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	63.5	Sum of lost time (s)	9.0
Intersection Capacity Utilization	73.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

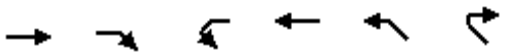
Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Volume (veh/h)	0	1820	1395	300	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	0	2068	1585	341	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		227	826			
pX, platoon unblocked	0.83				0.76	0.83
vC, conflicting volume	1926				2790	699
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1384				1341	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	414				110	901

Direction, Lane #	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	1034	1034	634	634	658
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	341
cSH	1700	1700	1700	1700	1700
Volume to Capacity	0.61	0.61	0.37	0.37	0.39
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS					
Approach Delay (s)	0.0		0.0		
Approach LOS					

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	73.6%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	920	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3539					
Flt Permitted	1.00					
Satd. Flow (perm)	3539					
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	948	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	948	0	0	0	0	0
Heavy Vehicles (%)	2%	0%	0%	0%	0%	0%
Turn Type						
Protected Phases	4					
Permitted Phases						
Actuated Green, G (s)	20.0					
Effective Green, g (s)	20.0					
Actuated g/C Ratio	1.00					
Clearance Time (s)	4.0					
Lane Grp Cap (vph)	3539					
v/s Ratio Prot	c0.27					
v/s Ratio Perm						
v/c Ratio	0.27					
Uniform Delay, d1	0.0					
Progression Factor	1.00					
Incremental Delay, d2	0.2					
Delay (s)	0.2					
Level of Service	A					
Approach Delay (s)	0.2			0.0	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM Average Control Delay	0.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	20.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	28.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Volume (veh/h)	0	290	0	300	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	0	299	0	309	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			299		309	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			299		309	0
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1274		687	1091

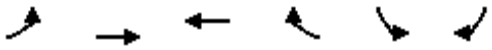
Direction, Lane #	EB 1	WB 1
Volume Total	299	309
Volume Left	0	0
Volume Right	299	0
cSH	1700	1700
Volume to Capacity	0.18	0.18
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	0.0
Lane LOS		
Approach Delay (s)	0.0	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	21.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBR	WBR2	SBL	SBR	SEL
Lane Configurations					
Volume (veh/h)	0	300	0	0	290
Sign Control	Free		Stop		Free
Grade	0%		0%		0%
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	0	309	0	0	299
Pedestrians					
Lane Width (ft)					
Walking Speed (ft/s)					
Percent Blockage					
Right turn flare (veh)					
Median type	None				None
Median storage veh)					
Upstream signal (ft)					
pX, platoon unblocked					
vC, conflicting volume			299	0	
vC1, stage 1 conf vol					
vC2, stage 2 conf vol					
vCu, unblocked vol			299	0	
tC, single (s)			6.4	6.2	
tC, 2 stage (s)					
tF (s)			3.5	3.3	
p0 queue free %			100	100	
cM capacity (veh/h)			697	1091	

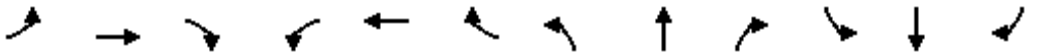
Direction, Lane #	WB 1	WB 2	SE 1
Volume Total	155	155	299
Volume Left	0	0	0
Volume Right	155	155	0
cSH	1700	1700	1700
Volume to Capacity	0.09	0.09	0.18
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			
Approach Delay (s)	0.0		0.0
Approach LOS			

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	Err%	ICU Level of Service	H
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	0	300	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0				
Lane Util. Factor		0.95				
Frt		1.00				
Flt Protected		1.00				
Satd. Flow (prot)		3438				
Flt Permitted		1.00				
Satd. Flow (perm)		3438				
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	309	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	309	0	0	0	0
Heavy Vehicles (%)	0%	5%	0%	0%	0%	0%
Turn Type						
Protected Phases						
Permitted Phases		2				
Actuated Green, G (s)		20.0				
Effective Green, g (s)		20.0				
Actuated g/C Ratio		1.00				
Clearance Time (s)		4.0				
Lane Grp Cap (vph)		3438				
v/s Ratio Prot						
v/s Ratio Perm		c0.09				
v/c Ratio		0.09				
Uniform Delay, d1		0.0				
Progression Factor		1.00				
Incremental Delay, d2		0.1				
Delay (s)		0.1				
Level of Service		A				
Approach Delay (s)		0.1	0.0		0.0	
Approach LOS		A	A		A	

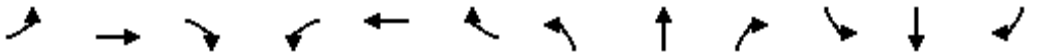
Intersection Summary			
HCM Average Control Delay	0.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.09		
Actuated Cycle Length (s)	20.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	11.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	380	860	160	80	355	410	55	1070	80	230	985	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5		4.0	5.5		4.0	5.5	4.0
Lane Util. Factor	0.97	0.95		1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.98		1.00	0.92		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3467	3514		1787	3270		1770	3507		1752	3539	1538
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3467	3514		1787	3270		1770	3507		1752	3539	1538
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	396	896	167	83	370	427	57	1115	83	240	1026	26
RTOR Reduction (vph)	0	12	0	0	145	0	0	4	0	0	0	14
Lane Group Flow (vph)	396	1051	0	83	652	0	57	1194	0	240	1026	12
Heavy Vehicles (%)	1%	0%	2%	1%	1%	2%	2%	2%	0%	3%	2%	5%
Turn Type	Prot			Prot			Prot			Prot		custom
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												5 6
Actuated Green, G (s)	18.2	41.6		7.9	31.3		7.2	40.6		11.1	44.5	55.7
Effective Green, g (s)	18.2	41.6		7.9	31.3		7.2	40.6		11.1	44.5	55.7
Actuated g/C Ratio	0.15	0.35		0.07	0.26		0.06	0.34		0.09	0.37	0.46
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	5.5		4.0	5.5	
Vehicle Extension (s)	2.3	3.1		2.4	3.1		2.4	3.1		2.4	3.1	
Lane Grp Cap (vph)	525	1216		117	852		106	1185		162	1310	713
v/s Ratio Prot	c0.11	c0.30		0.05	0.20		0.03	c0.34		c0.14	c0.29	
v/s Ratio Perm												0.01
v/c Ratio	0.75	0.86		0.71	0.77		0.54	1.01		1.48	0.78	0.02
Uniform Delay, d1	48.9	36.7		55.0	41.1		54.9	39.8		54.6	33.6	17.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.6	6.6		16.3	4.2		3.7	28.0		246.7	3.2	0.0
Delay (s)	54.5	43.3		71.3	45.2		58.6	67.8		301.2	36.7	17.4
Level of Service	D	D		E	D		E	E		F	D	B
Approach Delay (s)		46.3			47.7			67.4			85.5	
Approach LOS		D			D			E			F	

Intersection Summary			
HCM Average Control Delay	62.3	HCM Level of Service	E
HCM Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	120.2	Sum of lost time (s)	24.5
Intersection Capacity Utilization	94.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	2	245	5	2	2	205	1640	5	2	925	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.0		4.0	5.5		4.0	5.5	5.5
Lane Util. Factor		1.00	1.00		1.00		0.97	0.95		1.00	0.95	1.00
Frt		1.00	0.85		0.97		1.00	1.00		1.00	1.00	0.85
Flt Protected		0.96	1.00		0.97		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1815	1553		1638		3433	3535		1805	3471	1568
Flt Permitted		0.74	1.00		0.89		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1410	1553		1500		3433	3535		1805	3471	1568
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	32	2	258	5	2	2	216	1726	5	2	974	32
RTOR Reduction (vph)	0	0	230	0	2	0	0	0	0	0	0	8
Lane Group Flow (vph)	0	34	28	0	7	0	216	1731	0	2	974	24
Heavy Vehicles (%)	0%	0%	4%	17%	0%	0%	2%	2%	25%	0%	4%	3%
Turn Type	Perm		Perm	Perm			Prot			Prot		Perm
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8		8	4								2
Actuated Green, G (s)		10.9	10.9		11.4		10.9	73.9		1.2	64.2	64.2
Effective Green, g (s)		10.9	10.9		11.4		10.9	73.9		1.2	64.2	64.2
Actuated g/C Ratio		0.11	0.11		0.11		0.11	0.74		0.01	0.64	0.64
Clearance Time (s)		4.5	4.5		4.0		4.0	5.5		4.0	5.5	5.5
Vehicle Extension (s)		1.4	1.4		2.3		2.3	2.4		2.6	2.4	2.4
Lane Grp Cap (vph)		154	169		171		374	2612		22	2228	1007
v/s Ratio Prot							c0.06	c0.49		0.00	0.28	
v/s Ratio Perm		c0.02	0.02		0.00							0.02
v/c Ratio		0.22	0.17		0.04		0.58	0.66		0.09	0.44	0.02
Uniform Delay, d1		40.7	40.4		39.4		42.4	6.7		48.9	8.9	6.5
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.07	0.45	0.31
Incremental Delay, d2		0.3	0.2		0.1		1.6	1.3		1.4	0.6	0.0
Delay (s)		40.9	40.6		39.5		44.0	8.0		53.5	4.6	2.0
Level of Service		D	D		D		D	A		D	A	A
Approach Delay (s)		40.6			39.5			12.0			4.6	
Approach LOS		D			D			B			A	

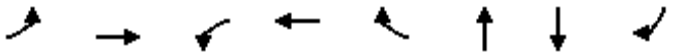
Intersection Summary			
HCM Average Control Delay	12.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	66.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

AM Queuing

Lane Group	EBT
Lane Group Flow (vph)	715
v/c Ratio	0.21
Control Delay	0.1
Queue Delay	0.0
Total Delay	0.1
Queue Length 50th (ft)	0
Queue Length 95th (ft)	0
Internal Link Dist (ft)	1022
Turn Bay Length (ft)	
Base Capacity (vph)	3374
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.21

Intersection Summary



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	431	680	6	247	103	14	186	345
v/c Ratio	1.24	0.69	0.03	0.51	0.20	0.06	0.65	0.56
Control Delay	155.1	17.1	25.6	19.6	4.9	17.0	31.1	6.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	155.1	17.1	25.6	19.6	4.9	17.0	31.1	6.7
Queue Length 50th (ft)	~154	104	2	57	0	2	49	0
Queue Length 95th (ft)	#399	#448	12	126	26	13	116	49
Internal Link Dist (ft)		1526		1340		663	4821	
Turn Bay Length (ft)	250		100		150			175
Base Capacity (vph)	348	984	291	717	711	312	285	614
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.24	0.69	0.02	0.34	0.14	0.04	0.65	0.56

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

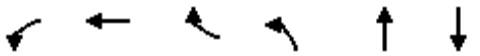
Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	848	376	298	107	213
v/c Ratio	0.72	0.86	0.14	0.40	0.49
Control Delay	20.5	47.2	4.7	28.1	8.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	20.5	47.2	4.7	28.1	8.2
Queue Length 50th (ft)	120	129	16	36	0
Queue Length 95th (ft)	226	#362	46	78	46
Internal Link Dist (ft)	314		808	1077	
Turn Bay Length (ft)		325		150	
Base Capacity (vph)	1344	437	2275	301	456
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.63	0.86	0.13	0.36	0.47

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	832	607	607	67	180
v/c Ratio	0.72	0.70	0.26	0.28	0.13
Control Delay	23.7	28.2	4.8	29.5	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	23.7	28.2	4.8	29.5	5.0
Queue Length 50th (ft)	146	110	37	25	9
Queue Length 95th (ft)	253	201	88	59	26
Internal Link Dist (ft)	808		520	298	
Turn Bay Length (ft)		325		225	
Base Capacity (vph)	1287	969	2474	400	1584
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.65	0.63	0.25	0.17	0.11

Intersection Summary



Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	677	680	43	59	344	511
v/c Ratio	0.83	0.83	0.05	0.34	0.44	0.44
Control Delay	24.6	24.6	6.0	31.3	16.3	22.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.6	24.6	6.0	31.3	16.3	22.9
Queue Length 50th (ft)	231	232	6	24	107	103
Queue Length 95th (ft)	350	352	18	58	186	157
Internal Link Dist (ft)		590			585	225
Turn Bay Length (ft)			25	150		
Base Capacity (vph)	922	925	892	186	780	1160
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.74	0.05	0.32	0.44	0.44

Intersection Summary

Lane Group	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	68	192	346	511	44	1835
v/c Ratio	0.31	0.90	0.28	0.42	0.20	0.65
Control Delay	32.5	66.6	6.1	1.8	33.2	2.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.5	66.6	6.1	1.8	33.2	2.0
Queue Length 50th (ft)	27	62	58	0	17	110
Queue Length 95th (ft)	63	#178	108	33	m27	1
Internal Link Dist (ft)	1108		147			585
Turn Bay Length (ft)		300			175	
Base Capacity (vph)	218	214	1220	1227	516	2808
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.90	0.28	0.42	0.09	0.65

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBT
Lane Group Flow (vph)	549
v/c Ratio	0.16
Control Delay	0.1
Queue Delay	0.0
Total Delay	0.1
Queue Length 50th (ft)	0
Queue Length 95th (ft)	0
Internal Link Dist (ft)	963
Turn Bay Length (ft)	
Base Capacity (vph)	3539
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.16

Intersection Summary

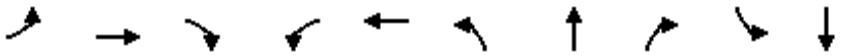
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	268	571	125	393	60	71	708	149	83	1089	905
v/c Ratio	0.49	0.62	0.36	0.51	0.16	0.34	0.57	0.22	0.38	0.86	0.55
Control Delay	38.1	29.7	42.1	32.8	8.9	43.1	26.9	5.7	43.1	35.9	6.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.1	29.7	42.1	32.8	8.9	43.1	26.9	5.7	43.1	35.9	6.3
Queue Length 50th (ft)	67	136	31	99	0	35	155	0	41	276	46
Queue Length 95th (ft)	123	191	69	150	27	86	291	39	97	#553	126
Internal Link Dist (ft)		1743		1977			1296			1006	
Turn Bay Length (ft)	475		250		375	175		350	475		350
Base Capacity (vph)	832	1489	443	1274	592	331	1258	665	332	1269	1721
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.38	0.28	0.31	0.10	0.21	0.56	0.22	0.25	0.86	0.53

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group
Lane Group Flow (vph)
v/c Ratio
Control Delay
Queue Delay
Total Delay
Queue Length 50th (ft)
Queue Length 95th (ft)
Internal Link Dist (ft)
Turn Bay Length (ft)
Base Capacity (vph)
Starvation Cap Reductn
Spillback Cap Reductn
Storage Cap Reductn
Reduced v/c Ratio

Intersection Summary

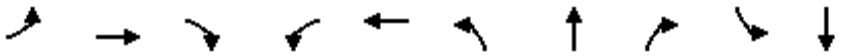


Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	17	416	96	607	837	118	79	298	45	34
v/c Ratio	0.20	0.46	0.20	0.97	0.39	1.57	0.43	0.32	0.31	0.13
Control Delay	54.5	31.7	8.5	62.4	11.8	348.0	45.8	2.6	48.0	28.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.5	31.7	8.5	62.4	11.8	348.0	45.8	2.6	48.0	28.7
Queue Length 50th (ft)	9	100	0	321	85	~92	43	0	23	14
Queue Length 95th (ft)	38	204	44	#849	300	#269	90	39	70	39
Internal Link Dist (ft)		914			1312		643			619
Turn Bay Length (ft)	100		375	250		150		250	100	
Base Capacity (vph)	83	1116	588	623	2213	75	183	946	518	609
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.37	0.16	0.97	0.38	1.57	0.43	0.32	0.09	0.06

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL		EBR	WBL		NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	34		57	591		57	409	216	11	688
v/c Ratio	0.30	0.31	0.19	0.80	0.40	0.39	0.50	0.17	0.11	0.49
Control Delay	45.0	39.2	7.3	43.0	29.2	46.0	20.8	1.1	41.9	23.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.0	39.2	7.3	43.0	29.2	46.0	20.8	1.1	41.9	23.4
Queue Length 50th (ft)	19	34	4	161	90	31	146	0	6	157
Queue Length 95th (ft)	46	63	17	#254	143	66	#321	18	22	238
Internal Link Dist (ft)		675			857		916			324
Turn Bay Length (ft)	250		150	250		175			75	
Base Capacity (vph)	170	355	454	751	522	199	826	1243	186	1407
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.17	0.13	0.79	0.37	0.29	0.50	0.17	0.06	0.49

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	WBT
Lane Group Flow (vph)	11
v/c Ratio	0.01
Control Delay	0.0
Queue Delay	0.0
Total Delay	0.0
Queue Length 50th (ft)	0
Queue Length 95th (ft)	0
Internal Link Dist (ft)	510
Turn Bay Length (ft)	
Base Capacity (vph)	1214
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.01

Intersection Summary

Lane Group
Lane Group Flow (vph)
v/c Ratio
Control Delay
Queue Delay
Total Delay
Queue Length 50th (ft)
Queue Length 95th (ft)
Internal Link Dist (ft)
Turn Bay Length (ft)
Base Capacity (vph)
Starvation Cap Reductn
Spillback Cap Reductn
Storage Cap Reductn
Reduced v/c Ratio

Intersection Summary

Lane Group	EBR	WBR2	NBL	NBT	SBT
Lane Group Flow (vph)	1339	256	78	833	1183
v/c Ratio	1.66	0.21	0.50	0.51	0.91
Control Delay	321.5	3.9	51.3	16.3	39.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	321.5	3.9	51.3	16.3	39.1
Queue Length 50th (ft)	~1079	3	44	158	343
Queue Length 95th (ft)	#1367	30	89	208	#495
Internal Link Dist (ft)				746	178
Turn Bay Length (ft)			325		
Base Capacity (vph)	808	1219	195	1743	1331
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.66	0.21	0.40	0.48	0.89

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBT	EBR	NBT	NBR	SBT
Lane Group Flow (vph)	178	210	756	557	2301
v/c Ratio	0.56	0.61	0.35	0.47	0.72
Control Delay	28.4	28.8	6.6	2.2	10.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	28.4	28.8	6.6	2.2	10.1
Queue Length 50th (ft)	61	70	54	0	166
Queue Length 95th (ft)	109	124	125	36	332
Internal Link Dist (ft)	307		1038		147
Turn Bay Length (ft)					
Base Capacity (vph)	397	430	2179	1191	3253
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.45	0.49	0.35	0.47	0.71

Intersection Summary

Lane Group	EBT
Lane Group Flow (vph)	557
v/c Ratio	0.16
Control Delay	0.1
Queue Delay	0.0
Total Delay	0.1
Queue Length 50th (ft)	0
Queue Length 95th (ft)	0
Internal Link Dist (ft)	1
Turn Bay Length (ft)	
Base Capacity (vph)	3438
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.16

Intersection Summary

Lane Group	EBT
Lane Group Flow (vph)	278
v/c Ratio	0.09
Control Delay	0.1
Queue Delay	0.0
Total Delay	0.1
Queue Length 50th (ft)	0
Queue Length 95th (ft)	0
Internal Link Dist (ft)	224
Turn Bay Length (ft)	
Base Capacity (vph)	3252
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.09

Intersection Summary

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	53	335	35	765	182	965	294	853	353
v/c Ratio	0.22	0.32	0.23	0.75	0.80	0.77	1.21	0.67	0.35
Control Delay	47.0	26.9	48.8	35.7	69.6	32.0	166.6	29.0	2.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.0	26.9	48.8	35.7	69.6	32.0	166.6	29.0	2.4
Queue Length 50th (ft)	17	84	22	224	118	286	~249	242	0
Queue Length 95th (ft)	35	125	51	292	#238	346	#408	295	32
Internal Link Dist (ft)		1463		1533		1423		1183	
Turn Bay Length (ft)	225		275		100		100		275
Base Capacity (vph)	693	1372	220	1112	228	1387	242	1406	1033
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.24	0.16	0.69	0.80	0.70	1.21	0.61	0.34

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group		EBR		NBL	NBT	SBT	SBR
Lane Group Flow (vph)		68		205	909	1392	45
v/c Ratio	0.07	0.31	0.06	0.55	0.34	0.64	0.04
Control Delay	31.0	11.1	30.4	42.9	4.7	15.6	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.0	11.1	30.4	42.9	4.7	15.6	8.1
Queue Length 50th (ft)	6	0	3	57	45	208	4
Queue Length 95th (ft)	16	28	11	87	189	#576	30
Internal Link Dist (ft)	331		22		749	732	
Turn Bay Length (ft)				300			125
Base Capacity (vph)	552	634	353	611	2674	2174	1008
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.11	0.02	0.34	0.34	0.64	0.04

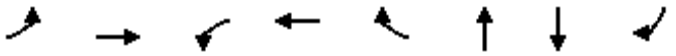
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

PM Queuing

Lane Group	EBT
Lane Group Flow (vph)	709
v/c Ratio	0.20
Control Delay	0.1
Queue Delay	0.0
Total Delay	0.1
Queue Length 50th (ft)	0
Queue Length 95th (ft)	0
Internal Link Dist (ft)	1022
Turn Bay Length (ft)	
Base Capacity (vph)	3574
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.20

Intersection Summary



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	346	398	11	769	352	18	109	352
v/c Ratio	1.19	0.34	0.06	0.98	0.41	0.09	0.49	0.63
Control Delay	142.2	8.9	28.9	49.4	4.0	16.8	30.3	8.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	142.2	8.9	28.9	49.4	4.0	16.8	30.3	8.6
Queue Length 50th (ft)	~155	48	4	259	4	2	37	0
Queue Length 95th (ft)	#343	203	18	#577	55	16	77	58
Internal Link Dist (ft)		1526		1340		663	4821	
Turn Bay Length (ft)	250		100		150			175
Base Capacity (vph)	291	1154	251	784	860	259	240	569
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.19	0.34	0.04	0.98	0.41	0.07	0.45	0.62

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	483	267	824	341	472
v/c Ratio	0.52	0.63	0.39	0.95	0.67
Control Delay	18.3	28.6	6.8	63.2	7.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	18.3	28.6	6.8	63.2	7.9
Queue Length 50th (ft)	60	71	54	~128	0
Queue Length 95th (ft)	121	#204	132	210	58
Internal Link Dist (ft)	314		808	1077	
Turn Bay Length (ft)		325		150	
Base Capacity (vph)	1376	475	2410	358	701
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.35	0.56	0.34	0.95	0.67

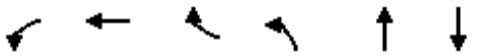
Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	864	165	858	233	830
v/c Ratio	0.75	0.33	0.42	0.50	0.58
Control Delay	24.3	28.0	8.8	26.2	12.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	24.3	28.0	8.8	26.2	12.5
Queue Length 50th (ft)	160	32	98	79	113
Queue Length 95th (ft)	238	59	131	157	176
Internal Link Dist (ft)	808		520	298	
Turn Bay Length (ft)		325		225	
Base Capacity (vph)	1290	866	2293	509	1650
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.67	0.19	0.37	0.46	0.50

Intersection Summary



Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	336	338	59	204	919	334
v/c Ratio	0.80	0.80	0.14	0.54	0.81	0.22
Control Delay	40.4	40.6	14.5	22.9	22.5	12.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.4	40.6	14.5	22.9	22.5	12.4
Queue Length 50th (ft)	138	140	11	80	419	39
Queue Length 95th (ft)	#262	#264	38	m77	#580	74
Internal Link Dist (ft)		590			585	225
Turn Bay Length (ft)			25	150		
Base Capacity (vph)	451	452	442	689	1135	1501
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.75	0.13	0.30	0.81	0.22

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	64	62	1026	812	16	880
v/c Ratio	0.35	0.28	0.71	0.57	0.11	0.31
Control Delay	34.2	12.1	11.8	2.4	34.8	1.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.2	12.1	11.8	2.4	34.8	1.3
Queue Length 50th (ft)	26	0	175	0	7	35
Queue Length 95th (ft)	59	31	#663	42	m12	1
Internal Link Dist (ft)	1108		147			585
Turn Bay Length (ft)		300			175	
Base Capacity (vph)	233	262	1445	1417	232	2884
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.24	0.71	0.57	0.07	0.31

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

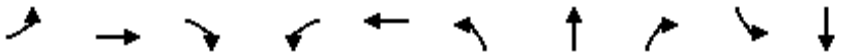
Lane Group	EBT
Lane Group Flow (vph)	864
v/c Ratio	0.24
Control Delay	0.2
Queue Delay	0.0
Total Delay	0.2
Queue Length 50th (ft)	0
Queue Length 95th (ft)	0
Internal Link Dist (ft)	963
Turn Bay Length (ft)	
Base Capacity (vph)	3610
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.24

Intersection Summary

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	674	787	191	551	129	112	1045	107	73	753	258
v/c Ratio	0.90	0.64	0.50	0.66	0.27	0.48	0.88	0.20	0.38	0.72	0.16
Control Delay	55.8	30.2	49.0	39.5	7.3	49.9	43.2	7.1	50.0	37.8	2.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.8	30.2	49.0	39.5	7.3	49.9	43.2	7.1	50.0	37.8	2.2
Queue Length 50th (ft)	222	223	60	172	0	68	337	0	45	225	0
Queue Length 95th (ft)	#402	306	108	239	44	134	#557	42	97	347	22
Internal Link Dist (ft)		1368		1977			1296			1006	
Turn Bay Length (ft)	475		250		375	175		350	475		350
Base Capacity (vph)	751	1468	433	1155	605	309	1187	568	299	1115	1689
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.90	0.54	0.44	0.48	0.21	0.36	0.88	0.19	0.24	0.68	0.15

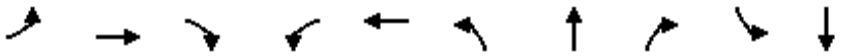
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	17	1017	6	6	890	17	18	47	41	72
v/c Ratio	0.11	0.48	0.01	0.04	0.43	0.10	0.10	0.17	0.20	0.23
Control Delay	26.9	10.0	7.0	27.2	9.6	17.7	17.5	7.9	18.5	7.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.9	10.0	7.0	27.2	9.6	17.7	17.5	7.9	18.5	7.5
Queue Length 50th (ft)	3	58	0	1	48	3	3	0	7	0
Queue Length 95th (ft)	25	266	6	13	229	21	22	22	36	27
Internal Link Dist (ft)		1977			982		616			1323
Turn Bay Length (ft)	275		200	250		350		350	150	
Base Capacity (vph)	223	2349	1064	217	2317	279	312	435	340	466
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.43	0.01	0.03	0.38	0.06	0.06	0.11	0.12	0.15

Intersection Summary

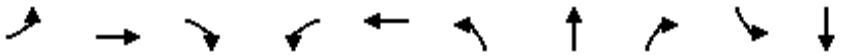


Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	11	840	117	234	664	90	43	670	181	70
v/c Ratio	0.17	0.85	0.22	0.48	0.32	0.71	0.30	0.83	0.67	0.19
Control Delay	65.7	47.2	8.1	39.9	14.5	84.3	52.3	27.8	56.8	30.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.7	47.2	8.1	39.9	14.5	84.3	52.3	27.8	56.8	30.7
Queue Length 50th (ft)	7	265	0	126	91	~80	28	258	113	35
Queue Length 95th (ft)	32	#584	52	291	288	#244	66	484	231	70
Internal Link Dist (ft)		914			1312		643			619
Turn Bay Length (ft)	100		375	250		150		250	100	
Base Capacity (vph)	66	1012	541	492	2085	126	144	803	521	607
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.83	0.22	0.48	0.32	0.71	0.30	0.83	0.35	0.12

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

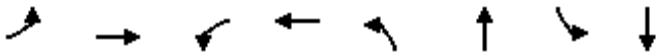
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL		EBR	WBL		NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	119		98	232		62	876	701	26	438
v/c Ratio	0.48	0.66	0.21	0.55	0.33	0.47	0.92	0.57	0.24	0.28
Control Delay	48.5	49.6	3.8	45.7	32.5	62.9	30.9	3.1	49.4	19.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.5	49.6	3.8	45.7	32.5	62.9	30.9	3.1	49.4	19.5
Queue Length 50th (ft)	73	122	0	72	48	40	159	0	16	90
Queue Length 95th (ft)	131	185	21	108	88	m61	m#913	m82	42	152
Internal Link Dist (ft)		675			857		916			324
Turn Bay Length (ft)	250		150	250		175			75	
Base Capacity (vph)	260	409	590	521	420	168	949	1229	175	1554
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.49	0.17	0.45	0.23	0.37	0.92	0.57	0.15	0.28

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	364	229	33	10	43	1424	11	767
v/c Ratio	0.98	0.40	0.14	0.02	0.34	0.65	0.10	0.40
Control Delay	80.5	8.8	30.1	21.0	65.5	6.6	59.9	7.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	80.5	8.8	30.1	21.0	65.5	6.6	59.9	7.4
Queue Length 50th (ft)	231	16	16	2	24	43	8	127
Queue Length 95th (ft)	#416	75	42	15	m50	10	m23	127
Internal Link Dist (ft)		1101		510		1272		916
Turn Bay Length (ft)	200		100		300		125	
Base Capacity (vph)	371	576	232	470	164	2177	181	1933
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.98	0.40	0.14	0.02	0.26	0.65	0.06	0.40

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	WBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	186	1456	379	66	890
v/c Ratio	0.47	0.60	0.27	0.43	0.33
Control Delay	39.8	14.3	1.6	40.6	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	39.8	14.3	1.6	40.6	4.7
Queue Length 50th (ft)	53	312	0	41	109
Queue Length 95th (ft)	76	596	96	86	186
Internal Link Dist (ft)	460	732			1272
Turn Bay Length (ft)	175		200	200	
Base Capacity (vph)	795	2412	1535	186	2715
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.23	0.60	0.25	0.35	0.33

Intersection Summary

Lane Group	EBR	WBR2	NBL	NBT	SBT
Lane Group Flow (vph)	722	309	278	1598	1026
v/c Ratio	0.95	0.31	1.22	0.85	0.82
Control Delay	39.7	19.0	170.5	23.7	32.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	39.7	19.0	170.5	23.7	32.3
Queue Length 50th (ft)	274	64	~222	415	286
Queue Length 95th (ft)	#524	100	#379	524	367
Internal Link Dist (ft)				746	178
Turn Bay Length (ft)			325		
Base Capacity (vph)	806	1089	227	1953	1354
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.90	0.28	1.22	0.82	0.76

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBT	EBR	NBT	NBR	SBT
Lane Group Flow (vph)	170	129	1706	948	1438
v/c Ratio	0.53	0.39	0.72	0.69	0.42
Control Delay	27.5	17.1	10.7	3.7	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	27.5	17.1	10.7	3.7	6.2
Queue Length 50th (ft)	56	26	161	0	68
Queue Length 95th (ft)	104	64	#422	48	168
Internal Link Dist (ft)	307		1038		147
Turn Bay Length (ft)					
Base Capacity (vph)	435	428	2370	1373	3405
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.39	0.30	0.72	0.69	0.42

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBT
Lane Group Flow (vph)	948
v/c Ratio	0.27
Control Delay	0.2
Queue Delay	0.0
Total Delay	0.2
Queue Length 50th (ft)	0
Queue Length 95th (ft)	0
Internal Link Dist (ft)	1
Turn Bay Length (ft)	
Base Capacity (vph)	3539
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.27

Intersection Summary

Lane Group	EBT
Lane Group Flow (vph)	309
v/c Ratio	0.09
Control Delay	0.1
Queue Delay	0.0
Total Delay	0.1
Queue Length 50th (ft)	0
Queue Length 95th (ft)	0
Internal Link Dist (ft)	224
Turn Bay Length (ft)	
Base Capacity (vph)	3438
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.09

Intersection Summary

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	396	1063	83	797	57	1198	240	1026	26
v/c Ratio	0.74	0.85	0.60	0.81	0.46	1.01	1.46	0.77	0.03
Control Delay	57.4	43.4	72.6	38.3	66.6	69.6	278.6	40.0	7.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.4	43.4	72.6	38.3	66.6	69.6	278.6	40.0	7.0
Queue Length 50th (ft)	158	404	65	233	45	~558	~271	403	0
Queue Length 95th (ft)	206	498	120	327	90	#707	#440	#547	17
Internal Link Dist (ft)		1463		1533		1423		1183	
Turn Bay Length (ft)	225		275		100		100		275
Base Capacity (vph)	716	1303	161	1024	159	1181	164	1331	750
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.82	0.52	0.78	0.36	1.01	1.46	0.77	0.03

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group		EBR		NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)		258		216	1731	2	974	32
v/c Ratio	0.22	0.65	0.05	0.58	0.63	0.02	0.44	0.03
Control Delay	40.2	12.3	30.3	48.3	9.8	48.0	5.6	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.2	12.3	30.3	48.3	9.8	48.0	5.6	2.1
Queue Length 50th (ft)	21	0	4	68	127	1	21	0
Queue Length 95th (ft)	40	58	15	102	#711	m3	200	8
Internal Link Dist (ft)	331		22		749		732	
Turn Bay Length (ft)				300		100		125
Base Capacity (vph)	564	776	609	399	2728	217	2229	1014
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.33	0.01	0.54	0.63	0.01	0.44	0.03

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Appendix E-2. Freeway Operations

AM Merge/Diverge Operations

Interchange	Direction	Location	Merge/ Diverge	HCS Volume	Capacity	V/C
59 - Jackson School Rd	WB	Mainline		1183	4600	0.26
	WB	OFF	Diverge	491	2000	0.25
	WB	Mainline		740	4600	0.16
	WB	ON	Merge	784	4600	0.17
	WB	Mainline		784	4600	0.17
	EB	Mainline		1588	4600	0.35
	EB	OFF	Diverge	95	2000	0.05
	EB	Mainline		1495	4600	0.33
	EB	ON	Merge	2189	4600	0.48
	EB	Mainline		2189	4600	0.48
61 - Brookwood Pkwy / Helvetia Rd	WB	Mainline		2578	4600	0.56
	WB	OFF	Diverge	1617	2000	0.81
	WB	Mainline		1121	4600	0.24
	WB	ON	Merge	1189	4600	0.26
	WB	Mainline		1189	4600	0.26
	EB	Mainline		2173	4600	0.47
	EB	OFF	Diverge	213	2000	0.11
	EB	Mainline		1965	4600	0.43
	EB	ON	Merge	2528	4600	0.55
	EB	Mainline		2528	4600	0.55
62 - Cornelius Pass Rd	WB	Mainline		3856	4600	0.84
	WB	OFF	Diverge	286	2000	0.14
	WB	Mainline		3598	4600	0.78
	WB	OFF	Diverge	1499	2000	0.75
	WB	Mainline		2247	4600	0.49
	WB	ON	Merge	2614	4600	0.57
	WB	Mainline		2614	4600	0.57
	EB	Mainline		2515	4600	0.55
	EB	OFF	Diverge	95	2000	0.05
	EB	Mainline		2420	4600	0.53
	EB	ON	Merge	2412	4600	0.52
	EB	Mainline		2412	4600	0.52
	EB	ON	Merge	2957	4600	0.64
	EB	Mainline		2957	4600	0.64

PM Merge/Diverge Operations

Interchange	Direction	Location	Merge/ Diverge	HCS Volume	Capacity	V/C
59 - Jackson School Rd	WB	Mainline		2248	4600	0.49
	WB	OFF	Diverge	611	2000	0.31
	WB	Mainline		1643	4600	0.36
	WB	ON	Merge	1725	4600	0.38
	WB	Mainline		1725	4600	0.38
	EB	Mainline		1152	4600	0.25
	EB	OFF	Diverge	31	2000	0.02
	EB	Mainline		1121	4600	0.24
	EB	ON	Merge	1759	4600	0.38
	EB	Mainline		1759	4600	0.38
61 - Brookwood Pkwy / Helvetia Rd	WB	Mainline		2729	4600	0.59
	WB	OFF	Diverge	791	2000	0.40
	WB	Mainline		1945	4600	0.42
	WB	ON	Merge	2251	4600	0.49
	WB	Mainline		2251	4600	0.49
	EB	Mainline		1786	4600	0.39
	EB	OFF	Diverge	136	2000	0.07
	EB	Mainline		1650	4600	0.36
	EB	ON	Merge	2482	4600	0.54
	EB	Mainline		2482	4600	0.54
62 - Cornelius Pass Rd	WB	Mainline		3323	4600	0.72
	WB	OFF	Diverge	327	2000	0.16
	WB	Mainline		2999	4600	0.65
	WB	OFF	Diverge	764	2000	0.38
	WB	Mainline		2242	4600	0.49
	WB	ON	Merge	2733	4600	0.59
	WB	Mainline		2733	4600	0.59
	EB	Mainline		2518	4600	0.55
	EB	OFF	Diverge	304	2000	0.15
	EB	Mainline		2214	4600	0.48
	EB	ON	Merge	2515	4600	0.55
	EB	Mainline		2529	4600	0.55
	EB	ON	Merge	3492	4600	0.76
	EB	Mainline		3492	4600	0.76

AM Operations

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	12/21/2011
Analysis time period:	AM Peak Period
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Cornelius Pass Rd Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Westbound On-ramp from Cornelius Pass Rd

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2005	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	295	vph
Length of first accel/decel lane	450	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2005	295		vph
Peak-hour factor, PHF	0.91	0.82		
Peak 15-min volume, v15	551	90		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2247	367	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2247 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2614	4600	No
v_3 or v_{av34}	0 pc/h	(Equation 25-4 or 25-5)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} =		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2247	4400	No

!

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 22.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.343

Space mean speed in ramp influence area, S_R = 53.8 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.8 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	12/21/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Cornelius Pass Rd Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Eastbound Off-ramp to Cornelius Pass Rd

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2170	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	325	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2170	325		vph
Peak-hour factor, PHF	0.88	0.86		
Peak 15-min volume, v15	616	94		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2515	385	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2515 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2515	4600	No
$v_{FO} = v_F - v_R$	2130	4600	No
v_R	385	2000	No
$v_{3 \text{ or } av34}$	0 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34}$	> 2700 pc/h?	No	
Is $v_{3 \text{ or } av34}$	> 1.5 v_{12} /2	No	
If yes, v_{12A} =		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2515	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 12.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.463	
Space mean speed in ramp influence area,	S_R = 51.7	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.7	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	12/21/2011
Analysis time period:	AM Peak Period
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Cornelius Pass Rd Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Northbound to Eastbound On-ramp from Cornelius Pass Rd

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2075	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	465	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2075	465		vph
Peak-hour factor, PHF	0.88	0.86		
Peak 15-min volume, v15	589	135		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2405	552	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2405 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2957	4600	No
v_3 or v_{av34}	0 pc/h	(Equation 25-4 or 25-5)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} =		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2405	4400	No

!

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 25.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.361

Space mean speed in ramp influence area, S_R = 53.5 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.5 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	12/21/2011
Analysis time period:	AM Peak Period
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Cornelius Pass Rd Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Southbound to Eastbound On-ramp from Cornelius Pass Rd

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1845	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	230	vph
Length of first accel/decel lane	250	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1845	230		vph
Peak-hour factor, PHF	0.88	0.86		
Peak 15-min volume, v15	524	67		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2139	273	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2139 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2412	4600	No
v_3 or v_{av34}	0 pc/h	(Equation 25-4 or 25-5)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} =		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2139	4400	No

!

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 22.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.347

Space mean speed in ramp influence area, S_R = 53.8 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.8 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	12/21/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Cornelius Pass Rd Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Westbound LOOP Off-ramp to Cornelius Pass Rd

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3210	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	1205	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3210	1205		vph
Peak-hour factor, PHF	0.91	0.82		
Peak 15-min volume, v15	882	367		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3598	1499	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3598 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3598	4600	No
$v_{FO} = v_F - v_R$	2099	4600	No
v_R	1499	2000	No
$v_{3 \text{ or } av34}$	0 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34}$	> 2700 pc/h?	No	
Is $v_{3 \text{ or } av34}$	> 1.5 v_{12} /2	No	
If yes, v_{12A} =		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3598	4600	No

!

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 21.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	D_S = 0.563	
Space mean speed in ramp influence area,	S_R = 49.9	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 49.9	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	12/21/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Cornelius Pass Rd Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Westbound Off-ramp to Cornelius Pass Rd

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3440	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	230	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3440	230		vph
Peak-hour factor, PHF	0.91	0.82		
Peak 15-min volume, v15	945	70		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3856	286	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3856 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3856	4600	No
$v_{FO} = v_F - v_R$	3570	4600	No
v_R	286	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} =		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3856	4600	No

!

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 23.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	D_S = 0.454	
Space mean speed in ramp influence area,	S_R = 51.8	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.8	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	AM Peak Period
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Westbound On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1000	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	55	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1000	55		vph
Peak-hour factor, PHF	0.91	0.82		
Peak 15-min volume, v15	275	17		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1121	68	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1121 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	1189	4600	No

$v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 1121 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1121	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 12.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.305	
Space mean speed in ramp influence area,	S_R = 54.5	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 54.5	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Eastbound Off-ramp to Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1875	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	180	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1875	180		vph
Peak-hour factor, PHF	0.88	0.86		
Peak 15-min volume, v15	533	52		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2173	213	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2173 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2173	4600	No
$v_{FO} = v_F - v_R$	1960	4600	No
v_R	213	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 2173		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2173	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 9.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	D_S = 0.447	
Space mean speed in ramp influence area,	S_R = 52.0	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 52.0	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	AM Peak Period
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Eastbound On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1695	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	475	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1695	475		vph
Peak-hour factor, PHF	0.88	0.86		
Peak 15-min volume, v15	482	138		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1965	563	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1965 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2528	4600	No

$v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 1965 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1965	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_{R} + 0.0078 v_{12} - 0.00627 L_A$ = 22.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.341

Space mean speed in ramp influence area, S_R = 53.9 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.9 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Westbound Off-ramp to Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2300	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	1300	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2300	1300		vph
Peak-hour factor, PHF	0.91	0.82		
Peak 15-min volume, v15	632	396		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2578	1617	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v - v_F) P_{FD}$ = 2578 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2578	4600	No
$v_{FO} = v - v_F - v_R$	961	4600	No
v_R	1617	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 2578 (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2578	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 12.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.574	
Space mean speed in ramp influence area,	S_R = 49.7	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 49.7	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	12/21/2011
Analysis time period:	AM Peak Period
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Jackson School Rd Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Westbound On-ramp from Jackson School Rd

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	660	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	35	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	660	35		vph
Peak-hour factor, PHF	0.91	0.82		
Peak 15-min volume, v15	181	11		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	740	44	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 740 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	784	4600	No
v_3 or v_{av34}	0 pc/h	(Equation 25-4 or 25-5)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} =		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	740	4400	No

!

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 8.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	M_S = 0.295	
Space mean speed in ramp influence area,	S_R = 54.7	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 54.7	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	12/21/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Jackson School Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Eastbound Off-ramp to Jackson School Rd

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1370	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	80	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1370	80		vph
Peak-hour factor, PHF	0.88	0.86		
Peak 15-min volume, v15	389	23		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1588	95	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1588 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	1588	4600	No
$v_{FO} = v_F - v_R$	1493	4600	No
v_R	95	2000	No
$v_{3 \text{ or } av34}$	0 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34}$	> 2700 pc/h?	No	
Is $v_{3 \text{ or } av34}$	> 1.5 v_{12} /2	No	
If yes, v_{12A} =		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1588	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 4.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	D_S = 0.437	
Space mean speed in ramp influence area,	S_R = 52.1	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 52.1	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	AM Peak Period
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Jackson School Rd Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Eastbound On-ramp from Jackson School Rd

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1290	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	585	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1290	585		vph
Peak-hour factor, PHF	0.88	0.86		
Peak 15-min volume, v15	366	170		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1495	694	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1495 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2189	4600	No
v_3 or v_{av34}	0 pc/h	(Equation 25-4 or 25-5)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} =		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1495	4400	No

!

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 19.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, M_S = 0.321

Space mean speed in ramp influence area, S_R = 54.2 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 54.2 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	12/21/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Jackson School Rd Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Westbound Off-ramp to Jackson School Rd

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1055	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	395	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1055	395		vph
Peak-hour factor, PHF	0.91	0.82		
Peak 15-min volume, v15	290	120		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1183	491	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1183 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	1183	4600	No
$v_{FO} = v_F - v_R$	692	4600	No
v_R	491	2000	No
$v_{3 \text{ or } av34}$	0 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34}$	> 2700 pc/h?	No	
Is $v_{3 \text{ or } av34}$	> 1.5 v_{12} /2	No	
If yes, v_{12A} =		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1183	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 0.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	D_S = 0.472	
Space mean speed in ramp influence area,	S_R = 51.5	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.5	mph

PM Operations

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	12/21/2011
Analysis time period:	PM Peak Period
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Cornelius Pass Rd Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Westbound On-ramp from Cornelius Pass Rd

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2075	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	450	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp	0	vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp	1000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	2075		450		0		vph
Peak-hour factor, PHF	0.93		0.93		0.90		
Peak 15-min volume, v15	558		121		0		v
Trucks and buses	1		3		0		%
Recreational vehicles	0		0		0		%
Terrain type:	Level		Level				
Grade	0.00	%	0.00	%	0.00	%	
Length	0.00	mi	0.00	mi	0.00	mi	
Trucks and buses PCE, ET	1.5		1.5		1.5		
Recreational vehicle PCE, ER	1.2		1.2		1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	1.000	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2242	491	0	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2242 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2733	4600	No
v_3 or v_{av34}	0 pc/h	(Equation 25-4 or 25-5)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} =		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2242	4400	No

!

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 23.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.346

Space mean speed in ramp influence area, S_R = 53.8 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.8 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	12/21/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Cornelius Pass Rd Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Eastbound Off-ramp to Cornelius Pass Rd

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2305	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	290	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2305	290		vph
Peak-hour factor, PHF	0.92	0.96		
Peak 15-min volume, v15	626	76		v
Trucks and buses	1	1		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.995	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2518	304	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2518 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2518	4600	No
$v_{FO} = v_F - v_R$	2214	4600	No
v_R	304	2000	No
$v_{3 \text{ or } av34}$	0 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34}$	> 2700 pc/h?	No	
Is $v_{3 \text{ or } av34}$	> 1.5 v_{12} /2	No	
If yes, v_{12A} =		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2518	4600	No

!

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\ v_R - 0.009\ L_{12}$ = 12.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.455	
Space mean speed in ramp influence area,	S_R = 51.8	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.8	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	12/21/2011
Analysis time period:	PM Peak Period
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Cornelius Pass Rd Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Northbound to Eastbound On-Ramp from Cornelius Pass Rd

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2315	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	920	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2315	920		vph
Peak-hour factor, PHF	0.92	0.96		
Peak 15-min volume, v15	629	240		v
Trucks and buses	1	1		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.995	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2529	963	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2529 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3492	4600	No
v_3 or v_{av34}	0 pc/h	(Equation 25-4 or 25-5)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} =		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2529	4400	No

!

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ = 29.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, M_S = 0.414

Space mean speed in ramp influence area, S_R = 52.5 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 52.5 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	12/21/2011
Analysis time period:	PM Peak Period
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Cornelius Pass Rd Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Southbound to Eastbound On-Ramp from Cornelius Pass Rd

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2015	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	300	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2015	300		vph
Peak-hour factor, PHF	0.92	0.96		
Peak 15-min volume, v15	548	78		v
Trucks and buses	1	1		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.995	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2201	314	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2201 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2515	4600	No
$v_{3 \text{ or } av34}$	0 pc/h	(Equation 25-4 or 25-5)	
Is $v_{3 \text{ or } av34}$ > 2700 pc/h?		No	
Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2		No	
If yes, v_{12A} =		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?	
v_{12}	2201	4400	No	!

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 21.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.334	
Space mean speed in ramp influence area,	S_R = 54.0	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 54.0	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	12/21/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Cornelius Pass Rd Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Westbound LOOP Off-ramp to Cornelius Pass Rd

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2775	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	700	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2775	700		vph
Peak-hour factor, PHF	0.93	0.93		
Peak 15-min volume, v15	746	188		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2999	764	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2999 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2999	4600	No
$v_{FO} = v_F - v_R$	2235	4600	No
v_R	764	2000	No
$v_{3 \text{ or } av34}$	0 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34}$	> 2700 pc/h?	No	
Is $v_{3 \text{ or } av34}$	> 1.5 v_{12} /2	No	
If yes, v_{12A} =		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2999	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 16.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.497	
Space mean speed in ramp influence area,	S_R = 51.1	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.1	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	12/21/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Cornelius Pass Rd Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Westbound Off-ramp to Cornelius Pass Rd

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3075	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	300	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3075	300		vph
Peak-hour factor, PHF	0.93	0.93		
Peak 15-min volume, v15	827	81		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3323	327	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3323 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3323	4600	No
$v_{FO} = v_F - v_R$	2996	4600	No
v_R	327	2000	No
$v_{3 \text{ or } av34}$	0 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34}$	> 2700 pc/h?	No	
Is $v_{3 \text{ or } av34}$	> 1.5 v_{12} /2	No	
If yes, v_{12A} =		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3323	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 19.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.457	
Space mean speed in ramp influence area,	S_R = 51.8	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.8	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	PM Peak Period
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Westbound On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1800	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	280	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1800	280		vph
Peak-hour factor, PHF	0.93	0.93		
Peak 15-min volume, v15	484	75		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1945	306	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1945 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2251	4600	No

$v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 1945 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1945	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ = 20.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.329	
Space mean speed in ramp influence area,	S_R = 54.1	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 54.1	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Eastbound Off-ramp to Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1635	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	130	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1635	130		vph
Peak-hour factor, PHF	0.92	0.96		
Peak 15-min volume, v15	444	34		v
Trucks and buses	1	1		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.995	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1786	136	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1786 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	1786	4600	No
$v_{FO} = v_F - v_R$	1650	4600	No
v_R	136	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 1786		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1786	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 6.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	D_S = 0.440	
Space mean speed in ramp influence area,	S_R = 52.1	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 52.1	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	PM Peak Period
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Eastbound On-Ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1505	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	800	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1505	800		vph
Peak-hour factor, PHF	0.92	0.96		
Peak 15-min volume, v15	409	208		v
Trucks and buses	1	1		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.995	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1644	838	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1644 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2482	4600	No

$v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 1644 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1644	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_{12} + 0.0078\, v_R - 0.00627\, L_A$ = 21.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.339

Space mean speed in ramp influence area, S_R = 53.9 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.9 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Westbound Off-ramp to Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2525	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	725	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2525	725		vph
Peak-hour factor, PHF	0.93	0.93		
Peak 15-min volume, v15	679	195		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2729	791	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v - v_F) P_{FD}$ = 2729 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2729	4600	No
$v_{FO} = v - v_F - v_R$	1938	4600	No
v_R	791	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 2729		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2729	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 14.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.499	
Space mean speed in ramp influence area,	S_R = 51.0	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.0	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	12/21/2011
Analysis time period:	PM Peak Period
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Jackson School Rd Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Westbound On-ramp from Jackson School Rd

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1520	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	75	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1520	75		vph
Peak-hour factor, PHF	0.93	0.93		
Peak 15-min volume, v15	409	20		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1643	82	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1643 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	1725	4600	No
v_3 or v_{av34}	0 pc/h	(Equation 25-4 or 25-5)	
Is v_3 or v_{av34} > 2700 pc/h?		No	
Is v_3 or v_{av34} > 1.5 v_{12} /2		No	
If yes, v_{12A} =		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1643	4400	No

!

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 15.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, M_S = 0.308

Space mean speed in ramp influence area, S_R = 54.5 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 54.5 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	12/21/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Jackson School Rd Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Eastbound Off-ramp to Jackson School Rd

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1055	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	30	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1055	30		vph
Peak-hour factor, PHF	0.92	0.96		
Peak 15-min volume, v15	287	8		v
Trucks and buses	1	1		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.995	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1152	31	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1152 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	1152	4600	No
$v_{FO} = v_F - v_R$	1121	4600	No
v_R	31	2000	No
$v_{3 \text{ or } av34}$	0 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34}$	> 2700 pc/h?	No	
Is $v_{3 \text{ or } av34}$	> 1.5 v_{12} /2	No	
If yes, v_{12A} =		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1152	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 0.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	D_S = 0.431	
Space mean speed in ramp influence area,	S_R = 52.2	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 52.2	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	12/21/2011
Analysis time period:	PM Peak Period
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Jackson School Rd Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Eastbound On-Ramp from Jackson School Rd

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1025	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	610	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1025	610		vph
Peak-hour factor, PHF	0.92	0.96		
Peak 15-min volume, v15	279	159		v
Trucks and buses	1	1		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.995	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1120	639	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1120 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	1759	4600	No
v_3 or v_{av34}	0 pc/h	(Equation 25-4 or 25-5)	
Is v_3 or v_{av34} > 2700 pc/h?		No	
Is v_3 or v_{av34} > 1.5 v_{12} /2		No	
If yes, v_{12A} =		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1120	4400	No

!

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 15.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, M_S = 0.309

Space mean speed in ramp influence area, S_R = 54.4 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 54.4 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	12/21/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Jackson School Rd Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Westbound Off-ramp to Jackson School Rd

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2080	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	560	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2080	560		vph
Peak-hour factor, PHF	0.93	0.93		
Peak 15-min volume, v15	559	151		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2248	611	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2248 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2248	4600	No
$v_{FO} = v_F - v_R$	1637	4600	No
v_R	611	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} =		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2248	4600	No

!

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 10.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.483	
Space mean speed in ramp influence area,	S_R = 51.3	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.3	mph

Appendix F. Hazardous Materials Databases Information

Oregon DEQ Facility Profiler 2.0

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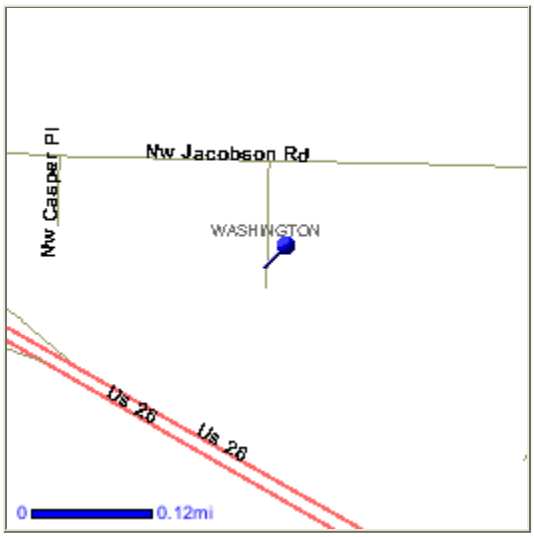
Facility Summary Report

Return to Site Listing Print Report

Maps



Facility / Site Information for Location 10536

Facility/Site Name:	SHINEI USA INC	**Latitude:**	45° 33' 50"
Address:	6220 NW PINEFARM PL	**Longitude:**	-122° 55' 5"
City State Zip:	HILLSBORO OR 97124-8563	**Location Accuracy:**	HIGH
		Last Updated:	4/1/2004 5:20:00 PM

Aliases

Shinei USA Inc	HazWaste	Shinei USA, Inc.	TRAACS
Solectron	HazWaste		

Geographic Features

Township:	T1N-R2W-S0	**Congress Dist:**	1	**Forest Type:**	N/A
County:	WASHINGTON	**OR Senate Dist:**	15	**Vegetation:**	Urban and industrial
Watershed:	TUALATIN	**OR House Dist:**	30	**Agricultural Land:**	PREDOM IRR
Drinking Water Source:		N/A			

Oregon DEQ Program Information

Hazardous Waste (HazWaste)

Identifier	Start Date	Effective Date	Review Date	NFA Date	Type	Sub Type	Detail Information[1]	EPA Number
6309	05/27/1998	12/03/2007			Generator	CEG	HW Site Report	ORQ000009092

SIC CODE	SIC Description	PRIMARY
3499	FABRICATED METAL PRODUCTS	N

[1] Linked reports may be unavailable from 9:00pm to 7:00am PST due to system maintenance.
[2] DEQ does not maintain air discharge permit information for Lane County.

More Information on this location

Oregon DEQ Neighborhood Info (by region/county)
See wells in the same Township Range Section from the Oregon Water Resources Department Well logs Application
See county's scanned assessor maps through ORMAP

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Oregon DEQ Facility Profiler 2.0

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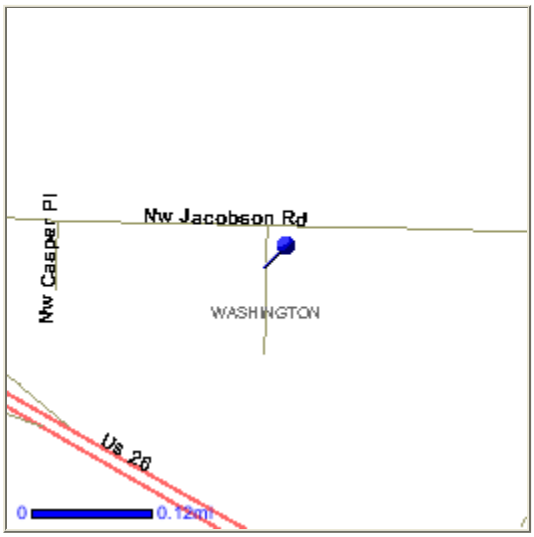
Facility Summary Report

Return to Site Listing Print Report

Maps



Facility / Site Information for Location 97188

Facility/Site Name:	CREDENCE SYSTEMS CORPORATION	**Latitude:**	45° 33' 53.3"
Address:	5975 NW PINEFARM PL	**Longitude:**	-122° 55' 5.9"
City State Zip:	HILLSBORO OR 97124-8563	**Location Accuracy:**	HIGH
		Last Updated:	6/20/2006 7:46:08 PM

Aliases

CREDENCE SYSTEMS CORPORATION	HazWaste

Geographic Features

Township:	T1N-R2W-S0	**Congress Dist:**	1	**Forest Type:**	N/A
County:	WASHINGTON	**OR Senate Dist:**	15	**Vegetation:**	Urban and industrial
Watershed:	TUALATIN	**OR House Dist:**	30	**Agricultural Land:**	PREDOM IRR
Drinking Water Source:		N/A			

Oregon DEQ Program Information

Hazardous Waste (HazWaste)

Identifier	Start Date	Effective Date	Review Date	NFA Date	Type	Sub Type	Detail Information[1]	EPA Number
6969	05/10/2006	12/31/2008		12/31/2008	Generator	CEG	HW Site Report	ORQ000025677

[1] Linked reports may be unavailable from 9:00pm to 7:00am PST due to system maintenance.
[2] DEQ does not maintain air discharge permit information for Lane County.

More Information on this location

Oregon DEQ Neighborhood Info (by region/county)
See wells in the same Township Range Section from the Oregon Water Resources Department Well logs Application
See county's scanned assessor maps through ORMAP

[DEQ's Privacy Notice] [Contact DEQ] [Application Feedback]

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Oregon DEQ Facility Profiler 2.0

[Help] [Close Window]

Facility Summary Report

Return to Site Listing Print Report

Maps

Facility / Site Information for Location 107147

Facility/Site Name:	GENENTECH INC	**Latitude:**	45° 33' 25.9"
Address:	4625 NW Brookwood Parkway	**Longitude:**	-122° 55' 34.3"
City State Zip:	HILLSBORO OR 97124-9332	**Location Accuracy:**	HIGH
		Last Updated:	1/12/2011 2:05:30 PM

Aliases

Genentech Inc	HazWaste	Genentech, Inc.	TRAACS

Geographic Features

Township:	T1N-R2W-S21	**Congress Dist:**	1	**Forest Type:**	N/A
County:	WASHINGTON	**OR Senate Dist:**	15	**Vegetation:**	Urban and industrial
Watershed:	TUALATIN	**OR House Dist:**	30	**Agricultural Land:**	PREDOM IRR
Drinking Water Source:	N/A				

Oregon DEQ Program Information

Hazardous Waste (HazWaste)

Identifier	Start Date	Effective Date	Review Date	NFA Date	Type	Sub Type	Detail Information[1]	EPA Number
7160	04/07/2008	12/31/2010			Generator	SQG	HW Site Report	ORQ000027521

Air Quality Permits (TRAACS)

Air Quality Permit	Start Date	Effective Date	Review Date	Closed Date	Status	Type	Sub Type	Detail Information[1]	EPA Number
34-9507-BS-01	10/11/2007	10/05/2007	10/01/2017		Active	ACDP	Basic	AQ Report	OR06709507

SIC CODE	SIC Description	PRIMARY
2834	PHARMACEUTICAL PREPARATIONS	Y
4961	STEAM SUPPLY	N

[1] Linked reports may be unavailable from 9:00pm to 7:00am PST due to system maintenance.
[2] DEQ does not maintain air discharge permit information for Lane County.

More Information on this location

Oregon DEQ Neighborhood Info (by region/county)
See wells in the same Township Range Section from the Oregon Water Resources Department Well logs Application
See county's scanned assessor maps through ORMAP

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Facility Summary Report

Return to Site Listing Print Report

Maps

Facility / Site Information for Location 10716

Facility/Site Name:	SGL CARBON CORPORATION	**Latitude:**	45° 33' 22.3199"
Address:	4860 NW SHUTE RD	**Longitude:**	-122° 55' 34.6799"
City State Zip:	HILLSBORO OR 97124	**Location Accuracy:**	HIGH
		Last Updated:	4/26/2002 5:05:15 PM

Aliases

SGL Carbon Corporation	HazWaste	SGL Carbon Corporation	TRAACS

Geographic Features

Township:	T1N-R2W-S21	**Congress Dist:**	1	**Forest Type:**	N/A
County:	WASHINGTON	**OR Senate Dist:**	15	**Vegetation:**	Urban and industrial
Watershed:	TUALATIN	**OR House Dist:**	30	**Agricultural Land:**	PREDOM IRR
Drinking Water Source:	N/A				

Oregon DEQ Program Information

Hazardous Waste (HazWaste)

Identifier	Start Date	Effective Date	Review Date	NFA Date	Type	Sub Type	Detail Information[1]	EPA Number
3626	04/20/1998	01/15/2003		09/01/2002	Generator	CEG	HW Site Report	ORQ000008839

SIC CODE	SIC Description	PRIMARY
3624	CARBON AND GRAPHITE PRODUCTS	N

[1] Linked reports may be unavailable from 9:00pm to 7:00am PST due to system maintenance.
[2] DEQ does not maintain air discharge permit information for Lane County.

More Information on this location

Oregon DEQ Neighborhood Info (by region/county)
See wells in the same Township Range Section from the Oregon Water Resources Department Well logs Application
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Facility Summary Report

Return to Site Listing Print Report

Maps

Facility / Site Information for Location 105088

Facility/Site Name:	MOHR SOLUTIONS POWER	**Latitude:**	45° 33' 24.1"
Address:	23780 NW HUFFMAN ST DOOR 112	**Longitude:**	-122° 55' 7"
		Location Accuracy:	HIGH
City State Zip:	HILLSBORO OR 97124-5871	**Last Updated:**	10/29/2007 4:20:32 PM

Aliases

Mohr Solutions Power HazWaste

Geographic Features

Township:	T1N-R2W-S0	**Congress Dist:**	1	**Forest Type:**	N/A
County:	WASHINGTON	**OR Senate Dist:**	15	**Vegetation:**	Urban and industrial
Watershed:	TUALATIN	**OR House Dist:**	30	**Agricultural Land:**	PREDOM IRR
Drinking Water Source:	N/A				

Oregon DEQ Program Information

Hazardous Waste (HazWaste)

Identifier	Start Date	Effective Date	Review Date	NFA Date	Type	Sub Type	Detail Information[1]	EPA Number
7127	10/19/2007	10/19/2007			TSD		HW Site Report	ORQ000027219

[1] Linked reports may be unavailable from 9:00pm to 7:00am PST due to system maintenance.
[2] DEQ does not maintain air discharge permit information for Lane County.

More Information on this location

Oregon DEQ Neighborhood Info (by region/county)
See wells in the same Township Range Section from the Oregon Water Resources Department Well logs Application
See county's scanned assessor maps through ORMAP

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Facility Summary Report

Return to Site Listing Print Report

Maps

Facility / Site Information for Location 1783

Facility/Site Name:	OHKA AMERICA INC	**Latitude:**	45° 33' 6.84"
Address:	4600 NW Brookwood Pkwy	**Longitude:**	-122° 55' 27.84"
City State Zip:	HILLSBORO OR 97124	**Location Accuracy:**	LOW
		Last Updated:	11/30/2009 12:45:36 PM

Aliases

OHKA America Inc	HazWaste	TOK AMERICA	HazWaste

Geographic Features

Township:	T1N-R2W-S0	**Congress Dist:**	1	**Forest Type:**	N/A
County:	WASHINGTON	**OR Senate Dist:**	15	**Vegetation:**	Urban and industrial
Watershed:	TUALATIN	**OR House Dist:**	30	**Agricultural Land:**	PREDOM IRR
Drinking Water Source:	N/A				

Oregon DEQ Program Information

Hazardous Waste (HazWaste)

Identifier	Start Date	Effective Date	Review Date	NFA Date	Type	Sub Type	Detail Information[1]	EPA Number
3574	02/28/1992	12/31/2010			Generator	LQG	HW Site Report	ORD987195088

SIC CODE	SIC Description	PRIMARY
2899	OTHER CHEMICAL PREPARATIONS	N

[1] Linked reports may be unavailable from 9:00pm to 7:00am PST due to system maintenance.
[2] DEQ does not maintain air discharge permit information for Lane County.

More Information on this location

Oregon DEQ Neighborhood Info (by region/county)
See wells in the same Township Range Section from the Oregon Water Resources Department Well logs Application
See county's scanned assessor maps through ORMAP

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Facility Summary Report

Return to Site Listing Print Report

Maps

Facility / Site Information for Location 10368

Facility/Site Name:	TOKAI CARBON USA INC	**Latitude:**	45° 33' 9"
Address:	4495 NW 235TH AVE	**Longitude:**	-122° 55' 5"
City State Zip:	HILLSBORO OR 97124-5846	**Location Accuracy:**	HIGH
		Last Updated:	4/1/2004 2:45:00 PM

Aliases

TOKAI CARBON	WQSIS	TOKAI CARBON U.S.A.	WQSIS
Tokai Carbon U.S.A., Inc.	TRAACS	Tokai Carbon USA Inc	HazWaste

Geographic Features

Township:	T1N-R2W-S0	**Congress Dist:**	1	**Forest Type:**	N/A
County:	WASHINGTON	**OR Senate Dist:**	15	**Vegetation:**	Urban and industrial
Watershed:	TUALATIN	**OR House Dist:**	30	**Agricultural Land:**	PREDOM IRR
Drinking Water Source:	N/A				

Oregon DEQ Program Information

Hazardous Waste (HazWaste)

Identifier	Start Date	Effective Date	Review Date	NFA Date	Type	Sub Type	Detail Information[1]	EPA Number
5973	04/22/1997	12/31/2003			Generator	CEG	HW Site Report	ORQ000006114

SIC CODE	SIC Description	PRIMARY
3624	CARBON AND GRAPHITE PRODUCTS	N

Water Quality Permits (WQSIS)

File Number	Permit Number	Start date	Effective Date	Review Date	Permit Type	Permit SubType	Comments	Status	Detail Information[1]	Permit Status
109693	15627	11/14/1997	11/17/1997	06/30/2012	STORMWATER MINOR	NPDES General Permit - Industrial storm water discharges	GEN12Z Industrial storm water	Active Renew no eff mod	SIS Detail Report	Permit Status

SIC CODE	SIC Description	PRIMARY
3624	CARBON AND GRAPHITE PRODUCTS	Y

[1] Linked reports may be unavailable from 9:00pm to 7:00am PST due to system maintenance.
[2] DEQ does not maintain air discharge permit information for Lane County.

Oregon DEQ Facility Profiler 2.0

Facility Summary Report

Return to Site Listing Print Report

Maps

Facility / Site Information for Location 9977

Facility/Site Name:	AGPR INC	**Latitude:**	45° 33' 3"
Address:	4375 NW 235TH AVE	**Longitude:**	-122° 55' 6"
City State Zip:	HILLSBORO OR 97124-5852	**Location Accuracy:**	HIGH
		Last Updated:	3/24/2004 4:51:00 PM

Aliases

AFG Industries, Inc.	TRAACS	AG Electronic Materials aka AGEM	HazWaste
AGC Electronics America	TRAACS	AGPR A Division of AFG Industries Inc	HazWaste
AGPR Inc	HazWaste	AGPR, Inc.	TRAACS

Geographic Features

Township:	T1N-R2W-S34	**Congress Dist:**	1	**Forest Type:**	N/A
County:	WASHINGTON	**OR Senate Dist:**	15	**Vegetation:**	Urban and industrial
Watershed:	TUALATIN	**OR House Dist:**	30	**Agricultural Land:**	PREDOM IRR
Drinking Water Source:	N/A				

Oregon DEQ Program Information

Hazardous Waste (HazWaste)

Identifier	Start Date	Effective Date	Review Date	NFA Date	Type	Sub Type	Detail Information[1]	EPA Number
3526	09/04/1996	01/01/2004			Generator	CEG	HW Site Report	ORQ000004093

SIC CODE	SIC Description	PRIMARY
3674	SEMICONDUCTORS	N

Air Quality Permits (TRAACS)

Air Quality Permit	Start Date	Effective Date	Review Date	Closed Date	Status	Type	Sub Type	Detail Information[1]	EPA Number
34-0016-SI-01	10/06/2006	02/09/1996	08/01/2011		Active	ACDP	Simple	AQ Report	OR06700016

SIC CODE	SIC Description	PRIMARY
3559	OTHER SPECIAL IND. MACHINERY	Y

[1] Linked reports may be unavailable from 9:00pm to 7:00am PST due to system maintenance.
[2] DEQ does not maintain air discharge permit information for Lane County.

More Information on this location

Oregon DEQ Neighborhood Info (by region/county)

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Facility Summary Report

Return to Site Listing Print Report

Maps

Facility / Site Information for Location 30726

Facility/Site Name:	ASHLAND INC.	**Latitude:**	45° 33' 3"
Address:	4605 NW 235th Ave	**Longitude:**	-122° 55' 6"
City State Zip:	Hillsboro OR 97124-5879	**Location Accuracy:**	LOW
		Last Updated:	3/22/2007 7:40:28 AM

Aliases

Air Products and Chemicals Inc	HazWaste	Ashland Distribution Co A Div of Ashland	HazWaste
Ashland Inc.	TRAACS	Hewlett Packard at Ashland Spec Chem	HazWaste
Hewlett Packard at Rinchem Company,Inc.	HazWaste		

Geographic Features

Township:	T1N-R2W-S34	**Congress Dist:**	1	**Forest Type:**	N/A
County:	WASHINGTON	**OR Senate Dist:**	15	**Vegetation:**	Urban and industrial
Watershed:	TUALATIN	**OR House Dist:**	30	**Agricultural Land:**	PREDOM IRR
Drinking Water Source:		N/A			

Oregon DEQ Program Information

Hazardous Waste (HazWaste)

Identifier	Start Date	Effective Date	Review Date	NFA Date	Type	Sub Type	Detail Information[1]	EPA Number
2205	06/28/1999	12/31/2007			Generator	CEG	HW Site Report	ORQ000012195
4456	03/23/2001	12/31/2003		12/31/2003	Generator	CEG	HW Site Report	ORQ000017392

SIC CODE	SIC Description	PRIMARY
3577	COMPUTER PERIPHERAL EQUIP, nec	N
5169	CHEMICALS & ALLIED PRODUCTS	N

[1] Linked reports may be unavailable from 9:00pm to 7:00am PST due to system maintenance.
[2] DEQ does not maintain air discharge permit information for Lane County.

More Information on this location

Oregon DEQ Neighborhood Info (by region/county)
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Facility Summary Report

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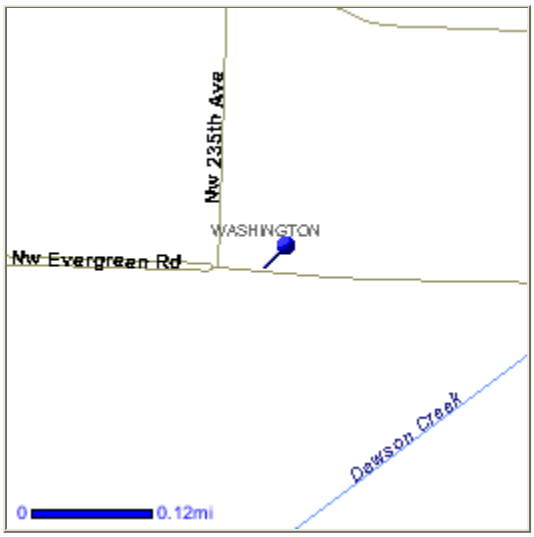
Maps



Facility / Site Information for Location 48397

Facility/Site Name:	Intel Corporation Evergreen Campus	**Latitude:**	45° 33' 3.24"
Address:	23225 NW EVERGREEN	**Longitude:**	-122° 55' 2.64"
City State Zip:	HILLSBORO OR 97124-5767	**Location Accuracy:**	HIGH
		Last Updated:	3/3/2004 6:54:00 PM

Aliases

Intel Corporation Evergreen	HazWaste	Intel Corporation Evergreen Campus	HazWaste

Geographic Features

Township:	T1N-R2W-S34	**Congress Dist:**	1	**Forest Type:**	N/A
County:	WASHINGTON	**OR Senate Dist:**	15	**Vegetation:**	Urban and industrial
Watershed:	TUALATIN	**OR House Dist:**	30	**Agricultural Land:**	PREDOM IRR
Drinking Water Source:	N/A				

Oregon DEQ Program Information

Hazardous Waste (HazWaste)

Identifier	Start Date	Effective Date	Review Date	NFA Date	Type	Sub Type	Detail Information[1]	EPA Number
3415	02/25/2003	12/31/2006			Generator	CEG	HW Site Report	ORQ000022152

SIC CODE	SIC Description	PRIMARY
7376	COMPUTER FACILITIES MANAGEMENT	N

[1] Linked reports may be unavailable from 9:00pm to 7:00am PST due to system maintenance.
[2] DEQ does not maintain air discharge permit information for Lane County.

More Information on this location

Oregon DEQ Neighborhood Info (by region/county)
See wells in the same Township Range Section from the Oregon Water Resources Department Well logs Application
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Search Criteria Used (More)	
Reporting Year	ALL GO
Level of Detail	Extended GO
Type of Report Output	Text (HTML) GO

Incident with ID number 734699 (1982-2010)

Reporting Year: 2004

Incident ID #1 : 734699

Call Recordkeeping

Incident ID Number	734699
Date Call Received	09/10/2004
Date Call Complete	09/10/2004
Call Type	Incident
Source of Report	TELEPHONE

Suspected Responsible Party

Resp. Company	COLUMBIA CORP
Resp. Organization Type	PRIVATE ENTERPRISE
Resp. City	HILLSBORO
Resp. State	OR
On Behalf Of	N

Incident Description

Incident Description	THE CALLER STATED THAT THE SUSPECTED RESPONSIBLE PARTY IS BUILDING A MACHINERY, THE MACHINERY WAS OVERFLOWED AND HYDRAULIC OIL WAS SPILLED ON THE GROUND.
Incident Type	FIXED
Incident Date / Time	9/7/2004 13:00
Incident Date	09/07/2004
Incident Occurred/ Discovered/ Planned	OCCURRED
Additional Info	THE CALLER HAD NO ADDITIONAL INFORMATION

Incident Location (Incident ID #1 : 734699)

Location Address	5775 NORTHWEST WAGONWAY
City Near Location	HILLSBORO
Location State	OR
Location County	WASHINGTON
Distance From City	0

Material

Chris Code	OHY
Amount Of Material	150
Amount Of Material Units	GALLON(S)
Name of Material	HYDRAULIC OIL
Material Reached Water	YES
Amount In Water	150
Amount In Water Units	GALLON(S)

Impact Information

Fire Involved (Yes/No)	No
Evacuations (Yes/No)	No
Number Evacuated	0
Radius of Evacuation	0
Injuries (Yes/No)	No
Number Injured	0
Number Hospitalized	0
Fatalities (Yes/No)	No
Number Fatalities	0

Property Damage (Yes/No)	No
Property Damage (in Dollars)	0
Air Corridor Closed (Yes/No)	No
Air Corridor Closure Time	0
Waterway Closed (Yes/No)	No
Waterway Closure Time	0
Road Closed (Yes/No)	No
Road Closure Time	0
Major Artery (Yes/No)	No
Track Closed (Yes/No)	No
Track Closure Time	0
Media Interest	NONE
Medium Description	WATER
Additional Medium Info	UNNAMED POND
Employee Fatalities	0
Passenger Fatalities	0
Community Impact (Yes/No)	No
Employee Injuries	0
Passenger Injuries	0
Occupant Fatalities	0
Passengers Transferred	UNK

Continuous Release (Incident ID #1 : 734699)

All data fields in this section were blank.

Remedial Action

Remedial Action	NONE

Drilling Platform Details

All data fields in this section were blank.

Fixed Object Details

Type of Fixed Object	OTHER
Power Gen. Facility (Yes/No)	No
Structure Operating (Yes/No)	Unknown

Mobile Incident

Road Mile Marker	0
Bus Service Disruption Time	0

Pipeline Details (Incident ID #1 : 734699)

Pipeline Above Ground	ABOVE
Pipeline Exposed Underwater (Yes/No)	No

Railroad Incident

Grade Crossing (Yes/No)	No
Crossing Device Operational (Yes/No)	Yes
Brake Failure (Yes/No)	No
Sub-Part C Testing Required	XXX
Passenger Route	XXX
Passenger Delay	XXX

Storage Tank Details

Tank Above Ground	ABOVE

Aircraft Details

All data fields in this section were blank.

Vessel Incident (Incident ID #1 : 734699)

Allision (Yes/No)	No

Weather

Weather Conditions	UNKNOWN

Material In Water

Body of Water	UNNAMED POND
Water Supply Contaminated (Yes/No)	No
Offshore (Yes/No)	No

Unknown Sheen Details

All data fields in this section were blank.

Disused Fields

All data fields in this section were blank.

Record Counts (Incident ID #1 : 734699)

Number of Materials Records	1
Number of CR Materials Records	0
Number of Mobile Vehicle Records	0
Number of Train Records	0
Number of Derailed Train Records	0
Number of Vessel Records	0

Total incidents for reporting year 2004: 1

END OF REPORT

This search was done on April 5, 2011. It was compiled from government data last released on January 04, 2011. The data were obtained from the U.S. Coast Guard's Emergency Response Notification System database (ERNS).

Search Criteria Used	
Reporting Year	ALL GO
Incident ID Number	734699
Level of Detail	Extended GO
Type of Report Output	Text (HTML) GO

Incident with ID number 532122 (1982-2010)

Search Criteria Used (More)	
Reporting Year	ALL GO
Level of Detail	Extended GO
Type of Report Output	Text (HTML) GO

Reporting Year: 2000

Incident ID #1 : 532122

Call Recordkeeping

Incident ID Number	532122
Date Call Received	06/14/2000
Date Call Complete	06/14/2000
Call Type	Incident
Incident ID Number	532122
Call Taker	TRF7665

Suspected Responsible Party

On Behalf Of	N

Incident Description

Incident Description	THE CALLER STATED THAT HE HAS A VERY BAD ODOR AROUND HIS HOUSE, AND BELIEVES IT IS CAUSING HIS FAMILY HARM. HE BELIEVES THAT EITHER THE PLANT DOWN THE ROAD, OR A PERSON DUMPING "WHITE WASH," IS RESPONSIBLE FOR THE RELEASE.
Incident Type	FIXED
Incident Date / Time	6/14/2000 12:00
Incident Date	06/14/2000
Incident Occurred/ Discovered/ Planned	DISCOVERED
Additional Info	THE CALLER STATED THAT HIS FAMILY'S SKIN IS PEELING, DUE TO THIS RELEASE. HE HAS NOTICED THIS FOR ABOUT 3 WEEKS. HE ALSO SAID THAT THE RELEASE LEAVES AN OILY RESIDUE IN HIS MOUTH.
Unknown: WMD_CHEM_FLAG	No
Radioactive Materials (Yes/No)	No
Biological Materials (Yes/No)	No
Unknown: MILITARY_ORG_FLAG	No

Incident Location (Incident ID #1 : 532122)

Location Address	23585 NORTHWEST JACOBSEN
Location Street 1	ROAD SPACE 30
City Near Location	HILLSBORO
Location State	OR
Location County	WASHINGTON
Distance From City	0

Material

Chris Code	NCC
Amount Of Material	0
Name of Material	ACID WASH
Material Reached Water	YES
Amount In Water	0

Impact Information

Fire Involved (Yes/No)	No
Evacuations (Yes/No)	No
Number Evacuated	0
Radius of Evacuation	0
Injuries (Yes/No)	No

Number Injured	0
Number Hospitalized	0
Fatalities (Yes/No)	No
Number Fatalities	0
Property Damage (Yes/No)	No
Property Damage (in Dollars)	0
Air Corridor Closed (Yes/No)	No
Air Corridor Closure Time	0
Waterway Closed (Yes/No)	No
Waterway Closure Time	0
Road Closed (Yes/No)	No
Road Closure Time	0
Major Artery (Yes/No)	No
Track Closed (Yes/No)	No
Track Closure Time	0
Media Interest	NONE
Medium Description	WATER
Additional Medium Info	WELL WATER
Employee Fatalities	0
Passenger Fatalities	0
Community Impact (Yes/No)	No
Employee Injuries	0
Passenger Injuries	0
Occupant Fatalities	0
Passengers Transferred	UNK

Continuous Release (Incident ID #1 : 532122)

All data fields in this section were blank.

Remedial Action

Remedial Action	NONE

Drilling Platform Details

All data fields in this section were blank.

Fixed Object Details

Type of Fixed Object	OTHER
Power Gen. Facility (Yes/No)	No
Structure Operating (Yes/No)	Unknown

Mobile Incident

Road Mile Marker	0
Bus Service Disruption Time	0

Pipeline Details (Incident ID #1 : 532122)

Pipeline Above Ground	ABOVE
Pipeline Exposed Underwater (Yes/No)	No

Railroad Incident

Grade Crossing (Yes/No)	No
Crossing Device Operational (Yes/No)	Yes
Brake Failure (Yes/No)	No
Railroad Hotline	No
Sub-Part C Testing Required	XXX
Passenger Route	XXX
Passenger Delay	XXX

Storage Tank Details

Tank Above Ground	ABOVE

Aircraft Details

All data fields in this section were blank.

Vessel Incident (Incident ID #1 : 532122)

Allision (Yes/No)	No

Weather

Weather Conditions	PARTLY CLOUDY
Air Temperature	75
Wind Speed	5
Wind Direction	S
Wind Speed Units	MPH

Material In Water

Body of Water	DRINKING WATER
Tributary Of	NOT APPLICABLE
Water Supply Contaminated (Yes/No)	Yes
Current Speed Units	M
Offshore (Yes/No)	No

Unknown Sheen Details

Sheen Odor	BURNING SKIN

Disused Fields (Incident ID #1 :)

All data fields in this section were blank.

Record Counts

Number of Materials Records	1
Number of CR Materials Records	0
Number of Mobile Vehicle Records	0
Number of Train Records	0
Number of Derailed Train Records	0
Number of Vessel Records	0

Total incidents for reporting year 2000: 1

END OF REPORT

This search was done on April 5, 2011. It was compiled from government data last released on January 04, 2011. The data were obtained from the U.S. Coast Guard's Emergency Response Notification System database (ERNS).

Search Criteria Used	
Reporting Year	ALL GO
Incident ID Number	532122
Level of Detail	Extended GO
Type of Report Output	Text (HTML) GO

Search Criteria Used (More)	
Reporting Year	ALL GO
Level of Detail	Extended GO
Type of Report Output	Text (HTML) GO

Incident with ID number 373088 (1982-2010)

Reporting Year: 1997

Incident ID #1 : 373088

Call Recordkeeping

Incident ID Number	373088
Date Call Received	01/14/1997
Date Call Complete	01/14/1997
Call Type	Incident
Incident ID Number	373088
Call Taker	CJB1740

Suspected Responsible Party

Resp. Company	PACIFIC GAS & ELECTRIC
Resp. Organization Type	PUBLIC UTILITY
Resp. State	OR
Resp. Last Name	HAGAN
Resp. First Name	STEVE
Resp. Phone 1	5037019278
Resp. Phone Type 1	PRIMARY
On Behalf Of	N

Incident Description

Incident Description	PAD MOUNTED TRANSFORMER PUNCTURED
Incident Type	FIXED
Incident Cause	EQUIPMENT FAILURE
Incident Date / Time	1/13/1997 9:30
Incident Date	01/13/1997
Incident Occurred/ Discovered/ Planned	DISCOVERED

Incident Location (Incident ID #1 : 373088)

Location Address	25300 NW EVERGREEN RD
City Near Location	HILLSBORO
Location State	OR
Location County	WASHINGTON
Distance From City	0

Material

Chris Code	OTF
Amount Of Material	0
Name of Material	OIL, MISC: TRANSFORMER
Material Reached Water	YES
Amount In Water	0

Impact Information

Fire Involved (Yes/No)	No
Evacuations (Yes/No)	No
Number Evacuated	0
Number Injured	0
Number Fatalities	0
Property Damage (Yes/No)	No
Property Damage (in Dollars)	0
Air Corridor Closed (Yes/No)	No

Road Closed (Yes/No)	No
Medium Description	LAND
Additional Medium Info	SOIL
Passengers Transferred	UNK

Continuous Release (Incident ID #1 : 373088)

All data fields in this section were blank.

Remedial Action

All data fields in this section were blank.

Drilling Platform Details

All data fields in this section were blank.

Fixed Object Details

Structure Operating (Yes/No)	Yes

Mobile Incident

All data fields in this section were blank.

Pipeline Details

Pipeline Above Ground	ABOVE

Railroad Incident (Incident ID #1 : 373088)

Grade Crossing (Yes/No)	No
Crossing Device Operational (Yes/No)	Yes
Brake Failure (Yes/No)	No
Railroad Hotline	No
Sub-Part C Testing Required	XXX
Passenger Route	XXX
Passenger Delay	XXX

Storage Tank Details

Tank Above Ground	ABOVE

Aircraft Details

All data fields in this section were blank.

Vessel Incident

Allision (Yes/No)	No

Weather (Incident ID #1 : 373088)

All data fields in this section were blank.

Material In Water

All data fields in this section were blank.

Unknown Sheen Details

All data fields in this section were blank.

Disused Fields

All data fields in this section were blank.

Record Counts

Number of Materials Records	1
Number of CR Materials Records	0
Number of Mobile Vehicle Records	0

Number of Train Records	0
Number of Derailed Train Records	0
Number of Vessel Records	0

Total incidents for reporting year 1997: 1

END OF REPORT

This search was done on April 13, 2011. It was compiled from government data last released on January 04, 2011. The data were obtained from the U.S. Coast Guard's **Emergency Response Notification System** database (ERNS).

Search Criteria Used	
Reporting Year	ALL GO
Incident ID Number	373088
Level of Detail	Extended GO
Type of Report Output	Text (HTML) GO

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Facility Summary Report

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Maps

Facility / Site Information for Location 97793

Facility/Site Name:	WESTMARK CENTER	**Latitude:**	45° 34' 17"
Address:	NW WEST UNION RD. & NW JACOBSON RD.	**Longitude:**	-122° 55' 35"
City State Zip:	HILLSBORO OR 97124	**Location Accuracy:**	HIGH
		Last Updated:	8/10/2006 2:05:48 PM

Aliases

Westmark Center	ECSI

Geographic Features

Township:	T1N-R2W-S10	**Congress Dist:**	1	**Forest Type:**	N/A
County:	WASHINGTON	**OR Senate Dist:**	15	**Vegetation:**	Agricultural cropland and pastureland
Watershed:	TUALATIN	**OR House Dist:**	30	**Agricultural Land:**	PREDOM IRR
Drinking Water Source:	N/A				

Oregon DEQ Program Information

Environmental Cleanup (ECSI)

Operation ID	Start Date	NFA Date	Permit Type	Permit SubType	Status	Detail Information[1]	EPA Number
4051	01/18/2004	01/18/2004	Contaminated Site		No further action required	ECSI Site Report	

[1] Linked reports may be unavailable from 9:00pm to 7:00am PST due to system maintenance.
[2] DEQ does not maintain air discharge permit information for Lane County.

More Information on this location

Oregon DEQ Neighborhood Info (by region/county)
See wells in the same Township Range Section from the Oregon Water Resources Department Well logs Application
See county's scanned assessor maps through ORMAP

[DEQ's Privacy Notice] [Contact DEQ] [Application Feedback]

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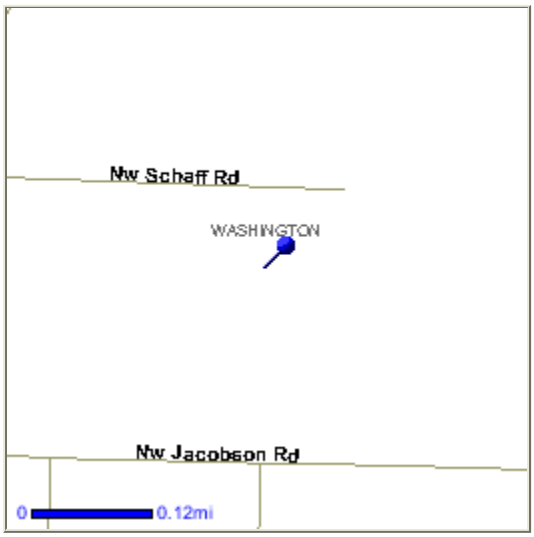
Maps



Facility / Site Information for Location 109109

Facility/Site Name:	BAKER SITE - HILLSBORO	**Latitude:**	45° 34' 5.2"
Address:	EAST OF HELVETIA, SOUTH OF SCHAFF RD	**Longitude:**	-122° 55' 5.9"
City State Zip:	HILLSBORO OR 97124	**Location Accuracy:**	HIGH
		Last Updated:	9/22/2008 11:32:06 AM

Aliases

Baker Site - Hillsboro	ECSI

Geographic Features

Township:	T1N-R2W-S0	**Congress Dist:**	1	**Forest Type:**	N/A
County:	WASHINGTON	**OR Senate Dist:**	15	**Vegetation:**	Urban and industrial
Watershed:	TUALATIN	**OR House Dist:**	30	**Agricultural Land:**	PREDOM IRR
Drinking Water Source:		N/A			

Oregon DEQ Program Information

Environmental Cleanup (ECSI)

Operation ID	Start Date	NFA Date	Permit Type	Permit SubType	Status	Detail Information[1]	EPA Number
5082	09/02/2008	02/10/2009	Contaminated Site		No further action required	ECSI Site Report	

[1] Linked reports may be unavailable from 9:00pm to 7:00am PST due to system maintenance.
[2] DEQ does not maintain air discharge permit information for Lane County.

More Information on this location

Oregon DEQ Neighborhood Info (by region/county)
See wells in the same Township Range Section from the Oregon Water Resources Department Well logs Application
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Facility Summary Report

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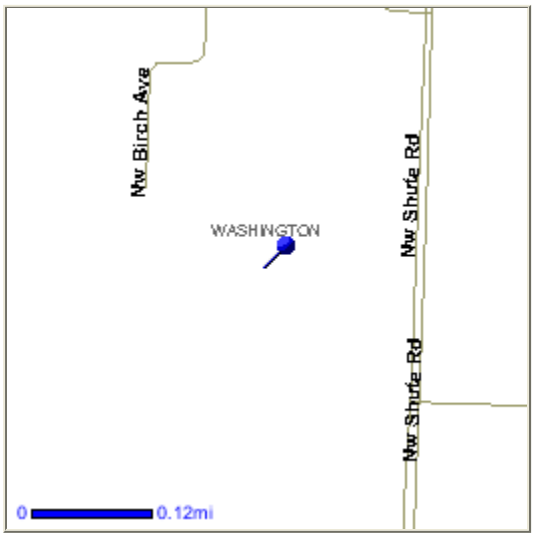
Maps



Facility / Site Information for Location 89082

Facility/Site Name:	SHUTE ROAD PROPERTY, CITY OF HILLSBORO	**Latitude:**	45° 33' 31.7"
Address:	EVERGREEN PKWY AND SHUTE ROAD	**Longitude:**	-122° 55' 45.5"
City State Zip:	HILLSBORO OR 97124	**Location Accuracy:**	HIGH
		Last Updated:	6/24/2005 2:39:12 PM

Aliases

Shute Road, City of Hillsboro	ECSI

Geographic Features

Township:	T1N-R2W-S21	**Congress Dist:**	1	**Forest Type:**	N/A
County:	WASHINGTON	**OR Senate Dist:**	15	**Vegetation:**	Agricultural cropland and pastureland
Watershed:	TUALATIN	**OR House Dist:**	30	**Agricultural Land:**	PREDOM IRR
Drinking Water Source:	N/A				

Oregon DEQ Program Information

Environmental Cleanup (ECSI)

Operation ID	Start Date	NFA Date	Permit Type	Permit SubType	Status	Detail Information[1]	EPA Number
4436	06/01/2004	06/22/2005	Contaminated Site		No further action required	ECSI Site Report	

[1] Linked reports may be unavailable from 9:00pm to 7:00am PST due to system maintenance.
[2] DEQ does not maintain air discharge permit information for Lane County.

More Information on this location

Oregon DEQ Neighborhood Info (by region/county)
See wells in the same Township Range Section from the Oregon Water Resources Department Well logs Application
See county's scanned assessor maps through ORMAP

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Incidents by Zip Code

IncZipCode	IncNumber	IncLocation	IncCity	IncDate	DeptRsp	Chem1	AmtReleased	Comments
97124	050028	111 NE LINCOLN St	HILLSBORO	5/19/2005	HILLSBORO FIRE DEPT	REQUEST REPORT		Responded to assist in white powder scare at a county facility in Hillsboro.
97124	980107	1400 NW COMPTON DR	HILLSBORO	5/20/1998	HAZMAT TEAM TUALATIN	HYDROGEN SULFIDE	0	UNKNOWN QUANTITY OF SULFER DIOXIDE RELEASED INSIDE A CYLINDER CABINET LOCATED INSIDE MANUFACTURING PLANT. INITIAL MONITORING EQUIPMENT SHOWED 136 PPM INSIDE CABINET AND 1 PPM INSIDE ROOM. CYLINDER WAS SHUT OFF BY MAINTENANCE TECH AND READING DROPPED TO 1 PPM INSIDE ROOM AND 2 PPM INSIDE CABINET. LEAKING CYLINDER WILL BE REPLACED TOMORROW. AIR SCRUBBER IN OPERATION THROUGHOUT EVENT BUT HEAVY ODOR OF SULFER NOTICED DURING RELEASE OF H2S. FOR FUTHER INFORMATION REFER TO TVF&R INCIDENT NUMBER 98012247. H2S CONTAINED IN A 6" DIAMETERX11/2"CYLINDER. CONCENTRATION WAS .4% GAGE READ 170 PSI AT THE BOTTLE AND 20 PSI AT THE REGULATOR.
97124	950135	150 N FIRST AVE	HILLSBORO	3/19/1995	HILLSBORO FIRE DEPT	DRUG LAB CHEMICALS	0	OSFM NOTE: NO COMMENTS GIVEN
97124-	980666	188TH & EVERGREEN PKY	HILLSBORO	11/3/1998	HILLSBORO FIRE DEPT	DIESEL FUEL	0	SPILL OF DIESEL ALONG EVERGREEN PARKWAY, BY UNKNOWN TRUCK., MOST LIKELY FROM ITS FUEL TANK. WASH. CO. LUT PROVIDE CLEANUP MATERIALS AND CREW.
97124	910017	19600 NW VON NEWMAN DR	HILLSBORO	11/5/1991	HAZMAT TEAM TUALATIN	CHLOROFORM	1 GALLONS	OSFM NOTE: NO COMMENTS GIVEN
97124	920227	21420 NW NICHOLAS	HILLSBORO	8/4/1992	HILLSBORO FIRE DEPT	SULFURIC ACID	0	ONE 12 VOLT AUTOMOTIVE BATTERY WAS LEFT ON CHARGER TOO LONG AND OVERHEATED. SULFURIC ACID FUMES FILLED OCCUPANCY AND ALERTED OCCUPANTS IN NEIGHBORING BUSINESS UNIT. AREA WAS EVACUTED AND BUILDING WAS VENTILATED. BATTERY WAS REMOVED TO REMOTE AREA FOR LATER DISPOSAL.
97124	880112	22800 NW EVERGREEN RD	HILLSBORO	10/3/1988	HILLSBORO FIRE DEPT	UNKNOWN CHEMICAL	5 GALLONS	15. BEING IDENTIFIED THROUGH LAB TEST WITH PEGUSUS WASTE MANAGEMENT. 20. TEST BEING PERFORMED AT THIS TIME. RESULTS ARE NOT EXPECTED BACK FOR 8-10 DAYS.
97124	090001	2300 NE BROOKWOOD Pky	HILLSBORO	1/6/2009	HILLSBORO FIRE DEPT	REQUEST REPORT		TriQuint is a semiconductor manufacturer. During normal operations inside a clean-

								room a worker incorrectly combined two chemicals in a poly sink. The worker was wearing a chemical suit and respiratory protection at the time of the accident. Directly above the sink is a ventilation hood that goes to an air scrubber that uses water and caustic soda. This mixture results in a sudden release of CN gas and may cause some heat. The building was evacuated. TriQuint called a clean-up company to deal with the hazard and also 911. we were called by C-1 from Hillsboro Fire to respond and do an "onsite recon" of the mixture to ensure it was stable until the clean-up company could arrive and remove the mixture. We contacted the manufacture of the CN product and confirmed that the air scrubber in place would take care of the release. They assured us the scrubber was adequate for the job. We entered in "level A" suits and visualized the sink containing the mixture from outside the clean room through a window. The Mixture appeared stable, with no foaming of vaporizing of chemicals and no deforming of the sink seen. We used two CN monitors and received no positive readings. We used our entry camera to broadcast live video, allowing the TriQuint personnel to evaluate the conditions. We also showed a recording of this to the clean-up company.
97124	920064	231ST & CAMPUS DR	HILLSBORO	4/7/1992	HILLSBORO FIRE DEPT	UNKNOWN CHEMICAL	0	PASSERBY REPORTED UNKNOWN CONTAINER IN DITCH ALONG ROADWAY. HILLSBORO FIRE, WASH. CO. L.U.T. HILLSBORO POLICE, UNIFIED SEWERAGE AGENCY ALL WERE PRESENT ON SCENE. CONTAINER WAS A BLUE PLASTIC 7-GAL CONTAINER MARKED ZEP, WHICH ORIGINALLY SHOULD HAVE CONTAINED A CLEANSER OR SOLVENT TYPE SUBSTANCE. UPON EXAMINATION BY FIRE CREWS, IT WAS DETERMINED THAT THE CONTAINER WAS FILLED WITH A MATERIAL SIMILAR TO PAINT SLUDGE & WAS NOT DEEMED TO E A TRUE "HAZMAT" INCIDENT REQUIRING ACTIVATION OF THE REGIONAL RESPONSE TEAM. PHONE COMMUNICATIONS WITH DEQ, OERS, & COUNTY EMERGENCY SERVICES ALL SUGGESTED NOTIFICATION OF

								RESPONSIBLE JURISDICTION FOR REMOVAL OF CONTAINER. CITY OF HILLSBORO PUBLIC WORKS WAS NOTIFIED. THEY RESPONDED, PICKED UP THE CONTAINER & PLACED IT WITH THE CITY COLLECTIONS AWAITING DISPOSAL. REFER TO OERS INCIDENT #92-504.
97124	930010	2380 NE CORNELL RD	HILLSBORO	2/11/1993	HILLSBORO FIRE DEPT	GASOLINE	900 GALLONS	DEQ WAS CALLED IN IMMEDIATELY. AREA WAS TAPED OFF & RESTRICTED TO THE PUBLIC. JOEL JEFFERY FROM BRAUN INTERTECT WAS ON SCENE FOR EVIRONMRNTAL. GEORGE KNEESE WAS CALLED TO THE SITE FROM PUBLIC WORKS. A SMALL TRENCH WAS DUG & PRODUCT WAS SUCKED OFF THE TOP OF STANDING WATER. THE TANK WAS SCHEDULED TO BE DECOMMISSIONED & REMOVED ON 12 FEBRUARY 1993 IN THE MORNING, AS APPROVED & DIRECTED BY DEQ, WHO ARRIVED ON SCENE WITH 2 INSPECTORS (ANDREE POLOCK & RACHEL CARLIN SEGEL). U-HAUL REPS WERE DIRECTED TO HAVE SOMEONE STAY OVER NIGHT AT THE BUILDING TO ENSURE NO PUBLIC WILL ENTER THE SPILL AREA. INSPECTOR FOSTER CONDUCTED A SITE INSPECTION & WITNESSED THE REMOVAL & DECOMMISSION OF THE SAID TANK. DAVE WEISEN, MARKETING MANAGER FOR U-HAUL ADVISED DEQ & MYSELF THAT THE SOIL WOULD BE TRANSPORTED TO TIGARD TO BE BURNED OFF.
97124	880219	24945 NW EVERGREEN RD	HILLSBORO	1/9/1988	HILLSBORO FIRE DEPT	DIESEL FUEL	30 GALLONS	A 2200 GALLON DIESEL DELIVERY TRUCK LOADED WITH DIESEL TIPPED SIDEWAYS INTO A DITCH WHEN THE FRONT WHEEL WENT OFF ROAD, & THE DIRT SHOULDER COLLAPSED. THE TRUCK WAS TRAVELING AT APPROX AT 20 MPH. THE PRODUCT TANK REMAINED INTACT, & THE CARGO WAS EVENTUALLY PUMPED INTO ANOTHER VEHICLE. THE LEAK OCCURRED BECAUSE THE VEHICLES FUEL TANK LEAKED THROUGH THE CAP & VENT. THERE MAY HAVE BEEN SOME SEEPAGE OF PRODUCT THROUGH THE VAPOR RECOVERY SYSTEM.

97124	960583	2501 NW 229TH AVENUE	HILLSBORO	11/18/1996	HILLSBORO FIRE DEPT	ACETIC ACID	2 CF	AN INTEL EMPLOYEE WAS CLEANING OUT A TANK THAT HAD BEEN EMPTIED & FLUSHED WITH CHEMICALS TO RENDER THE ACETIC ACID NEUTRAL. DURING THIS PROCESS, HEAT WAS APPLIED AS ROUTINE & WHEN HE CLIMBED THE LADDER TO THE TOP OF THE TANK, A SMALL PUFF OF STEAM WAS RELEASED INTO HIS FACE. ACCORDING TO THE EMERGENCY RESPONSE TEAM LEADER, MOST OF THE MIXTURE IN THE TANK WAS WATER & ONLY A VERY MINUTE AMOUNT WAS ACETIC ACID. THE ERT TEAM WAS CLEARING THE BUILDING OF PERSONNEL WHILE WEARING SCBA. UPON OUR ARRIVAL, THEY NOTED NO FURTHER HAZARD. THE PATIENT INITIALLY COMPLAINED OF CHEST DISCOMFORT, AFTER HE WAS PLACED ON OXYGEN, HE FELT BETTER, NO BLOOD IN THE MUCOUS AREA OF HIS FACE; HE WAS TRANSPORTED TO ST VINCENT HOSPITAL FOR OBSERVATION.
97124	940413	2700 NW GLENCOE ROAD	HILLSBORO	9/14/1994	HILLSBORO FIRE DEPT	UNKNOWN CHEMICAL	0	UNIDENTIFIED STUDENT PUT A 16 OZ PLASTIC SOFT DRINK BOTTLE OF UNKNOWN CHEMICALS IN AN INTERIOR HALLWAY TRASH CAN DURING SCHOOL HOURS WHEN THE HALLS WERE OCCUPIED. THE RESULTANT EXOTHERMIC REACTION OF THE CHEMICALS CAUSED THE BOTTLE TO MELT, IGNITED PAPER TRASH & MELTED THE TRASH CAN'S PLASTIC LINER. THIS APPEARED TO BE AN INTENTIONAL ACT. THIS SMALL FIRE GENERATED ACRID SMOKE. NEARBY TEACHERS TOOK THE TRASH CAN THROUGH THE HALLWAY TO AN OUTSIDE LANDING, THEN NOTIFIED MAINTENANCE PERSONNEL. THE TEACHERS, & THE SUBSEQUENT MAINTENANCE PEOPLE, INHALED VAPORS IN THE SMOKE THAT THEY DESCRIBED AS SMELLING LIKE CHLORINE & ACID. NO MEDICAL COMPLAINTS WERE MADE. THERE WAS NOT SUFFICIENT SMOKE OR FIRE TO ACTIVATE DETECTORS OR SPRINKLERS, NO PART OF

								THE SCHOOL WAS EVACUATED. FIREFIGHTERS WERE CALLED TO INVESTIGATE. WE FOUND THE TRASH CAN HAD BEEN REMOVED TO THE DUMPSTER AREA OUTSIDE THE CAFETERIA, WHERE IT WAS BEING OBSERVED BY MAINTENANCE STAFF. THE SCENE WAS TAPED OFF & A PEDESTRIAN-CONTROL PERIMETER WAS ESTABLISHED. A FIREFIGHTER IN SCBA APPROACHED THE CAN & LOOKED INSIDE, OBSERVING THAT ALL REACTIONS HAD APPARENTLY CEASED, THE TRASH CAN WAS COOL & NO OFF-GASSING WAS VISIBLE. WHEN SCBA WAS REMOVED, A SLIGHT SMELL OF CHLORINE WAS DETECTED. THE BOTTLE & SOME HALF-BURNED DEBRIS WERE TAKEN AS EVIDENCE, THE TRASH CAN WAS EMPTIED & FLUSHED OUT. NO DAMAGE WAS SEEN ON THE TRASH CAN ITSELF. AN ARSON I INVESTIGATION WAS INITIATED, TO BE FOLLOWED UP BY MYSELF & OFFICER MATT SHANNON OF HILLSBORO POLICE DEPT.
97124	930269	281ST & EVERGREEN RD	HILLSBORO	6/10/1993	HILLSBORO FIRE DEPT	ASPHALT	0	#14: NO SHIPPING PAPERS. MSDS PAPERS CARRIED IN CAB OF TRUCK. ROOFING ASPHALT TANK TRUCK WITH ASPHALT HEATED TO 500 DEGREES F. PRESSURE BUILT-UP IN TANK CAUSED EXPLOSIN & CAUSED DOME HATCH COVER (2' DISK) TO BE BLOWN OFF. IGNITION OF HOT VAPOR OCCURED WITH INDUCTION OF FRESH AIR. FIRE CONTAINED TO TOP OF TRUCK & EACH OPENING. FIRE EXTINGUISHED WITH DRY CHEMICAL POWDER. HATCH COVERS REPLACED TO EXCLUDE ADDITIONAL FRESH AIR. TANK ALLOWED TO COOL. THERE WAS NO RELEASE OF PRODUCT. VAPORS & FIRE GASES WERE RELEASED.
97124	950650	3125 SE RIVER RD	HILLSBORO	12/19/1995	HAZMAT TEAM TUALATIN	SODIUM BISULFATE	0	DRIVER OF A 10,000 GAL TANKER OF SODIUM BISULFATE OFF LOADED INTO THE WRONG CONTAINMENT SYSTEM WHICH CONTAINED SODIUM HYPO CHLORIDE. IT REACTED, CREATING A FOG & PRESSURIZED THE TANK TRUCK. THE

								RESULTING FOG VENTED ALSO CAUSING SOME PAINT TO PEEL ON THE
97124	070049	3740 NW ALOCLEK PI	HILLSBORO	7/29/2007	HILLSBORO FIRE DEPT	REQUEST REPORT		E34 on the air listening to dispatch when Hillsboro Fire dispatched for a commercial fire. Fire upgraded to a full box and upon pulling the information of the fire on the MDT, the narrative notes describe fire as in a warehouse where "chemicals are stored." Station 53 then called to have them look up address, company name to check chemicals stored. Captain Weiss located 25+ chemicals stored at business and C5 notified of potential hazard over MDT. With conference with Command, HFD requested HM Team response. Enroute informed Command the fire potentially involved a heavy metal and Poison Control notified for possible hazards. Notified command of hazards and requested a Level 1 decon for crews that were exposed. Upon arriving to scene, HM34 and HM53 set up ofr an off site recon while Team Leader (TL) and Safety met with IC and C5. Fire was out upon arrival, however, natural ventilation was occuring as building had been opened up during fire operations prior to arrival. It was decided with Command to do an on-site transition to entry to recon the structure and check to see what 200 gallon tanks were involved and if the on-site containment had held the potential volume of all the tanks. Team meeting, resource contacts made with Medical (Metro West Ambulance) was briefed of medical potential Entry Crews would have. Shortly after Team meeting, business owner as well as an Operations Manager arrived on scene. Team briefed for entry. Entry priorities will be recon inside, securing power inside structure and checking conditions inside. Entry camera used to verify that computer used to turn off heating elements potentially failed (scenario per business contacts) as conditions from entry crews described tank failure and locations. Entry made to structure, power turned off, computer room checked and then 200 gallon tanks as well as spill containment checked. Hillsboro Fire Investigator also had crews show him with camera specific places behind tank where heating element

								had been located checked while they were in the IDLH environment. Level 1 decon provided for entry team and business owner, HFD command briefed of what was found. Scene left to HFD.
97124	920065	570 NE 53RD AVE	HILLSBORO	4/7/1992	HILLSBORO FIRE DEPT	ROCK AND SAND	0	PERSONNEL FROM SOLOFLEX MAIL ROOM RECEIVED A BOX CONTAINING SAND & ROCKS 6 APRIL 1992, AS PART OF THEIR PETITION EFFORT TO CLOSE TROJAN NUCLEAR PLANT. THEY DUMPED CONTENTS OUTSIDE IN FIELD NEAR THEIR WAREHOUSE. ON THE MORNING OF 7 APRIL, THE PERSONNEL WORRIED THAT THE CONTENTS MAY BE RADIOACTIVE, SO THAT CONTACTED WASH. CO. FIRE DIST. #2 FIRE CHIEF RICHARD DUYCK ABOUT THEIR CONCERN. CHIEF DUYCK IN TURN CONTACTED ON-DUTY ENGINE COMPANY, ACTING OFFICER LINDAUER, WHO IN TURN CONTACTED ME AS THE RRTA FOR THE AREA TO ASSESS THE SITUATION. I CONTACTED WASH. CO EMERGENCY MANAGEMENT WHO CONTACTED OERS & RADIATION CONTROL (MR. G. TOOMBS). UPON ARRIVAL AT SOLOFLEX I MADE CONTACT WITH JAN GILBERTSON, SECURED THE SITE & THEN MONITORED THE AREA & MATERIAL WITH THE CDVY00M. I FOUND NOTHING OVER THE BACKGROUND LEVELS OF RADIATION. I NOTIFIED WASH. CO. EMERG. MNGMNT & RADIATION CONTROL OF FINDINGS. HILLSBORO FIRE DEPARTMENT OPERATIONS CHIEF DENNIS ENGLAND ALSO ON SCENE. REFER TO OERS INCIDENT #92-505.
97124-	980659	616 NE SUNDANCE CT	HILLSBORO	9/7/1998	HILLSBORO FIRE DEPT	NATURAL GAS	0	NW NATURAL SUPERVISOR CAPPED LINE AND A REPAIR CREW WILL BE OUT 9/8/98 TO COMPLETE REPAIR.
97124	980285	616 NE SUNDANCE CT	HILLSBORO	9/7/1998	HILLSBORO FIRE DEPT	NATURAL GAS	0	NW NATURAL SUPERVISOR CAPPED LINE AND A REPAIR CREW WILL BE OUT 09/08/98 TO COMPLETE REPAIR.
97124	910144	7431 NE EVERGREEN PKWY	HILLSBORO	4/16/1991	HILLSBORO FIRE DEPT	GASOLINE	15 GALLONS	STATE OWNED VEHICLE ACCIDENTALLY BACKED INTO PARKING LOT LIGHT MOUNTING BASE. BOLTS OPENED UP GAS TANK SPILLING CONTENTS INTO

								PARKING LOT. WATER FOG USED TO CLEAR AIR AROUND AUTO. DAMAGE CONFINED TO GAS TANK.
97124	930274	764 NE 21ST AVE	HILLSBORO	6/25/1993	HILLSBORO FIRE DEPT	WAFER WASH	0	CONTAINERS FOUND IN RENTAL HOUSE AFTER OCCUPANTS EVICTED BY COURT. LAND OWNER REPORT TO POLICE, THEN POILCE NOTIFIED FIRE DEPARTMENT. UPON INVESTIGATION THERE WERE NO SPILLS. OWNER WAS INFORMED THEY WERE RESPONSIBLE FOR ITS REMOVAL & PROPER DISPOSAL. OWNER CALLED RIEDEL INTL & TALKED TO LARRY FUNICHELLO & HE WAS SENDING A CHEMIST TO SCENE TO INVESTIGATE CONTENTS OF THE 55 GAL DRUM. HAZ MAT #9 WAS ALSO CALLED. THEY COULDN'T DO ANYTHING BECAUSE OF NO SPILL, ETC. (PAT TURINA FROM TEAM RIEDEL).
97124	960556	845 NW 231ST AVE	HILLSBORO	11/12/1996	HILLSBORO FIRE DEPT	MINERAL OIL	20 GALLONS	TWO TRANSFORMERS WITH ELECTRICAL INSULATING OIL WERE BROKEN SPILLING CONTENTS OUT INTO STREET AND CONTAINED DIRT. DIESEL FUEL FROM ONE TANK WAS LEAKING INTO DITCH, LESS THAN 5 GALS. PGE HAZ. MAT. CLEAN-UP TEAM ARRIVED ON SITE AND PROCEEDED TO CLEAN UP AND CONTAIN BOTH MATERIALS. DEQ CONTACTED BY LT. NAYLOR.
97124	930344	855 NW 227TH AVENUE	HILLSBORO	8/4/1993	HILLSBORO FIRE DEPT	UNKNOWN CHEMICAL	0	FIRE DEPARTMENT WAS CALLED TO SCENE BY MARVIN SHARP (1345 NW 228TH; 648-2533). HE STATED THAT BETWEEN 0900&1000 HOURS THIS DATE, HE OBSERVED A PERSON HE KNOWS BY SIGHT, SWEEPING AN OILY MATERIAL OUT OF BACK END OF PANEL TRUCK & ON TO THE ROADWAY. HE THEN THREW THE RAGS USED IN THIS PROCESS INTO THE ADJACENT DITCH. SEEING MR. SHARP & HIS WIFE, DOROTHY, THIS PERSON HURRIEDLY GOT INTO THE VEHICLE & DROVE OFF. THE MATERIAL HAD LEFT AN APPROX 4' X 4' PATCH ON THE ROAD. THERE WAS STILL A SMALL AMOUNT OF LIQUID PRESENT ON MY ARRIVAL & I TOOK A SAMPLE OF THIS. I ALSO TOOK ONE OF THE RAGS & A PIPE CONNECTION AS EVIDENCE. I PHOTOGRAPHED THE

								SCENE. ENGINE 103 APPLIED ABSORBENT MATERIAL & SWEPT THE ROADWAY. I CONTACTED GREG GRUNAW, THE DEQ DUTY OFFICER, & GAVE HIM THIS INFORMATION. HE SAID HE WOULD FORWARD IT TO THE APPROPRIATE PERSON FOR FOLLOW-UP.
97124	980284	HWY 26 @ MP 61	HILLSBORO	9/16/1998	HILLSBORO FIRE DEPT	DIESEL #2	30 GALLONS	NONE GIVEN
97124	970085	HWY 26 WB @ SHUTE RD	HILLSBORO	4/17/1997	HILLSBORO FIRE DEPT	DIESEL	135 GALLONS	THIS IS DIESEL FROM ONE FUEL TANK OF SEMI TRUCK INVOLVED IN MVA. ORS/ODOT/DEQ CONTACTED. ODOT HAS FOSS ENVIRONMENTAL & INFRASTRUCTURE TAKE OVER THE SCENE TO PERFORM CLEANUP
97124	950548	NW 219TH & BASELINE ST	HILLSBORO	10/10/1995	HAZMAT TEAM TUALATIN	DIESEL	30 GALLONS	DELIVERY VAN INVOLVED IN A MOTOR VEHICLE ACCIDENT. FUEL TANK STRUCK AND RIPPED OPEN SPILLING CONTENTS ON ROADWAY. TANK 30 GAL CAPACITY, 7 GAL PUMPED OUT AND RECOVERED. TANK WAS NEAR FULL AT TIME OF INCIDENT. ABSORBANT MATERIAL SPREAD OVER SPILL AREA AND
97124	980289	NW EVERGREEN/GLENCOE RD	HILLSBORO	8/19/1998	HILLSBORO FIRE DEPT	OIL	50 GALLONS	VEHICLE OIL SPILL APPROXIMATLY 50 GALLONS OVER 1 TO 2 MILES OF PUBLIC ROADWAY. NO RUNOFF OR EXPOSURE TO WATERWAY. OERS CONTACTED ALONG WITH DEQ. COUNTY AND CITY PUBLIC WORKS PROVIDED CLEAN UP UNDER ADVISEMENT OF DEQ "DON PETITT" BRETTHAUER OIL ASSISTED WITH ID ON SCENE. CONSULTED WITH HM9 WHICH OPTED NOT TO RESPOND INITIALLY AND WERE LATER ADVISED TO STANDBY AS CLEAN UP WAS UNDERWAY.

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Facility Summary Report

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Maps

Facility / Site Information for Location 47928

Facility/Site Name:	STANDRING HOLDINGS LLC	**Latitude:**	45° 34' 0.12"
Address:	24665 NW GROVELAND DRIVE	**Longitude:**	-122° 55' 56.64"
City State Zip:	HILLSBORO OR 97124	**Location Accuracy:**	HIGH
		Last Updated:	3/11/2003 11:25:27 AM

Aliases

STANDRING HOLDINGS LLC	LUST

Geographic Features

Township:	T1N-R2W-S16	**Congress Dist:**	1	**Forest Type:**	N/A
County:	WASHINGTON	**OR Senate Dist:**	15	**Vegetation:**	Agricultural cropland and pastureland
Watershed:	TUALATIN	**OR House Dist:**	30	**Agricultural Land:**	PREDOM IRR
Drinking Water Source:	N/A				

Oregon DEQ Program Information

Leaking Underground Storage Tanks (LUST)

Log Number	Received	Cleanup Initiated	Cleanup Complete	Type	Heating Oil Tank	UST Facility ID	Status	Detail Information[1]
34-03-0008		01/02/2003		NON_REGULATED	HEATING_OIL_TANK		CLEANUP_COMPLETED	LUST Site Report

[1] Linked reports may be unavailable from 9:00pm to 7:00am PST due to system maintenance.
[2] DEQ does not maintain air discharge permit information for Lane County.

More Information on this location

Oregon DEQ Neighborhood Info (by region/county)
See wells in the same Township Range Section from the Oregon Water Resources Department Well logs Application
See county's scanned assessor maps through ORMAP

[DEQ's Privacy Notice] [Contact DEQ] [Application Feedback]

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Oregon DEQ Facility Profiler 2.0

[Help] [Close Window]

Facility Summary Report

Return to Site Listing Print Report

Maps

Facility / Site Information for Location 27018

Facility/Site Name:	BAXTER, B HOT	**Latitude:**	45° 33' 52.1"
Address:	27700 NW MEEK ROAD	**Longitude:**	-122° 55' 38.8"
City State Zip:	HILLSBORO OR 97124	**Location Accuracy:**	HIGH
		Last Updated:	12/22/1998 12:00:00 AM

Aliases

BAXTER, B HOT	LUST

Geographic Features

Township:	T1N-R2W-S21	**Congress Dist:**	1	**Forest Type:**	N/A
County:	WASHINGTON	**OR Senate Dist:**	15	**Vegetation:**	Agricultural cropland and pastureland
Watershed:	TUALATIN	**OR House Dist:**	30	**Agricultural Land:**	PREDOM IRR
Drinking Water Source:	N/A				

Oregon DEQ Program Information

Leaking Underground Storage Tanks (LUST)

Log Number	Received	Cleanup Initiated	Cleanup Complete	Type	Heating Oil Tank	UST Facility ID	Status	Detail Information[1]
34-95-5166		08/06/1998		NON_REGULATED	HEATING_OIL_TANK		CLEANUP_COMPLETED	LUST Site Report

[1] Linked reports may be unavailable from 9:00pm to 7:00am PST due to system maintenance.
[2] DEQ does not maintain air discharge permit information for Lane County.

More Information on this location

Oregon DEQ Neighborhood Info (by region/county)
See wells in the same Township Range Section from the Oregon Water Resources Department Well logs Application
See county's scanned assessor maps through ORMAP

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Oregon DEQ Facility Profiler 2.0

[Help] [Close Window]

Facility Summary Report

Return to Site Listing Print Report

Maps

Facility / Site Information for Location 38833

Facility/Site Name:	BERGER FARMS	**Latitude:**	45° 33' 44.3"
Address:	5888 NW SHUTE RD	**Longitude:**	-122° 55' 24.2"
City State Zip:	HILLSBORO OR 97124	**Location Accuracy:**	HIGH
		Last Updated:	8/4/2010 3:50:21 PM

Aliases

BERGER FARMS	LUST

Geographic Features

Township:	T1N-R2W-S0	**Congress Dist:**	1	**Forest Type:**	N/A
County:	WASHINGTON	**OR Senate Dist:**	15	**Vegetation:**	Urban and industrial
Watershed:	TUALATIN	**OR House Dist:**	30	**Agricultural Land:**	PREDOM IRR
Drinking Water Source:	N/A				

Oregon DEQ Program Information

Leaking Underground Storage Tanks (LUST)

Log Number	Received	Cleanup Initiated	Cleanup Complete	Type	Heating Oil Tank	UST Facility ID	Status	Detail Information[1]
34-01-0032		06/08/2001		NON_REGULATED			CLEANUP_STARTED	LUST Site Report

[1] Linked reports may be unavailable from 9:00pm to 7:00am PST due to system maintenance.
[2] DEQ does not maintain air discharge permit information for Lane County.

More Information on this location

Oregon DEQ Neighborhood Info (by region/county)
See wells in the same Township Range Section from the Oregon Water Resources Department Well logs Application
See county's scanned assessor maps through ORMAP

[DEQ's Privacy Notice] [Contact DEQ] [Application Feedback]

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Oregon DEQ Facility Profiler 2.0

[Help] [Close Window]

Facility Summary Report

Return to Site Listing Print Report

Maps

Facility / Site Information for Location 43404

Facility/Site Name:	BERGER FARMS HOT	**Latitude:**	45° 33' 43.6"
Address:	5870 NW 242ND AVE	**Longitude:**	-122° 55' 32.2"
City State Zip:	HILLSBORO OR 97124	**Location Accuracy:**	HIGH
		Last Updated:	8/4/2010 3:14:18 PM

Aliases

BERGER FARMS HOT	LUST

Geographic Features

Township:	T1N-R2W-S0	**Congress Dist:**	1	**Forest Type:**	N/A
County:	WASHINGTON	**OR Senate Dist:**	15	**Vegetation:**	Urban and industrial
Watershed:	TUALATIN	**OR House Dist:**	30	**Agricultural Land:**	PREDOM IRR
Drinking Water Source:	N/A				

Oregon DEQ Program Information

Leaking Underground Storage Tanks (LUST)

Log Number	Received	Cleanup Initiated	Cleanup Complete	Type	Heating Oil Tank	UST Facility ID	Status	Detail Information[1]
34-01-8373		06/12/2001		NON_REGULATED	HEATING_OIL_TANK		CLEANUP_COMPLETED	LUST Site Report

[1] Linked reports may be unavailable from 9:00pm to 7:00am PST due to system maintenance.
[2] DEQ does not maintain air discharge permit information for Lane County.

More Information on this location

Oregon DEQ Neighborhood Info (by region/county)
See wells in the same Township Range Section from the Oregon Water Resources Department Well logs Application
See county's scanned assessor maps through ORMAP

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Oregon DEQ Facility Profiler 2.0

Facility Summary Report

Return to Site Listing Print Report

Maps

Facility / Site Information for Location 102830

Facility/Site Name:	LAAS, DONNIE	**Latitude:**	45° 33' 50.4"
Address:	6140 NW BIRCH AVE	**Longitude:**	-122° 55' 50.2"
City State Zip:	HILLSBORO OR 97124-8600	**Location Accuracy:**	HIGH
		Last Updated:	6/7/2007 8:20:41 AM

Aliases

Laas, Donnie	LUST

Geographic Features

Township:	T1N-R2W-S21	**Congress Dist:**	1	**Forest Type:**	N/A
County:	WASHINGTON	**OR Senate Dist:**	15	**Vegetation:**	Agricultural cropland and pastureland
Watershed:	TUALATIN	**OR House Dist:**	30	**Agricultural Land:**	PREDOM IRR
Drinking Water Source:	N/A				

Oregon DEQ Program Information

Leaking Underground Storage Tanks (LUST)

Log Number	Received	Cleanup Initiated	Cleanup Complete	Type	Heating Oil Tank	UST Facility ID	Status	Detail Information[1]
34-07-0796				NON_REGULATED	HEATING_OIL_TANK		CLEANUP_COMPLETED	LUST Site Report

[1] Linked reports may be unavailable from 9:00pm to 7:00am PST due to system maintenance.
[2] DEQ does not maintain air discharge permit information for Lane County.

More Information on this location

Oregon DEQ Neighborhood Info (by region/county)
See wells in the same Township Range Section from the Oregon Water Resources Department Well logs Application
See county's scanned assessor maps through ORMAP

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Oregon DEQ Facility Profiler 2.0

Facility Summary Report

Return to Site Listing Print Report

Maps

Facility / Site Information for Location 24899

Facility/Site Name:	HAGG, R HOT	**Latitude:**	45° 33' 19.1"
Address:	4825 NW 253RD AVE	**Longitude:**	-122° 56' 12.8"
City State Zip:	HILLSBORO OR 97124-5701	**Location Accuracy:**	HIGH
		Last Updated:	2/15/2006 8:06:00 AM

Aliases

HAAG, RAY II	LUST	HAGG, R HOT	LUST

Geographic Features

Township:	T1N-R2W-S21	**Congress Dist:**	1	**Forest Type:**	N/A
County:	WASHINGTON	**OR Senate Dist:**	15	**Vegetation:**	Agricultural cropland and pastureland
Watershed:	TUALATIN	**OR House Dist:**	30	**Agricultural Land:**	PREDOM IRR
Drinking Water Source:	N/A				

Oregon DEQ Program Information

Leaking Underground Storage Tanks (LUST)

Log Number	Received	Cleanup Initiated	Cleanup Complete	Type	Heating Oil Tank	UST Facility ID	Status	Detail Information[1]
34-04-0494		03/30/2004		NON_REGULATED	HEATING_OIL_TANK		CLEANUP_COMPLETED	LUST Site Report
34-90-0301		08/22/1990		NON_REGULATED	HEATING_OIL_TANK		CLEANUP_COMPLETED	LUST Site Report

[1] Linked reports may be unavailable from 9:00pm to 7:00am PST due to system maintenance.
[2] DEQ does not maintain air discharge permit information for Lane County.

More Information on this location

Oregon DEQ Neighborhood Info (by region/county)
See wells in the same Township Range Section from the Oregon Water Resources Department Well logs Application
See county's scanned assessor maps through ORMAP

[DEQ's Privacy Notice] [Contact DEQ] [Application Feedback]

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Oregon DEQ Facility Profiler 2.0

[Help] [Close Window]

Facility Summary Report

Return to Site Listing Print Report

Maps

Facility / Site Information for Location 39221

Facility/Site Name:	WEST UNION ELEMENTARY SCHOOL	**Latitude:**	45° 34' 39"
Address:	23870 NW WEST UNION RD	**Longitude:**	-122° 55' 22"
City State Zip:	HILLSBORO OR 97124	**Location Accuracy:**	HIGH
		Last Updated:	9/29/2004 4:55:00 PM

Aliases

WEST UNION ELEMENTARY SCHOOL	LUST

Geographic Features

Township:	T1N-R2W-S10	**Congress Dist:**	1	**Forest Type:**	N/A
County:	WASHINGTON	**OR Senate Dist:**	17	**Vegetation:**	Urban and industrial
Watershed:	TUALATIN	**OR House Dist:**	33	**Agricultural Land:**	PREDOM IRR
Drinking Water Source:	N/A				

Oregon DEQ Program Information

Leaking Underground Storage Tanks (LUST)

Log Number	Received	Cleanup Initiated	Cleanup Complete	Type	Heating Oil Tank	UST Facility ID	Status	Detail Information[1]
34-01-6518		07/23/2001		NON_REGULATED	HEATING_OIL_TANK		CLEANUP_COMPLETED	LUST Site Report

[1] Linked reports may be unavailable from 9:00pm to 7:00am PST due to system maintenance.
[2] DEQ does not maintain air discharge permit information for Lane County.

More Information on this location

Oregon DEQ Neighborhood Info (by region/county)
See wells in the same Township Range Section from the Oregon Water Resources Department Well logs Application
See county's scanned assessor maps through ORMAP

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Oregon DEQ Facility Profiler 2.0

[Help] [Close Window]

Facility Summary Report

Return to Site Listing Print Report

Maps

Facility / Site Information for Location 35167

Facility/Site Name:	SEVERSON PROPERTY	**Latitude:**	45° 33' 3.6"
Address:	23265 NE EVERGREEN PARKWAY	**Longitude:**	-122° 55' 3.7"
City State Zip:	HILLSBORO OR 97124	**Location Accuracy:**	HIGH
		Last Updated:	3/21/2002 4:32:00 PM

Aliases

SEVERSON PROPERTY	LUST

Geographic Features

Township:	T1N-R2W-S0	**Congress Dist:**	1	**Forest Type:**	N/A
County:	WASHINGTON	**OR Senate Dist:**	15	**Vegetation:**	Urban and industrial
Watershed:	TUALATIN	**OR House Dist:**	30	**Agricultural Land:**	PREDOM IRR
Drinking Water Source:		N/A			

Oregon DEQ Program Information

Leaking Underground Storage Tanks (LUST)

Log Number	Received	Cleanup Initiated	Cleanup Complete	Type	Heating Oil Tank	UST Facility ID	Status	Detail Information[1]
34-00-0633		05/01/2000		NON_REGULATED	HEATING_OIL_TANK		CLEANUP_COMPLETED	LUST Site Report

[1] Linked reports may be unavailable from 9:00pm to 7:00am PST due to system maintenance.
[2] DEQ does not maintain air discharge permit information for Lane County.

More Information on this location

Oregon DEQ Neighborhood Info (by region/county)
See wells in the same Township Range Section from the Oregon Water Resources Department Well logs Application
See county's scanned assessor maps through ORMAP

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Appendix G. Oregon Historic Preservation Office Oregon Historic Site Records

Oregon Historic Site Record

LOCATION AND PROPERTY NAME

address:	26385 NW Groveland Dr Hillsboro, Washington County	**historic name:**	Rice, Richard & Helen, House
		current/other names:	Rice NW Museum Of Rocks And Minerals
assoc addresses:		**block/lot/tax lot:**	
location descr:		**twnshp/rng/sect/qtr sect:**	

PROPERTY CHARACTERISTICS

resource type:	Building	**height (stories):**	1.0	**total elig resources:**	4	**total inelig resources:**	2
elig evaluation:	eligible/significant			**NR Status:**	Individually Listed		
prim constr date:	1953	**second date:**		**date indiv listed:**	11/29/2006		

primary orig use:	Single Dwelling	**orig use comments:**	
second orig use:			
primary style:	Ranch (Type)	**prim style comments:**	
secondary style:		**sec style comments:**	
primary siding:	Sandstone	**siding comments:**	
secondary siding:			
plan type:	Ranch/Rambler	**architect:**	Wayman, William F. (designer); Charles F. Walters (landscaper)
		builder:	Victor Batchelar

comments/notes:

GROUPINGS / ASSOCIATIONS

Survey/Grouping Included In:	Type of Grouping	Date Listed	Date Compiled
Farmstead/Cluster Name:			

SHPO INFORMATION FOR THIS PROPERTY

NR date listed:	11/29/2006
ILS survey date:	
RLS survey date:	
Gen file date:	

106 Project(s)

SHPO Case	Date	Agency Effect Eval

ARCHITECTURAL / PROPERTY DESCRIPTION

(Includes expanded description of the building/property, setting, significant landscape features, outbuildings and alterations)

HISTORY

(Chronological, descriptive history of the property from its construction through at least the historic period - preferably to the present)

RESEARCH INFORMATION

Title Records	Census Records	Property Tax Records	Local Histories
Sanborn Maps	Biographical Sources	SHPO Files	Interviews
Obituaries	Newspapers	State Archives	Historic Photographs
City Directories	Building Permits	State Library	

Local Library:		**University Library:**	
Historical Society:		**Other Respository:**	

Bibliography:

Oregon Historic Site Record

LOCATION AND PROPERTY NAME

address:	W Union Rd West Union, Washington County	**historic name:**	West Union Baptist Church
		current/other names:	
assoc addresses:		**block/lot/tax lot:**	
location descr:		**twnshp/rng/sect/qtr sect:**	01N 02W 14

PROPERTY CHARACTERISTICS

resource type:	Building	**height (stories):**	1.0	**total elig resources:**	1	**total inelig resources:**	
elig evaluation:	eligible/significant			**NR Status:**	Individually Listed		
prim constr date:	c.1853	**second date:**		**date indiv listed:**	07/10/1974		

primary orig use:	Religious Facility	**orig use comments:**	
second orig use:			
primary style:	Vernacular	**prim style comments:**	
secondary style:	Classical Revival: other	**sec style comments:**	
primary siding:	Wood:Other/Undefined	**siding comments:**	
secondary siding:			
plan type:		**architect:**	Kane, William
		builder:	Unknown

comments/notes:

GROUPINGS / ASSOCIATIONS

Survey/Grouping Included In:	Type of Grouping	Date Listed	Date Compiled
Farmstead/Cluster Name:			

SHPO INFORMATION FOR THIS PROPERTY

NR date listed:	07/10/1974
ILS survey date:	
RLS survey date:	
Gen file date:	

106 Project(s)

SHPO Case	Date	Agency Effect Eval

ARCHITECTURAL / PROPERTY DESCRIPTION

(Includes expanded description of the building/property, setting, significant landscape features, outbuildings and alterations)

HISTORY

(Chronological, descriptive history of the property from its construction through at least the historic period - preferably to the present)

RESEARCH INFORMATION

Title Records	Census Records	Property Tax Records	Local Histories
Sanborn Maps	Biographical Sources	SHPO Files	Interviews
Obituaries	Newspapers	State Archives	Historic Photographs
City Directories	Building Permits	State Library	

Local Library:		**University Library:**	
Historical Society:		**Other Respository:**	

Bibliography:

Oregon Historic Site Record

LOCATION AND PROPERTY NAME

address:	24665 NW Groveland Dr Hillsboro, Washington County	**historic name:**	Chambers, James & Mary, House
		current/other names:	
assoc addresses:		**block/lot/tax lot:**	
location descr:		**twnshp/rng/sect/qtr sect:**	01N 02W 15

PROPERTY CHARACTERISTICS

resource type:	Building	**height (stories):**	1.5	**total elig resources:**	**total inelig resources:**
elig evaluation:	eligible/contributing			**NR Status:**	
prim constr date:	c.1865	**second date:**		**date indiv listed:**	

primary orig use:	Single Dwelling	**orig use comments:**	
second orig use:			
primary style:	Vernacular	**prim style comments:**	
secondary style:		**sec style comments:**	
primary siding:	Horizontal Board	**siding comments:**	
secondary siding:	Wood:Other/Undefined		
plan type:		**architect:**	
		builder:	

comments/notes:

GROUPINGS / ASSOCIATIONS

Survey/Grouping Included In:	Type of Grouping	Date Listed	Date Compiled
Farmstead/Cluster Name:			

SHPO INFORMATION FOR THIS PROPERTY

NR date listed:	106 Project(s)
ILS survey date:	**SHPO Case** **Date** **Agency Effect Eval**
RLS survey date:	
Gen file date:	

ARCHITECTURAL / PROPERTY DESCRIPTION

(Includes expanded description of the building/property, setting, significant landscape features, outbuildings and alterations)

HISTORY

(Chronological, descriptive history of the property from its construction through at least the historic period - preferably to the present)

RESEARCH INFORMATION

Title Records	Census Records	Property Tax Records	Local Histories
Sanborn Maps	Biographical Sources	SHPO Files	Interviews
Obituaries	Newspapers	State Archives	Historic Photographs
City Directories	Building Permits	State Library	

Local Library:	**University Library:**
Historical Society:	**Other Respository:**

Bibliography:

Oregon Historic Site Record

LOCATION AND PROPERTY NAME

address:	4825 NW 253rd Ave Hillsboro, Washington County	**historic name:**	Shute, T W & Lizzie, House & Barn
		current/other names:	
assoc addresses:		**block/lot/tax lot:**	
location descr:		**twnshp/rng/sect/qtr sect:**	01N 02W 21

PROPERTY CHARACTERISTICS

resource type:	Building	**height (stories):**	2.0	**total elig resources:**	**total inelig resources:**
elig evaluation:	eligible/contributing			**NR Status:**	
prim constr date:	c.1890	**second date:**	1909	**date indiv listed:**	

primary orig use:	Single Dwelling	**orig use comments:**	
second orig use:			
primary style:	Queen Anne	**prim style comments:**	
secondary style:		**sec style comments:**	
primary siding:	Horizontal Board	**siding comments:**	
secondary siding:	Shingle		
plan type:		**architect:**	
		builder:	

comments/notes:

GROUPINGS / ASSOCIATIONS

Survey/Grouping Included In:	Type of Grouping	Date Listed	Date Compiled
Farmstead/Cluster Name:			

SHPO INFORMATION FOR THIS PROPERTY

NR date listed:	
ILS survey date:	
RLS survey date:	
Gen file date:	

106 Project(s)

SHPO Case	Date	Agency Effect Eval

ARCHITECTURAL / PROPERTY DESCRIPTION

(Includes expanded description of the building/property, setting, significant landscape features, outbuildings and alterations)

HISTORY

(Chronological, descriptive history of the property from its construction through at least the historic period - preferably to the present)

RESEARCH INFORMATION

Title Records	Census Records	Property Tax Records	Local Histories
Sanborn Maps	Biographical Sources	SHPO Files	Interviews
Obituaries	Newspapers	State Archives	Historic Photographs
City Directories	Building Permits	State Library	

Local Library:	**University Library:**
Historical Society:	**Other Respository:**

Bibliography:

Oregon Historic Site Record

LOCATION AND PROPERTY NAME

address:	21860 NW Imbrie Dr	**historic name:**	Imbrie Farm
	Hillsboro, Washington County	**current/other names:**	Imbrie, Robert, House; Imbrie, Frank, Farmstead
assoc addresses:	Rt 1 Box 223; 4045 NW Cornelius Pass Rd	**block/lot/tax lot:**	
location descr:		**twnshp/rng/sect/qtr sect:**	01N 02W 23

PROPERTY CHARACTERISTICS

resource type:	Building	**height (stories):**	2.0	**total elig resources:**	4	**total inelig resources:**	
elig evaluation:	eligible/significant			**NR Status:**	Individually Listed		
prim constr date:	1866	**second date:**	1913	**date indiv listed:**	02/15/1977		

primary orig use:	Farmstead	**orig use comments:**	
second orig use:	Agric. Outbuilding		
primary style:	Italianate	**prim style comments:**	
secondary style:		**sec style comments:**	
primary siding:	Wood:Other/Undefined	**siding comments:**	
secondary siding:			
plan type:		**architect:**	Unknown
		builder:	Unknown

comments/notes:

CR-B

GROUPINGS / ASSOCIATIONS

Survey/Grouping Included In:	Type of Grouping	Date Listed	Date Compiled
Hillsboro Local Inventory Update 2008	Survey & Inventory Project		2008

Farmstead/Cluster Name: Imbrie Farm

SHPO INFORMATION FOR THIS PROPERTY

NR date listed:	02/15/1977
ILS survey date:	
RLS survey date:	
Gen file date:	

106 Project(s)

SHPO Case	Date	Agency Effect Eval

ARCHITECTURAL / PROPERTY DESCRIPTION

(Includes expanded description of the building/property, setting, significant landscape features, outbuildings and alterations)

Architectural Description: The property consists of a house, octagonal barn, grainery and orchards. The frame house was built c.1866 in the manner popularized by Calvert Vaux's architectural design book Villas and Cottages. It is a typical two-story Italian Villa with attic and cellar. It's dimensions, excluding porches, are 25' x 42'. The rooms are arranged semiformally around a stair hall. The center three bays of the main façade are projected under a gable. The main story includes a living room, formal hall, family room, dining room, pantry, kitchen and bath. The upstairs is composed of three bedrooms, each with an adjoining room. There is a formal stairway leading upstairs from the front hall and another stairway from the pantry. The front porch is 10' x 16'. It has a parapet, and its members are simple and squared, compared to the finishing of the cornice, doors, window framements, etc. The railing is crudely nailed to the façade. Access to the roof of the porch is given by a door aligned with the entry in the upper story. The back porch is about eight feet square. A garage is attached to the rear of the house by a causeway roof. Of the foundation, a thirty-inch ground course of brick is exposed. It is faced with stucco laid in a rectangular pattern and articulated by expansion joints. The exterior trim is in keeping with the keynote of the Italian Villa mode, namely the allusion to Renaissance detailing. All corners are decorated with staggered quoining of wood. Under the cornice is a deep, molded entablature, and decorated brackets. At the time the exterior was covered with composition siding, care was taken to replace the quoins. The window framements consist of lintels, brackets, and kneed frames. The double hung sash holds two lights each. There is a shallow, one-foot vestibule with molded paneling preceding the main entry. Old hinges remaining indicate that there was once an outer door or screening of some sort. The front door is divided , in the French manner, pierced by two tall lights with rounded arch heads, and decorated with elaborate molded panels. The interior trim consists of wainscoting of tongue-in-groove battens and chair rail. The family room chimney piece has been restyled in the Craftsman tradition with Roman bricks and mantle piece supported by plain modillions. The grainery was built c. 1855 and is a simple four-sided building with interior sections divided for grain storage. The basic structure of the building was built entirely with hand-hewn timbers, which were notched and pegged together providing strong support. The exterior is composed of batten siding. The octagonal barn was built in 1913, as the original log barn was removed to make way for the Orenco spur of the Oregon Electric Railway track. The entire barn is made of cedar. There is neither a silo nor a central post in the barn. The uncluttered central haymow is made possible by a superb roof of radiating rafters. On the ground floor there are cattle stalls as an extension of the floor of mow. The second floor, which looks down over the central haymow, was also meant to store loose hay. Site and Environment: The grounds, at once disciplined and romantic, are laid out in accordance with the principal landscaping aesthetic of the day, that advanced by sometime associates Andrew Jackson Downing and Calvert Vaux. An imposing approach is created by a circular fore-court lined with weeping birches and catalpa. An orchard, including three ancient Chestnut trees, lies to the north, the filbert orchard to the south. Interspersed throughout the grounds are fir trees, walnut, cherry spirea, Japanese maple, hawthorne, Giant Arborvitae, boxwood, Silver maple, Big-Leaf maple, Flowering Quince, Cryptomeria, rhododendrons, firethorn, Oregon grape, Buddelia, holly and laurel. The undercover of perennials and herbaceous plants includes ferns, roses, iris, sweet william, columbine, violets, peonies, etc. In addition to the landscaping around the house, there are two orchards, located on the north and south of the main entrance containing mature filbert and English walnut plantings. There trees are about twenty feet high and provide good shade. Description of Conditions and Alterations: A. House- Excellent condition; altered. Alterations in the house include the following 1. Bathroom and kitchen have been re-modeled, 1971 2. Composition roofing replaces the shakes of 100 years ago, 1975 3. Composition siding covers the original wood, 1954 4. The front porch no longer extends the length of the house, date unknown B. Grainery – Fair condition; altered. In the grainery a concrete floor has been poured and grain bins have been reinforced with wooden divisions and steel crossbars, c. 1948. C. Octagon Barn – Deteriorated condition; slightly altered. The octagon barn is missing the original cupola, otherwise it is unaltered, date unknown.

HISTORY

(Chronological, descriptive history of the property from its construction through at least the historic period - preferably to the present)

Historical significance: The Imbrie Farm complex is one of the finest collections of rural architecture in Oregon. The farm house alone is one of the finest examples of Italian Villa architecture within the state. James and Robert Imbrie were among the earliest permanent settlers in Washington County. Amazingly, the family has maintained ownership of the farm to the present, and they have carefully and thoughtfully maintained all of the buildings. The Imbrie farm has been owned and operated by five generations of the Imbrie family. The first Imbrie to migrate westward was James Imbrie, a second-generation American born citizen whose grandfather participated in the Revolutionary War. He arrived, according to family history, in 1844, and his first claim to Washington County land appeared in the Provisional Government records in May 1847. James Imbrie's role in local history was not distinguished, but he was a successful farmer and stock raiser and a respected member of the Tualatin Plains community. In 1853 he joined with others under the leadership of Simon Reed in agitation for a territorial road which would connect the productive plains to the fast growing shipping outlets north of the Columbia. He also had a part in other political developments in his area, as Territorial Government documents show that he was a signer of a petition to fix the boundary of Champoeg County, signer of a petition for a "Nehalem" County, and a signer of other petitions for miscellaneous domestic affairs. James Imbrie's younger brother, Robert, who was born in Ohio on August 21, 1831 and later lived in Illinois, came to Oregon with his wife and mother in 1859. They took the route around the Isthmus of Panama, the same route his brother James had taken. On their arrival in Oregon they stayed with James and his family while deciding on a location for their home. Robert obtained a Land Grant and purchased a number of other claims from various neighbors until the time of his death he owned about 1,500 acres in Washington County with additional large holdings of land in Eastern Washington. Their first home was a log cabin, but in 1866 they built on the same site of the present home. Family history states that the first room to be completed was the present dining room, in order to be used for the birth of Frank on June 8, 1869. Robert was also very active in the community affairs and at the time of his death on January 5, 1897, the Hillsboro Argus paid him great tribute, stressing his readiness to contribute benevolent purposes and give a helping hand. He was president of the Washington County Agricultural Society and quite active on various committees for the State Fair. He was also one of the original members of the Hillsboro Grange and a member of Tuality Lodge, No. 6, A.F. and A.M. Robert and his wife had twelve children, six of whom were living at the time of his death. The property has stayed in the family line going from Robert to one of his twelve children, Frank. Frank had only one son, James Hay, who then had four sons. James Hay Imbrie's wife, Lillian Berger Imbrie, still lives at the century old home. The architecture of each of the buildings is significant in its own right. The octagon barn, considered an oddity in the Tualatin plains area, was designed and built by Frank Imbrie in 1913. The grainery is a fine example of pioneer construction and techniques as it is entirely hand-hewn cedar timbers which are notched and pegged together. The house is an extraordinary structure for a farm house built during the early period of Oregon statehood. It is of unusual design and was obviously built by a wealthy farmer with some imagination. The site is a well preserved example of a prosperous farm in the Post-Reconstruction Era. The combination of the existing buildings makes this one of the finest examples of late nineteenth century farm complexes in Oregon.

RESEARCH INFORMATION

Title Records	Census Records	Property Tax Records	Local Histories
Sanborn Maps	Biographical Sources	SHPO Files	Interviews
Obituaries	Newspapers	State Archives	Historic Photographs
City Directories	Building Permits	State Library	

Local Library:

University Library:

Historical Society:

Other Respository:

Bibliography:

Sources Consulted: Arthur, Eric and Witney. The Barn: A Vanishing Landmark in North America. Toronto: A&W Visual Library, 1972. 253 pp. Curly, Lottie. Oregon Donation Land Claims. Washington County Historical Library. Imbrie, Boyd V. Geneology of the Imbrie Family of Western Pennsylvania. Pittsburg, 1953. Mooberry, Lester. "Discovery of Log Cabin Homes of Early Pioneers, One of the Highlights of Oregon Centennial Observance", Hillsboro Argus, May 12, 1960. Oregon Department of Parks and Recreation. Area Investigation, Imbrie Farm Historic Site. William K. Riesland, June 13, 1966. Sites, Ann. Barns, Barns, Barns, A Sampling of Vernacular Architecture in the Tualatin Plains Area of Oregon. Unpublished paper. Washington County Historical Society Library, December 31, 1969. Washington County Historical Society. Genealogical Material in Oregon Donation Land Claims, Volume II, abstracted from applications by the Genealogical Forum of Portland, Oregon, 1959. Washington County Historical Society, "Impressions and Observations of the Journal Man", June 2, 1935.

Oregon Historic Site Form

LOCATION AND PROPERTY NAME

address: **NW Casper Lane, South of NW Jacobsen, Helvetia Road** ☐ apprx. addrs

Hillsboro ☐ vcnt **Washington County**

historic name: **Five Oaks Site**

current/ other names:

Optional Information

assoc addresses:
(former addresses, intersections, etc.)

location descr:
(remote sites)

block nbr: ____ lot nbr: ____ tax lot nbr: ____

township: ____ range: ____ section: ____ 1/4: ____

zip: ____

PROPERTY CHARACTERISTICS

resource type: **site** height (# stories): ____

elig. evaluation: **undetermined**

primary constr date: ____ (c.) ☐ secondary date: ____ (c.) ☐
(optional--use for major addns)

primary orig use: **Natural Feature**

secondary orig use: ____

primary style: **Not Applicable**

secondary style: ____

primary siding: ____

secondary siding: ____

plan type: ____

total # eligible resources: **1** total # ineligible resources: ☐

NR status: ____

NR date listed: ____ (indiv listed only; see Grouping for hist dist)

orig use comments: ____

prim style comments: ____

sec style comments: ____

siding comments: ____

architect: ____

builder: ____

comments/notes: **Site of historic meeting location; trees planted c. 16□□**

GROUPINGS / ASSOCIATIONS

survey project name or other grouping name: Hillsboro Local Inventory Update 2008 2008 | Survey & Inventory Project

farmstead/cluster name:

external site #: 113/317
(ID# used in city/agency database)

SHPO INFO FOR THIS PROPERTY

NR date listed: ____ ____

ILS survey date: ____

RLS survey date: **7/1/2□□8**

Gen File date: ____

106 Project(s)

Oregon Historic Site Form

ARCHITECTURAL / PROPERTY DESCRIPTION

(Include expanded description of the building/property, setting, significant landscape features, outbuildings, and alterations)

Contextual Description:

☐

The Five Oaks Meeting Place is located north of Sunset Highway and east of Helvetia Road in a wheat field. The trees, of which only three stand, can be easily viewed by freeway traffic. Another set of five oaks are sited to the south off of Jackson Road.

HISTORY

(Chronological, descriptive history of the property from its construction through at least the historic period [preferably to the present])

Historical Significance:

The Five Oaks Meeting Place was host to both Indian and early pioneers. The circle of five large Oregon white oak trees was called by the Indians, Cha-ta-kuin, place of big trees, and was used frequently as a camping spot. It is believed that the Tuality District, of which Washington County was a part, was organized in the grove next to the Five Oaks. This spot was referred to as the Five Oaks by Joe Meek and the Mountain Men, organizers of the first American farming community in the west. Estimated to be from four to six hundred years old, these historic trees witnessed many types of gatherings dating back to at least 1830. The Mountain Men and early pioneers in the area used this area as a social center for Fourth of July picnics, religious revivals, horse races and sessions of the County court. It is told that at one of the Fourth of July gatherings over one thousand Indians and two hundred settlers celebrated together. In later years, when Portland became the trading center, Five Oaks continued to be the stopping place for settlers on their way to Portland to do their trading. Two of the five oaks, located on the original A. Zachary Donation Land Claim, were blown down by storms during the late 1940's. Of the three oaks still standing, one is dead. A living testimonial to both Native American and early white settlement activities, the Five Oaks Meeting Place is a significant historic site for Washington County and the State of Oregon.

RESEARCH INFORMATION

(Check all of the basic sources consulted and cite specific important sources)

☐ Title Records	☐ Census Records	☐ Property Tax Records	☐ Local Histories
☐ Sanborn Maps	☐ Biographical Sources	☐ SHPO Files	☐ Interviews
☐ Obituaries	☑ Newspapers	☐ State Archives	☐ Historic Photographs
☐ City Directories	☐ Building Permits	☐ State Library	

Local Library: _____ University Library: _____

Historical Society: _____ Other Repository: _____

Bibliography: Sources Consulted:

Benson, Robert L., State of Orgeon Historic Sites and Building, Washington County.

West Union Centennial 1851-1951. Printed by the Hillsboro Argus, p. 28.

Recorded by: McLaughlin, Emde, and O'Brien, Cole, September 1983.

Oregon Historic Site Record

LOCATION AND PROPERTY NAME

address:	NW Casper Ln (approx) Hillsboro, Washington County	**historic name:**	Five Oaks Meeting Place
assoc addresses:		**current/other names:** **block/lot/tax lot:**	
location descr:	Sunset Hwy & Helvetia Rd; S of NW Jacobsen, Helvetia Rd	**twnshp/rng/sect/qtr sect:**	01N 02W 15

PROPERTY CHARACTERISTICS

resource type:	Site	**height (stories):**		**total elig resources:**	1	**total inelig resources:**	0
elig evaluation:	undetermined			**NR Status:**			
prim constr date:	c.1830	**second date:**	1940	**date indiv listed:**			

primary orig use:	Natural Feature	**orig use comments:**	
second orig use:	SOCIAL: General		
primary style:	Not Applicable	**prim style comments:**	
secondary style:		**sec style comments:**	
primary siding:		**siding comments:**	
secondary siding:			
plan type:		**architect:**	
		builder:	

comments/notes:

grove of trees traditionally used as meeting place; Site of historic meeting location; trees planted c. 1600

GROUPINGS / ASSOCIATIONS

Survey/Grouping Included In:	Type of Grouping	Date Listed	Date Compiled
Hillsboro Local Inventory Update 2008	Survey & Inventory Project		2008

Farmstead/Cluster Name:

SHPO INFORMATION FOR THIS PROPERTY

NR date listed:	
ILS survey date:	
RLS survey date:	07/01/2008
Gen file date:	

106 Project(s)

SHPO Case	Date	Agency Effect Eval

ARCHITECTURAL / PROPERTY DESCRIPTION

(Includes expanded description of the building/property, setting, significant landscape features, outbuildings and alterations)

Contextual Description: The Five Oaks Meeting Place is located north of Sunset Highway and east of Helvetia Road in a wheat field. The trees, of which only three stand, can be easily viewed by freeway traffic. Another set of five oaks are sited to the south off of Jackson Road.

HISTORY

(Chronological, descriptive history of the property from its construction through at least the historic period - preferably to the present)

Historical Significance: The Five Oaks Meeting Place was host to both Indian and early pioneers. The circle of five large Oregon white oak trees was called by the Indians, Cha-ta-kuin, place of big trees, and was used frequently as a camping spot. It is believed that the Tuality District, of which Washington County was a part, was organized in the grove next to the Five Oaks. This spot was referred to as the Five Oaks by Joe Meek and the Mountain Men, organizers of the first American farming community in the west. Estimated to be from four to six hundred years old, these historic trees witnessed many types of gatherings dating back to at least 1830. The Mountain Men and early pioneers in the area used this area as a social center for Fourth of July picnics, religious revivals, horse races and sessions of the County court. It is told that at one of the Fourth of July gatherings over one thousand Indians and two hundred settlers celebrated together. In later years, when Portland became the trading center, Five Oaks continued to be the stopping place for settlers on their way to Portland to do their trading. Two of the five oaks, located on the original A. Zachary Donation Land Claim, were blown down by storms during the late 1940's. Of the three oaks still standing, one is dead. A living testimonial to both Native American and early white settlement activities, the Five Oaks Meeting Place is a significant historic site for Washington County and the State of Oregon.

RESEARCH INFORMATION

Title Records	Census Records	Property Tax Records	Local Histories
Sanborn Maps	Biographical Sources	SHPO Files	Interviews
Obituaries	✔ Newspapers	State Archives	Historic Photographs
City Directories	Building Permits	State Library	

Local Library:		**University Library:**	
Historical Society:		**Other Respository:**	

Bibliography:

Sources Consulted: Benson, Robert L., State of Orgeon Historic Sites and Building, Washington County. West Union Centennial 1851-1951. Printed by the Hillsboro Argus, p. 28. Recorded by: McLaughlin, Emde, and O'Brien, Cole, September 1983.

Oregon Historic Site Record

LOCATION AND PROPERTY NAME

address:	253rd St Hillsboro, Washington County	**historic name:**	Methodist Meeting House Site
		current/other names:	
assoc addresses:		**block/lot/tax lot:**	
location descr:		**twnshp/rng/sect/qtr sect:**	01N 02W 21

PROPERTY CHARACTERISTICS

resource type:	Site	**height (stories):**		**total elig resources:**	1	**total inelig resources:**	0
elig evaluation:	undetermined			**NR Status:**			
prim constr date:	1843	**second date:**	1844	**date indiv listed:**			

primary orig use:	RELIGION: General	**orig use comments:**	
second orig use:			
primary style:	Other / Undefined	**prim style comments:**	
secondary style:		**sec style comments:**	
primary siding:		**siding comments:**	
secondary siding:			
plan type:		**architect:**	
		builder:	

comments/notes:

In county

GROUPINGS / ASSOCIATIONS

Survey/Grouping Included In:	Type of Grouping	Date Listed	Date Compiled
Hillsboro Local Inventory Update 2008	Survey & Inventory Project		2008

Farmstead/Cluster Name:

SHPO INFORMATION FOR THIS PROPERTY

NR date listed:	
ILS survey date:	
RLS survey date:	
Gen file date:	

106 Project(s)

SHPO Case	Date	Agency Effect Eval

ARCHITECTURAL / PROPERTY DESCRIPTION

(Includes expanded description of the building/property, setting, significant landscape features, outbuildings and alterations)

Contextual Description: The site of the Methodist Meeting House is in the Tualatin Plains, five miles Northeast of Hillsboro. It was located east of 253rd Avenue, across from the Shute residence on the Richard Constable Donation Land Claim. A thick grove of fir trees and berry bushes are north of the field.

HISTORY

(Chronological, descriptive history of the property from its construction through at least the historic period - preferably to the present)

Historical Significance: The Methodist Meeting House was the forerunner of the Hillsboro Methodist Church. The Meeting House was constructed in 1844 by Reverend Joseph Hosgry, on the Richard Constable Farm. There is no evidence that the church members had legal rights to this property, as no deed was issued. The building resembled an early day church; it had a belfry but no bell. It is said that the church members could not afford to buy a bell. Prior to the construction of the Meeting House, camp meetings were help outdoors on this site. Jason Lee preached his first sermon here on Sunday, July 12, 1843, with a congregation of 16 people. A week later, 60 people came here for the meeting, which was followed by services in the home of Richard Constable. Constable later helped organize and build the Meeting House. Rev. James Cave preached at the Meeting House until 1860, when Rev. C. C. Hosford took over. The Meeting House was used by other denominations and for other purposes besides church services. The Baptists conducted services in the building from 1845-1852. During the early days of the Territorial and Provisional Governments, court sessions were held at the Meeting House. By 1865, a site had both been purchased in Hillsboro for a new church by a group of trustees. This site was sold shortly thereafter, and a new site for the church was purchased on what is now the corner of 3rd and Washington Streets. People stopped attending the Meeting House, and the church was abandoned in 1865. It was dismantled at this time by William O. Gibson and James Gibson, and the timber was hauled to Hillsboro for reconstruction of the new church. This church was started, but was not completed until 1872. It did have a bell, brought from Portland, for the belfry. It is said that there was an Indian uprising near the Methodist Meeting House in 1855. Because the church was the largest building at that time in the Plains area, church members built a stockade around the church to defend their families in case of an attack. After the Indian threat subsided, the fence was removed. The site of the Methodist Meeting House is significant in its association with the religious activities of early Washington County pioneers. The actual siting of the Methodist Meeting House is unclear, although it is reputed to be in the general area of the Constable DLC. It is a very important settlement area in HGA 4.

RESEARCH INFORMATION

Title Records	Census Records	Property Tax Records	Local Histories
Sanborn Maps	Biographical Sources	SHPO Files	Interviews
Obituaries	✔ Newspapers	State Archives	Historic Photographs
City Directories	Building Permits	State Library	

Local Library:		**University Library:**	
Historical Society:		**Other Respository:**	

Bibliography:

Sources Consulted: Washington County Museum, Vertical Files: Methodist Churches: Lester C. Mooberry. “The Methodist Church”, 1859. pp. 1-7. Nixon, Birgetta, Ed. Hillsboro Argus-Bicentennial Edition, Washington County, 1976. P. 108.

Oregon Historic Site Record

LOCATION AND PROPERTY NAME

address:	Evergreen & Sewell Rds Hillsboro, Washington County	**historic name:**	Sewell Clay Works
		current/other names:	North Pacific Clay Works
assoc addresses:		**block/lot/tax lot:**	
location descr:		**twnshp/rng/sect/qtr sect:**	01N 02W 20

PROPERTY CHARACTERISTICS

resource type:	Site	**height (stories):**	**total elig resources:**	1	**total inelig resources:**
elig evaluation:	undetermined		**NR Status:**		
prim constr date:	1880	**second date:**	**date indiv listed:**		

primary orig use:	Processing Site	**orig use comments:**	
second orig use:			
primary style:	Not Applicable	**prim style comments:**	
secondary style:		**sec style comments:**	
primary siding:		**siding comments:**	
secondary siding:			
plan type:		**architect:**	
		builder:	

comments/notes:

CR-E

GROUPINGS / ASSOCIATIONS

Survey/Grouping Included In:	Type of Grouping	Date Listed	Date Compiled
Hillsboro Local Inventory Update 2008	Survey & Inventory Project		2008

Farmstead/Cluster Name:

SHPO INFORMATION FOR THIS PROPERTY

NR date listed:	
ILS survey date:	
RLS survey date:	07/01/2008
Gen file date:	

106 Project(s)

SHPO Case	Date	Agency Effect Eval

ARCHITECTURAL / PROPERTY DESCRIPTION

(Includes expanded description of the building/property, setting, significant landscape features, outbuildings and alterations)

Contextual Description: The site at the southeast corner of Sewell and Evergreen Roads is the location of James H. Sewell's North Pacific Clay Works, often referred to simply as the Sewell Clay Works. A grove of oak trees surround the site.

HISTORY

(Chronological, descriptive history of the property from its construction through at least the historic period - preferably to the present)

Historical Significance: James H. Sewell was born May 24, 1847, the son of English-born immigrants, Henry Sewell and Mary Ann Garrish, pioneers of the 1843 and 1844 immigrations, respectively. James H. was raised on the 526 acre Sewell Donation Land Claim but left to work in Eastern Oregon. He returned in 1870, at the age of 23, upon death of his father, to manage the family farm. He did so successfully, building up the family holdings to 740 acres, engaging in general farming as well as horse and cattle raising. The origins of Sewell's Clay Works were not a deliberate business venture but rather were based on Sewell's need for a large quantity of drainage tile for the family farm. It is interesting to note that the soil conditions of the central Tualatin Valley that required extensive drainage of farmlands, i.e., a high water table and heavy clay content, included in part a solution to the problem of drainage: clay for drainage tiles. Sewell found that he possessed a significant amount of high quality clay on his own farm. The record is unclear exactly when Sewell began the limited manufacture of drainage tile for his own need, but we do know his original equipment costs were approximately $30.00 for a second hand tile mill. Sewell's tile producing efforts were quantities of good drainage tile from the high quality clay on his farm, he ordered the best available technology from the east and began manufacturing drainage tile on a large scale. As of 1893, the North Pacific Clay Works was reported to be the largest such industry in the state and served a national clientele. The record indicates that Sewell was also considering expanding into brick manufacturing at his clay works, but it is not clear if he ever actually did so. It is interesting to note that Sewell was not alone in the clay works industry. There was another tile factory in the Tualatin area (see site #145/516) and at least two brick yards that we know of, those operated by Joe Adams at the site of the present Shute Park and at 5th and Oak Streets in Hillsboro, in the 1880's. James H. Sewell died on February 11, 1913. His estate was left to his two children, and the record is unclear as to whether or not North Pacific Clay Works was still in operation at that time. In any event, it would seem safe to state that the North Pacific Clay Works has a 15-20 year span of existence at least, and provided a great deal of drainage tile for the agricultural needs of the central Tualatin Valley. It is an outstanding example of the successful agricultural business of the late 19th century founded on the original Donation Land Claim farms of the first American overland pioneers of the 1840's in HGA

RESEARCH INFORMATION

Title Records	Census Records	Property Tax Records	Local Histories
Sanborn Maps	Biographical Sources	SHPO Files	Interviews
✔ Obituaries	Newspapers	State Archives	Historic Photographs
City Directories	Building Permits	State Library	

Local Library:	**University Library:**
Historical Society:	**Other Respository:**

Bibliography:

Sources Consulted: Nixon, Birgetta. Hillsboro Argus-Centennial Edition. 1976. Hillsboro Independent. Sewell Obituary, February 28, 1913. Hines, Rev. H. K. An Illustrated History of the State of Oregon. Chicago: Lewis Publishing Co., 1893, p. 935.

Appendix C:

Technical Memorandum #3: Future 2035 Baseline Conditions (No Build)

US 26/Brookwood Parkway/Helvetia Road Interchange Area Management Plan

Hillsboro and Washington County, Oregon

Technical Memorandum #3:

Future Baseline Conditions

Prepared for

Oregon Department of Transportation, Region 1
123 NW Flanders Street
Portland, Oregon 97209-4012

Prepared by

David Evans and Associates, Inc.
2100 SW River Parkway
Portland, Oregon 97201

June 2012

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Appendix A: Traffic Volume Development

Appendix B: Intersection Operations Analysis

Appendix C: Intersection Queuing Analysis

Appendix D: Freeway Operations Analysis

1. INTRODUCTION

This technical memorandum summarizes the 2035 baseline (no-build) land use, develops the 2035 baseline traffic volume forecasts, and analyzes the 2035 baseline traffic operations and safety for the US 26/Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP). Baseline conditions for roads in the IAMP Study Area (defined below) are evaluated based on outputs and assumptions for one future land use scenario.

IAMP Study Area

The IAMP Study Area includes a section of the US 26 corridor and the accompanying local road networks serving North Hillsboro including land encompassed by Cornelius Pass Road (at US 26 mile point [MP] 62.53) on the east, Evergreen Parkway on the south, Jackson School Road (at US 26 MP 58.42) on the west, and West Union Road on the north, as shown in **Figure 1**. Existing and planned land uses and activities within the IAMP Study Area inform the IAMP planning process.

IAMP Management Area

The IAMP Management Area, also delineated in **Figure 1**, includes the land within 1,320 feet to the north and south of the interchange ramp terminals, extending beyond Schaaf Road to the north and beyond Huffman Road to the south. To the east and west of the interchange, this IAMP Management Area includes land that may be affected by realignment of an existing facility or planned construction of a new facility. Land that is within the larger IAMP Study Area but not within the smaller IAMP Management Area is not subject to the provisions in the IAMP.

2. 2035 LAND USE

There are two key areas within the IAMP Study Area that are designated for future planning and development: The North Hillsboro Industrial Area/Sanctuary and the Urban Growth Boundary (UGB) expansion area (see **Figure 1**). Information from the existing concept plans for these areas has been incorporated into this IAMP.

The North Hillsboro Industrial Area covers two areas north and south of the US 26/Brookwood Parkway/Helvetia Road Interchange that overlap with the IAMP Study Area. The Industrial Sanctuary (IS) zone that implements the North Hillsboro Industrial Area Community Plan retains and strengthens the requirements for large lots and restrictions on commercial development. However, it also broadens allowable industrial uses and still allows commercial, retail, office, and service support uses. Permitted uses are industrial services, manufacturing and production, public safety facilities, warehousing and distribution, wholesale sales, and utility facilities. There are multiple conditional and limited uses as well. Commercial nodes are limited to less than 20,000 square feet in three areas that support industrial uses. The North Hillsboro Industrial Area Community Plan also establishes a planning foundation for possible future UGB expansions.

On October 20, 2011, the Metro Council decided to expand the region's UGB, including a 330-acre (358.89 acres including roads and right-of-way) area north of Hillsboro, in the vicinity of Meek Road and south of US 26, for the purposes of attracting future large-site industrial employers. After adoption of the IAMP, the City of Hillsboro plans to start the planning process required by Metro's Urban Growth Management Functional Plan Title 11: Planning for New Urban Areas (Metro Code section 3.07) to allow for the future planning and development of the 358.89-acre area. The City of Hillsboro will annex the land areas within the UGB for future industrial land uses.

The areas outside the Metro UGB will remain designated for rural uses.

All of the year 2035 scenarios using the regional transportation model include the North Hillsboro Industrial Area and the UGB expansion area. Travel demand model assumptions for households and employment in the IAMP study area for the base year (2010) and future year (2035) are shown in **Table 1**.

Table 1. IAMP Households and Employment for Base Year 2010 and Future Year 2035[3]

	2010[1]	2035[2]	Difference
Households	298	353	56
Employment	4,876	29,716	24,840

Notes:

1. 2010 data based on Metro's household and employment allocation.
2. 2035 data based on City of Hillsboro's household and employment allocation.
3. Household and employment data based on 14 Traffic Analysis Zones: 1252, 1253, 1254, 25% of 1255, 1257, 1258, 1259, 1260, 1261, 1270, 1271, 1272, 1273, and 1274.

As shown in **Table 1**, the number of households in the IAMP Study area is projected to grow by approximately 20 percent from 2010 to 2035. The number of jobs in the IAMP Study Area is

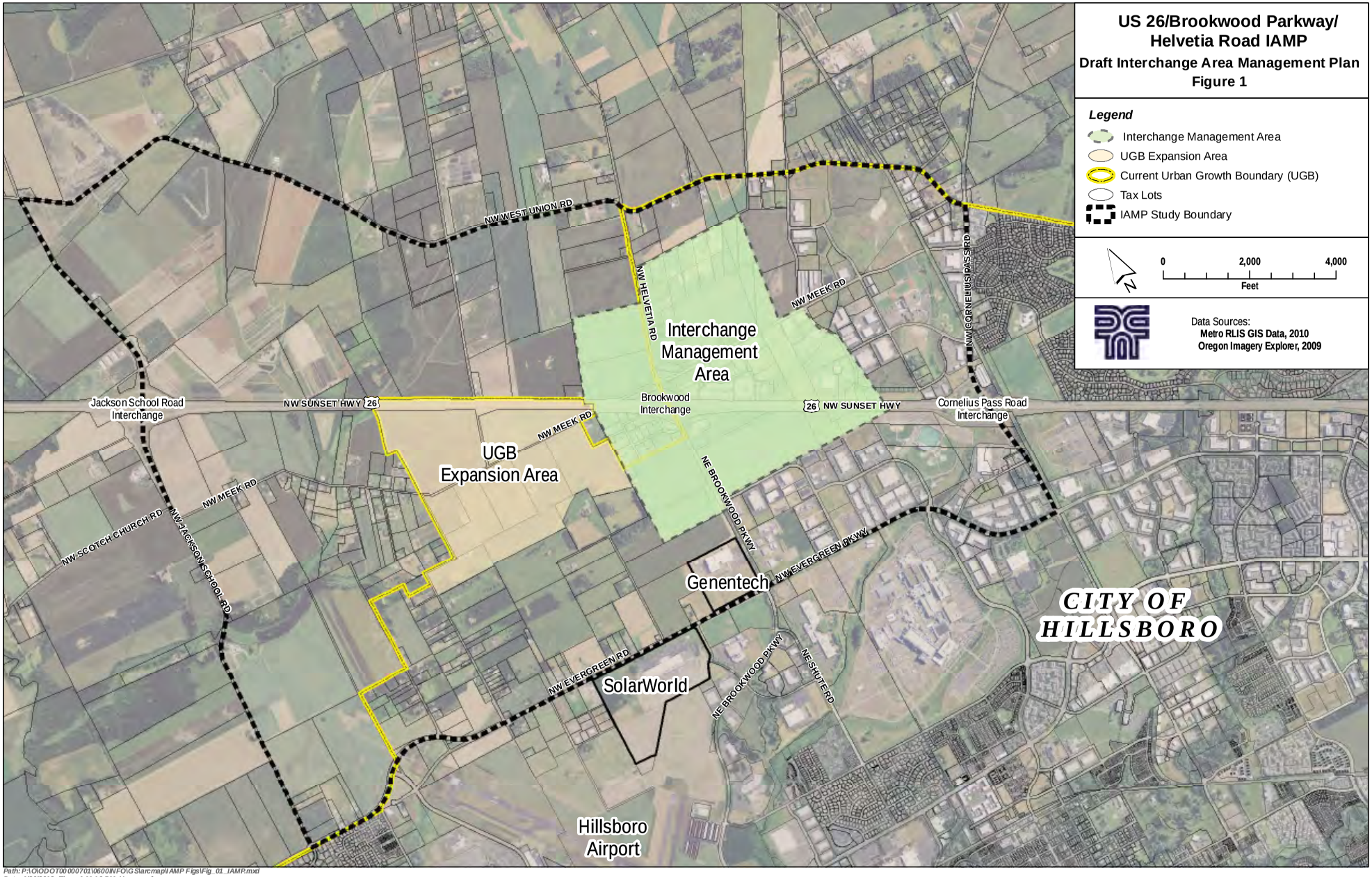
expected to grow to more than six times the current number by 2035. As shown in **Table 2**, this household and employment growth will increase the number of vehicle trips entering and exiting the IAMP Study Area during the AM and PM peak periods.

Table 2. IAMP Entering and Exiting Volumes for Base Year 2010 and Future Year 2035[3]

	Entering and Exiting Trips		
	2010[1]	**2035**[2]	**Difference**
AM Peak Hour	1,925	9,275	7,350
PM Peak Hour	2,250	9,650	7,400

Notes:

1. 2010 data based on Metro's household and employment allocation.
2. 2035 data based on City of Hillsboro's household and employment allocation.
3. Trip data based on 14 Traffic Analysis Zones: 1252, 1253, 1254, 25% of 1255, 1257, 1258, 1259, 1260, 1261, 1270, 1271, 1272, 1273, and 1274.



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3. 2035 BASELINE TRANSPORTATION NETWORK

The future baseline transportation network is based on a financially constrained transportation system. The financially constrained system will include projects from Metro's adopted 2035 State Regional Transportation System Plan (RTP) and both the city and the county adopted Transportation System Plans (TSPs). The complete list of projects within the IAMP Study Area that are to be included in the 2035 baseline scenario are shown in **Figure 2** and listed in **Table 3**. Projects included in the baseline scenario are indicated with a check mark. Projects in local community plans were not included in the travel demand model and not checked in Table 3. The baseline scenario assumes that the JTA Project (see Table 3 for a description of the JTA) is not constructed.

Some of the projects in the immediate vicinity of the interchange may be addressed in the short term if excess funding from the JTA interchange improvement project is available. Washington County and the City of Hillsboro will be responsible for planning and scheduling future local roadway improvements near the interchange through 2035.

Table 3. Baseline Transportation Improvement Projects

Figure 2: Map Reference #	Project Name	Project Description	Included in Baseline
JTA	JTA Interchange Project	Add westbound-to-southbound loop ramp on US 26, add an additional travel lane southbound across Brookwood Pkwy, intersection and storage improvements, improved bicycle and pedestrian facilities, realign Jacobson Rd	
1	253rd Ave	Build 3 lanes with bike lanes and sidewalks from Evergreen Parkway to Huffman St	✓
2	Groveland Dr Realignment	Construct 2-lane rural connector from Helvetia Rd to Groveland Dr	
3	Brookwood Pkwy	Widen to 3 lanes northbound and 3 lanes southbound, and construct with bike lanes and sidewalks from Huffman St to US 26 eastbound ramp terminal	
4	Huffman St	Build 3 lanes with bike lanes and sidewalks from Brookwood Pkwy to 253rd Ave	✓
5	Brookwood Pkwy	Widen to 3 lanes northbound and 3 lanes southbound, and construct with bike lanes and sidewalks from Evergreen Pkwy to Huffman St	
6	231st Ave/ Century Blvd	Construct 2-/3-lane US 26 overpass with bike lanes and sidewalks, connecting existing segments from Bennett St to West Union Rd	✓
7	Huffman St	Build 3 lanes with bike lanes and sidewalks from 253rd Ave to Sewell Rd	✓
8	264th Ave	Build 3 lanes with bike lanes and sidewalks from Evergreen Rd to Meek Rd	
9	Jacobson Rd	Widen and add bike and pedestrian facilities at Jacobson Rd at Helvetia Rd	✓
10	Century Blvd	Construct 3-lane roadway with bike lanes and sidewalks at Jacobson Rd and Century Blvd	✓
11	Jacobson Rd to Schaaf Rd	Construct 3-lane roadway with bike lanes and sidewalks from Jacobson Rd to Schaaf Rd	
12	Schaaf Rd	Construct 3-lane roadway with bike lanes and sidewalks from Helvetia Rd to Century Blvd	
13	Helvetia Rd	Construct 3-lane roadway with bike lanes and sidewalks from Jacobson Rd to Schaaf Rd	✓
14	Helvetia Rd	Construct 3-lane roadway with bike lanes and sidewalks from Schaaf Rd to West Union Rd	✓
15	West Union Rd	Construct 3-lane roadway with bike lanes and sidewalks from Helvetia Rd to Cornelius Pass Rd	✓

4. FUTURE BASELINE TRAFFIC VOLUMES

The future baseline traffic volumes were developed from travel demand forecasting models. Travel demand models have been in use since the 1950s and employ a market-based approach by considering both transportation supply and travel demand for producing traffic forecasts. The model relies on socioeconomic data (e.g., households and employment) to determine travel demand and system attributes (e.g., roadway capacity, speeds, and distances) to represent the transportation supply.

The regional travel demand model is based on City of Hillsboro land use allocations on the Washington County Westside Travel Demand Model, which is a subarea model of the Metro State RTP model. The travel demand model for this analysis was developed for a base year of 2010 and a forecast year of 2035.

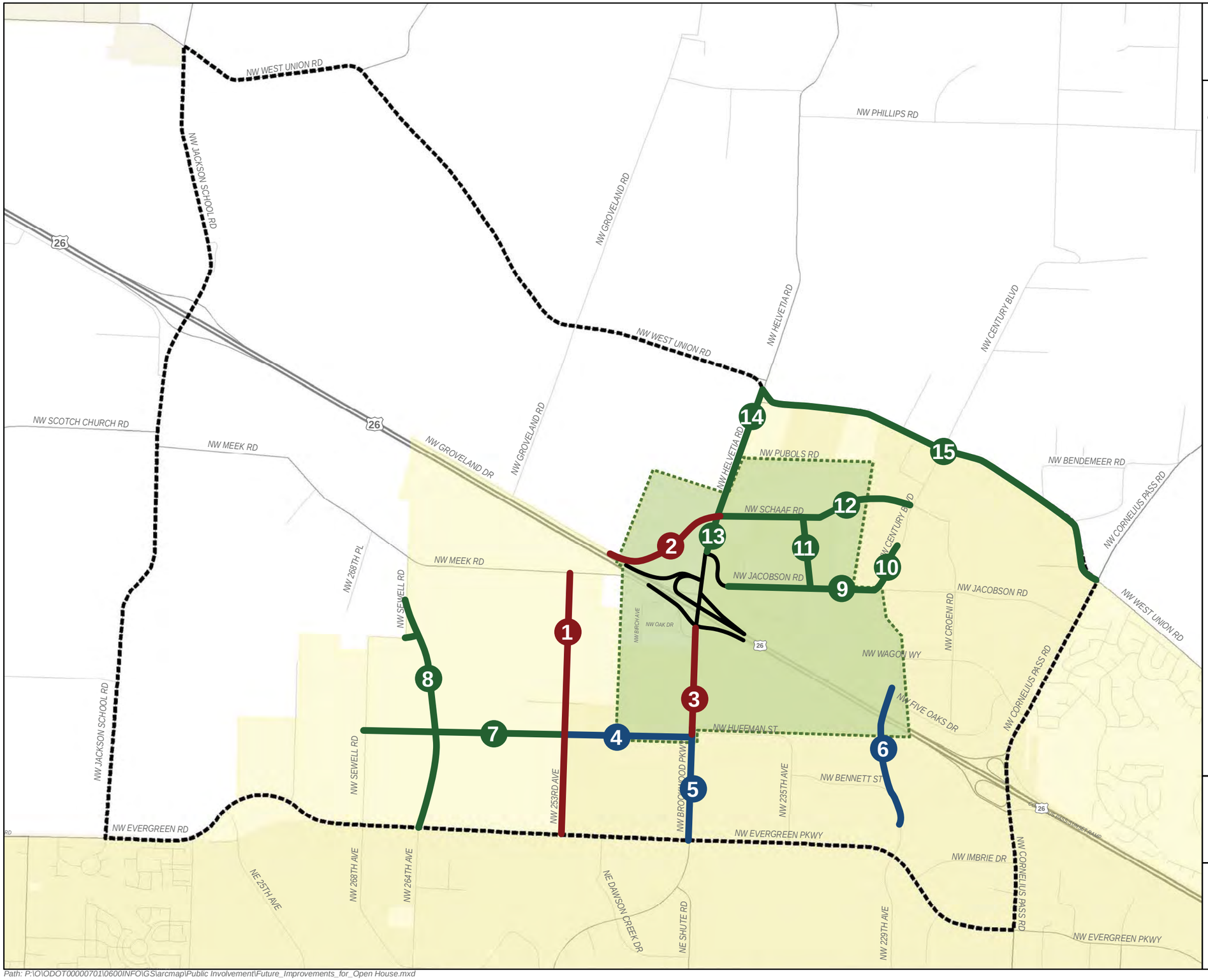
Future traffic forecasts were developed for 39 intersections in the IAMP Study Area. Forecasts were based on the 2010 and 2035 regional travel demand models and the 2011 existing traffic data. The process followed the procedures from ODOT's Analysis Procedures Manual (APM).[1] To convert travel demand model link volumes to design hour intersection turning-movement volumes, the link-based post-processing method outlined in the APM was used.

The APM instructs the user to use the two most commonly used link-based methods for determining future traffic volumes—the growth method and the difference method. The growth method uses growth equations to calculate future design hour volumes. Caution is advised when using this method, because it may severely overestimate growth on links that have little volume in the base year and large volumes in the future year. The difference method should be used in areas for which large differences between base year and future year model link volumes exist. The APM states that both methods should be compared using a spreadsheet, and areas that show large percentage or absolute differences should use the difference method and areas that compare similarly can use one or the other method, or an average of the two methods.

Therefore, when the difference between the growth and difference methods was large (greater than 10 percent), the difference method was used. When the difference between the two methods was small (less than 10 percent), the average of the growth and difference methods was used. This technique is consistent with the preferred method identified in the National Cooperative Highway Research Program (NCHRP) Report 255. The forecasted approach (link) volumes and existing turning-movement volumes were then input into a NCHRP Report 255 spreadsheet and, through an iterative process, future baseline 2035 turning-movement volumes were calculated.

[1] Analysis Procedures Manual, Oregon Department of Transportation, Transportation Development Division Planning Section, Transportation Planning and Analysis Unit, Salem, Oregon, April 2006, Section 4.64. Updated January 2011.

Figure 2. Proposed IAMP Improvement Projects



Legend

- IAMP Study Boundary
- Urban Growth Boundary (UGB)
- City Limits
- Interchange Management Area
- JTA Interchange Project
- Tier 1 Projects
- Tier 2 Projects
- Tier 3 Projects

Discussion Draft

Revised April 2012

N

0 1,000 2,000 4,000

Feet

Data Sources:
Metro RLIS GIS Data, 2010
City of Hillsboro
Washington County

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The link-based process was also used for the US 26 mainline freeway forecasts. Interchange ramp volumes were held constant based on the intersection forecasts, and the freeway mainline volumes were balanced outward from the freeway segment between the Cornelius Pass Road and US 26/Brookwood Parkway/Helvetia Road interchanges. **Figures 3** through **5** depict baseline 2035 AM and PM traffic volumes. The worksheets are provided in **Appendix A**.

Based on the planned population growth and expected land uses, there will be an average vehicular growth rate from 2011 to 2035 of approximately 50 percent for the AM peak hour and approximately 45 percent for the PM peak hour for roadways within the IAMP Study Area. Traffic volume growth varies throughout the IAMP Study Area, with some intersections experiencing a minimal growth of approximately 2 percent. Intersections near areas of intense land use changes have forecasted traffic volumes that are more than double existing traffic volumes.

Average daily traffic (ADT) volumes were calculated at several points in the IAMP Study Area. The ADT volumes were developed using the same methodology described in *Technical Memorandum #2: Existing Conditions Analysis* and using the forecast 2035 PM peak hour volumes described above. **Figure 6** shows the estimated ADT volumes for the IAMP Study Area.

5. TRAFFIC OPERATIONS OVERVIEW

Operational Criteria

Transportation engineers have established various methods for measuring traffic operations of roadways and intersections. Most jurisdictions use either volume-to-capacity (v/c) ratio or level of service (LOS) to establish performance criteria. Both the LOS and v/c ratio concepts require consideration of factors that include traffic demand, capacity of the intersection or roadway, delay, frequency of interruptions in traffic flow, relative freedom for traffic maneuvers, driving comfort, convenience, and operating cost.

Volume-to-Capacity (V/C) Ratio

A comparison of traffic volume demand to intersection capacity is one method of evaluating how well an intersection is operating. This comparison is presented as a v/c ratio. A v/c ratio of less than 1.00 indicates that the volume is less than capacity. When the v/c ratio is closer to zero, traffic conditions are generally good, with little congestion and low delays for most intersection movements. As the v/c ratio approaches 1.00, traffic becomes more congested and unstable, with longer delays.

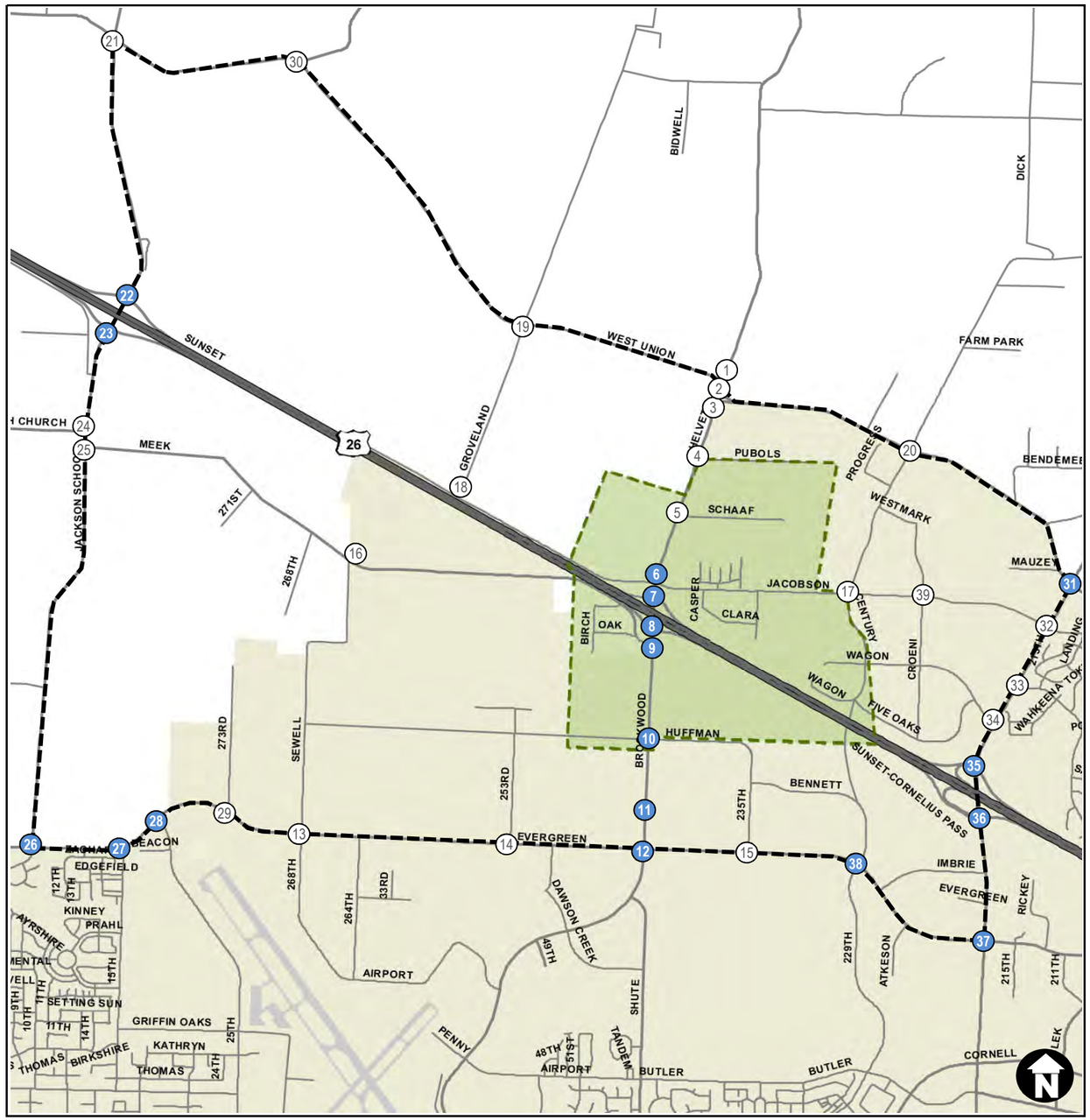
Level of Service (LOS)

LOS is also a widely recognized and accepted measure and descriptor of traffic operations. At both STOP-controlled and signalized intersections, LOS is a function of control delay, which includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. Six standards have been established, ranging from LOS A, where there is little or no delay, to LOS F, where there is delay of more than 50 seconds at unsignalized intersections, or more than 80 seconds at signalized intersections.

It should be noted that, although delays can sometimes be long for some movements at a STOP-controlled intersection, the v/c ratio may indicate that there is adequate capacity to process the demand for that movement. Similarly, at signalized intersections, some movements, particularly side street approaches or left turns onto side streets, may experience longer delays because they receive only a small portion of the green time during a signal cycle, but their v/c ratio may be relatively low. For these reasons, it is important to examine both v/c ratio and LOS when evaluating overall intersection operations. Both are reported in the following section.

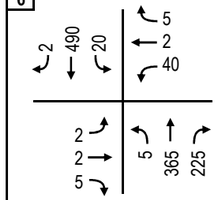
Operational Standards

The Oregon Highway Plan (OHP) has established several policies that enforce general objectives and approaches for maintaining highway mobility. Of these policies, the Highway Mobility Standards (Policy 1F) establish maximum v/c ratio standards for peak hour operating conditions for all highways in Oregon based on the location and classification of the highway segment being examined. The OHP policy also specifies that the v/c ratio standards be maintained for ODOT facilities through a 20-year horizon.



Helvetia Rd @ Jacobson Rd

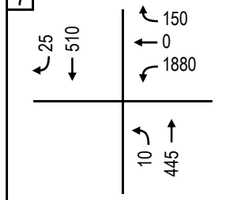
6



TEV = 1163

Brookwood Pkwy @ US26 WB Ramps

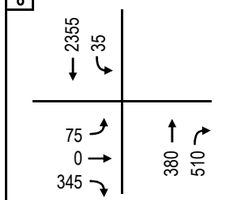
7



TEV = 3020

Brookwood Pkwy @ US26 EB Ramps

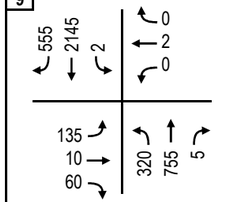
8



TEV = 3700

Brookwood Pkwy @ Meek Rd

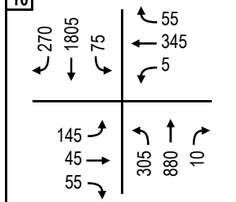
9



TEV = 3989

Brookwood Pkwy @ Huffman Street

10



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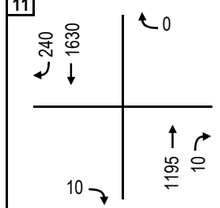
Brookwood Pkwy @ Genentech Access

11



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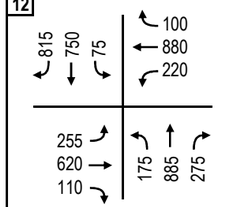
Brookwood Pkwy @ Evergreen Pkwy

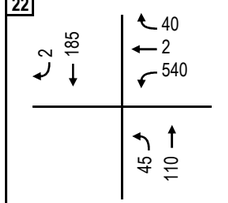
12



TEV = 5160

Jackson Sch Rd @ US26 WB Ramps

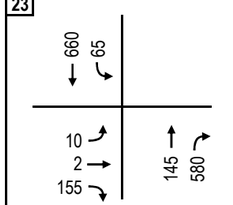
22



TEV = 924

Jackson Sch Rd @ US26 EB Ramps

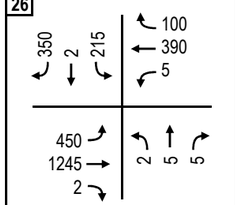
23



TEV = 1617

Jackson Sch Rd @ Evergreen Pkwy

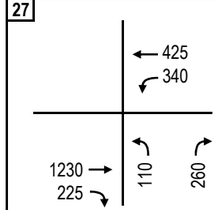
26



TEV = 2771

15th Avenue @ Evergreen Pkwy

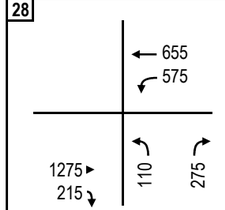
27



TEV = 2590

25th Avenue @ Evergreen Pkwy

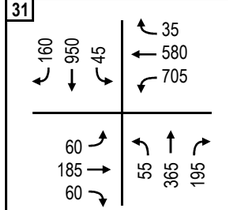
28



TEV = 3105

Cornelius Pass Rd @ West Union Rd

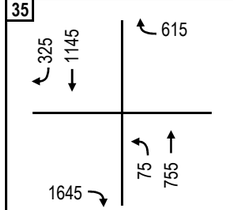
31



TEV = 3395

Cornelius Pass Rd @ US26 WB Ramps

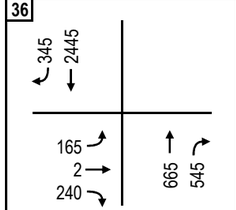
35



TEV = 3620

Cornelius Pass Rd @ US26 EB Ramps

36



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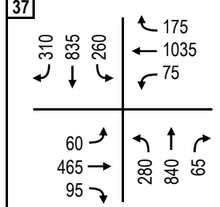
Cornelius Pass Rd @ Evergreen Pkwy

37



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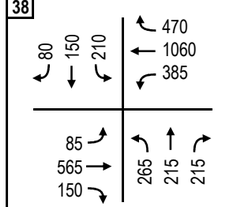
229th Avenue @ Evergreen Pkwy

38



TEV = 3850

DAVID EVANS AND ASSOCIATES INC.

Oregon Department of Transportation

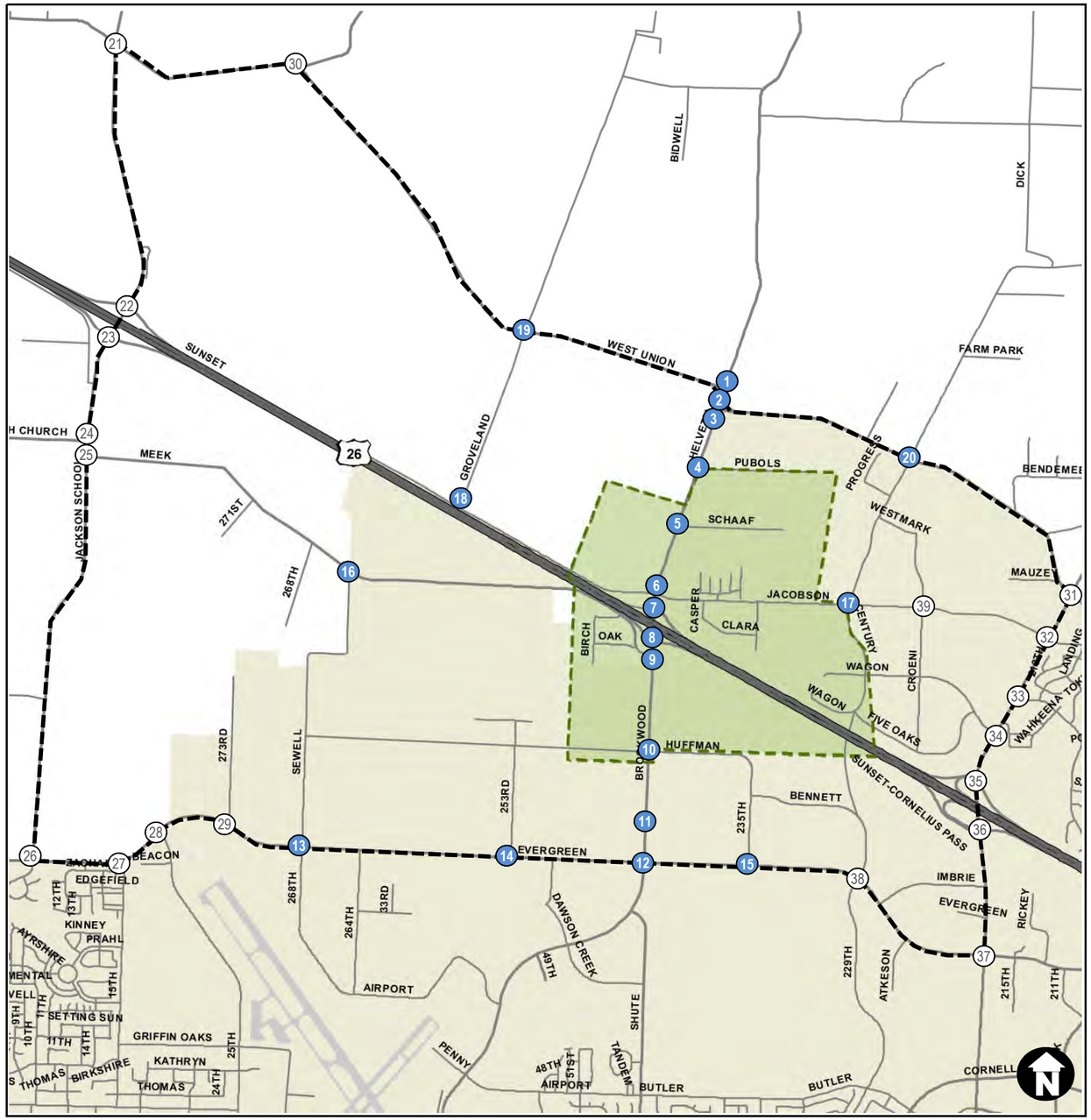
Legend

- 123 — Peak Hour Volume
- → — Turning Movement
- TEV: — Total Entering Volume
- (##) — Intersection evaluated
- (##) — Intersection not evaluated in AM Peak Hour
- IAMP Study Boundary
- Interchange Management Area
- Urban Growth Boundary

FIGURE 3

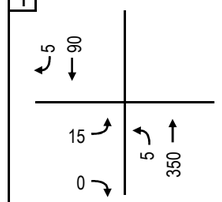
2035 Baseline
Turning Movement Traffic Volumes
AM Peak Hour

US 26 / Brookwood / Helvetia IAMP



Helvetia Rd North @ West Union Rd

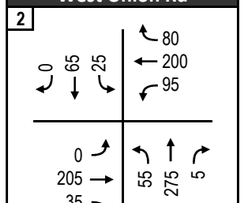
1



Overall = 465

Helvetia Rd Middle @ West Union Rd

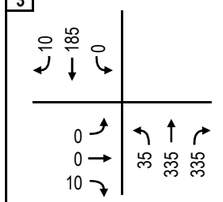
2



Overall = 1040

Helvetia Rd South @ West Union Rd

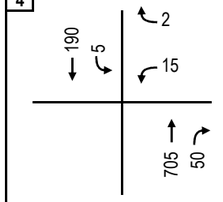
3



Overall = 910

Helvetia Rd @ Pubols Rd

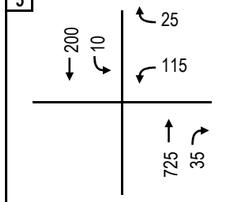
4



Overall = 967

Helvetia Rd @ Schaff Rd

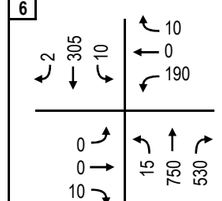
5



Overall = 1110

Helvetia Rd @ Jacobson Rd

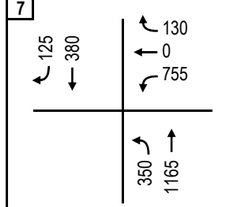
6



Overall = 1822

Brookwood Pkwy @ US26 WB Ramps

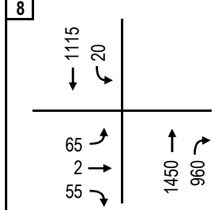
7



Overall = 2905

Brookwood Pkwy @ US26 EB Ramps

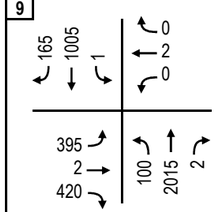
8



Overall = 3667

Brookwood Pkwy @ Meek Rd

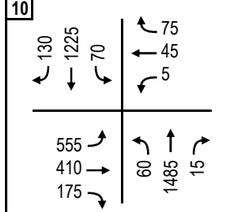
9



Overall = 4107

Brookwood Pkwy @ Huffman Street

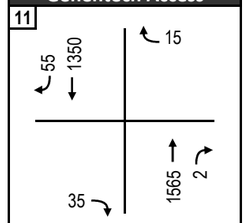
10



Overall = 4250

Brookwood Pkwy @ Genentech Access

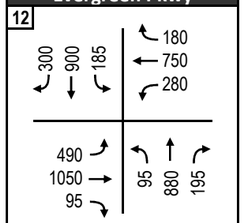
11



Overall = 3022

Brookwood Pkwy @ Evergreen Pkwy

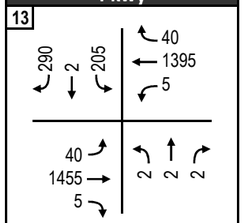
12



Overall = 5400

Sewell Rd @ Evergreen Pkwy

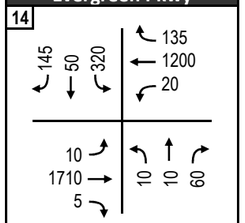
13



Overall = 3443

Meier-Jurgen Rd @ Evergreen Pkwy

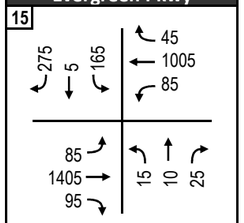
14



Overall = 3675

235th Avenue @ Evergreen Pkwy

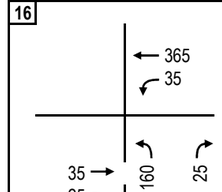
15



Overall = 3215

Sewell Rd @ Meek Rd

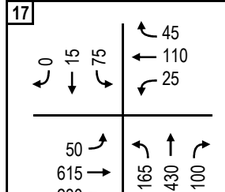
16



Overall = 645

Century Blvd @ Jacobson Rd

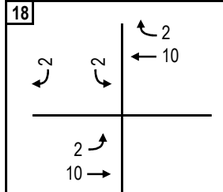
17



Overall = 1860

Groveland Rd @ Groveland Drive

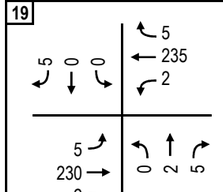
18



Overall = 28

Groveland Rd @ West Union Rd

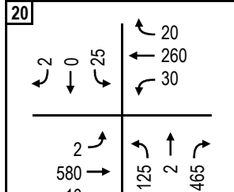
19



Overall = 491

Century Blvd @ West Union Rd

20



Overall = 1521

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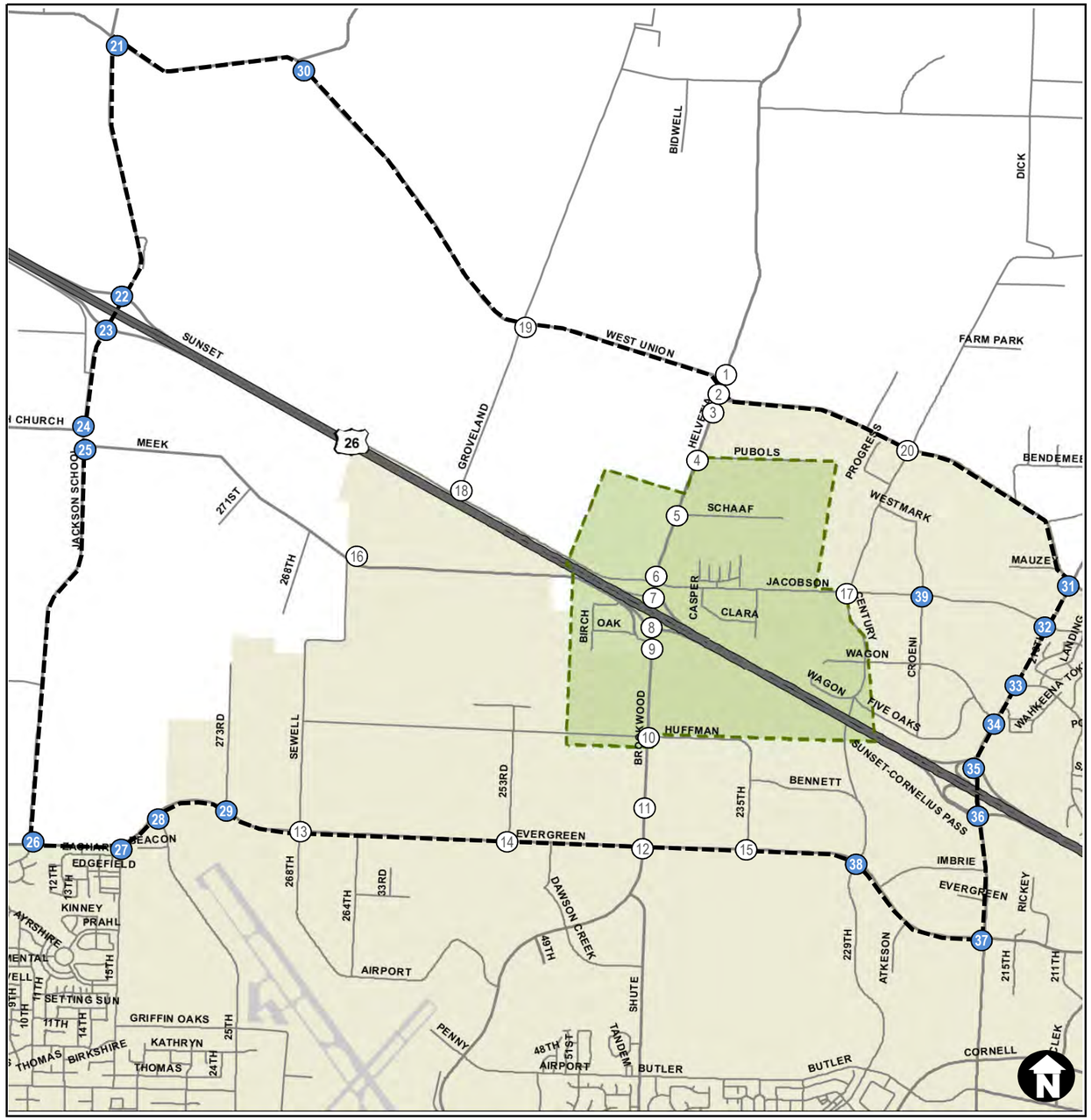
Legend

123	Peak Hour Volume	(##)	Intersection volumes shown		IAMP Study Boundary
→	Turning Movement	##	Intersection volumes shown on separate figure		Interchange Management Area
TEV:	Total Entering Volume				Urban Growth Boundary

FIGURE 4

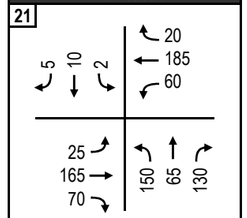
2035 Baseline
Turning Movement Traffic Volumes
PM Peak Hour

US 26 / Brookwood / Helvetia IAMP



Jackson Sch Rd @ West Union Rd

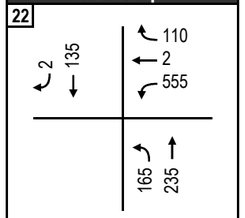
21



Overall = 887

Jackson Sch Rd @ US26 WB Ramps

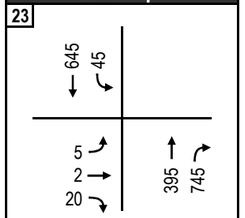
22



Overall = 1204

Jackson Sch Rd @ US26 EB Ramps

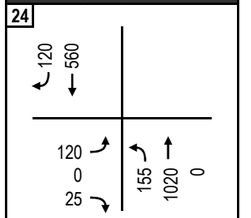
23



Overall = 1857

Jackson Sch Rd @ Scotch Church Rd

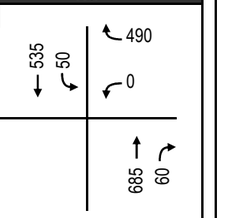
24



Overall = 2000

Jackson Sch Rd @ Meek Rd

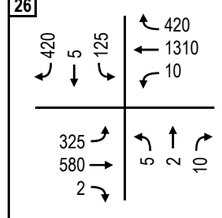
25



Overall = 1820

Jackson Sch Rd @ Evergreen Pkwy

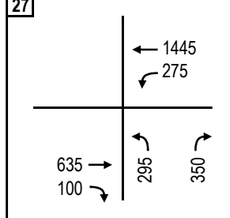
26



Overall = 3214

15th Avenue @ Evergreen Pkwy

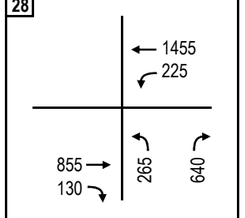
27



Overall = 3100

25th Avenue @ Evergreen Pkwy

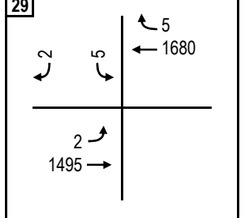
28



Overall = 3570

Eggiman Rd @ Evergreen Pkwy

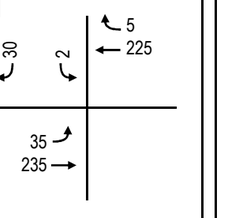
29



Overall = 3189

Jackson Quarry Rd @ West Union Rd

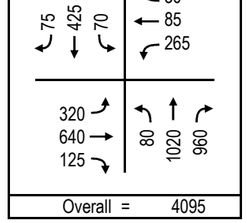
30



Overall = 532

Cornelius Pass Rd @ West Union Rd

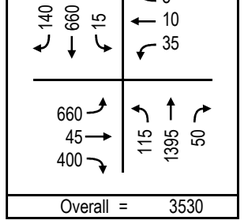
31



Overall = 4095

Cornelius Pass Rd @ Jacobson Rd

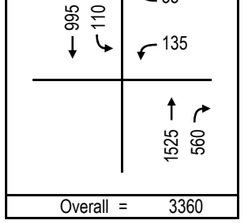
32



Overall = 3530

Cornelius Pass Rd @ Rock Creek Blvd

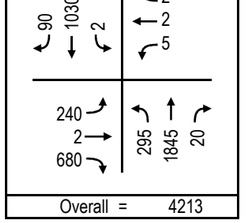
33



Overall = 3360

Cornelius Pass Rd @ Wagon Way

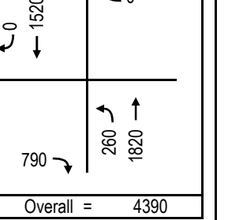
34



Overall = 4213

Cornelius Pass Rd @ US26 WB Ramps

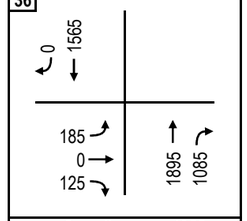
35



Overall = 4390

Cornelius Pass Rd @ US26 EB Ramps

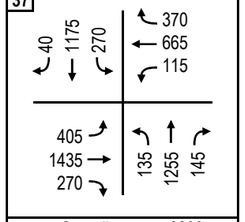
36



Overall = 4855

Cornelius Pass Rd @ Evergreen Pkwy

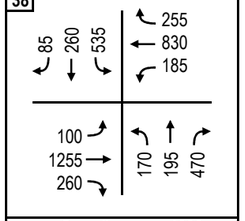
37



Overall = 6280

229th Avenue @ Evergreen Pkwy

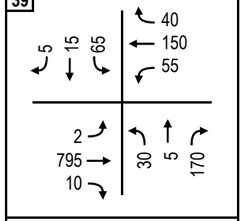
38



Overall = 4600

Croeni Rd @ Jacobson Rd

39



Overall = 1342

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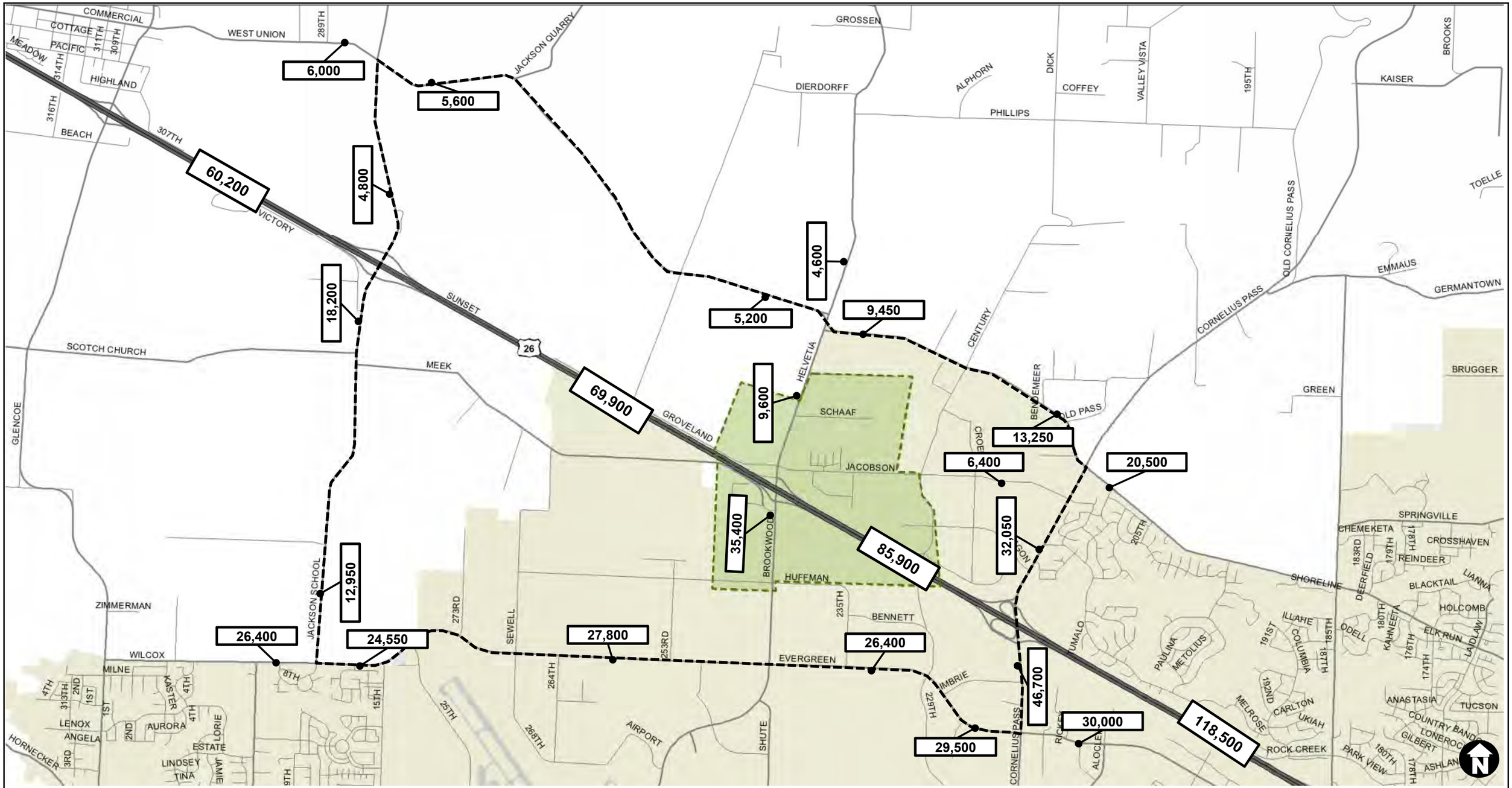
Legend

123	Peak Hour Volume	##	Intersection volumes shown		IAMP Study Boundary
→	Turning Movement	(##)	Intersection volumes shown on separate figure		Interchange Management Area
TEV:	Total Entering Volume				Urban Growth Boundary

FIGURE 5

2035 Baseline
Turning Movement Traffic Volumes
PM Peak Hour

US 26 / Brookwood / Helvetia IAMP



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Oregon Department of Transportation

Legend

- IAMP Study Boundary
- Interchange Management Area
- Urban Growth Boundary
- 15,000 — 2035 Average Daily Traffic (ADT)

FIGURE 6

2035 Baseline Conditions
Average Daily Traffic

US 26 / Brookwood / Helvetia IAMP

Hillsboro, Washington County and Metro also have their own performance standards. Hillsboro uses LOS as a performance standard, while Washington County and Metro use v/c ratio standards. For the existing conditions, **Table 4** below provides a summary of applicable operational standards for each jurisdiction. These standards are outlined in their corresponding TSPs and master plans. Generally, where approaches are maintained by different jurisdictions, the more restrictive of the performance standards is applied.

Table 4. Summary of Operational Standards for Existing Conditions

Jurisdiction	Operational Standard
ODOT	
Outside Metro UGB and not within another UGB[1]	0.70 v/c
US 26, west of Sylvan, inside Metro UGB[2]	0.99 v/c (1st hour)
US 26 Ramp Terminals, inside the Metro UGB	0.85
US 26 Ramp Terminals, outside Metro UGB	0.70
City of Hillsboro[3]	LOS D
Washington County[4]	
Inside UGB	0.99 v/c
Outside UGB	0.90 v/c
Metro[5]	0.99 v/c

1. Existing requirements outlined in 2009 OHP Mobility Standard Guidelines Table 6 and based on v/c.
2. Existing requirements outlined in 2009 OHP Mobility Standard Guidelines Table 6 and based on v/c and Metro interim regional mobility policy standards as outlined in the 2035 RTP, Table 2.4.
3. City of Hillsboro operating standards outlined in the Hillsboro Comprehensive Plan, Section 13.D.
4. Washington County operating standards outlined in Washington County Comprehensive Plan.
5. Metro 2035 Regional Transportation Plan.

Traffic Operations Analysis Procedures

All operations were evaluated using the methodology outlined in the *2000 Highway Capacity Manual* (HCM) along with the procedures outlined in ODOT's Analysis Procedures Manual (APM). The Synchro/SimTraffic analysis software was selected to perform the intersection analysis, since it can provide the v/c ratio and LOS output of an HCM analysis as well as consider the systematic interaction of the intersections with regard to queuing and delays.

Synchro is a macroscopic model similar to the Highway Capacity Software (HCS), and like the HCS, is based on the 2000 HCM. The Synchro model explicitly evaluates traffic operations under coordinated and uncoordinated systems of signalized and unsignalized intersections. The v/c ratios and LOS presented in this report are based on the Synchro model output.

SimTraffic animates traffic flow based on input volumes and signal timing and allows viewing of traffic flow under saturated traffic conditions, where traffic may spill over from one intersection to another. It is particularly effective at evaluating closely spaced intersections. For locations where the HCM is not applicable, the SimTraffic model was run multiple times using different arrival patterns to determine how sensitive traffic operations are in response to subtle variations in traffic flows. If it is determined that the use of SimTraffic is needed, the 95th percentile queues from the SimTraffic model are also evaluated.

As noted above, results from both Synchro and SimTraffic are considered in this report. Because these programs evaluate operations using different methodologies, the analysis results sometimes vary; however, the differences are generally minor unless saturated or congested conditions are present. Under saturated conditions, SimTraffic queuing and delays present results that reflect how congested intersections impact each other, while Synchro represents intersection performance in isolation and may reflect better performance results.

6. FUTURE 2035 BASELINE TRAFFIC OPERATIONS

Traffic analysis for the 2035 baseline scenario was performed for the 39 IAMP Study Area intersections and for the merge-diverge sections of the freeway.

Intersection Operations

Traffic operations were evaluated at all 39 IAMP Study Area intersections during the PM peak hour and at 17 key AM peak hour intersections (Brookwood Parkway at Huffman Street and Brookwood Parkway at Genentech Access were added for the 2035 AM alternatives). **Figures 7** through **9** present the v/c ratios and LOS performance by lane group for the IAMP Study Area intersections. **Table 5** below summarizes the intersections that exceed operational standards for ODOT, City of Hillsboro, and/or Washington County for the 2035 baseline scenario. Detailed analysis worksheets are presented in **Appendix B**.

Table 5. 2035 Baseline Intersections Where Operational Standards Are Not Met[1]

Int. X	Intersection Location	Critical Movement[2] AM (PM)	AM V/C Ratio	AM LOS	PM V/C Ratio	PM LOS	Jurisdiction Where Operational Standard Not Met[3]
IAMP Management Area							
6	Helvetia Rd @ Jacobson Rd	WB L/T/R (WB L/T/R)	0.13	C	**>1.0**	**F**	All
7	Brookwood Pkwy @ US26 WB Ramps	Overall	**0.93**	D	**>1.0**	D	ODOT, Wash Co
8	Brookwood Pkwy @ US26 EB Ramps	Overall	**>1.0**	D	**>1.0**	D	ODOT, Wash Co
9	Brookwood Pkwy @ Meek Rd	NB L (EB L/T/R)	**>1.0**	**F**	**>1.0**	**F**	All
10	Brookwood Pkwy @ Huffman St	Overall	**>1.0**	**F**	**>1.0**	**F**	Hillsboro
IAMP Study Area							
22	Jackson School Rd @ US26 WB Ramps	Overall	**>1.0**	**F**	**>1.0**	**F**	All
24	Jackson School Rd @ Scotch Church Rd	(EB L/R)	Not analyzed in AM Peak Hour		**>1.0**	**F**	Wash Co, Hillsboro
25	Jackson School Rd @ Meek Rd	(WB L/R)	Not analyzed in AM Peak Hour		**>1.0**	**F**	Wash Co, Hillsboro
26	Jackson School Rd @ Evergreen Pkwy	Overall	**>1.0**	**E**	**>1.0**	**F**	Wash Co, Hillsboro
13	Sewell Rd @ Evergreen Pkwy	(SB L/T)	Not analyzed in AM Peak Hour		**>1.0**	**F**	Wash Co, Hillsboro
14	253rd @ Evergreen Pkwy	(SB L)	Not analyzed in AM Peak Hour		**>1.0**	**F**	Wash Co, Hillsboro
12	Brookwood Pkwy @ Evergreen Pkwy	Overall	0.77	C	0.99	**E**	Hillsboro
20	Century Blvd @ West Union Rd	(SB L/T/R)	Not analyzed in AM Peak Hour		**>1.0**	**F**	Wash Co, Hillsboro
39	Croeni Rd @ Jacobson Rd	(SB L)	Not analyzed in AM Peak Hour		**>1.0**	**F**	Wash Co, Hillsboro
38	229th Avenue @ Evergreen Pkwy	Overall	**>1.0**	**F**	**>1.0**	**F**	Wash Co, Hillsboro
31	Cornelius Pass Rd @ West Union Rd	Overall	0.99	**E**	**>1.0**	**F**	Wash Co, Hillsboro
32	Cornelius Pass Rd @ Jacobson Rd	Overall	Not analyzed in AM Peak Hour		**>1.0**	D	ODOT, Wash Co
35	Cornelius Pass Rd @ US26 WB Ramps	Overall	**>1.0**	**F**	**>1.0**	**F**	All
36	Cornelius Pass Rd @ US26 EB Ramps	Overall	0.78	B	**0.87**	B	ODOT
37	Cornelius Pass Rd @ Evergreen Pkwy	Overall	0.94	**E**	**>1.0**	**F**	Wash Co, Hillsboro
34	Cornelius Pass Rd @ Wagon Way	Overall	Not analyzed in AM Peak Hour		**>1.0**	**E**	Wash Co, Hillsboro

For intersection approaches NB = northbound, SB = southbound, EB = eastbound, and WB = westbound. At the intersection approach L = left-turn movement, T = through movement, and R=right-turn movement. Some approaches have shared lanes where two or more travel movements may be permitted, as indicated with a slash.

Notes:
1. **Shaded** results indicate an intersection that fails to meet operational standards.
2. The critical movement at a signalized intersection is the overall operation of the intersection. The critical movement at an unsignalized intersection is the stopped (or yield) movement with the worst v/c ratio.
3. "All" indicates the following jurisdictions: ODOT, City of Hillsboro, and Washington County.

For the IAMP Management Area, the 2035 baseline conditions are expectedly worse than existing conditions, with five intersections exceeding operational standards during the AM and/or PM peak hours compared to one intersection under existing conditions. Under the 2035 baseline conditions, the eastbound and westbound Brookwood Parkway ramp terminals would be over capacity and would fail to meet operational standards.

For the IAMP Study Area, 16 intersections would exceed operational standards during the AM and/or PM peak hours compared to 6 intersections under existing conditions. Under 2035 baseline conditions, the westbound ramp terminal at Jackson School Road and the eastbound and westbound Cornelius Pass Road ramp terminals would be over capacity and would fail to meet operational standards.

Queuing

Queuing was evaluated using SimTraffic (a microsimulation tool) at the Jackson School Road Interchange, the Cornelius Pass Road Interchange, and along Brookwood Parkway/Helvetia Road from Jacobson Road to Evergreen Parkway. **Table 6** illustrates the approach and time period when queuing would be expected to extend into the upstream intersections for the IAMP Management Area and the IAMP Study Area.

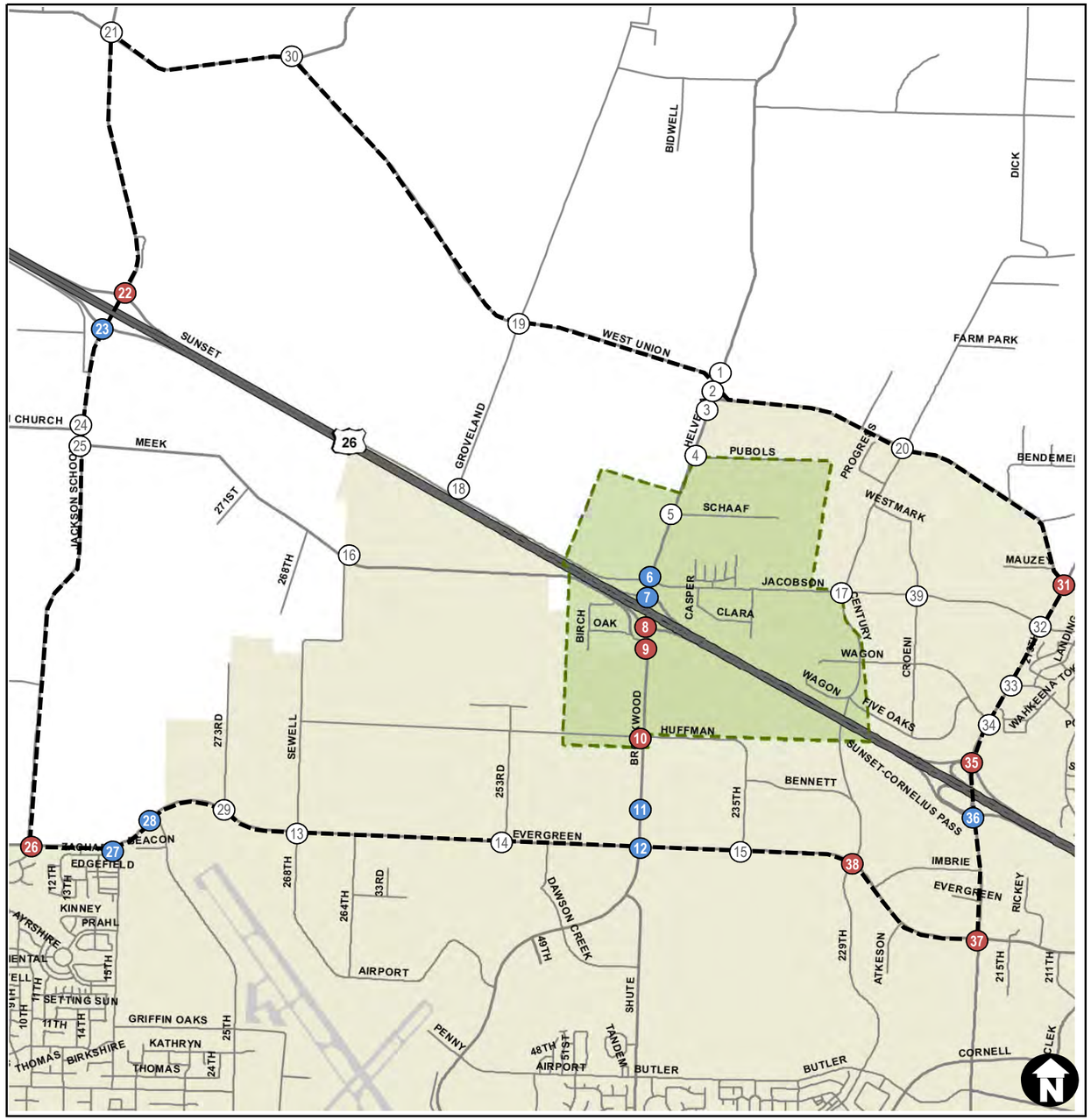
Table 6. 2035 Baseline Intersections with Queue Spillback

Intersection with Queue Spillback		Direction & Movement	Peak Period	
			AM	PM
IAMP Management Area				
7	Brookwood Pkwy @ US26 WB Ramps	WBLT	■	■
		NBT		■
8	Brookwood Pkwy @ US26 EB Ramps	EBLT	■	■
		NBT		■
		SBT	■	
9	Brookwood Pkwy @ Meek Rd	EBLTR	■	■
		SBTR	■	
10	Brookwood Pkwy @ Huffman St	EBTR		■
		WBTR	■	
		NBL	■	■
		NBTR	■	
		SBTR	■	
IAMP Study Area				
22	Jackson School Rd @ US26 WB Ramps	WBLT	■	■
23	Jackson School Rd @ US26 EB Ramps	NBR		■
11	Brookwood Pkwy @ Genentech Access	NBTR	■	
12	Brookwood Pkwy @ Evergreen Pkwy	EBTR	■	■
		NBT	■	
35	Cornelius Pass Rd @ US26 WB Ramps	NBT		■
		SBT		■
36	Cornelius Pass Rd @ US26 EB Ramps	NBT		■
		NBR		■

■ = Queue spillback during peak period.
NB = northbound, SB = southbound, EB = eastbound, and WB = westbound. At the intersection approach L = left-turn movement, T = through movement, and R=right-turn movement.

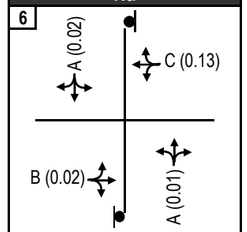
For the IAMP Management Area under 2035 baseline conditions, four intersections would have approaches with queue spillback. Queuing from southbound Brookwood Parkway would extend onto US 26 during the AM peak hour due to overcapacity operations at the intersection of Brookwood Parkway and Huffman Street and overcapacity operations at the westbound off-ramp from US 26. In addition, northbound queuing along Brookwood Parkway during the AM peak hour would spillback from Huffman Street into upstream intersections, including Evergreen Parkway. During the PM peak hour, the westbound off-ramp to Brookwood Parkway/Helvetia Road queues onto US 26. Queuing also occurs in the northbound direction on Brookwood Parkway and on the minor street approaches of unsignalized intersections at Jacobson Road and Meek Road during the PM peak hour will be addressed through the JTA project and local projects identified in the IAMP. **Figure 10** shows the extent of expected queuing along Brookwood Parkway/Helvetia Road.

Queuing at the Brookwood Parkway/Helvetia Road eastbound ramp meter to US 26 is generally contained on the ramp during the PM peak hour with the assumed ramp meter rate of 800 vehicles per hour (vph). Ramp meter queuing is not anticipated to impact operations on Brookwood Parkway under the baseline conditions because demand is metered by congestion on Brookwood Parkway south of the interchange and is unable to reach the ramp meter.



Helvetia Rd @ Jacobson Rd

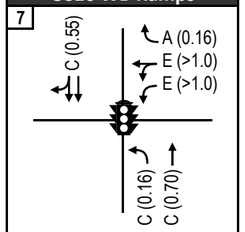
6



V/C: 0.13	LOS: C

Brookwood Pkwy @ US26 WB Ramps

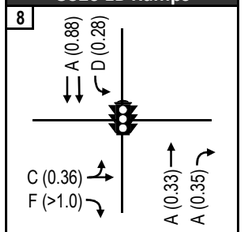
7



V/C: 0.93	LOS: D

Brookwood Pkwy @ US26 EB Ramps

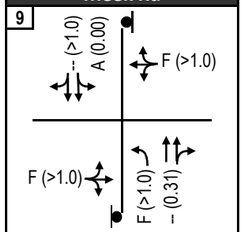
8



V/C: >1.0	LOS: D

Brookwood Pkwy @ Meek Rd

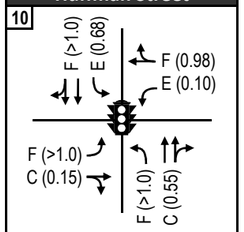
9



V/C: >1.0	LOS: F

Brookwood Pkwy @ Huffman Street

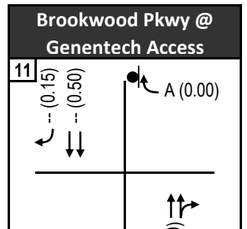
10



V/C: >1.0	LOS: F

Brookwood Pkwy @ Genentech Access

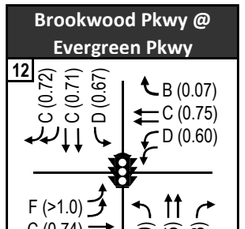
11



V/C: 0.02	LOS: B

Brookwood Pkwy @ Evergreen Pkwy

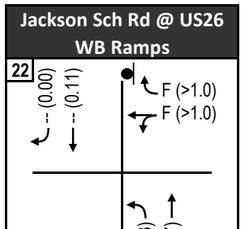
12



V/C: 0.77	LOS: C

Jackson Sch Rd @ US26 WB Ramps

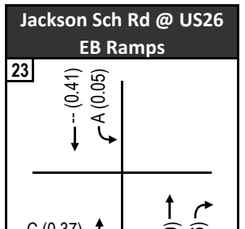
22



V/C: >1.0	LOS: F

Jackson Sch Rd @ US26 EB Ramps

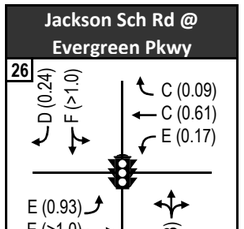
23



V/C: 0.37	LOS: C

Jackson Sch Rd @ Evergreen Pkwy

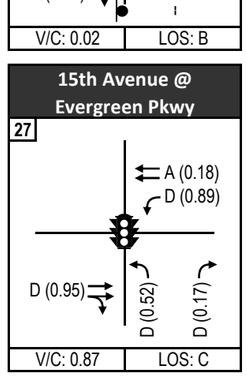
26



V/C: >1.0	LOS: E

15th Avenue @ Evergreen Pkwy

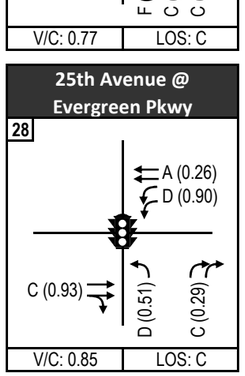
27



V/C: 0.87	LOS: C

25th Avenue @ Evergreen Pkwy

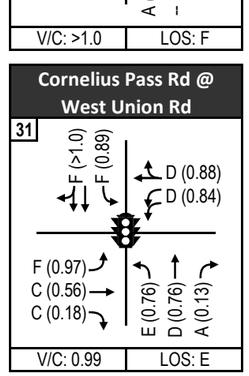
28



V/C: 0.85	LOS: C

Cornelius Pass Rd @ West Union Rd

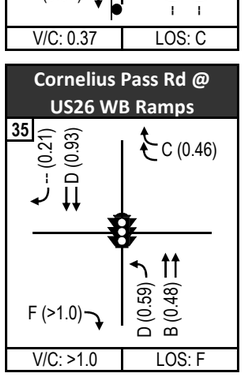
31



V/C: 0.99	LOS: E

Cornelius Pass Rd @ US26 WB Ramps

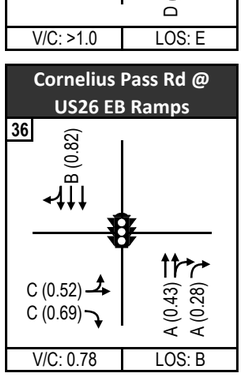
35



V/C: >1.0	LOS: F

Cornelius Pass Rd @ US26 EB Ramps

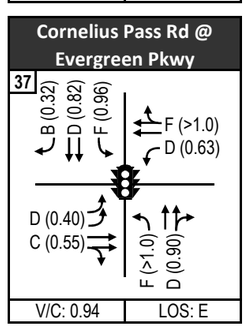
36



V/C: 0.78	LOS: B

Cornelius Pass Rd @ Evergreen Pkwy

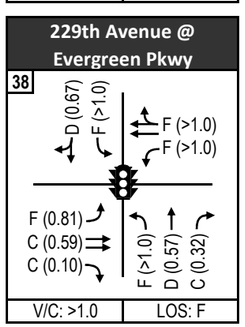
37



V/C: 0.94	LOS: E

229th Avenue @ Evergreen Pkwy

38



V/C: >1.0	LOS: F

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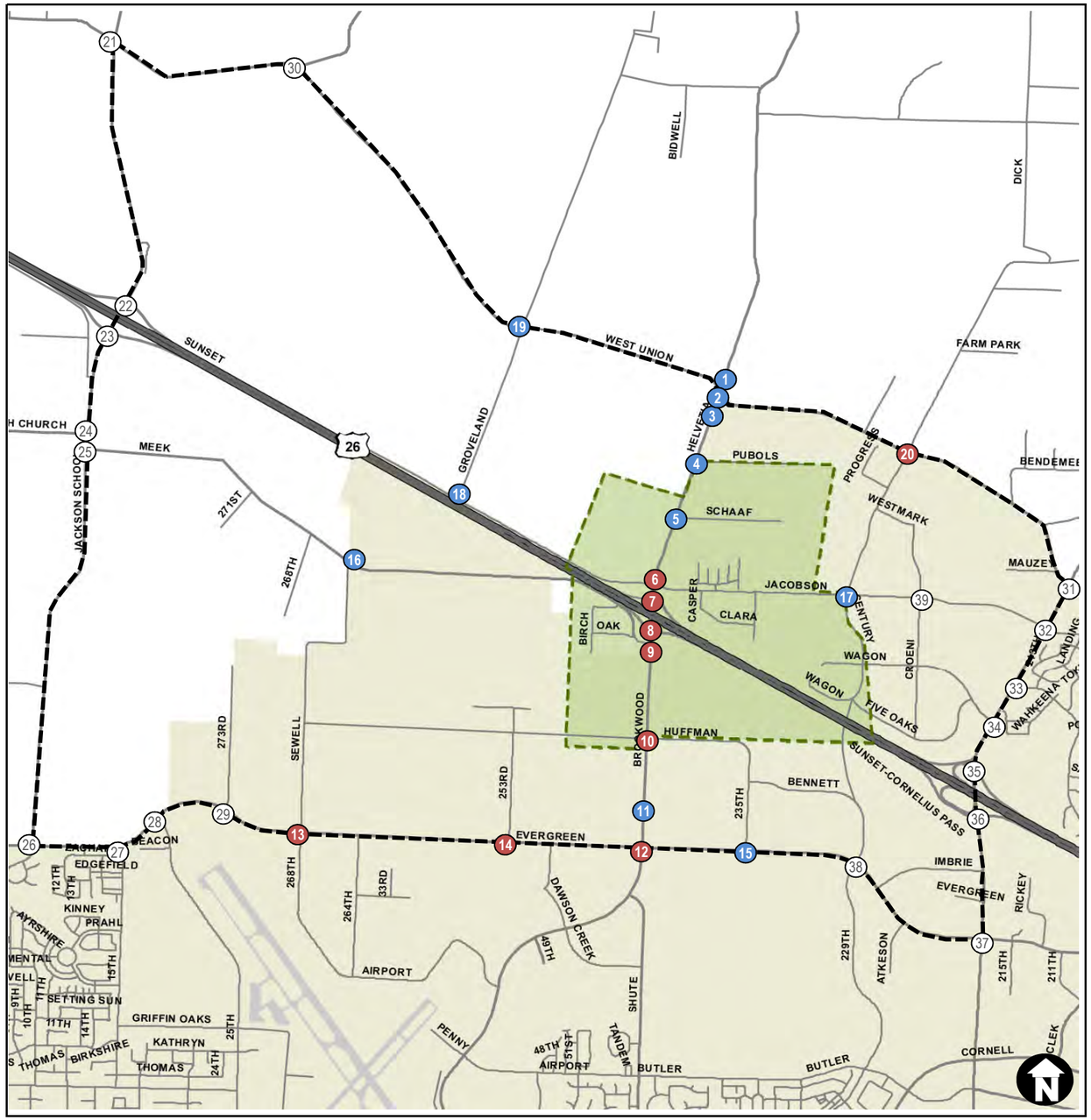
Legend

- Signalized inersection
- STOP Controlled Approach
- Lane Configuration
- IAMP Study Boundary
- **V/C:** Volume-to-Capacity Ratio
- **LOS:** Level of Service
- **A (0.01)** Lane Group LOS (V/C)
- Interchange Management Area
- Intersection evaluated
- Intersection fails operational standard
- Intersection not evaluated in AM Peak Hour
- V/C: 0.01 | LOS: A — Overall Intersection Operations*
  **Overall stop-controlled intersection operations reported for worst stopped movement*
- Urban Growth Boundary
- -- LOS not reported for free movements

FIGURE 7

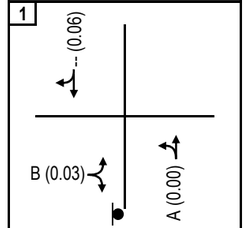
2035 Baseline Operations AM Peak Hour

US 26 / Brookwood / Helvetia IAMP



Helvetia Rd North @ West Union Rd

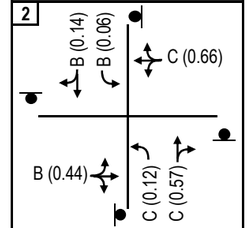
1



V/C: 0.03 | LOS: B

Helvetia Rd Middle @ West Union Rd

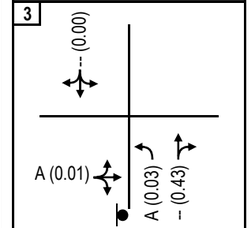
2



V/C: 0.66 | LOS: C

Helvetia Rd South @ West Union Rd

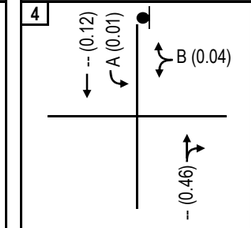
3



V/C: 0.01 | LOS: A

Helvetia Rd @ Pubols Rd

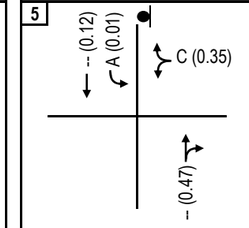
4



V/C: 0.04 | LOS: B

Helvetia Rd @ Schaff Rd

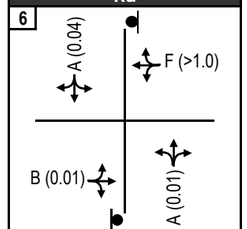
5



V/C: 0.35 | LOS: C

Helvetia Rd @ Jacobson Rd

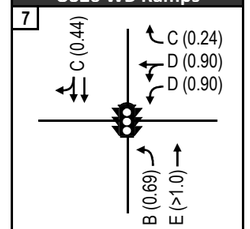
6



V/C: >1.0 | LOS: F

Brookwood Pkwy @ US26 WB Ramps

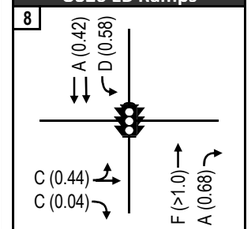
7



V/C: >1.0 | LOS: D

Brookwood Pkwy @ US26 EB Ramps

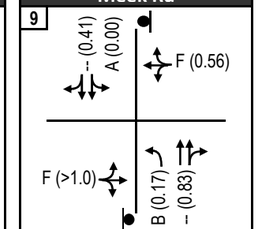
8



V/C: >1.0 | LOS: D

Brookwood Pkwy @ Meek Rd

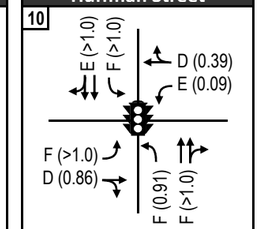
9



V/C: >1.0 | LOS: F

Brookwood Pkwy @ Huffman Street

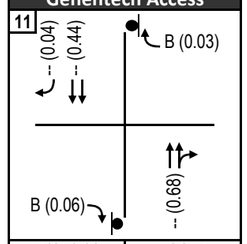
10



V/C: 1.00 | LOS: F

Brookwood Pkwy @ Genentech Access

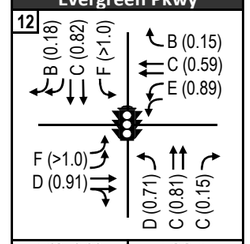
11



V/C: 0.06 | LOS: B

Brookwood Pkwy @ Evergreen Pkwy

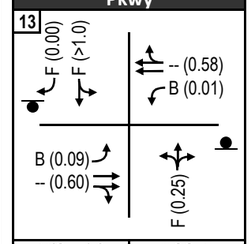
12



V/C: 0.99 | LOS: E

Sewell Rd @ Evergreen Pkwy

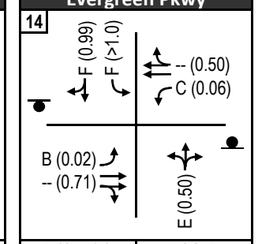
13



V/C: >1.0 | LOS: F

Meier-Jurgen Rd @ Evergreen Pkwy

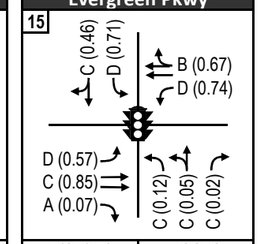
14



V/C: >1.0 | LOS: F

235th Avenue @ Evergreen Pkwy

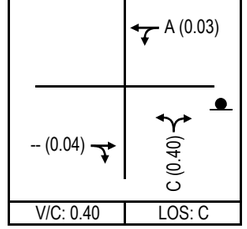
15



V/C: 0.73 | LOS: C

Sewell Rd @ Meek Rd

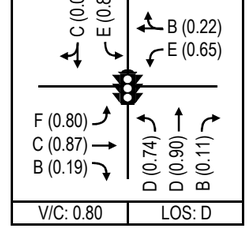
16



V/C: 0.40 | LOS: C

Century Blvd @ Jacobson Rd

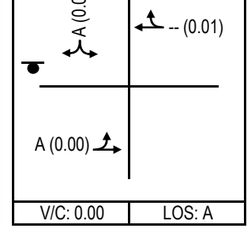
17



V/C: 0.80 | LOS: D

Groveland Rd @ Groveland Drive

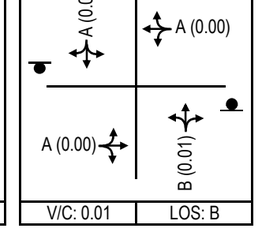
18



V/C: 0.00 | LOS: A

Groveland Rd @ West Union Rd

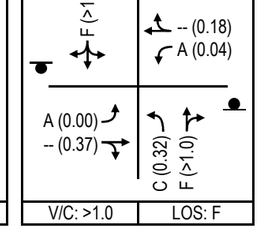
19



V/C: 0.01 | LOS: B

Century Blvd @ West Union Rd

20



V/C: >1.0 | LOS: F

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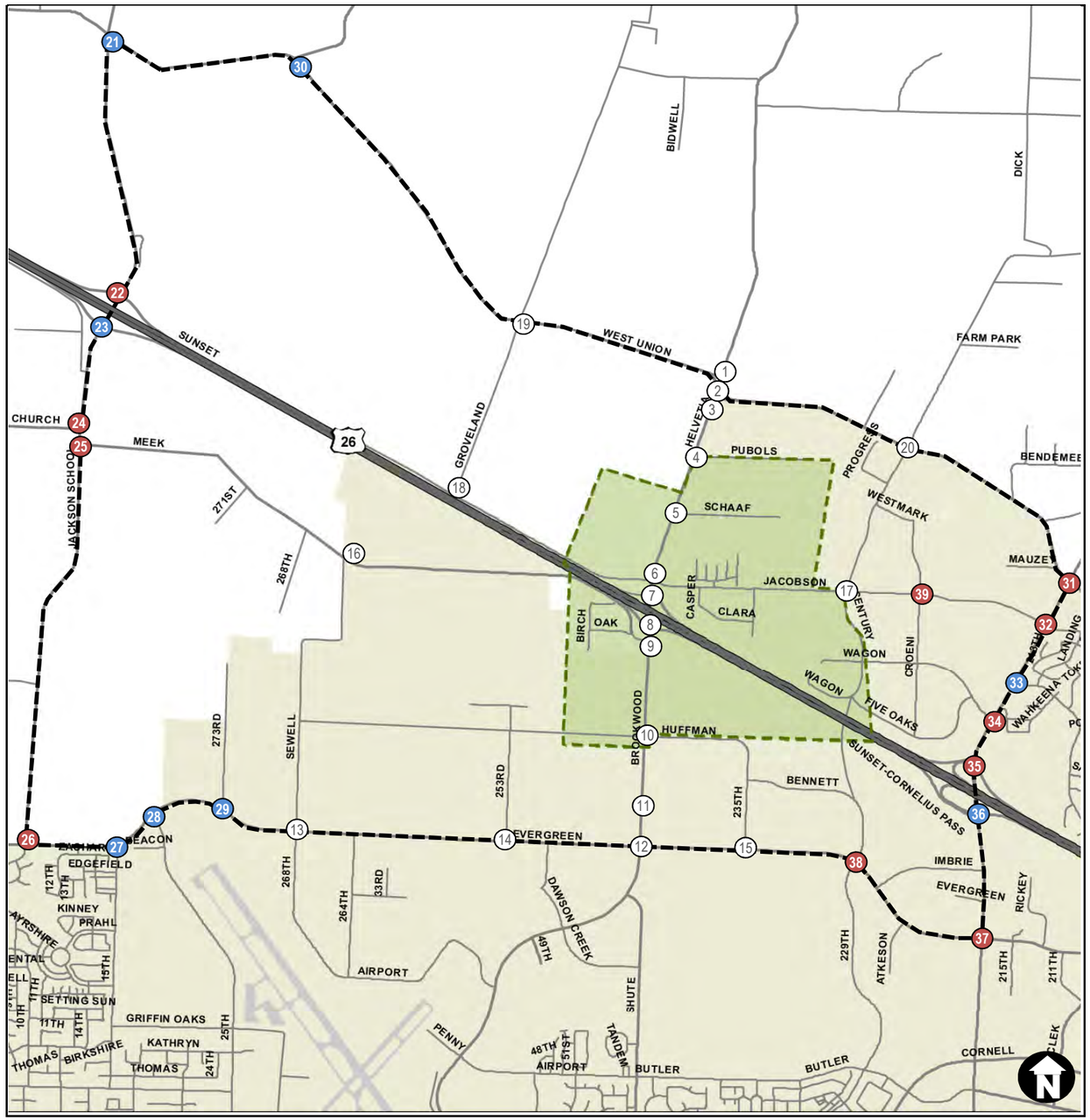
Legend

- Signalized inersection
- STOP Controlled Approach
- Lane Configuration
- IAMP Study Boundary
- **V/C:** Volume-to-Capacity Ratio
- **LOS:** Level of Service
- **A (0.01)** Lane Group LOS (V/C)
- Interchange Management Area
- ## Intersection evaluated
- ## Intersection fails operational standard
- ## Intersection volumes shown on separate figure
- V/C: 0.01 | LOS: A Overall Intersection Operations*
- *Overall stop-controlled intersection operations reported for worst stopped movement
- Urban Growth Boundary
- -- LOS not reported for free movements

FIGURE 8

2035 Baseline Operations PM Peak Hour

US 26 / Brookwood / Helvetia IAMP



Jackson Sch Rd @ West Union Rd
21

V/C: 0.79	LOS: E

Jackson Sch Rd @ US26 WB Ramps
22

V/C: >1.0	LOS: F

Jackson Sch Rd @ US26 EB Ramps
23

V/C: 0.05	LOS: B

Jackson Sch Rd @ Scotch Church Rd
24

V/C: >1.0	LOS: F

Jackson Sch Rd @ Meek Rd
25

V/C: >1.0	LOS: F

Jackson Sch Rd @ Evergreen Pkwy
26

V/C: >1.0	LOS: F

15th Avenue @ Evergreen Pkwy
27

V/C: 0.76	LOS: B

25th Avenue @ Evergreen Pkwy
28

V/C: 0.71	LOS: B

Eggiman Rd @ Evergreen Pkwy
29

V/C: 0.05	LOS: D

Jackson Quarry Rd @ West Union Rd
30

V/C: 0.05	LOS: B

Cornelius Pass Rd @ West Union Rd
31

V/C: >1.0	LOS: F

Cornelius Pass Rd @ Jacobson Rd
32

V/C: >1.0	LOS: D

Cornelius Pass Rd @ Rock Creek Blvd
33

V/C: 0.66	LOS: A

Cornelius Pass Rd @ Wagon Way
34

V/C: >1.0	LOS: E

Cornelius Pass Rd @ US26 WB Ramps
35

V/C: >1.0	LOS: F

Cornelius Pass Rd @ US26 EB Ramps
36

V/C: 0.87	LOS: B

Cornelius Pass Rd @ Evergreen Pkwy
37

V/C: >1.0	LOS: F

229th Avenue @ Evergreen Pkwy
38

V/C: >1.0	LOS: F

Croeni Rd @ Jacobson Rd
39

V/C: >1.0	LOS: F

DAVID EVANS AND ASSOCIATES INC.

Oregon Department of Transportation

Legend

- Signalized inersection
- STOP Controlled Approach
- Lane Configuration
- **V/C:** Volume-to-Capacity Ratio
- **LOS:** Level of Service
- **A (0.01)** Lane Group LOS (V/C)
- IAMP Study Boundary
- Interchange Management Area
- Urban Growth Boundary
- ## Intersection evaluated
- ## Intersection fails operational standard
- ## Intersection volumes shown on separate figure
- -- LOS not reported for free movements
- V/C: 0.01 | LOS: A Overall Intersection Operations*

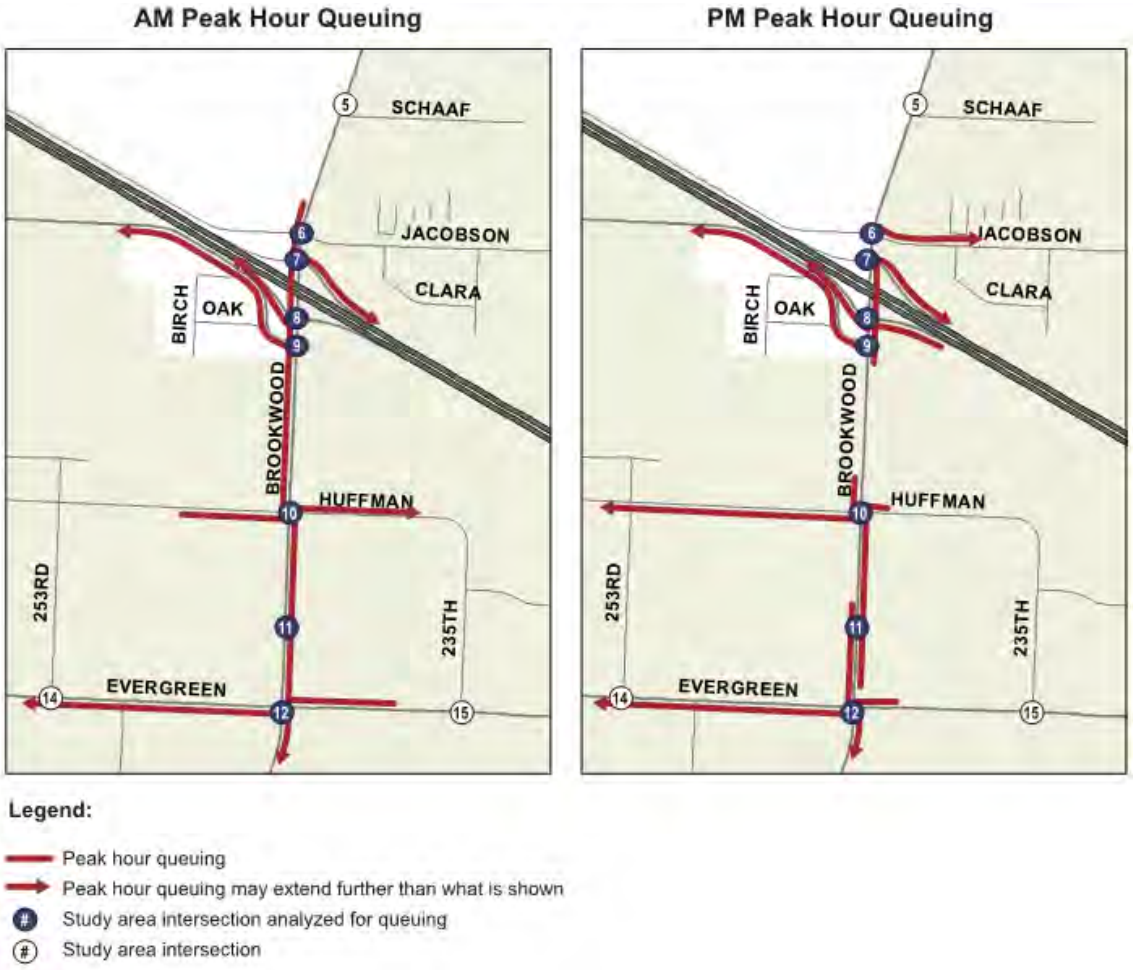
*Overall stop-controlled intersection operations reported for worst stopped movement

FIGURE 9

2035 Baseline Operations PM Peak Hour

US 26 / Brookwood / Helvetia IAMP

Figure 10. 2035 Baseline Conditions – Brookwood Parkway Queue Spillback



Within the IAMP Study Area, six intersections would have queuing with spillback into upstream intersections during either the AM and/or PM peak hours. This includes the eastbound and westbound ramp terminals at Jackson School Road and Cornelius Pass Road. During the PM peak hour, the eastbound ramp meters at Jackson School Road and southbound Cornelius Pass Road spill back into upstream intersections. Queuing at these intersections will not be addressed in the IAMP. Detailed queuing worksheets are presented in **Appendix C**.

Freeway Analysis

HCS was used to determine freeway operations along US 26 between the Jackson School Road interchanges and the Cornelius Pass Road Interchange for the 2035 baseline scenario. The analysis includes the widening of US 26 to three lanes in each direction east of Cornelius Pass Road. **Figure 11** summarizes the v/c ratios for US 26 in the IAMP Study Area mainline, merge, and diverge areas. As shown in **Figure 11**, US 26 within the IAMP Study Area would operate within ODOT standards except for the westbound diverge to Brookwood Parkway/Helvetia Road during the AM peak hour. This segment is forecast to operate at a v/c ratio of 1.09, resulting in slowing on westbound US 26 that would affect all travel lanes. Detailed analysis worksheets are presented in **Appendix D**.

7. FUTURE BASELINE TRAFFIC SAFETY CONSIDERATIONS

The baseline operations analysis reveals several long-term traffic safety issues that need consideration. Long delays and extensive queues may cause drivers to engage in riskier actions, such as running lights or traveling longer distances in the two-way left-turn lane (TWLTL) to go around queues, which could result in more turning, angle, and sideswipe collisions. Congestion at the Brookwood Parkway/Helvetia Road westbound ramp terminal with US 26 will degrade overall freeway operations, which could result in more rear-end and sideswipe collisions. On unsignalized side streets, longer delays may increase the likelihood that drivers would accept shorter gaps in traffic, putting them at risk for turning or angle collisions. Where congestion is expected to worsen, current safety concerns would be exacerbated and new safety concerns would arise (especially queuing backing onto US 26).

Safety and Access Management Deficiencies

The OHP standards for access locations are two miles between interchange ramps on US 26, and 1,320 feet (1/4 mile) between on- and off-ramps and roadway intersections or driveways. This ¼-mile area is called the Influence Area of the interchange. These standards as they apply to the IAMP Management Area roadways are described below.

US 26 westbound exit ramp: Congestion at the Brookwood Parkway/Helvetia Road westbound ramp terminal with US 26 will degrade overall freeway operations, which could result in more rear-end and sideswipe collisions. Where congestion is expected to worsen, current safety concerns would be exacerbated and new safety concerns would arise (especially queuing backing onto US 26). These conditions cause the diamond interchange to fail, which is one of the prime motivations for improving the Brookwood Parkway/Helvetia Road Interchange.

Eastbound entrance ramp: Queuing for the eastbound entrance ramp potentially could cause conflicts with northbound through movements on Brookwood Parkway.

Jacobson Road/Brookwood Parkway intersection: This intersection does not meet minimum interchange access spacing standards and will not meet operational standards.

Meek Road/Brookwood Parkway intersection: This intersection does not meet minimum interchange access spacing standards, and the current sight distance is inadequate considering the speed of vehicles traveling on Brookwood Parkway. In addition, the intersection will not meet operational standards and will experience queue spillback during the peak periods. Longer delays may increase the likelihood that drivers would accept shorter gaps in the mainline traffic, putting them at risk for turning or angle collisions.

Groveland Drive/Brookwood Parkway intersection: This intersection does not meet minimum interchange access spacing standards, and the current sight distance is inadequate considering the speed of vehicles traveling on Brookwood Parkway.

Bicycle and Pedestrian Access: Inadequate bicycle and pedestrian facilities for crossing US 26 could cause potential conflicts between vehicles and other modes attempting to use the interchange.

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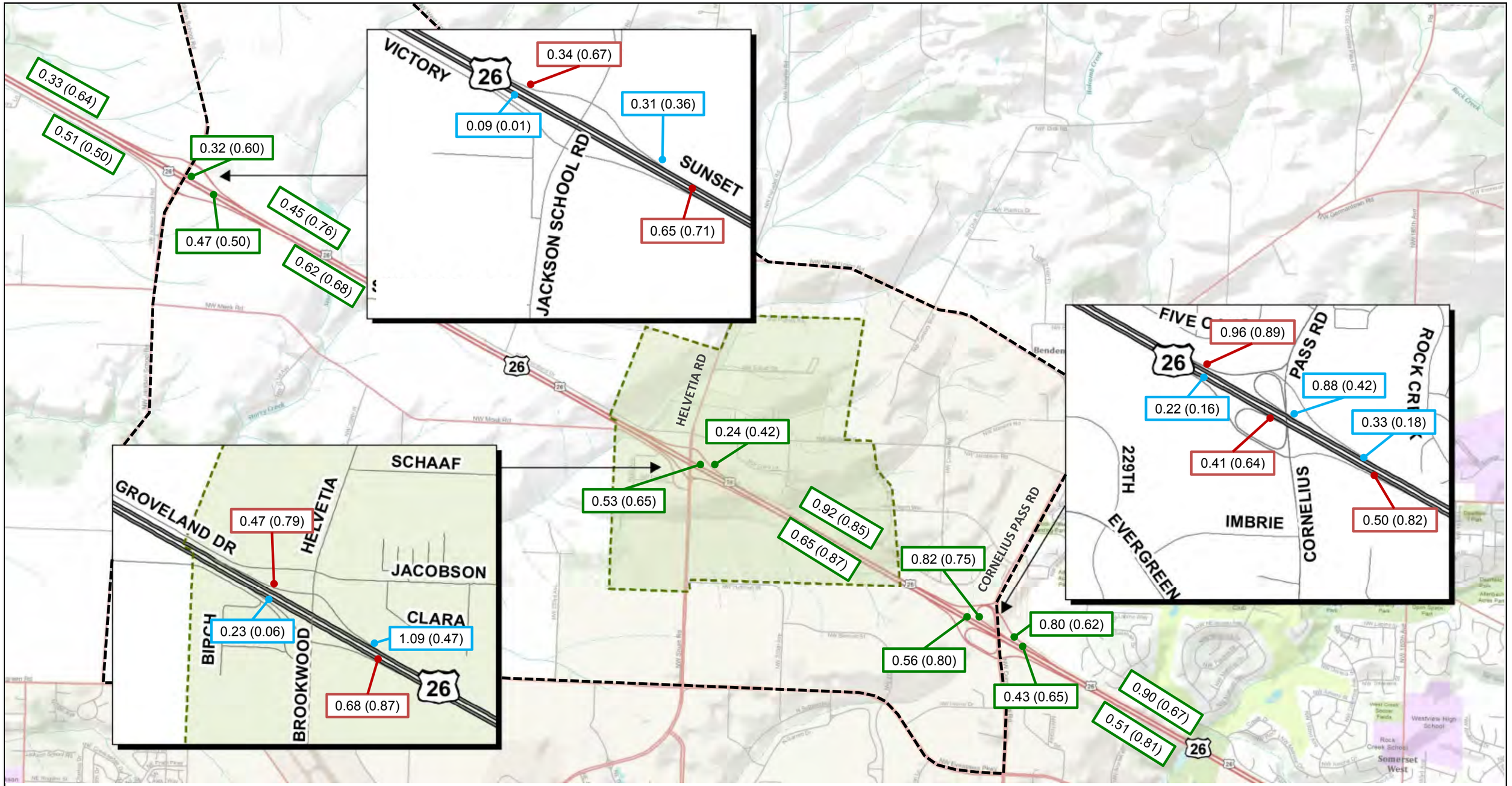

DAVID EVANS AND ASSOCIATES INC.

Oregon Department of Transportation

Legend

- Mainline
- Merge
- Diverge

0.50 (0.65) AM (PM) Volume-to-Capacity Ratio

Note:
A third eastbound mainline lane assumed east of Cornelius Pass Road

- IAMP Study Boundary
- Interchange Management Area
- Urban Growth Boundary

FIGURE 11

2035 Baseline Conditions
Freeway Operations
AM and PM Peak Hours

US 26 / Brookwood / Helvetia IAMP

Appendix A. Traffic Volume Development

Project: Brookwood IAMP
Job #: ODOT0000-0701
Subject: ***AM Baseline Turning Movement Volumes***
Created: 6/8/2011
Rev. Date: 4/12/2012

	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - AM Peak	2035 Baseline NCHRP 255-Link Unbalanced - AM	Difference	2035 Baseline (No Build) NCHRP 255-Balanced - AM
22	30	Jackson Sch Rd @ US26 WB Ramps	NBL	35	45	0	45
	30	16 hr Turning Movement Count	NBT	40	110	0	110
	30	Count Date: 5/25/2011	NBR	0	0	0	0
	30	2011	SBL	0	0	0	0
	30		SBT	110	185	0	185
	30		SBR	0	0	2	2
	30	AM Peak Hour: 7:15 AM-8:15 AM	EBL	0	0	0	0
	30	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	0	0	0	0
	30		EBR	0	0	0	0
	30		WBL	370	540	0	540
	30	PHF:	WBT	0	0	2	2
	30	0.95	WBR	25	40	0	40
			TEV	**580**	**920**	**4**	**924**
23	40	Jackson Sch Rd @ US26 EB Ramps	NBL	0	0	0	0
	40	16 hr Turning Movement Count	NBT	70	140	5	145
	40	Count Date: 5/25/2011	NBR	560	580	0	580
	40	2011	SBL	55	55	10	65
	40		SBT	425	660	0	660
	40		SBR	0	0	0	0
	40	AM Peak Hour: 7:00 AM-8:00 AM	EBL	5	10	0	10
	40	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	0	0	2	2
	40		EBR	80	155	0	155
	40		WBL	0	0	0	0
	40	PHF:	WBT	0	0	0	0
	40	0.95	WBR	0	0	0	0
			TEV	**1195**	**1600**	**17**	**1617**
26	70	Jackson Sch Rd @ Evergreen Rd	NBL	0	0	2	2
	70	16 hr Turning Movement Count	NBT	5	5	0	5
	70	Count Date: 5/25/2011	NBR	5	5	0	5
	70	2011	SBL	160	215	0	215
	70		SBT	0	0	2	2
	70		SBR	300	350	0	350
	70	AM Peak Hour: 7:15 AM-8:15 AM	EBL	375	450	0	450
	70	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	590	1,245	0	1,245
	70		EBR	0	0	2	2
	70		WBL	5	5	0	5
	70	PHF:	WBT	215	370	20	390
	70	0.90	WBR	90	100	0	100
			TEV	**1745**	**2745**	**26**	**2771**
27	80	15th Avenue @ Evergreen Rd	NBL	95	90	20	110
	80	2 hr AM/PM Turning Movement Count	NBT	0	0	0	0
	80	Count Date: 10/19/2010	NBR	190	280	(20)	260
	80	2010	SBL	0	0	0	0
	80		SBT	0	0	0	0
	80		SBR	0	0	0	0
	80	AM Peak Hour: 7:30 AM-8:30 AM	EBL	0	0	0	0
	80	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	550	1,265	(35)	1,230
	80		EBR	205	190	35	225
	80		WBL	335	340	0	340
	80	PHF:	WBT	265	425	0	425
	80	0.95	WBR	0	0	0	0
			TEV	**1640**	**2590**	**0**	**2590**

	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - AM Peak	2035 Baseline NCHRP 255-Link Unbalanced - AM	Difference	2035 Baseline (No Build) NCHRP 255-Balanced - AM
28	90	25th Avenue @ Evergreen Rd	NBL	60	110	0	110
	90	2 hr AM/PM Turning Movement Count	NBT	0	0	0	0
	90	Count Date: 10/19/2010	NBR	160	275	0	275
	90	2010	SBL	0	0	0	0
	90		SBT	0	0	0	0
	90		SBR	0	0	0	0
	90	AM Peak Hour: 7:45 AM-8:45 AM	EBL	0	0	0	0
	90	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	630	1,295	(20)	1,275
	90		EBR	110	215	0	215
	90		WBL	540	575	0	575
	90	PHF:	WBT	540	655	0	655
	90	0.95	WBR	0	0	0	0
			TEV	**2040**	**3125**	**-20**	**3105**
6	210	Helvetia Rd @ Jacobson Rd	NBL	5	5	0	5
	210	3 hr AM/PM Turning Movement Count	NBT	145	400	(35)	365
	210	Count Date: 5/25/2011	NBR	210	225	0	225
	210	2011	SBL	10	20	0	20
	210		SBT	305	490	0	490
	210		SBR	0	0	2	2
	210	AM Peak Hour: 7:15 AM-8:15 AM	EBL	0	0	2	2
	210	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	0	0	2	2
	210		EBR	5	5	0	5
	210		WBL	165	40	0	40
	210	PHF:	WBT	0	0	2	2
	210	0.90	WBR	5	5	0	5
			TEV	**870**	**1190**	**-27**	**1163**
7	220	Brookwood Pkwy @ US26 WB Ramps	NBL	55	10	0	10
	220	16 hr Turning Movement Count	NBT	320	465	(20)	445
	220	Count Date: 5/25/2011	NBR	0	0	0	0
	220	2011	SBL	0	0	0	0
	220		SBT	450	540	(30)	510
	220		SBR	25	10	15	25
	220	AM Peak Hour: 7:30 AM-8:30 AM	EBL	0	0	0	0
	220	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	0	0	0	0
	220		EBR	0	0	0	0
	220		WBL	1260	1,880	0	1,880
	220	PHF:	WBT	0	0	0	0
	220	0.95	WBR	40	150	0	150
			TEV	**2150**	**3055**	**-35**	**3020**
8	230	Brookwood Pkwy @ US26 EB Ramps	NBL	0	0	0	0
	230	16 hr Turning Movement Count	NBT	315	380	0	380
	230	Count Date: 5/25/2011	NBR	465	505	5	510
	230	2011	SBL	40	35	0	35
	230		SBT	1670	2,410	(55)	2,355
	230		SBR	0	0	0	0
	230	AM Peak Hour: 7:30 AM-8:30 AM	EBL	60	75	0	75
	230	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	0	0	0	0
	230		EBR	175	345	0	345
	230		WBL	0	0	0	0
	230	PHF:	WBT	0	0	0	0
	230	0.95	WBR	0	0	0	0
			TEV	**2725**	**3750**	**-50**	**3700**

Project: Brookwood IAMP
Job #: ODOT0000-0701
Subject: ***AM Baseline Turning Movement Volumes***
Created: 6/8/2011
Rev. Date: 4/12/2012

	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - AM Peak	2035 Baseline NCHRP 255-Link Unbalanced - AM	Difference	2035 Baseline (No Build) NCHRP 255-Balanced - AM
9	240	Brookwood Pkwy @ Meek Rd	NBL	10	320	0	320
	240	3 hr AM/PM Turning Movement Count	NBT	765	755	0	755
	240	Count Date: 5/25/2011	NBR	5	0	5	5
	240	2011	SBL	0	0	2	2
	240		SBT	1840	2,145	0	2,145
	240		SBR	5	560	(5)	555
	240	AM Peak Hour: 7:30 AM-8:30 AM	EBL	15	135	0	135
	240	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	5	10	0	10
	240		EBR	20	60	0	60
	240		WBL	0	0	0	0
	240	PHF:	WBT	0	0	2	2
	240	0.95	WBR	0	0	0	0
			TEV	**2665**	**3985**	**4**	**3989**
10	250	Brookwood Pkwy @ Huffman Street	NBL	1	305	0	305
	250	3 hr AM/PM Turning Movement Count	NBT	740	890	(10)	880
	250	Count Date: 5/25/2011	NBR	30	10	0	10
	250	2011	SBL	120	75	0	75
	250		SBT	1740	1,625	180	1,805
	250		SBR	1	510	(240)	270
	250	AM Peak Hour: 7:30 AM-8:30 AM	EBL	1	140	5	145
	250	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	1	45	0	45
	250		EBR	1	65	(10)	55
	250		WBL	5	5	0	5
	250	PHF:	WBT	1	345	0	345
	250	0.95	WBR	40	55	0	55
			TEV	**2675**	**4070**	**-75**	**3995**
11	260	Brookwood Pkwy @ Genentech Access	NBL	25	45	(45)	0
	260	3 hr AM/PM Turning Movement Count	NBT	835	1,190	5	1,195
	260	Count Date: 5/25/2011	NBR	10	10	0	10
	260	2011	SBL	5	2	(2)	0
	260		SBT	1735	1,645	(15)	1,630
	260		SBR	80	60	180	240
	260	AM Peak Hour: 7:30 AM-8:30 AM	EBL	5	5	(5)	0
	260	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	0	0	0	0
	260		EBR	10	10	0	10
	260		WBL	0	0	0	0
	260	PHF:	WBT	0	0	0	0
	260	0.95	WBR	0	0	0	0
			TEV	**2705**	**2967**	**118**	**3085**
12	270	Brookwood Pkwy @ Evergreen Rd	NBL	60	130	45	175
	270	16 hr Turning Movement Count	NBT	595	930	(45)	885
	270	Count Date: 5/25/2011	NBR	125	275	0	275
	270	2011	SBL	70	75	0	75
	270		SBT	915	760	(10)	750
	270		SBR	760	815	0	815
	270	AM Peak Hour: 7:30 AM-8:30 AM	EBL	225	255	0	255
	270	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	390	620	0	620
	270		EBR	90	110	0	110
	270		WBL	105	220	0	220
	270	PHF:	WBT	330	880	0	880
	270	0.95	WBR	50	100	0	100
			TEV	**3715**	**5170**	**-10**	**5160**

	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - AM Peak	2035 Baseline NCHRP 255-Link Unbalanced - AM	Difference	2035 Baseline (No Build) NCHRP 255-Balanced - AM
38	320	229th Avenue @ Evergreen Pkwy	NBL	105	265	0	265
	320	2 hr AM/PM Turning Movement Count	NBT	70	215	0	215
	320	Count Date: 10/19/2010	NBR	265	215	0	215
	320	2010	SBL	40	210	0	210
	320		SBT	25	150	0	150
	320		SBR	5	80	0	80
	320	AM Peak Hour: 7:15 AM-8:15 AM	EBL	15	85	0	85
	320	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	370	565	0	565
	320		EBR	85	150	0	150
	320		WBL	540	385	0	385
	320	PHF:	WBT	545	1,060	0	1,060
	320	0.95	WBR	200	470	0	470
			TEV	**2265**	**3850**	**0**	**3850**
31	330	Cornelius Pass Rd @ West Union Rd	NBL	50	65	(10)	55
	330	16 hr Turning Movement Count	NBT	360	280	85	365
	330	Count Date: 5/25/2011	NBR	190	255	(60)	195
	330	2011	SBL	10	45	0	45
	330		SBT	570	950	0	950
	330		SBR	35	160	0	160
	330	AM Peak Hour: 7:15 AM-8:15 AM	EBL	30	60	0	60
	330	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	55	185	0	185
	330		EBR	50	60	0	60
	330		WBL	520	705	0	705
	330	PHF:	WBT	155	580	0	580
	330	0.95	WBR	15	35	0	35
			TEV	**2040**	**3380**	**15**	**3395**
35	360	Cornelius Pass Rd @ US26 WB Ramps	NBL	70	80	(5)	75
	360	16 hr Turning Movement Count	NBT	750	740	15	755
	360	Count Date: 5/25/2011	NBR	0	0	0	0
	360	2011	SBL	0	0	0	0
	360		SBT	1065	1,105	40	1,145
	360		SBR	225	325	(325)	0
	360	AM Peak Hour: 7:00 AM-8:00 AM	EBL	0	0	0	0
	360	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	0	0	0	0
	360		EBR	1205	1,645	0	1,645
	360		WBL	0	0	0	0
	360	PHF:	WBT	0	0	0	0
	360	0.95	WBR	230	615	(615)	0
			TEV	**3545**	**4510**	**-890**	**3620**
36	370	Cornelius Pass Rd @ US26 EB Ramps	NBL	0	0	0	0
	370	16 hr Turning Movement Count	NBT	665	665	0	665
	370	Count Date: 5/25/2011	NBR	490	545	0	545
	370	2011	SBL	0	0	0	0
	370		SBT	2025	2,410	35	2,445
	370		SBR	245	345	(345)	0
	370	AM Peak Hour: 7:00 AM-8:00 AM	EBL	155	165	0	165
	370	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	0	0	2	2
	370		EBR	185	240	0	240
	370		WBL	0	0	0	0
	370	PHF:	WBT	0	0	0	0
	370	0.95	WBR	0	0	0	0
			TEV	**3765**	**4370**	**-308**	**4062**

Project: Brookwood IAMP
Job #: ODOT0000-0701
Subject: ***AM Baseline Turning Movement Volumes***
Created: 6/8/2011
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	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - AM Peak	2035 Baseline NCHRP 255-Link Unbalanced - AM	Difference	2035 Baseline (No Build) NCHRP 255-Balanced - AM
37	380	Cornelius Pass Rd @ Evergreen Pkwy	NBL	155	280	0	280
	380	16 hr Turning Movement Count	NBT	775	840	0	840
	380	Count Date: 5/25/2011	NBR	45	65	0	65
	380	2011	SBL	250	210	50	260
	380		SBT	725	885	(50)	835
	380		SBR	300	310	0	310
	380	AM Peak Hour: 7:15 AM-8:15 AM	EBL	45	60	0	60
	380	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	250	465	0	465
	380		EBR	35	95	0	95
	380		WBL	30	75	0	75
	380	PHF:	WBT	505	1,035	0	1,035
	380	0.95	WBR	145	175	0	175
			TEV	**3260**	**4495**	**0**	**4495**

Project: Brookwood IAMP
Job #: ODOT0000-0701
Subject: **AM Baseline Link Volumes**

Table 2: 2035 Link Volume Calculations for the AM Peak Period

Road	From	To	Direction	Volumes 2011	Model 2010	Interpolated Model 2011	Model 2035	2010-2035 Model Comparison: Annual Growth	Total Growth	Volume Growth	2035 Volume Estimates: Volume Difference	Volume Growth	Absolute Difference	Average	Forecast Used	Method Used	Comments
Helvetia Rd/Brookwood Pkwy	South of Evergreen	Evergreen	NB	780	1064	1087	1643	2.2%	52.2%	556	1336	1187	12%	1262	**1336**	Difference Method	Absolute difference >10% --> Used difference only
	Evergreen	South of Evergreen	SB	1110	1109	1108	1086	-0.1%	-2.0%	-22	1088	1088	0%	1088	**1088**	Difference Method	To be consistent with method used for opposing direction
	Evergreen	Genentech	NB	870	1003	1021	1465	1.8%	44.2%	444	1314	1255	5%	1284	**1284**	Average of Difference and Growth	
	Genentech	Evergreen	SB	1745	1192	1189	1116	-0.3%	-6.1%	-73	1672	1638	2%	1655	**1655**	Average of Difference and Growth	
	Genentech	Huffman St	NB	771	974	994	1465	2.0%	48.4%	471	1242	1144	8%	1193	**1193**	Average of Difference and Growth	
	Huffman St	Genentech	SB	1820	1223	1219	1116	-0.3%	-8.4%	-103	1717	1667	3%	1692	**1692**	Average of Difference and Growth	
	Huffman St	Meek Rd	NB	780	976	990	1328	1.4%	34.6%	338	1118	1050	6%	1084	**1084**	Average of Difference and Growth	
	Meek Rd	Huffman St	SB	1861	1437	1450	1752	0.9%	21.0%	302	2163	2253	4%	2208	**2208**	Average of Difference and Growth	
	Meek Rd	EB Ramp Terminal	NB	780	986	991	1118	0.5%	12.9%	127	907	880	3%	893	**893**	Average of Difference and Growth	
	EB Ramp Terminal	Meek Rd	SB	1845	1414	1447	2238	2.3%	55.9%	791	2636	2877	9%	2757	**2757**	Average of Difference and Growth	
	EB Ramp Terminal	WB Ramp Terminal	NB	375	533	537	630	0.7%	17.5%	93	468	441	6%	454	**454**	Average of Difference and Growth	
	WB Ramp Terminal	EB Ramp Terminal	SB	1710	1281	1306	1917	2.0%	47.7%	611	2321	2525	8%	2423	**2423**	Average of Difference and Growth	
	WB Ramp Terminal	Jacobson Rd	NB	360	403	414	683	2.8%	66.7%	269	629	600	5%	614	**614**	Average of Difference and Growth	
	Jacobson Rd	WB Ramp Terminal	SB	475	571	574	637	0.5%	11.1%	63	538	528	2%	533	**533**	Average of Difference and Growth	
	Jacobson Rd	Schaff Rd	NB	150	180	191	447	5.9%	142.4%	256	406	364	11%	385	**406**	Difference Method	Absolute difference >10% --> Used difference only
	Schaff Rd	Jacobson Rd	SB	315	339	348	555	2.5%	61.2%	207	522	508	3%	515	**522**	Difference Method	To be consistent with method used for opposing direction
Jackson School Rd	South of Evergreen	Evergreen	NB	10											**10**	**Manual**	Not in Models - Used existing volumes
	Evergreen	South of Evergreen	SB	5											**5**	**Manual**	Not in Models - Used existing volumes
	Evergreen	North of Evergreen	NB	470	258	260	320	1.0%	23.1%	60	530	578	9%	554	**554**	Average of Difference and Growth	
	North of Evergreen	Evergreen	SB	460	313	317	401	1.1%	27.0%	84	544	584	7%	564	**564**	Average of Difference and Growth	
	Scotch Church Rd	EB Ramp Terminal	NB	630	468	472	561	0.8%	19.1%	89	719	750	4%	735	**735**	Average of Difference and Growth	
	EB Ramp Terminal	Scotch Church Rd	SB	505	502	515	822	2.5%	61.2%	307	812	814	0%	813	**813**	Average of Difference and Growth	
	EB Ramp Terminal	WB Ramp Terminal	NB	75	35	38	116	9.3%	222.2%	78	153	242	45%	197	**153**	Difference Method	Absolute difference >10% --> Used difference only
	WB Ramp Terminal	EB Ramp Terminal	SB	480	642	652	894	1.6%	37.7%	242	722	661	9%	691	**722**	Difference Method	To be consistent with method used for opposing direction
	WB Ramp Terminal	West Union	NB	55	151	155	251	2.6%	63.6%	96	151	90	51%	120	**151**	Difference Method	Absolute difference >10% --> Used difference only
	West Union	WB Ramp Terminal	SB	115	248	251	316	1.1%	26.3%	65	180	145	22%	163	**180**	Difference Method	Absolute difference >10% --> Used difference only
Cornelius Pass	South of Evergreen	Evergreen	NB	975	1144	1153	1381	0.8%	19.9%	228	1203	1169	3%	1186	**1186**	Average of Difference and Growth	
	Evergreen	South of Evergreen	SB	790	702	712	959	1.5%	35.1%	247	1037	1068	3%	1052	**1052**	Average of Difference and Growth	
	Evergreen	N of Evergreen	NB	965	1402	1408	1541	0.4%	9.5%	133	1098	1057	4%	1078	**1078**	Average of Difference and Growth	
	N of Evergreen	Evergreen	SB	1275	1131	1136	1253	0.4%	10.4%	117	1392	1407	1%	1400	**1400**	Average of Difference and Growth	
	South of EB Ramp	EB Ramp Terminal	NB	1155	1385	1388	1459	0.2%	5.1%	71	1226	1214	1%	1220	**1220**	Average of Difference and Growth	
	EB Ramp Terminal	South of EB Ramp	SB	2210	1622	1638	2011	1.0%	23.0%	373	2583	2719	5%	2651	**2651**	Average of Difference and Growth	
	EB Ramp Terminal	WB Ramp Terminal	NB	820	807	807	817	0.0%	1.2%	10	830	830	0%	830	**830**	Average of Difference and Growth	
	WB Ramp Terminal	EB Ramp Terminal	SB	2270	1769	1786	2204	1.0%	23.6%	418	2688	2806	4%	2747	**2747**	Average of Difference and Growth	
	WB Ramp Terminal	N of WB Ramp	NB	980	1152	1169	1570	1.5%	34.8%	401	1381	1321	4%	1351	**1351**	Average of Difference and Growth	
	N of WB Ramp	WB Ramp Terminal	SB	1290	1080	1087	1252	0.6%	15.3%	165	1455	1487	2%	1471	**1471**	Average of Difference and Growth	
	Jacobson Rd	West Union	NB	600	989	988	971	-0.1%	-1.7%	-17	583	590	1%	586	**586**	Average of Difference and Growth	
	West Union	Jacobson Rd	SB	1140	1046	1069	1619	2.2%	52.6%	550	1690	1740	3%	1715	**1715**	Average of Difference and Growth	
	West Union	N of West Union	NB	405	726	724	677	-0.3%	-6.5%	-47	358	379	6%	368	**368**	Average of Difference and Growth	
	N of West Union	West Union	SB	615	658	681	1229	3.5%	83.3%	548	1163	1127	3%	1145	**1145**	Average of Difference and Growth	
West Union	E of Corn Pass	Corn Pass	WB	690	666	691	1301	3.8%	91.5%	610	1300	1322	2%	1311	**1300**	Difference Method	To be consistent with method used for opposing direction
	Corn Pass	E of Corn Pass	EB	255	524	534	764	1.8%	44.0%	230	485	367	28%	426	**485**	Difference Method	Absolute difference >10% --> Used difference only
	Corn Pass	W of Corn Pass	WB	240	270	294	864	8.8%	211.2%	570	810	747	8%	779	**810**	Difference Method	To be consistent with method used for opposing direction
	W of Corn Pass	Corn Pass	EB	135	253	260	422	2.7%	64.1%	162	297	222	29%	259	**297**	Difference Method	Absolute difference >10% --> Used difference only
Jacobson Road	E of Helvetia Rd	Helvetia Rd	WB	170	231	226	100	-2.3%	-54.4%	-126	44	77	55%	61	**44**	Difference Method	Absolute difference >10% --> Used difference only
	Helvetia Rd	E of Helvetia Rd	EB	220	223	224	253	0.5%	12.9%	29	249	248	0%	249	**249**	Difference Method	To be consistent with method used for opposing direction
	Helvatia Rd	W of Helvati Rd	WB	5											**5**	**Manual**	Not in Models - Used existing volumes
	W of Helvatia Rd	Helvatia Rd	EB	5											**5**	**Manual**	Not in Models - Used existing volumes
EB US 26 Ramps	W of Jackson School	Jackson School	EB	85	73	76	152	4.3%	103.9%	76	161	173	7%	167	**167**	Average of Difference and Growth	
	Jackson School	E of Jackson School	EB	615	647	648	669	0.1%	3.3%	21	636	635	0%	636	**636**	Average of Difference and Growth	
	W of Brookwood Pkwy	Brookwood Pkwy	EB	235	314	322	505	2.4%	58.4%	183	418	372	12%	395	**418**	Difference Method	Absolute difference >10% --> Used difference only
	Brookwood Pkwy	E of Brookwood Pkwy	EB	505	634	636	672	0.2%	5.8%	36	541	534	1%	538	**538**	Average of Difference and Growth	
	W of Corn Pass	Corn Pass	EB	340	241	243	296	0.9%	21.9%	53	393	414	5%	404	**404**	Average of Difference and Growth	
	Corn Pass SB	E of Corn Pass	EB	245	377	381	481	1.1%	26.5%	100	345	310	11%	327	**345**	Difference Method	Absolute difference >10% --> Used difference only
	Corn Pass NB	E of Corn Pass	EB	490	588	590	650	0.4%	10.1%	60	550	540	2%	545	**545**	Average of Difference and Growth	
WB US 26 Ramps	E of Corn Pass	Corn Pass NB	WB	230	344	360	753	4.8%	114.1%	393	623	493	23%	558	**623**	Difference Method	Absolute difference >10% --> Used difference only
	E of Corn Pass	Corn Pass SB	WB	1205	713	728	1090	2.1%	50.8%	362	1567	1817	15%	1692	**1692**	Average of Difference and Growth	
	Corn Pass	W of Corn Pass	WB	295	25	30	138	18.1%	433.9%	108	403	1575	118%	989	**403**	Difference Method	Absolute difference >10% --> Used difference only
	E of Helvatia	NB Helvetia	WB	40	23	30	210	32.5%	780.5%	180	220	352	46%	286	**220**	Difference Method	Absolute difference >10% --> Used difference only
	E of Helvatia	SB Helvetia	WB	1260	796	816	1300	2.5%	60.8%	484	1744	2026	15%	1885	**1744**	Difference Method	Absolute difference >10% --> Used difference only
	Helvetia Rd	W of Helvatia	WB	80	238	236	176	-1.0%	-25.0%	-60	20	60	98%	40	**20**	Difference Method	Absolute difference >10% --> Used difference only
	E of Jackson School	Jackson School	WB	395	524	532	736	1.6%	38.8%	204	599	548	9%	573	**573**	Average of Difference and Growth	
	Jackson School	W of Jackson School	WB	35	14	14	24	2.9%	68.6%	10	45	59	28%	52	**45**	Difference Method	Absolute difference >10% --> Used difference only
Meek Road	Brookwood Pkwy	W of Brookwood Pkwy	WB	15	12	48	916	301.3%	7232.0%	868	883	1100	22%	991	**883**	Difference Method	Absolute difference >10% --> Used difference only
	W of Brookwood Pkwy	Brookwood Pkwy	EB	40	45	52	221	15.6%	375.5%	169	209	190	9%	200	**209**	Difference Method	To be consistent with method used for opposing direction

Project: Brookwood IAMP
Job #: ODOT0000-0701
Subject: **AM Baseline Link Volumes**

Table 2: 2035 Link Volume Calculations for the AM Peak Period

Road	From	To	Direction	Volumes	Model	Interpolated Model	Model	2010-2035 Model Comparison			2035 Volume Estimates				Forecast Used	Method Used	Comments
				2011	2010	2011	2035	Annual Growth	Total Growth	Volume Growth	Volume Difference	Volume Growth	Absolute Difference	Average			
Evergreen Road	E of Corn Pass	Corn Pass	WB	680	881	906	1510	2.9%	68.5%	604	1284	1146	11%	1215	**1284**	Difference Method	Absolute difference >10% --> Used difference only
	Corn Pass	E of Corn Pass	EB	545	561	569	766	1.5%	35.1%	197	742	736	1%	739	**742**	Difference Method	To be consistent with method used for opposing direction
	Corn Pass	W of Corn Pass	WB	960	1083	1111	1773	2.5%	61.2%	662	1622	1547	5%	1585	**1622**	Difference Method	To be consistent with method used for opposing direction
	W of Corn Pass	Corn Pass	EB	330	592	604	897	2.1%	49.5%	293	623	493	23%	558	**623**	Difference Method	Absolute difference >10% --> Used difference only
	E of 229th	229th	WB	1285	1158	1185	1821	2.3%	55.0%	636	1921	1991	4%	1956	**1956**	Average of Difference and Growth	
	229th	E of 229th	EB	675	863	878	1233	1.7%	41.2%	355	1030	953	8%	992	**992**	Average of Difference and Growth	
	229th	W of 229th	WB	655	1125	1156	1910	2.8%	67.0%	754	1409	1094	25%	1251	**1409**	Difference Method	Absolute difference >10% --> Used difference only
	W of 229th	229th	EB	470	862	876	1219	1.7%	39.8%	343	813	657	21%	735	**813**	Difference Method	To be consistent with method used for opposing direction
	E of Brookwood	Brookwood	WB	485	648	678	1393	4.6%	110.4%	715	1200	1020	16%	1110	**1200**	Difference Method	Absolute difference >10% --> Used difference only
	Brookwood	E of Brookwood	EB	585	948	964	1348	1.7%	40.5%	384	969	822	16%	895	**969**	Difference Method	Absolute difference >10% --> Used difference only
	Brookwood	W of Brookwood	WB	1150	621	649	1320	4.5%	108.1%	671	1821	2393	27%	2107	**1821**	Difference Method	Absolute difference >10% --> Used difference only
	W of Brookwood	Brookwood	EB	705	775	787	1068	1.5%	36.3%	281	986	961	3%	974	**986**	Difference Method	To be consistent with method used for opposing direction
	273rd	25th Ave	WB	1080	632	637	769	0.9%	20.8%	132	1212	1305	7%	1258	**1258**	Average of Difference and Growth	
	25th Ave	273rd	EB	790	846	880	1684	4.0%	95.1%	804	1594	1541	3%	1568	**1568**	Average of Difference and Growth	
	25th Ave	15th	WB	600	273	280	445	2.5%	60.5%	165	765	963	23%	864	**765**	Difference Method	Absolute difference >10% --> Used difference only
	15th	25th Ave	EB	740	918	951	1752	3.6%	87.2%	801	1541	1385	11%	1463	**1541**	Difference Method	Absolute difference >10% --> Used difference only
	15th	W of 15th	WB	360	257	263	415	2.5%	59.0%	152	512	572	11%	542	**512**	Difference Method	Absolute difference >10% --> Used difference only
	W of 15th	15th	EB	755	721	750	1447	4.0%	96.7%	697	1452	1485	2%	1468	**1452**	Difference Method	To be consistent with method used for opposing direction
	E of Jackson School	Jackson School	WB	310	257	263	415	2.5%	59.0%	152	462	493	7%	477	**477**	Average of Difference and Growth	
	Jackson School	E of Jackson School	EB	755	721	750	1447	4.0%	96.7%	697	1452	1485	2%	1468	**1468**	Average of Difference and Growth	
	Jackson School	W of Jackson School	WB	515	372	381	587	2.3%	55.5%	206	721	801	10%	761	**721**	Difference Method	Absolute difference >10% --> Used difference only
	W of Jackson School	Jackson School	EB	965	781	811	1539	3.9%	93.2%	728	1693	1864	10%	1778	**1693**	Difference Method	To be consistent with method used for opposing direction
229th	S of Evergreen	Evergreen	NB	440	73	84	356	15.5%	372.2%	272	712	2078	98%	1395	**712**	Difference Method	Absolute difference >10% --> Used difference only
	Evergreen	S of Evergreen	SB	650	6	7	42	24.0%	576.0%	35	685	4394	146%	2539	**685**	Difference Method	Absolute difference >10% --> Used difference only
	Evergreen	N of Evergreen	NB	285	103	123	610	19.7%	472.5%	487	772	1632	72%	1202	**772**	Difference Method	Absolute difference >10% --> Used difference only
	N of Evergreen	Evergreen	SB	70	4	20	400	396.0%	9504.0%	380	450	6723	175%	3586	**450**	Difference Method	Absolute difference >10% --> Used difference only
25th Ave	S of Evergreen	Evergreen	NB	220	235	242	419	3.1%	75.2%	177	397	385	3%	391	**391**	Average of Difference and Growth	
	Evergreen	S of Evergreen	SB	650	665	671	811	0.9%	21.1%	140	790	787	0%	789	**789**	Average of Difference and Growth	
15th Ave	S of Evergreen	Evergreen	NB	285	249	252	333	1.3%	32.4%	81	366	377	3%	371	**366**	Difference Method	To be consistent with method used for opposing direction
	Evergreen	S of Evergreen	SB	540	68	68	58	-0.6%	-14.1%	-10	530	464	13%	497	**530**	Difference Method	Absolute difference >10% --> Used difference only
Genentech Access	E of Brookwood Pkwy	Brookwood Pkwy	WB	0											**0**	**Manual**	Not in Models - Used existing volumes
	Brookwood Pkwy	E of Brookwood Pkwy	EB	15											**15**	**Manual**	Not in Models - Used existing volumes
	Brookwood Pkwy	W of Brookwood Pkwy	WB	105											**105**	**Manual**	Not in Models - Used existing volumes
	W of Brookwood Pkwy	Brookwood Pkwy	EB	15											**15**	**Manual**	Not in Models - Used existing volumes
Huffman Street	E of Brookwood Pkwy	Brookwood Pkwy	WB	46	11	26	380	134.2%	3220.4%	354	400	1527	117%	964	**400**	Difference Method	Absolute difference >10% --> Used difference only
	Brookwood Pkwy	E of Brookwood Pkwy	EB	151	223	222	197	-0.5%	-11.2%	-25	126	134	6%	130	**126**	Difference Method	To be consistent with method used for opposing direction
	Brookwood Pkwy	W of Brookwood Pkwy	WB	3	1	49	1211	4840.0%	116160.0%	1162	1165	3488	100%	2326	**1165**	Difference Method	Absolute difference >10% --> Used difference only
	W of Brookwood Pkwy	Brookwood Pkwy	EB	3	1	11	255	1016.0%	24384.0%	244	247	735	99%	491	**247**	Difference Method	Absolute difference >10% --> Used difference only

Greater than 10% difference between difference and growth methods

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

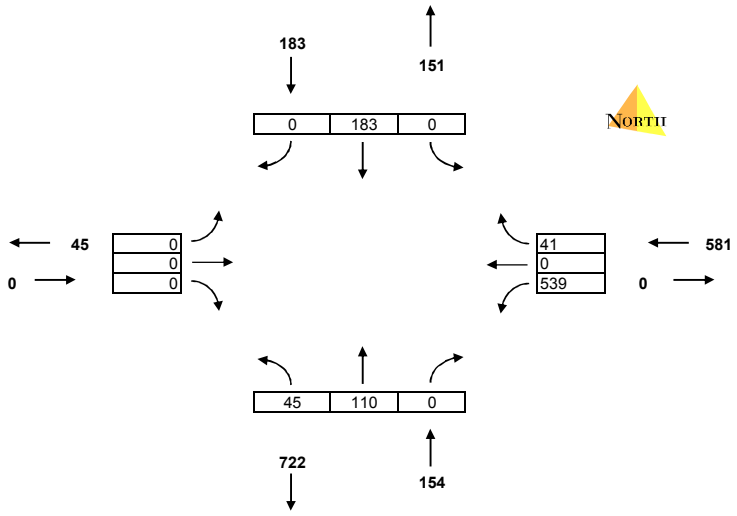
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Jackson School Rd @ US 26 WB Ramps
SCENARIO : 2035 Baseline
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: US 26 WB Ramps
NORTH-SOUTH ROAD: Jackson School Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	35	40	0	0	110	0	0	0	0	370	0	25
OUTPUT FUTURE	**45**	**110**	**0**	**0**	**183**	**0**	**0**	**0**	**0**	**539**	**0**	**41**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	75	480	110	65	0	35	395	0	580	580
OUTPUT FUTURE	**154**	**722**	**183**	**151**	**0**	**45**	**581**	**0**	918	918
INPUT FUTURE	153	722	180	151	0	45	573	0	907	918



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

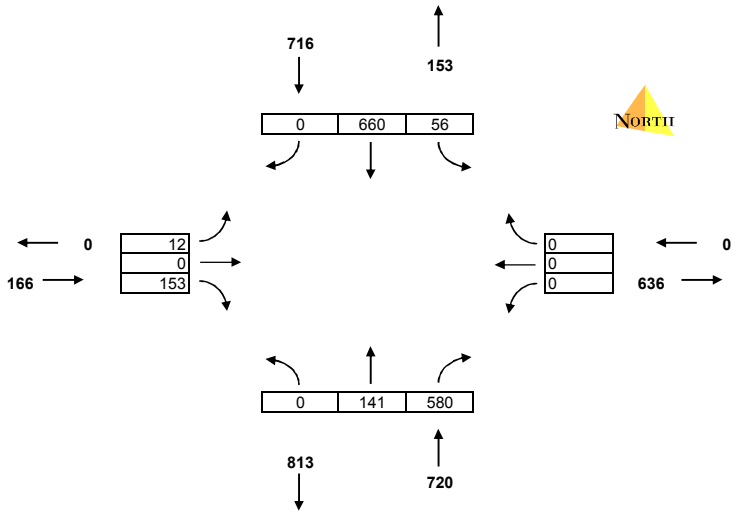
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Jackson School Rd @ US 26 EB Ramps
SCENARIO : 2035 Baseline
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: US 26 EB Ramps
NORTH-SOUTH ROAD: Jackson School Rd.

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	70	560	55	425	0	5	0	80	0	0	0
OUTPUT FUTURE	**0**	**141**	**580**	**56**	**660**	**0**	**12**	**0**	**153**	**0**	**0**	**0**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	630	505	480	75	85	0	0	615	1,195	1,195
OUTPUT FUTURE	**720**	**813**	**716**	**153**	**166**	**0**	**0**	**636**	1,601	1,601
INPUT FUTURE	735	813	722	153	167	0	0	636	1,624	1,601



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

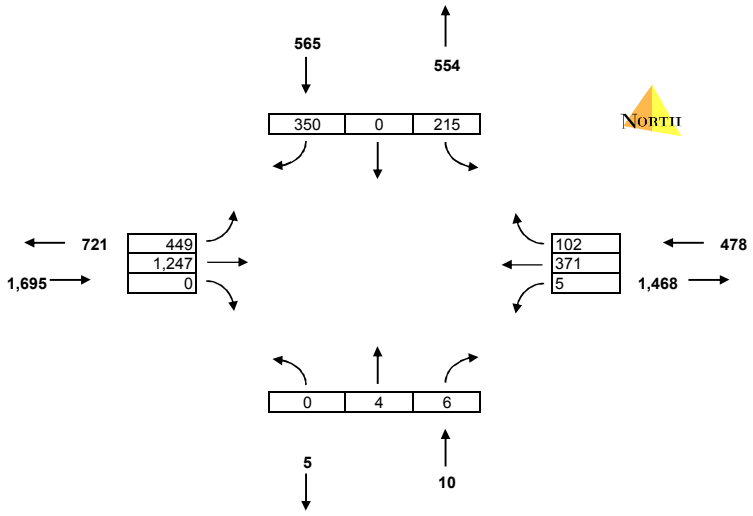
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Jackson School Rd @ Evergreen Rd
SCENARIO : 2035 Baseline
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Rd.
NORTH-SOUTH ROAD: Jackson School Rd.

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	5	5	160	0	300	375	590	0	5	215	90
OUTPUT FUTURE	**0**	**4**	**6**	**215**	**0**	**350**	**449**	**1,247**	**0**	**5**	**371**	**102**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	10	5	460	470	965	515	310	755	1,745	1,745
OUTPUT FUTURE	**10**	**5**	**565**	**554**	**1,695**	**721**	**478**	**1,468**	2,749	2,749
INPUT FUTURE	10	5	564	554	1,693	721	477	1,468	2,744	2,749



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

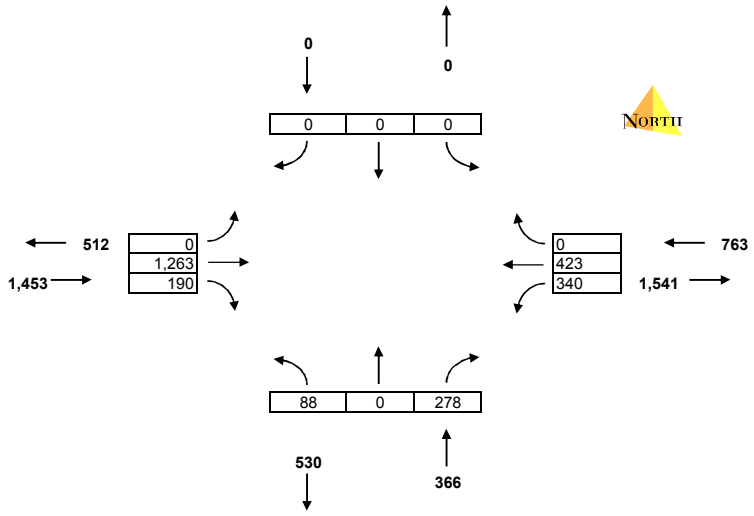
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : 15th Avenue @ Evergreen Rd
SCENARIO : 2035 Baseline
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Rd.
NORTH-SOUTH ROAD: 15th Avenue

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	95	0	190	0	0	0	0	550	205	335	265	0
OUTPUT FUTURE	**88**	**0**	**278**	**0**	**0**	**0**	**0**	**1,263**	**190**	**340**	**423**	**0**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	285	540	0	0	755	360	600	740	1,640	1,640
OUTPUT FUTURE	**366**	**530**	**0**	**0**	**1,453**	**512**	**763**	**1,541**	2,583	2,583
INPUT FUTURE	366	530	0	0	1,452	512	765	1,541	2,583	2,583



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

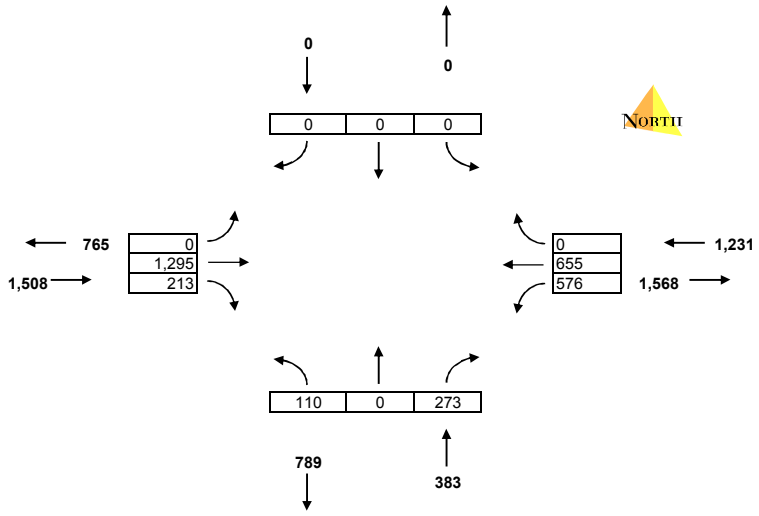
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : 25th Avenue @ Evergreen Rd
SCENARIO : 2035 Baseline
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Rd.
NORTH-SOUTH ROAD: 25th Avenue

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	60	0	160	0	0	0	0	630	110	540	540	0
OUTPUT FUTURE	**110**	**0**	**273**	**0**	**0**	**0**	**0**	**1,295**	**213**	**576**	**655**	**0**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	220	650	0	0	740	600	1,080	790	2,040	2,040
OUTPUT FUTURE	**383**	**789**	**0**	**0**	**1,508**	**765**	**1,231**	**1,568**	3,122	3,122
INPUT FUTURE	391	789	0	0	1,541	765	1,258	1,568	3,190	3,122



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

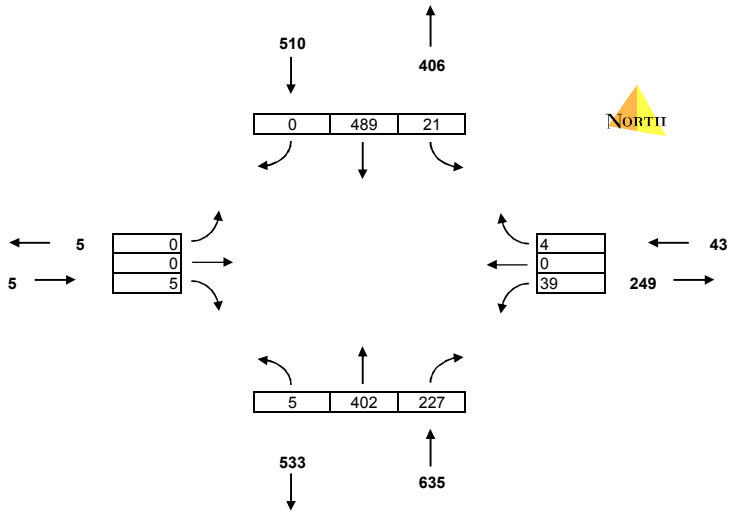
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Helvetia Rd @ Jacobson Rd
SCENARIO : 2035 Baseline
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Jacobson Rd.
NORTH-SOUTH ROAD: Helvetia Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	5	145	210	10	305	0	0	0	5	165	0	5
OUTPUT FUTURE	**5**	**402**	**227**	**21**	**489**	**0**	**0**	**0**	**5**	**39**	**0**	**4**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	360	475	315	150	5	5	170	220	850	850
OUTPUT FUTURE	**635**	**533**	**510**	**406**	**5**	**5**	**43**	**249**	1,193	1,193
INPUT FUTURE	614	533	522	406	5	5	44	249	1,186	1,193



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

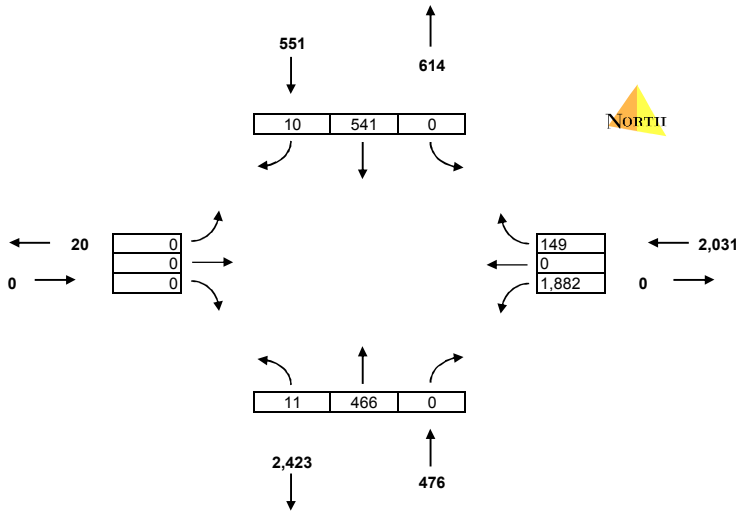
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Brookwood Pkwy @ US26 WB Ramps
SCENARIO : 2035 Baseline
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: US26 WB Ramps
NORTH-SOUTH ROAD: Brookwood Pkwy.

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	55	320	0	0	450	25	0	0	0	1,260	0	40
OUTPUT FUTURE	**11**	**466**	**0**	**0**	**541**	**10**	**0**	**0**	**0**	**1,882**	**0**	**149**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	375	1,710	475	360	0	80	1,300	0	2,150	2,150
OUTPUT FUTURE	**476**	**2,423**	**551**	**614**	**0**	**20**	**2,031**	**0**	3,058	3,058
INPUT FUTURE	454	2,423	533	614	0	20	1,963	0	2,951	3,058



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

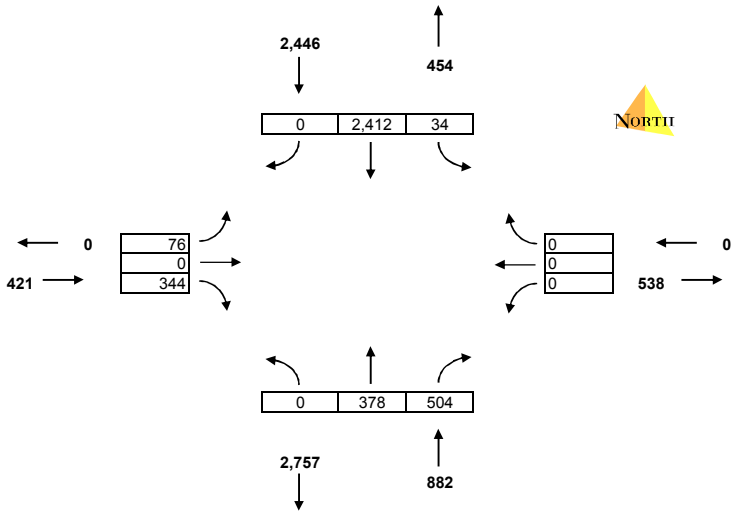
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Brookwood Pkwy @ US26 EB Ramps
SCENARIO : 2035 Baseline
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: US26 EB Ramps
NORTH-SOUTH ROAD: Brookwood Pkwy.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	315	465	40	1,670	0	60	0	175	0	0	0
OUTPUT FUTURE	**0**	**378**	**504**	**34**	**2,412**	**0**	**76**	**0**	**344**	**0**	**0**	**0**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	780	1,845	1,710	375	235	0	0	505	2,725	2,725
OUTPUT FUTURE	**882**	**2,757**	**2,446**	**454**	**421**	**0**	**0**	**538**	3,749	3,749
INPUT FUTURE	893	2,757	2,423	454	418	0	0	538	3,735	3,749



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

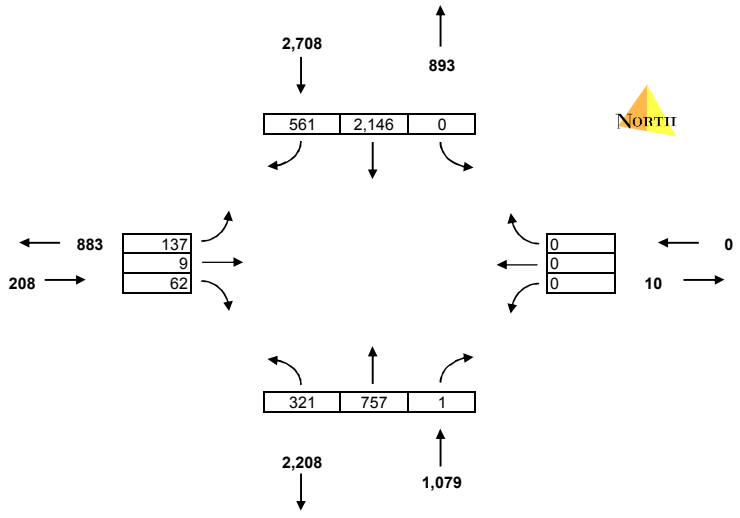
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Brookwood Pkwy @ Meek Rd
SCENARIO : 2035 Baseline
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Meek Rd.
NORTH-SOUTH ROAD: Brookwood Pkwy.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	10	765	5	0	1,840	5	15	5	20	0	0	0
OUTPUT FUTURE	**321**	**757**	**1**	**0**	**2,146**	**561**	**137**	**9**	**62**	**0**	**0**	**0**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	780	1,860	1,845	780	40	15	0	10	2,665	2,665
OUTPUT FUTURE	**1,079**	**2,208**	**2,708**	**893**	**208**	**883**	**0**	**10**	3,994	3,994
INPUT FUTURE	1,084	2,208	2,757	893	209	883	0	10	4,050	3,994



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

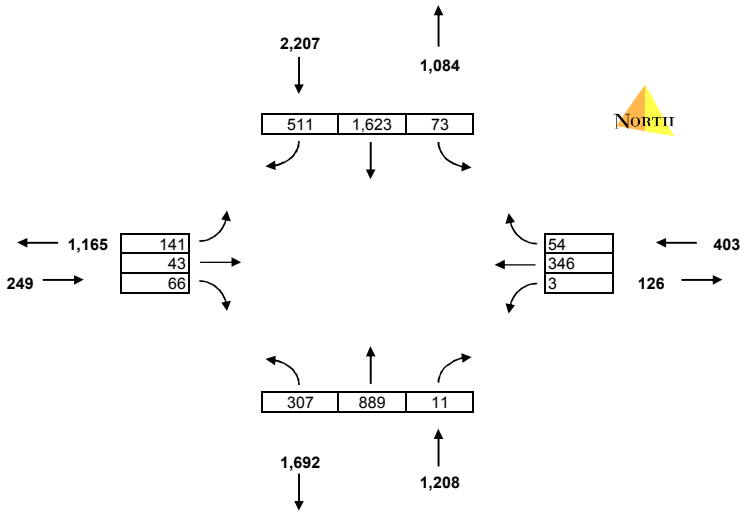
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Brookwood Pkwy @ Huffman St
SCENARIO : 2035 Baseline
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Huffman St.
NORTH-SOUTH ROAD: Brookwood Pkwy.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	1	740	30	120	1,740	1	1	1	1	5	1	40
OUTPUT FUTURE	**307**	**889**	**11**	**73**	**1,623**	**511**	**141**	**43**	**66**	**3**	**346**	**54**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	771	1,746	1,861	781	3	3	46	151	2,681	2,681
OUTPUT FUTURE	**1,208**	**1,692**	**2,207**	**1,084**	**249**	**1,165**	**403**	**126**	4,067	4,067
INPUT FUTURE	1,193	1,692	2,208	1,084	247	1,165	400	126	4,048	4,067



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

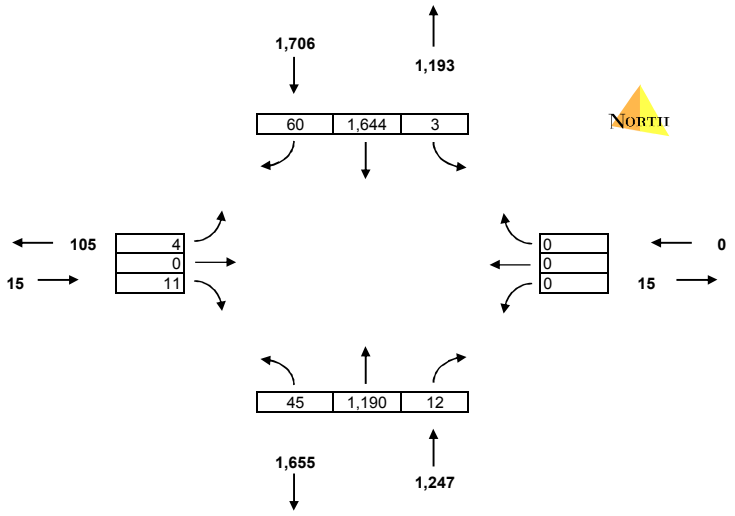
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Brookwood Pkwy @ Genetech Access
SCENARIO : 2035 Baseline
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Genetech Access
NORTH-SOUTH ROAD: Brookwood Pkwy.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	25	835	10	5	1,735	80	5	0	10	0	0	0
OUTPUT FUTURE	**45**	**1,190**	**12**	**3**	**1,644**	**60**	**4**	**0**	**11**	**0**	**0**	**0**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	870	1,745	1,820	840	15	105	0	15	2,705	2,705
OUTPUT FUTURE	**1,247**	**1,655**	**1,706**	**1,193**	**15**	**105**	**0**	**15**	2,968	2,968
INPUT FUTURE	1,284	1,655	1,692	1,193	15	105	0	15	2,991	2,968



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

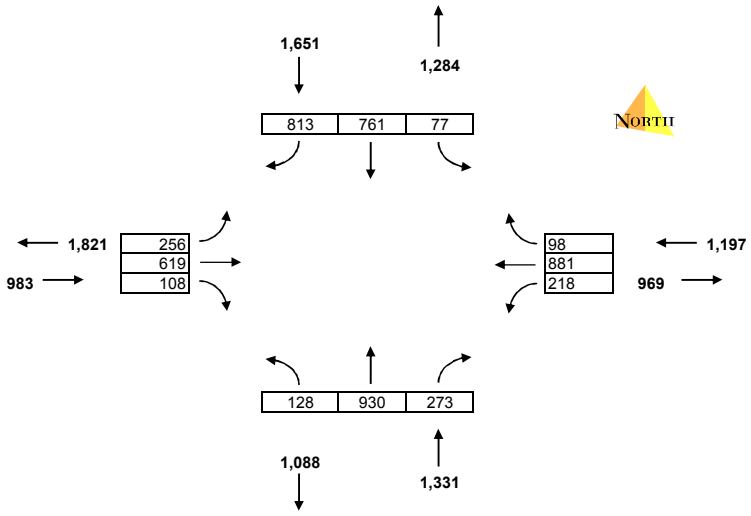
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Brookwood Pkwy @ Evergreen Rd
SCENARIO : 2035 Baseline
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Rd.
NORTH-SOUTH ROAD: Brookwood Pkwy.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	60	595	125	70	915	760	225	390	90	105	330	50
OUTPUT FUTURE	**128**	**930**	**273**	**77**	**761**	**813**	**256**	**619**	**108**	**218**	**881**	**98**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	780	1,110	1,745	870	705	1,150	485	585	3,715	3,715
OUTPUT FUTURE	**1,331**	**1,088**	**1,651**	**1,284**	**983**	**1,821**	**1,197**	**969**	5,162	5,162
INPUT FUTURE	1,336	1,088	1,655	1,284	986	1,821	1,200	969	5,177	5,162



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

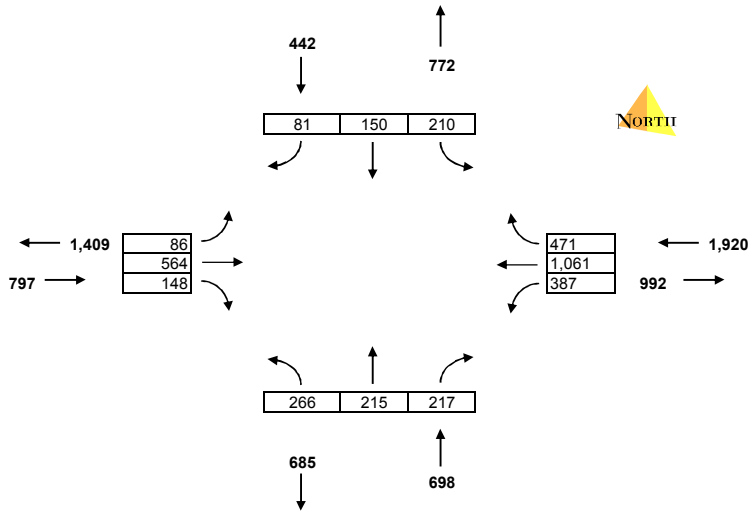
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : 229th Ave @ Evergreen Pkwy
SCENARIO : 2035 Baseline
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Pkwy.
NORTH-SOUTH ROAD: 229th Ave.

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	105	70	265	40	25	5	15	370	85	540	545	200
OUTPUT FUTURE	**266**	**215**	**217**	**210**	**150**	**81**	**86**	**564**	**148**	**387**	**1,061**	**471**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	440	650	70	285	470	655	1,285	675	2,265	2,265
OUTPUT FUTURE	**698**	**685**	**442**	**772**	**797**	**1,409**	**1,920**	**992**	3,856	3,856
INPUT FUTURE	712	685	450	772	813	1,409	1,956	992	3,931	3,856



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

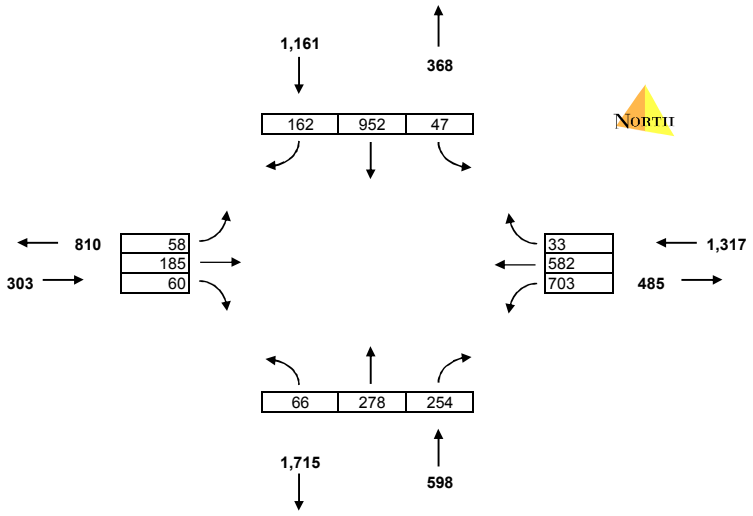
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Cornelius Pass Rd @ West Union Rd
SCENARIO : 2035 Baseline
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: West Union Rd.
NORTH-SOUTH ROAD: Cornelius Pass Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	50	360	190	10	570	35	30	55	50	520	155	15
OUTPUT FUTURE	**66**	**278**	**254**	**47**	**952**	**162**	**58**	**185**	**60**	**703**	**582**	**33**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	600	1,140	615	405	135	240	690	255	2,040	2,040
OUTPUT FUTURE	**598**	**1,715**	**1,161**	**368**	**303**	**810**	**1,317**	**485**	3,379	3,379
INPUT FUTURE	586	1,715	1,145	368	297	810	1,300	485	3,328	3,379



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

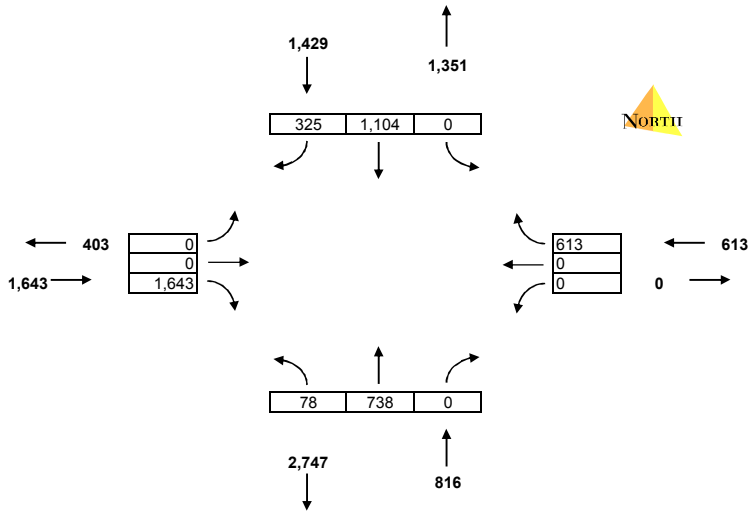
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Cornelius Pass Rd @ US 26 WB Ramps
SCENARIO : 2035 Baseline
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: US 26 WB Ramps
NORTH-SOUTH ROAD: Cornelius Pass Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	70	750	0	0	1,065	225	0	0	1,205	0	0	230
OUTPUT FUTURE	**78**	**738**	**0**	**0**	**1,104**	**325**	**0**	**0**	**1,643**	**0**	**0**	**613**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	820	2,270	1,290	980	1,205	295	230	0	3,545	3,545
OUTPUT FUTURE	**816**	**2,747**	**1,429**	**1,351**	**1,643**	**403**	**613**	**0**	4,502	4,502
INPUT FUTURE	830	2,747	1,471	1,351	1,692	403	623	0	4,615	4,502



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

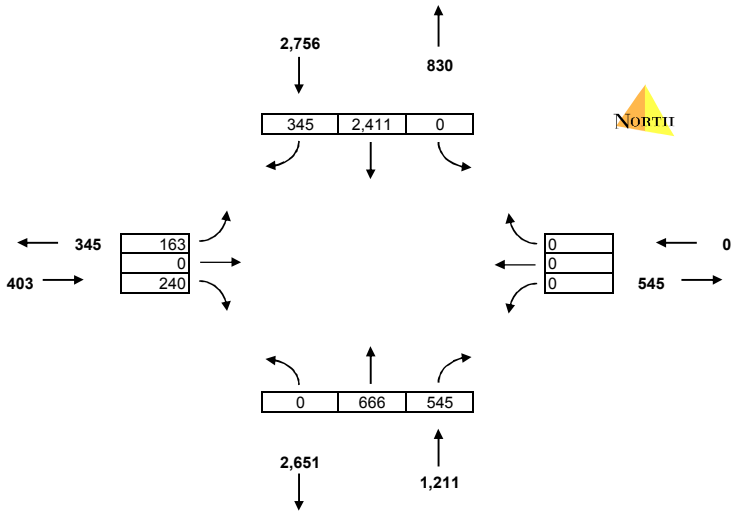
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Cornelius Pass Rd @ US 26 EB Ramps
SCENARIO : 2035 Baseline
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: US 26 EB Ramps
NORTH-SOUTH ROAD: Cornelius Pass Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	665	490	0	2,025	245	155	0	185	0	0	0
OUTPUT FUTURE	**0**	**666**	**545**	**0**	**2,411**	**345**	**163**	**0**	**240**	**0**	**0**	**0**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	1,155	2,210	2,270	820	340	245	0	490	3,765	3,765
OUTPUT FUTURE	**1,211**	**2,651**	**2,756**	**830**	**403**	**345**	**0**	**545**	4,370	4,370
INPUT FUTURE	1,220	2,651	2,747	830	404	345	0	545	4,371	4,370



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

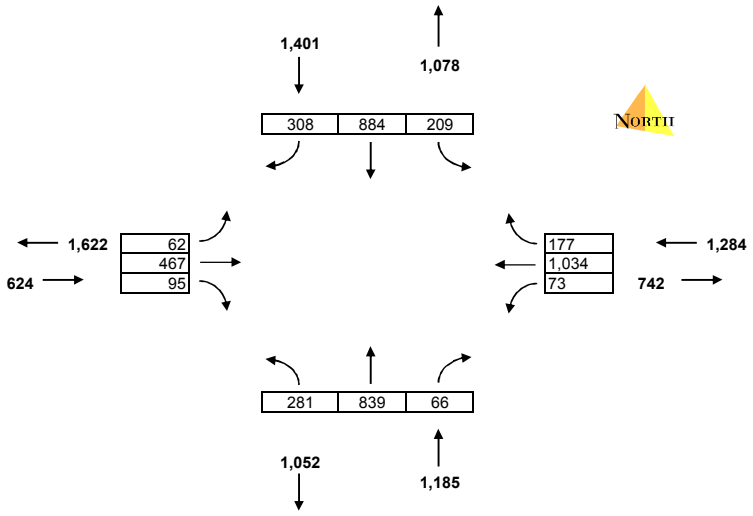
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Cornelius Pass Rd @ Evergreen Pkwy
SCENARIO : 2035 Baseline
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Pkwy.
NORTH-SOUTH ROAD: Cornelius Pass Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	155	775	45	250	725	300	45	250	35	30	505	145
OUTPUT FUTURE	**281**	**839**	**66**	**209**	**884**	**308**	**62**	**467**	**95**	**73**	**1,034**	**177**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	975	790	1,275	965	330	960	680	545	3,260	3,260
OUTPUT FUTURE	**1,185**	**1,052**	**1,401**	**1,078**	**624**	**1,622**	**1,284**	**742**	4,494	4,494
INPUT FUTURE	1,186	1,052	1,400	1,078	623	1,622	1,284	742	4,492	4,494



* Turn Calculation Output from NCHRP 255

Project: Brookwood IAMP

Job #: ODOT0000-0701

Subject: ***PM Baseline Turning Movement Volumes***

Created: 6/8/2011

Rev. Date: 4/12/2012

4/12/2012

Int No.	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - PM Peak	2035 Baseline (No Build) NCHRP 255-Link Unbalanced	Difference	2035 Baseline (No Build) NCHRP 255-Link Balanced
21	10	Jackson Sch Rd @ West Union Rd	NBL	65	150	0	150
	10	16 hr Turning Movement Count	NBT	40	65	0	65
	10	Count Date: 5/25/2011	NBR	60	130	0	130
	10	2011	SBL	5	2	0	2
	10		SBT	30	10	0	10
	10		SBR	10	5	0	5
	10	PM Peak Hour: 4:45 PM-5:45 PM	EBL	10	25	0	25
	10	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	55	165	0	165
	10		EBR	40	70	0	70
	10		WBL	40	60	0	60
	10	PHF:	WBT	65	185	0	185
	10	0.94	WBR	10	20	0	20
			TEV	**430**	**887**	**0**	**887**
30	20	Jackson Quarry Rd @ West Union Rd	NBL	0	0	0	0
	20	3 hr PM Turning Movement Count	NBT	0	0	0	0
	20	Count Date: 5/25/2011	NBR	0	0	0	0
	20	2011	SBL	5	2	0	2
	20		SBT	0	0	0	0
	20		SBR	30	30	0	30
	20	PM Peak Hour: 10:00 AM-11:00 AM	EBL	30	35	0	35
	20	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	90	235	0	235
	20		EBR	0	0	0	0
	20		WBL	0	0	0	0
	20	PHF:	WBT	75	225	0	225
	20	0.94	WBR	10	5	0	5
			TEV	**240**	**532**	**0**	**532**
22	30	Jackson Sch Rd @ US26 WB Ramps	NBL	75	165	0	165
	30	16 hr Turning Movement Count	NBT	100	230	5	235
	30	Count Date: 5/25/2011	NBR	0	0	0	0
	30	2011	SBL	0	0	0	0
	30		SBT	105	135	0	135
	30		SBR	0	0	2	2
	30	PM Peak Hour: 5:00 PM-6:00 PM	EBL	0	0	0	0
	30	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	30		EBR	0	0	0	0
	30		WBL	500	555	0	555
	30	PHF:	WBT	0	0	2	2
	30	0.93	WBR	60	110	0	110
			TEV	**840**	**1195**	**9**	**1204**
23	40	Jackson Sch Rd @ US26 EB Ramps	NBL	0	0	0	0
	40	16 hr Turning Movement Count	NBT	170	395	0	395
	40	Count Date: 5/25/2011	NBR	565	700	45	745
	40	2011	SBL	45	45	0	45
	40		SBT	560	635	10	645
	40		SBR	0	0	0	0
	40	PM Peak Hour: 4:30 PM-5:30 PM	EBL	5	5	0	5
	40	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	2	2
	40		EBR	25	20	0	20
	40		WBL	0	0	0	0
	40	PHF:	WBT	0	0	0	0
	40	0.93	WBR	0	0	0	0
			TEV	**1370**	**1800**	**57**	**1857**

Project: Brookwood IAMP
Job #: ODOT0000-0701
Subject: ***PM Baseline Turning Movement Volumes***
Created: 6/8/2011
Rev. Date: 4/12/2012

Int No.	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - PM Peak	2035 Baseline (No Build) NCHRP 255-Link Unbalanced	Difference	2035 Baseline (No Build) NCHRP 255-Link Balanced
24	50	Jackson Sch Rd @ Scotch Church Rd	NBL	25	155	0	155
	50	2 hr PM Turning Movement Count	NBT	620	1,040	(20)	1,020
	50	Count Date: 10/19/2010	NBR	0	0	0	0
	50	2010	SBL	0	0	0	0
	50		SBT	435	560	0	560
	50		SBR	140	120	0	120
	50	PM Peak Hour: 4:45 PM-5:45 PM	EBL	115	75	45	120
	50	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	50		EBR	20	70	(45)	25
	50		WBL	0	0	0	0
	50	PHF:	WBT	0	0	0	0
	50	0.90	WBR	0	0	0	0
			TEV	**1355**	**2020**	**-20**	**2000**
25	60	Jackson Sch Rd @ Meek Rd	NBL	0	0	0	0
	60	3 hr AM/2 hr PM Turning Movement Count	NBT	630	685	0	685
	60	Count Date: 5/25/2011	NBR	5	60	0	60
	60	2011	SBL	20	50	0	50
	60		SBT	435	640	(105)	535
	60		SBR	0	0	0	0
	60	PM Peak Hour: 4:45 PM-5:45 PM	EBL	0	0	0	0
	60	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	60		EBR	0	0	0	0
	60		WBL	0	0	0	0
	60	PHF:	WBT	0	0	0	0
	60	0.90	WBR	15	515	(25)	490
			TEV	**1105**	**1950**	**-130**	**1820**
26	70	Jackson Sch Rd @ Evergreen Rd	NBL	5	5	0	5
	70	16 hr Turning Movement Count	NBT	0	0	2	2
	70	Count Date: 5/25/2011	NBR	10	10	0	10
	70	2011	SBL	95	125	0	125
	70		SBT	5	5	0	5
	70		SBR	320	420	0	420
	70	PM Peak Hour: 5:00 PM-6:00 PM	EBL	315	325	0	325
	70	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	360	600	(20)	580
	70		EBR	0	0	2	2
	70		WBL	10	10	0	10
	70	PHF:	WBT	700	1,310	0	1,310
	70	0.95	WBR	320	380	40	420
			TEV	**2140**	**3190**	**24**	**3214**
27	80	15th Avenue @ Evergreen Rd	NBL	300	295	0	295
	80	2 hr AM/PM Turning Movement Count	NBT	0	0	0	0
	80	Count Date: 10/19/2010	NBR	415	350	0	350
	80	2010	SBL	0	0	0	0
	80		SBT	0	0	0	0
	80		SBR	0	0	0	0
	80	PM Peak Hour: 4:45 PM-5:45 PM	EBL	0	0	0	0
	80	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	345	635	0	635
	80		EBR	80	100	0	100
	80		WBL	235	275	0	275
	80	PHF:	WBT	725	1,475	(30)	1,445
	80	0.90	WBR	0	0	0	0
			TEV	**2100**	**3130**	**-30**	**3100**

Int No.	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - PM Peak	2035 Baseline (No Build) NCHRP 255-Link Unbalanced	Difference	2035 Baseline (No Build) NCHRP 255-Link Balanced
28	90	25th Avenue @ Evergreen Rd	NBL	205	265	0	265
	90	2 hr AM/PM Turning Movement Count	NBT	0	0	0	0
	90	Count Date: 03/21/2007	NBR	730	640	0	640
	90	2007	SBL	0	0	0	0
	90		SBT	0	0	0	0
	90		SBR	0	0	0	0
	90	PM Peak Hour: 5:00 PM-6:00 PM	EBL	0	0	0	0
	90	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	675	855	0	855
	90		EBR	85	130	0	130
	90		WBL	145	225	0	225
	90	PHF:	WBT	755	1,455	0	1,455
	90	0.95	WBR	0	0	0	0
			TEV	**2595**	**3570**	**0**	**3570**
29	100	Eggiman Rd @ Evergreen Rd	NBL	0	0	0	0
	100	3 hr PM Turning Movement Count	NBT	0	0	0	0
	100	Count Date: 5/25/2011	NBR	0	0	0	0
	100	2011	SBL	5	5	0	5
	100		SBT	0	0	0	0
	100		SBR	0	0	2	2
	100	PM Peak Hour: 5:00 PM-6:00 PM	EBL	0	0	2	2
	100	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	1405	1,495	0	1,495
	100		EBR	0	0	0	0
	100		WBL	0	0	0	0
	100	PHF:	WBT	900	1,680	0	1,680
	100	0.95	WBR	5	5	0	5
			TEV	**2315**	**3185**	**4**	**3189**
19	110	Groveland Rd @ West Union Rd	NBL	0	0	0	0
	110	3 hr PM Turning Movement Count	NBT	0	0	2	2
	110	Count Date: 5/25/2011	NBR	1	5	0	5
	110	2011	SBL	0	0	0	0
	110		SBT	0	0	0	0
	110		SBR	5	5	0	5
	110	PM Peak Hour: 4:15 PM-5:15 PM	EBL	5	5	0	5
	110	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	90	230	0	230
	110		EBR	1	2	0	2
	110		WBL	1	2	0	2
	110	PHF:	WBT	85	235	0	235
	110	0.95	WBR	5	5	0	5
			TEV	**190**	**489**	**2**	**491**
18	120	Groveland Rd @ Groveland Drive	NBL	0	0	0	0
	120	3 hr PM Turning Movement Count	NBT	0	0	0	0
	120	Count Date: 5/25/2011	NBR	0	0	0	0
	120	2011	SBL	1	2	0	2
	120		SBT	0	0	0	0
	120		SBR	1	2	0	2
	120	PM Peak Hour: 4:45 PM-5:45 PM	EBL	1	2	0	2
	120	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	10	10	0	10
	120		EBR	0	0	0	0
	120		WBL	0	0	0	0
	120	PHF:	WBT	10	10	0	10
	120	0.85	WBR	1	2	0	2
			TEV	**20**	**28**	**0**	**28**

Int No.	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - PM Peak	2035 Baseline (No Build) NCHRP 255-Link Unbalanced	Difference	2035 Baseline (No Build) NCHRP 255-Link Balanced
16	130	Sewell Rd @ Meek Rd	NBL	10	160	0	160
	130	3 hr PM Turning Movement Count	NBT	0	0	0	0
	130	Count Date: 5/25/2011	NBR	5	25	0	25
	130	2011	SBL	0	0	0	0
	130		SBT	0	0	0	0
	130		SBR	0	0	0	0
	130	PM Peak Hour: 4:30 PM-5:30 PM	EBL	0	0	0	0
	130	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	10	35	0	35
	130		EBR	5	25	0	25
	130		WBL	5	35	0	35
	130	PHF:	WBT	25	365	0	365
	130	0.90	WBR	0	0	0	0
			TEV	**60**	**645**	**0**	**645**
13	140	Sewell Rd @ Evergreen Rd	NBL	0	0	2	2
	140	2 hr AM/PM Turning Movement Count	NBT	0	0	2	2
	140	Count Date: 03/21/2007	NBR	0	0	2	2
	140	2007	SBL	5	205	0	205
	140		SBT	0	0	2	2
	140		SBR	5	295	(5)	290
	140	PM Peak Hour: 5:00 PM-6:00 PM	EBL	10	40	0	40
	140	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	1395	1,475	(20)	1,455
	140		EBR	5	5	0	5
	140		WBL	5	5	0	5
	140	PHF:	WBT	900	1,395	0	1,395
	140	0.95	WBR	10	40	0	40
			TEV	**2335**	**3460**	**-17**	**3443**
14	150	Meier-Jurgen Rd @ Evergreen Rd	NBL	10	5	5	10
	150	3 hr PM Turning Movement Count	NBT	1	10	0	10
	150	Count Date: 5/25/2011	NBR	60	60	0	60
	150	2011	SBL	1	320	0	320
	150		SBT	1	50	0	50
	150		SBR	1	145	0	145
	150	PM Peak Hour: 5:00 PM-6:00 PM	EBL	1	10	0	10
	150	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	1360	1,710	0	1,710
	150		EBR	30	5	0	5
	150		WBL	45	20	0	20
	150	PHF:	WBT	890	1,200	0	1,200
	150	0.95	WBR	5	135	0	135
			TEV	**2400**	**3670**	**5**	**3675**
1	160	Helvetia Rd North @ West Union Rd	NBL	5	5	0	5
	160	3 hr AM/PM Turning Movement Count	NBT	135	340	10	350
	160	Count Date: 5/25/2011	NBR	0	0	0	0
	160	2011	SBL	0	0	0	0
	160		SBT	60	95	(5)	90
	160		SBR	5	5	0	5
	160	PM Peak Hour: 4:45 PM-5:45 PM	EBL	15	15	0	15
	160	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	160		EBR	0	0	0	0
	160		WBL	0	0	0	0
	160	PHF:	WBT	0	0	0	0
	160	0.90	WBR	0	0	0	0
			TEV	**220**	**460**	**5**	**465**

Project: Brookwood IAMP
Job #: ODOT0000-0701
Subject: ***PM Baseline Turning Movement Volumes***
Created: 6/8/2011
Rev. Date: 4/12/2012

Int No.	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - PM Peak	2035 Baseline (No Build) NCHRP 255-Link Unbalanced	Difference	2035 Baseline (No Build) NCHRP 255-Link Balanced
2	170	Helvetia Rd Middle @ West Union Rd	NBL	35	55	0	55
	170	16 hr Turning Movement Count	NBT	120	260	15	275
	170	Count Date: 5/25/2011	NBR	5	5	0	5
	170	2011	SBL	15	25	0	25
	170		SBT	45	65	0	65
	170		SBR	0	0	0	0
	170	PM Peak Hour: 4:45 PM-5:45 PM	EBL	0	0	0	0
	170	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	70	205	0	205
	170		EBR	15	35	0	35
	170		WBL	85	105	(10)	95
	170	PHF:	WBT	70	200	0	200
	170	0.92	WBR	20	80	0	80
			TEV	**480**	**1035**	**5**	**1040**
3	180	Helvetia Rd South @ West Union Rd	NBL	35	35	0	35
	180	3 hr AM/PM Turning Movement Count	NBT	160	325	10	335
	180	Count Date: 5/25/2011	NBR	270	335	0	335
	180	2011	SBL	0	0	0	0
	180		SBT	135	195	(10)	185
	180		SBR	10	10	0	10
	180	PM Peak Hour: 4:45 PM-5:45 PM	EBL	0	0	0	0
	180	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	180		EBR	10	10	0	10
	180		WBL	0	0	0	0
	180	PHF:	WBT	0	0	0	0
	180	0.92	WBR	0	0	0	0
			TEV	**620**	**910**	**0**	**910**
4	190	Helvetia Rd @ Pubols Rd	NBL	0	0	0	0
	190	3 hr PM Turning Movement Count	NBT	465	695	10	705
	190	Count Date: 5/25/2011	NBR	5	50	0	50
	190	2011	SBL	0	0	5	5
	190		SBT	145	200	(10)	190
	190		SBR	0	0	0	0
	190	PM Peak Hour: 10:00 AM-11:00 AM	EBL	0	0	0	0
	190	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	190		EBR	0	0	0	0
	190		WBL	5	15	0	15
	190	PHF:	WBT	0	0	0	0
	190	0.97	WBR	0	0	2	2
			TEV	**620**	**960**	**7**	**967**
5	200	Helvetia Rd @ Schaff Rd	NBL	0	0	0	0
	200	3 hr AM/PM Turning Movement Count	NBT	470	670	55	725
	200	Count Date: 5/25/2011	NBR	1	35	0	35
	200	2011	SBL	1	10	0	10
	200		SBT	150	210	(10)	200
	200		SBR	0	0	0	0
	200	PM Peak Hour: 4:30 PM-5:30 PM	EBL	0	0	0	0
	200	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	200		EBR	0	0	0	0
	200		WBL	1	115	0	115
	200	PHF:	WBT	0	0	0	0
	200	0.95	WBR	1	25	0	25
			TEV	**620**	**1065**	**45**	**1110**

Int No.	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - PM Peak	2035 Baseline (No Build) NCHRP 255-Link Unbalanced	Difference	2035 Baseline (No Build) NCHRP 255-Link Balanced
6	210	Helvetia Rd @ Jacobson Rd	NBL	10	10	5	15
	210	3 hr AM/PM Turning Movement Count	NBT	460	710	40	750
	210	Count Date: 5/25/2011	NBR	500	515	15	530
	210	2011	SBL	5	10	0	10
	210		SBT	145	325	(20)	305
	210		SBR	0	0	2	2
	210	PM Peak Hour: 4:30 PM-5:30 PM	EBL	0	0	0	0
	210	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	210		EBR	10	10	0	10
	210		WBL	175	200	(10)	190
	210	PHF:	WBT	0	0	0	0
	210	0.95	WBR	10	10	0	10
			TEV	**1315**	**1790**	**32**	**1822**
7	220	Brookwood Pkwy @ US26 WB Ramps	NBL	215	410	(60)	350
	220	16 hr Turning Movement Count	NBT	885	1,105	60	1,165
	220	Count Date: 5/25/2011	NBR	0	0	0	0
	220	2011	SBL	0	0	0	0
	220		SBT	265	355	25	380
	220		SBR	65	165	(40)	125
	220	PM Peak Hour: 4:30 PM-5:30 PM	EBL	0	0	0	0
	220	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	220		EBR	0	0	0	0
	220		WBL	640	775	(20)	755
	220	PHF:	WBT	0	0	0	0
	220	0.95	WBR	85	130	0	130
			TEV	**2155**	**2940**	**-35**	**2905**
8	230	Brookwood Pkwy @ US26 EB Ramps	NBL	0	0	0	0
	230	16 hr Turning Movement Count	NBT	1030	1,490	(40)	1,450
	230	Count Date: 5/25/2011	NBR	780	950	10	960
	230	2011	SBL	20	20	0	20
	230		SBT	885	1,115	0	1,115
	230		SBR	0	0	0	0
	230	PM Peak Hour: 5:00 PM-6:00 PM	EBL	70	65	0	65
	230	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	2	2
	230		EBR	60	55	0	55
	230		WBL	0	0	0	0
	230	PHF:	WBT	0	0	0	0
	230	0.96	WBR	0	0	0	0
			TEV	**2845**	**3695**	**-28**	**3667**
9	240	Brookwood Pkwy @ Meek Rd	NBL	25	100	0	100
	240	3 hr AM/PM Turning Movement Count	NBT	1805	2,045	(30)	2,015
	240	Count Date: 5/25/2011	NBR	0	0	2	2
	240	2011	SBL	0	0	1	1
	240		SBT	930	1,005	0	1,005
	240		SBR	15	165	0	165
	240	PM Peak Hour: 4:30 PM-5:30 PM	EBL	5	395	0	395
	240	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	2	2
	240		EBR	15	420	0	420
	240		WBL	0	0	0	0
	240	PHF:	WBT	0	0	2	2
	240	0.95	WBR	0	0	0	0
			TEV	**2795**	**4130**	**-23**	**4107**

Int No.	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - PM Peak	2035 Baseline (No Build) NCHRP 255-Link Unbalanced	Difference	2035 Baseline (No Build) NCHRP 255-Link Balanced
10	250	Brookwood Pkwy @ Huffman Street	NBL	1	60	0	60
	250	3 hr AM/PM Turning Movement Count	NBT	1700	1,535	(50)	1,485
	250	Count Date: 5/25/2011	NBR	15	10	5	15
	250	2011	SBL	30	70	0	70
	250		SBT	915	1,180	45	1,225
	250		SBR	1	185	(55)	130
	250	PM Peak Hour: 4:30 PM-5:30 PM	EBL	1	490	65	555
	250	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	1	410	0	410
	250		EBR	1	225	(50)	175
	250		WBL	10	5	0	5
	250	PHF:	WBT	1	45	0	45
	250	0.95	WBR	130	85	(10)	75
			TEV	**2800**	**4300**	**-50**	**4250**
11	260	Brookwood Pkwy @ Genentech Access	NBL	5	5	(5)	0
	260	3 hr AM/PM Turning Movement Count	NBT	1640	1,510	55	1,565
	260	Count Date: 5/25/2011	NBR	0	0	2	2
	260	2011	SBL	0	0	0	0
	260		SBT	925	1,385	(35)	1,350
	260		SBR	0	0	55	55
	260	PM Peak Hour: 4:30 PM-5:30 PM	EBL	65	65	(65)	0
	260	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	260		EBR	35	35	0	35
	260		WBL	5	5	(5)	0
	260	PHF:	WBT	0	0	0	0
	260	0.90	WBR	10	10	5	15
			TEV	**2685**	**3015**	**7**	**3022**
12	270	Brookwood Pkwy @ Evergreen Rd	NBL	100	90	5	95
	270	16 hr Turning Movement Count	NBT	930	870	10	880
	270	Count Date: 5/25/2011	NBR	95	195	0	195
	270	2011	SBL	65	190	(5)	185
	270		SBT	670	935	(35)	900
	270		SBR	230	300	0	300
	270	PM Peak Hour: 5:00 PM-6:00 PM	EBL	600	490	0	490
	270	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	590	1,050	0	1,050
	270		EBR	110	95	0	95
	270		WBL	170	280	0	280
	270	PHF:	WBT	490	750	0	750
	270	0.95	WBR	115	180	0	180
			TEV	**4165**	**5425**	**-25**	**5400**
20	280	Century Blvd @ West Union Rd	NBL	10	125	0	125
	280	3 hr PM Turning Movement Count	NBT	0	0	2	2
	280	Count Date: 5/25/2011	NBR	10	465	0	465
	280	2011	SBL	15	25	0	25
	280		SBT	0	0	0	0
	280		SBR	5	2	0	2
	280	PM Peak Hour: 4:30 PM-5:30 PM	EBL	5	2	0	2
	280	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	350	580	0	580
	280		EBR	5	10	0	10
	280		WBL	5	30	0	30
	280	PHF:	WBT	155	260	0	260
	280	0.93	WBR	10	20	0	20
			TEV	**570**	**1519**	**2**	**1521**

Int No.	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - PM Peak	2035 Baseline (No Build) NCHRP 255-Link Unbalanced	Difference	2035 Baseline (No Build) NCHRP 255-Link Balanced
17	290	Century Blvd @ Jacobson Rd	NBL	40	165	0	165
	290	3 hr AM/PM Turning Movement Count	NBT	1	430	0	430
	290	Count Date: 5/25/2011	NBR	15	165	(65)	100
	290	2011	SBL	1	2	73	75
	290		SBT	1	15	0	15
	290		SBR	1	0	0	0
	290	PM Peak Hour: 4:30 PM-5:30 PM	EBL	1	50	0	50
	290	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	470	575	40	615
	290		EBR	30	230	0	230
	290		WBL	10	70	(45)	25
	290	PHF:	WBT	100	45	65	110
	290	0.90	WBR	1	45	0	45
			TEV	**665**	**1792**	**68**	**1860**
39	300	Croeni Rd @ Jacobson Rd	NBL	30	10	20	30
	300	3 hr AM/PM Turning Movement Count	NBT	5	5	0	5
	300	Count Date: 5/25/2011	NBR	20	170	0	170
	300	2011	SBL	40	65	0	65
	300		SBT	15	5	10	15
	300		SBR	5	0	5	5
	300	PM Peak Hour: 4:30 PM-5:30 PM	EBL	5	2	0	2
	300	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	450	745	50	795
	300		EBR	40	10	0	10
	300		WBL	5	55	0	55
	300	PHF:	WBT	80	150	0	150
	300	0.91	WBR	5	40	0	40
			TEV	**700**	**1257**	**85**	**1342**
15	310	235th Avenue @ Evergreen Pkwy	NBL	25	15	0	15
	310	3 hr PM Turning Movement Count	NBT	5	10	0	10
	310	Count Date: 5/25/2011	NBR	40	25	0	25
	310	2011	SBL	35	165	0	165
	310		SBT	0	0	5	5
	310		SBR	60	275	0	275
	310	PM Peak Hour: 5:00 PM-6:00 PM	EBL	15	85	0	85
	310	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	875	1,405	0	1,405
	310		EBR	5	100	(5)	95
	310		WBL	5	85	0	85
	310	PHF:	WBT	755	1,005	0	1,005
	310	0.95	WBR	10	45	0	45
			TEV	**1830**	**3215**	**0**	**3215**
38	320	229th Avenue @ Evergreen Pkwy	NBL	85	170	0	170
	320	2 hr AM/PM Turning Movement Count	NBT	40	195	0	195
	320	Count Date: 10/19/2010	NBR	630	470	0	470
	320	2010	SBL	170	535	0	535
	320		SBT	55	260	0	260
	320		SBR	10	85	0	85
	320	PM Peak Hour: 5:15 PM-6:15 PM	EBL	10	100	0	100
	320	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	790	1,255	0	1,255
	320		EBR	110	260	0	260
	320		WBL	220	185	0	185
	320	PHF:	WBT	555	830	0	830
	320	0.95	WBR	70	255	0	255
			TEV	**2745**	**4600**	**0**	**4600**

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Int No.	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - PM Peak	2035 Baseline (No Build) NCHRP 255-Link Unbalanced	Difference	2035 Baseline (No Build) NCHRP 255-Link Balanced
31	330	Cornelius Pass Rd @ West Union Rd	NBL	60	80	0	80
	330	16 hr Turning Movement Count	NBT	850	1,040	(20)	1,020
	330	Count Date: 5/25/2011	NBR	680	980	(20)	960
	330	2011	SBL	25	70	0	70
	330		SBT	395	425	0	425
	330		SBR	30	75	0	75
	330	PM Peak Hour: 4:45 PM-5:45 PM	EBL	115	320	0	320
	330	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	195	640	0	640
	330		EBR	95	125	0	125
	330		WBL	225	195	70	265
	330	PHF:	WBT	75	150	(65)	85
	330	0.97	WBR	20	35	(5)	30
			TEV	**2765**	**4135**	**-40**	**4095**
32	340	Cornelius Pass Rd @ Jacobson Rd	NBL	40	115	0	115
	340	3 hr PM Turning Movement Count	NBT	1250	1,395	0	1,395
	340	Count Date: 5/25/2011	NBR	60	50	0	50
	340	2011	SBL	10	5	10	15
	340		SBT	650	595	65	660
	340		SBR	55	145	(5)	140
	340	PM Peak Hour: 4:45 PM-5:45 PM	EBL	335	660	0	660
	340	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	30	45	0	45
	340		EBR	180	320	80	400
	340		WBL	30	25	10	35
	340	PHF:	WBT	5	10	0	10
	340	0.95	WBR	5	5	0	5
			TEV	**2650**	**3370**	**160**	**3530**
33	350	Cornelius Pass Rd @ Rock Creek Blvd	NBL	0	0	0	0
	350	3 hr PM Turning Movement Count	NBT	1325	1,525	0	1,525
	350	Count Date: 5/25/2011	NBR	345	560	0	560
	350	2011	SBL	60	110	0	110
	350		SBT	810	815	180	995
	350		SBR	0	0	0	0
	350	PM Peak Hour: 4:45 PM-5:45 PM	EBL	0	0	0	0
	350	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	350		EBR	0	0	0	0
	350		WBL	145	135	0	135
	350	PHF:	WBT	0	0	0	0
	350	0.95	WBR	25	30	5	35
			TEV	**2710**	**3175**	**185**	**3360**
35	360	Cornelius Pass Rd @ US26 WB Ramps	NBL	270	260	0	260
	360	16 hr Turning Movement Count	NBT	1550	1,765	55	1,820
	360	Count Date: 5/25/2011	NBR	0	0	0	0
	360	2011	SBL	0	0	0	0
	360		SBT	995	1,475	45	1,520
	360		SBR	180	175	(175)	0
	360	PM Peak Hour: 4:30 PM-5:30 PM	EBL	0	0	0	0
	360	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	360		EBR	700	790	0	790
	360		WBL	0	0	0	0
	360	PHF:	WBT	0	0	0	0
	360	0.97	WBR	300	340	(340)	0
			TEV	**3995**	**4805**	**-415**	**4390**

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Int No.	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - PM Peak	2035 Baseline (No Build) NCHRP 255-Link Unbalanced	Difference	2035 Baseline (No Build) NCHRP 255-Link Balanced
36	370	Cornelius Pass Rd @ US26 EB Ramps	NBL	0	0	0	0
	370	16 hr Turning Movement Count	NBT	1655	1,865	30	1,895
	370	Count Date: 5/25/2011	NBR	920	1,085	0	1,085
	370	2011	SBL	0	0	0	0
	370		SBT	1395	1,515	50	1,565
	370		SBR	300	745	(745)	0
	370	PM Peak Hour: 4:30 PM-5:30 PM	EBL	165	185	0	185
	370	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	370		EBR	125	125	0	125
	370		WBL	0	0	0	0
	370	PHF:	WBT	0	0	0	0
	370	0.97	WBR	0	0	0	0
			TEV	**4560**	**5520**	**-665**	**4855**
37	380	Cornelius Pass Rd @ Evergreen Pkwy	NBL	55	135	0	135
	380	16 hr Turning Movement Count	NBT	1070	1,255	0	1,255
	380	Count Date: 5/25/2011	NBR	80	145	0	145
	380	2011	SBL	230	270	0	270
	380		SBT	985	1,175	0	1,175
	380		SBR	25	40	0	40
	380	PM Peak Hour: 4:45 PM-5:45 PM	EBL	380	405	0	405
	380	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	860	1,435	0	1,435
	380		EBR	160	270	0	270
	380		WBL	80	115	0	115
	380	PHF:	WBT	355	665	0	665
	380	0.96	WBR	410	370	0	370
			TEV	**4690**	**6280**	**0**	**6280**
34	390	Cornelius Pass Rd @ Wagon Way	NBL	205	295	0	295
	390	3 hr AM/PM Turning Movement Count	NBT	1640	1,860	(15)	1,845
	390	Count Date: 5/25/2011	NBR	5	5	15	20
	390	2011	SBL	0	0	2	2
	390		SBT	925	865	165	1,030
	390		SBR	30	90	0	90
	390	PM Peak Hour: 4:30 PM-5:30 PM	EBL	30	240	0	240
	390	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	2	2
	390		EBR	245	780	(100)	680
	390		WBL	5	5	0	5
	390	PHF:	WBT	0	0	2	2
	390	0.95	WBR	0	0	2	2
			TEV	**3085**	**4140**	**73**	**4213**

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Table 2: 2035 Link Volume Calculations for the PM Peak Period

Road	From	To	Direction	Volumes 2011	Model 2010	Interpolated Model 2011	Model 2035	2010-2035 Model Comparison: Annual Growth	Total Growth	Volume Growth	2035 Volume Estimates: Volume Difference	Volume Growth	Absolute Difference	Average	Forecast Used	Method Used	Comments
Helvetia Rd/Brookwood Pkwy	South of Evergreen	Evergreen	NB	1125	1093	1094	1129	0.1%	3.2%	35	1160	1161	0%	1160	**1160**	Average of Difference and Growth	
	Evergreen	South of Evergreen	SB	950	1029	1045	1420	1.5%	36.5%	375	1325	1297	2%	1311	**1311**	Average of Difference and Growth	
	Evergreen	Genentech	NB	1645	1177	1173	1087	-0.3%	-7.3%	-86	1559	1524	2%	1541	**1541**	Average of Difference and Growth	
	Genentech	Evergreen	SB	965	934	953	1406	2.0%	48.5%	453	1418	1433	1%	1426	**1426**	Average of Difference and Growth	
	Genentech	Huffman St	NB	1716	1203	1198	1087	-0.4%	-9.3%	-111	1605	1557	3%	1581	**1581**	Average of Difference and Growth	
	Huffman St	Genentech	SB	925	907	927	1406	2.2%	52.8%	479	1404	1414	1%	1409	**1409**	Average of Difference and Growth	
	Huffman St	Meek Rd	NB	1830	1445	1455	1704	0.7%	17.2%	249	2079	2145	3%	2112	**2112**	Average of Difference and Growth	
	Meek Rd	Huffman St	SB	946	912	932	1400	2.1%	51.4%	468	1414	1432	1%	1423	**1423**	Average of Difference and Growth	
	Meek Rd	EB Ramp Terminal	NB	1810	1443	1466	2025	1.6%	38.7%	559	2369	2511	6%	2440	**2440**	Average of Difference and Growth	
	EB Ramp Terminal	Meek Rd	SB	945	916	925	1145	1.0%	24.0%	220	1165	1172	1%	1168	**1168**	Average of Difference and Growth	
	EB Ramp Terminal	WB Ramp Terminal	NB	1100	795	811	1190	2.0%	47.7%	379	1479	1625	9%	1552	**1552**	Average of Difference and Growth	
	WB Ramp Terminal	EB Ramp Terminal	SB	905	833	842	1058	1.1%	25.9%	216	1121	1140	2%	1130	**1130**	Average of Difference and Growth	
	WB Ramp Terminal	Jacobson Rd	NB	970	545	556	818	2.0%	48.1%	262	1232	1436	15%	1334	**1232**	Difference Method	Absolute difference >10% --> Used difference only
	Jacobson Rd	WB Ramp Terminal	SB	330	374	382	586	2.3%	54.4%	204	534	510	5%	522	**534**	Difference Method	To be consistent with method used for opposing direction
	Jacobson Rd	Schaff Rd	NB	471	303	313	564	3.4%	82.7%	251	722	860	18%	791	**722**	Difference Method	Absolute difference >10% --> Used difference only
	Schaff Rd	Jacobson Rd	SB	150	146	153	331	5.1%	121.6%	178	328	332	1%	330	**328**	Difference Method	To be consistent with method used for opposing direction
	Schaff Rd	Pubols	NB	470	251	260	488	3.8%	90.6%	228	698	896	25%	797	**698**	Difference Method	Absolute difference >10% --> Used difference only
	Pubols	Schaff Rd	SB	151	134	137	198	1.9%	45.9%	61	212	220	4%	216	**212**	Difference Method	To be consistent with method used for opposing direction
2	Pubols	West Union South	NB	465	251	260	488	3.8%	90.6%	228	693	887	25%	790	**693**	Difference Method	Absolute difference >10% --> Used difference only
1	West Union South	Pubols	SB	145	134	137	198	1.9%	45.9%	61	206	211	2%	209	**206**	Difference Method	To be consistent with method used for opposing direction
4	West Union South	West Union Center	NB	160	81	88	251	8.4%	201.5%	163	323	482	40%	403	**323**	Difference Method	Absolute difference >10% --> Used difference only
3	West Union Center	West Union South	SB	145	133	136	197	1.9%	46.2%	61	206	212	3%	209	**206**	Difference Method	To be consistent with method used for opposing direction
6	West Union Center	West Union North	NB	140	94	102	301	8.8%	211.4%	199	339	436	25%	387	**339**	Difference Method	Absolute difference >10% --> Used difference only
5	West Union North	West Union Center	SB	60	39	40	74	3.6%	86.2%	34	94	112	18%	103	**94**	Difference Method	Absolute difference >10% --> Used difference only
8	West Union North	North of West Union	NB	150	97	106	311	8.8%	211.8%	205	355	468	27%	412	**355**	Difference Method	Absolute difference >10% --> Used difference only
7	North of West Union	West Union North	SB	65	42	44	83	3.9%	93.7%	39	104	126	19%	115	**104**	Difference Method	Absolute difference >10% --> Used difference only
Jackson School Rd	South of Evergreen	Evergreen	NB	15	15	15	**15**	0.0%	0.0%	0	15	15	0%	15	**15**	Manual	Not in Models - Used existing volumes
	Evergreen	South of Evergreen	SB	15	15	15	**15**	0.0%	0.0%	0	15	15	0%	15	**15**	Manual	Not in Models - Used existing volumes
	Evergreen	North of Evergreen	NB	635	435	438	504	0.6%	15.2%	66	701	732	4%	716	**701**	Difference Method	To be consistent with method used for opposing direction
	North of Evergreen	Evergreen	SB	420	251	256	386	2.2%	51.6%	130	550	637	15%	593	**550**	Difference Method	Absolute difference >10% --> Used difference only
	South of Meek	Meek Rd	NB	635	434	440	581	1.4%	32.5%	141	776	841	8%	809	**776**	Difference Method	To be consistent with method used for opposing direction
	Meek Rd	South of Meek	SB	435	246	255	461	3.5%	83.9%	206	641	800	22%	721	**641**	Difference Method	Absolute difference >10% --> Used difference only
	Meek Rd	Scotch Church Rd	NB	645	438	461	1012	5.2%	125.8%	551	1196	1456	20%	1326	**1196**	Difference Method	Absolute difference >10% --> Used difference only
	Scotch Church Rd	Meek Rd	SB	455	246	253	428	3.0%	71.0%	175	630	778	21%	704	**630**	Difference Method	Absolute difference >10% --> Used difference only
	Scotch Church Rd	EB Ramp Terminal	NB	735	581	595	928	2.4%	57.3%	333	1068	1156	8%	1112	**1112**	Average of Difference and Growth	
	EB Ramp Terminal	Scotch Church Rd	SB	585	479	482	544	0.5%	13.0%	62	647	661	2%	654	**654**	Average of Difference and Growth	
	EB Ramp Terminal	WB Ramp Terminal	NB	175	118	127	351	7.9%	189.6%	224	399	507	24%	453	**399**	Difference Method	Absolute difference >10% --> Used difference only
	WB Ramp Terminal	EB Ramp Terminal	SB	605	545	549	635	0.7%	15.9%	86	691	701	1%	696	**691**	Difference Method	To be consistent with method used for opposing direction
	WB Ramp Terminal	West Union	NB	165	200	208	399	4.0%	95.5%	191	356	323	10%	339	**339**	Average of Difference and Growth	
	West Union	WB Ramp Terminal	SB	110	149	150	183	0.9%	21.9%	33	143	134	6%	138	**138**	Average of Difference and Growth	
	West Union	North of West Union	NB	60	213	215	263	0.9%	22.5%	48	108	74	38%	91	**108**	Difference Method	Absolute difference >10% --> Used difference only
	North of West Union	West Union	SB	45	150	149	120	-0.8%	-19.2%	-29	16	36	77%	26	**16**	Difference Method	Absolute difference >10% --> Used difference only
Cornelius Pass	South of Evergreen	Evergreen	NB	1205	957	969	1251	1.2%	29.5%	282	1487	1560	5%	1524	**1524**	Average of Difference and Growth	
	Evergreen	South of Evergreen	SB	1225	1103	1116	1432	1.2%	28.6%	316	1541	1576	2%	1558	**1558**	Average of Difference and Growth	
	Evergreen	N of Evergreen	NB	1860	1336	1342	1485	0.4%	10.7%	143	2003	2059	3%	2031	**2031**	Average of Difference and Growth	
	N of Evergreen	Evergreen	SB	1240	1160	1169	1392	0.8%	19.2%	223	1463	1478	1%	1470	**1470**	Average of Difference and Growth	
	South of EB Ramp	EB Ramp Terminal	NB	2575	1685	1698	2009	0.8%	18.5%	311	2886	3050	6%	2968	**2968**	Average of Difference and Growth	
	EB Ramp Terminal	South of EB Ramp	SB	1520	1231	1235	1340	0.4%	8.5%	105	1625	1649	2%	1637	**1637**	Average of Difference and Growth	
	EB Ramp Terminal	WB Ramp Terminal	NB	1820	1054	1061	1229	0.7%	15.9%	168	1988	2110	6%	2049	**2049**	Average of Difference and Growth	
	WB Ramp Terminal	EB Ramp Terminal	SB	1695	1427	1449	1966	1.5%	36.3%	517	2212	2310	4%	2261	**2261**	Average of Difference and Growth	
	WB Ramp Terminal	N of WB Ramp	NB	1850	1357	1366	1582	0.7%	15.9%	216	2066	2144	4%	2105	**2105**	Average of Difference and Growth	
	N of WB Ramp	WB Ramp Terminal	SB	1175	977	995	1425	1.8%	44.0%	430	1605	1692	5%	1649	**1649**	Average of Difference and Growth	
	South of Wagon	Wagon	NB	1850	1357	1366	1582	0.7%	15.9%	216	2066	2144	4%	2105	**2105**	Average of Difference and Growth	
	Wagon	South of Wagon	SB	1175	977	995	1425	1.8%	44.0%	430	1605	1692	5%	1649	**1649**	Average of Difference and Growth	
	Wagon	North of Wagon	NB	1670	1258	1273	1645	1.2%	29.5%	372	2042	2163	6%	2102	**2102**	Average of Difference and Growth	
	North of Wagon	Wagon	SB	955	690	690	686	0.0%	-0.6%	-4	951	950	0%	950	**950**	Average of Difference and Growth	
	S of Rock Creek	Rock Creek	NB	1670	1258	1273	1645	1.2%	29.5%	372	2042	2163	6%	2102	**2102**	Average of Difference and Growth	
	Rock Creek	S of Rock Creek	SB	955	690	690	686	0.0%	-0.6%	-4	951	950	0%	950	**950**	Average of Difference and Growth	
	Rock Creek	Jacobson Rd	NB	1350	990	997	1169	0.7%	17.4%	172	1522	1584	4%	1553	**1553**	Average of Difference and Growth	
	Jacobson Rd	Rock Creek	SB	870	591	593	651	0.4%	9.7%	58	928	955	3%	941	**941**	Average of Difference and Growth	
	Jacobson Rd	West Union	NB	1590	1250	1267	1680	1.4%	33.0%	413	2003	2115	5%	2059	**2059**	Average of Difference and Growth	
	West Union	Jacobson Rd	SB	715	740	741	773	0.2%	4.3%	32	747	746	0%	746	**746**	Average of Difference and Growth	
	West Union	N of West Union	NB	985	850	866	1245	1.9%	44.6%	379	1364	1424	4%	1394	**1394**	Average of Difference and Growth	
	N of West Union	West Union	SB	450	532	537	655	0.9%	22.2%	118	568	550	3%	559	**559**	Average of Difference and Growth	

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Subject: **PM Baseline Link Volumes**

Table 2: 2035 Link Volume Calculations for the PM Peak Period

Road	From	To	Direction	Volumes	Model	Interpolated Model	Model	2010-2035 Model Comparison			2035 Volume Estimates				Forecast Used	Method Used	Comments
				2011	2010	2011	2035	Annual Growth	Total Growth	Volume Growth	Volume Difference	Volume Growth	Absolute Difference	Average			
West Union	E of Corn Pass	Corn Pass	WB	320	401	404	467	0.7%	15.8%	63	383	371	3%	377	**377**	Average of Difference and Growth	
	Corn Pass	E of Corn Pass	EB	900	730	759	1465	4.0%	96.7%	706	1606	1770	10%	1688	**1688**	Average of Difference and Growth	
	Corn Pass	W of Corn Pass	WB	165	200	206	343	2.9%	68.6%	137	302	278	8%	290	**302**	Difference Method	To be consistent with method used for opposing direction
	W of Corn Pass	Corn Pass	EB	405	338	365	1024	8.1%	194.8%	659	1064	1194	12%	1129	**1064**	Difference Method	Absolute difference >10% --> Used difference only
	E of Dick Rd	Dick Rd	WB	170	200	206	343	2.9%	68.6%	137	307	287	7%	297	**297**	Average of Difference and Growth	
	Dick Rd	E of Dick Rd	EB	375	338	365	1024	8.1%	194.8%	659	1034	1106	7%	1070	**1070**	Average of Difference and Growth	
	Dick Rd	W of Dick Rd	WB	170	205	214	432	4.4%	106.3%	218	388	351	10%	369	**388**	Difference Method	Absolute difference >10% --> Used difference only
	W of Dick Rd	Dick Rd	EB	360	340	349	560	2.6%	62.1%	211	571	584	2%	577	**571**	Difference Method	To be consistent with method used for opposing direction
	E of Helvetia Rd	Helvetia Rd	WB	175	205	214	432	4.4%	106.3%	218	393	361	8%	377	**393**	Difference Method	To be consistent with method used for opposing direction
	Helvetia Rd	E of Helvetia Rd	EB	90	170	176	323	3.6%	86.4%	147	237	168	34%	202	**237**	Difference Method	Absolute difference >10% --> Used difference only
	Helvatia Rd	W of Helvati Rd	WB	110	82	88	235	7.5%	179.1%	147	257	307	18%	282	**257**	Difference Method	Absolute difference >10% --> Used difference only
	W of Helvatia Rd	Helvatia Rd	EB	100	155	161	310	4.0%	96.0%	149	249	196	24%	222	**249**	Difference Method	Absolute difference >10% --> Used difference only
	E of Groveland	Groveland	WB	91	85	91	244	7.5%	179.6%	153	244	254	4%	249	**244**	Difference Method	To be consistent with method used for opposing direction
	Groveland	E of Groveland	EB	91	158	164	310	3.8%	92.4%	146	237	175	30%	206	**237**	Difference Method	Absolute difference >10% --> Used difference only
	Groveland	W of Groveland	WB	90	81	87	238	7.8%	186.1%	151	241	257	7%	249	**241**	Difference Method	To be consistent with method used for opposing direction
	W of Groveland	Groveland	EB	96	149	155	298	4.0%	96.0%	143	239	188	24%	214	**239**	Difference Method	Absolute difference >10% --> Used difference only
	E of Jackson Quarry	Jackson Quarry	WB	85	81	87	238	7.8%	186.1%	151	236	243	3%	239	**236**	Difference Method	To be consistent with method used for opposing direction
	Jackson Quarry	E of Jackson Quarry	EB	95	149	155	298	4.0%	96.0%	143	238	186	24%	212	**238**	Difference Method	Absolute difference >10% --> Used difference only
	Jackson Quarry	W of Jackson Quarry	WB	105	81	87	238	7.8%	186.1%	151	256	300	16%	278	**256**	Difference Method	Absolute difference >10% --> Used difference only
	W of Jackson Quarry	Jackson Quarry	EB	120	149	156	335	5.0%	119.8%	179	299	264	12%	281	**299**	Difference Method	Absolute difference >10% --> Used difference only
	E of Jackson School	Jackson School	WB	115	81	87	238	7.8%	186.1%	151	266	329	21%	297	**266**	Difference Method	Absolute difference >10% --> Used difference only
	Jackson School	E of Jackson School	EB	120	149	156	335	5.0%	119.8%	179	299	264	12%	281	**299**	Difference Method	Absolute difference >10% --> Used difference only
	Jackson School	W of Jackson School	WB	140	88	96	298	9.5%	229.1%	202	342	461	30%	401	**342**	Difference Method	Absolute difference >10% --> Used difference only
	W of Jackson School	Jackson School	EB	105	168	174	322	3.7%	88.0%	148	253	197	25%	225	**253**	Difference Method	Absolute difference >10% --> Used difference only
West Union South	Helvetia Rd	E of Helvetia Rd	EB	270	170	173	236	1.6%	37.3%	63	333	371	11%	352	**333**	Difference Method	Absolute difference >10% --> Used difference only
West Union North	Helvatia Rd	W of Helvati Rd	WB	10	3	3	9	8.0%	192.0%	6	16	29	60%	22	**10**	Difference Method	Absolute difference >10% --> Used difference only
	W of Helvati Rd	Helvatia Rd	EB	15	4	4	10	6.0%	144.0%	6	21	37	55%	29	**15**	Difference Method	Absolute difference >10% --> Used difference only
Jacobson Road	E of Corn Pass	Corn Pass	WB	40											**40**	Manual	
	Corn Pass	E of Corn Pass	EB	100											**100**	Manual	
	Corn Pass	W of Corn Pass	WB	100	163	170	345	4.5%	107.2%	175	275	207	28%	241	**275**	Difference Method	Absolute difference >10% --> Used difference only
	W of Corn Pass	Corn Pass	EB	545	274	294	769	7.2%	173.4%	475	1020	1490	37%	1255	**1020**	Difference Method	Absolute difference >10% --> Used difference only
	E of Croeni	Croeni	WB	90	163	170	345	4.5%	107.2%	175	265	186	35%	226	**265**	Difference Method	Absolute difference >10% --> Used difference only
	Croeni	E of Croeni	EB	510	274	294	769	7.2%	173.4%	475	985	1394	34%	1190	**985**	Difference Method	Absolute difference >10% --> Used difference only
	Croeni	Century	WB	111	239	241	290	0.9%	20.5%	49	160	134	18%	147	**160**	Difference Method	Absolute difference >10% --> Used difference only
	Century	Croeni	EB	486	262	273	528	4.1%	97.5%	255	741	960	26%	851	**741**	Difference Method	Absolute difference >10% --> Used difference only
	Century	W of Century	WB	141	239	242	310	1.2%	28.5%	68	209	181	14%	195	**209**	Difference Method	Absolute difference >10% --> Used difference only
	W of Century	Century	EB	501	262	277	625	5.5%	133.0%	348	849	1167	32%	1008	**849**	Difference Method	Absolute difference >10% --> Used difference only
	E of Helvetia Rd	Helvetia Rd	WB	185	228	229	255	0.5%	11.4%	26	211	206	2%	208	**208**	Average of Difference and Growth	
	Helvetia Rd	E of Helvetia Rd	EB	505	242	242	254	0.2%	4.8%	12	517	529	2%	523	**523**	Average of Difference and Growth	
	Helvatia Rd	W of Helvati Rd	WB	10											**10**	Manual	
	W of Helvatia Rd	Helvatia Rd	EB	10											**10**	Manual	
EB US 26 Ramps	W of Jackson School	Jackson School	EB	30	50	50	45	-0.4%	-9.6%	-5	25	27	7%	26	**26**	Average of Difference and Growth	
	Jackson School	E of Jackson School	EB	610	579	584	712	0.9%	22.1%	128	738	745	1%	741	**741**	Average of Difference and Growth	
	W of Brookwood Pkwy	Brookwood Pkwy	EB	130	141	140	127	-0.4%	-9.5%	-13	117	118	1%	117	**117**	Average of Difference and Growth	
	Brookwood Pkwy	E of Brookwood Pkwy	EB	800	707	714	874	0.9%	22.7%	160	960	981	2%	971	**971**	Average of Difference and Growth	
	W of Corn Pass	Corn Pass	EB	290	189	190	207	0.4%	9.1%	17	307	317	3%	312	**312**	Average of Difference and Growth	
	Corn Pass SB	E of Corn Pass	EB	300	363	382	826	5.1%	122.4%	444	744	667	11%	706	**744**	Difference Method	Absolute difference >10% --> Used difference only
	Corn Pass NB	E of Corn Pass	EB	920	645	651	787	0.9%	21.1%	136	1056	1114	5%	1085	**1085**	Average of Difference and Growth	
WB US 26 Ramps	E of Corn Pass	Corn Pass NB	WB	300	304	306	353	0.6%	15.5%	47	347	346	0%	347	**347**	Average of Difference and Growth	
	E of Corn Pass	Corn Pass SB	WB	700	602	605	686	0.6%	13.4%	81	781	794	2%	787	**787**	Average of Difference and Growth	
	Corn Pass	W of Corn Pass	WB	450	153	153	145	-0.2%	-5.0%	-8	442	427	3%	435	**435**	Average of Difference and Growth	
	E of Helvatia	NB Helvetia	WB	85	55	57	110	4.0%	96.0%	53	138	167	19%	152	**138**	Difference Method	Absolute difference >10% --> Used difference only
	E of Helvatia	SB Helvetia	WB	640	507	513	647	1.1%	26.5%	134	774	810	4%	792	**792**	Average of Difference and Growth	
	Helvetia Rd	W of Helvatia	WB	280	353	365	658	3.5%	82.9%	293	573	512	11%	543	**573**	Difference Method	Absolute difference >10% --> Used difference only
	E of Jackson School	Jackson School	WB	560	548	553	664	0.8%	20.3%	111	671	674	0%	673	**673**	Average of Difference and Growth	
	Jackson School	W of Jackson School	WB	75	71	75	164	5.2%	125.7%	89	164	169	3%	167	**167**	Average of Difference and Growth	
Meek Road	Brookwood Pkwy	W of Brookwood Pkwy	WB	40	22	31	258	42.9%	1029.8%	227	267	452	52%	359	**267**	Difference Method	Absolute difference >10% --> Used difference only
	W of Brookwood Pkwy	Brookwood Pkwy	EB	20	16	49	833	204.3%	4902.0%	784	804	1000	22%	902	**804**	Difference Method	Absolute difference >10% --> Used difference only
	E of Sewell	Sewell	WB	30	14	29	399	110.0%	2640.0%	370	400	822	69%	611	**400**	Difference Method	Absolute difference >10% --> Used difference only
	Sewell	E of Sewell	EB	15	12	14	59	15.7%	376.0%	45	60	71	17%	66	**60**	Difference Method	Absolute difference >10% --> Used difference only
	Sewell	W of Swell	WB	35	15	35	523	135.5%	3251.2%	488	523	1173	77%	848	**523**	Difference Method	Absolute difference >10% --> Used difference only
	W of Swell	Sewell	EB	15	6	8	49	28.7%	688.0%	41	56	118	71%	87	**56**	Difference Method	Absolute difference >10% --> Used difference only
	E of Jackson School	Jackson School	WB	15	15	37	561	145.6%	3494.4%	524	539	539	0%	539	**539**	Difference Method	To be consistent with method used for opposing direction
	Jackson School	E of Jackson School	EB	25	11	14	98	31.6%	759.3%	84	109	215	66%	162	**109**	Difference Method	Absolute difference >10% --> Used difference only

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Table 2: 2035 Link Volume Calculations for the PM Peak Period

Road	From	To	Direction	Volumes	Model	Interpolated Model	Model	2010-2035 Model Comparison			2035 Volume Estimates				Forecast Used	Method Used	Comments
				2011	2010	2011	2035	Annual Growth	Total Growth	Volume Growth	Volume Difference	Volume Growth	Absolute Difference	Average			
Evergreen Road	E of Corn Pass	Corn Pass	WB	845	693	704	970	1.6%	38.4%	266	1111	1169	5%	1140	**1140**	Average of Difference and Growth	
	Corn Pass	E of Corn Pass	EB	1170	909	934	1531	2.7%	65.7%	597	1767	1939	9%	1853	**1853**	Average of Difference and Growth	
	Corn Pass	W of Corn Pass	WB	435	567	584	990	3.0%	71.6%	406	841	747	12%	794	**841**	Difference Method	Absolute difference >10% --> Used difference only
	W of Corn Pass	Corn Pass	EB	1400	1104	1133	1825	2.6%	62.7%	692	2092	2278	8%	2185	**2092**	Difference Method	To be consistent with method used for opposing direction
	E of 229th	229th	WB	845	952	970	1391	1.8%	44.3%	421	1266	1219	4%	1243	**1266**	Difference Method	To be consistent with method used for opposing direction
	229th	E of 229th	EB	1590	1161	1189	1861	2.4%	57.9%	672	2262	2510	10%	2386	**2262**	Difference Method	Absolute difference >10% --> Used difference only
	229th	W of 229th	WB	650	894	912	1344	2.0%	48.3%	432	1082	964	12%	1023	**1082**	Difference Method	Absolute difference >10% --> Used difference only
	W of 229th	229th	EB	910	1152	1182	1890	2.6%	61.5%	708	1618	1470	10%	1544	**1618**	Difference Method	To be consistent with method used for opposing direction
	E of 235th	235th	WB	770	894	912	1344	2.0%	48.3%	432	1202	1142	5%	1172	**1172**	Average of Difference and Growth	
	235th	E of 235th	EB	950	1152	1182	1890	2.6%	61.5%	708	1658	1534	8%	1596	**1596**	Average of Difference and Growth	
	235th	W of 235th	WB	840	913	933	1408	2.2%	52.0%	475	1315	1277	3%	1296	**1296**	Average of Difference and Growth	
	W of 235th	235th	EB	895	772	801	1493	3.7%	89.7%	692	1587	1697	7%	1642	**1642**	Average of Difference and Growth	
	E of Brookwood	Brookwood	WB	775	913	933	1408	2.2%	52.0%	475	1250	1178	6%	1214	**1214**	Average of Difference and Growth	
	Brookwood	E of Brookwood	EB	750	772	801	1493	3.7%	89.7%	692	1442	1422	1%	1432	**1432**	Average of Difference and Growth	
	Brookwood	W of Brookwood	WB	820	751	764	1083	1.8%	42.4%	319	1139	1168	3%	1153	**1139**	Difference Method	To be consistent with method used for opposing direction
	W of Brookwood	Brookwood	EB	1300	789	803	1138	1.8%	42.5%	335	1635	1852	12%	1744	**1635**	Difference Method	Absolute difference >10% --> Used difference only
	E of 253rd	253rd	WB	940	848	866	1306	2.2%	51.8%	440	1380	1427	3%	1404	**1380**	Difference Method	To be consistent with method used for opposing direction
	253rd	E of 253rd	EB	1421	842	870	1539	3.3%	79.5%	669	2090	2550	20%	2320	**2090**	Difference Method	Absolute difference >10% --> Used difference only
	253rd	W of 253rd	WB	901	848	867	1317	2.2%	53.1%	450	1351	1379	2%	1365	**1351**	Difference Method	To be consistent with method used for opposing direction
	W of 253rd	253rd	EB	1391	842	855	1172	1.6%	37.6%	317	1708	1914	11%	1811	**1708**	Difference Method	Absolute difference >10% --> Used difference only
	E of Sewell	Sewell	WB	915	847	867	1338	2.3%	55.7%	471	1386	1424	3%	1405	**1405**	Average of Difference and Growth	
	Sewell	E of Sewell	EB	1400	826	835	1043	1.1%	25.2%	208	1608	1753	9%	1681	**1681**	Average of Difference and Growth	
	Sewell	273rd	WB	905	843	874	1628	3.7%	89.4%	754	1659	1714	3%	1686	**1686**	Average of Difference and Growth	
	273rd	Sewell	EB	1410	825	828	895	0.3%	8.1%	67	1477	1525	3%	1501	**1501**	Average of Difference and Growth	
	273rd	25th Ave	WB	900	843	874	1628	3.7%	89.4%	754	1654	1705	3%	1679	**1679**	Average of Difference and Growth	
	25th Ave	273rd	EB	1405	825	828	895	0.3%	8.1%	67	1472	1519	3%	1496	**1496**	Average of Difference and Growth	
	25th Ave	15th	WB	960	1014	1046	1806	3.1%	75.0%	760	1720	1680	2%	1700	**1720**	Difference Method	To be consistent with method used for opposing direction
	15th	25th Ave	EB	760	473	482	708	2.0%	47.7%	226	986	1122	13%	1054	**986**	Difference Method	Absolute difference >10% --> Used difference only
	15th	W of 15th	WB	1025	841	869	1540	3.3%	79.8%	671	1696	1843	8%	1769	**1769**	Average of Difference and Growth	
	W of 15th	15th	EB	425	354	365	639	3.2%	77.3%	274	699	753	8%	726	**726**	Average of Difference and Growth	
	E of Jackson School	Jackson School	WB	1030	841	869	1540	3.3%	79.8%	671	1701	1852	8%	1776	**1701**	Difference Method	To be consistent with method used for opposing direction
	Jackson School	E of Jackson School	EB	465	354	365	639	3.2%	77.3%	274	739	824	11%	781	**739**	Difference Method	Absolute difference >10% --> Used difference only
	Jackson School	W of Jackson School	WB	1025	803	833	1543	3.7%	88.5%	710	1735	1932	11%	1834	**1735**	Difference Method	Absolute difference >10% --> Used difference only
	W of Jackson School	Jackson School	EB	675	500	510	760	2.1%	49.9%	250	925	1012	9%	968	**925**	Difference Method	To be consistent with method used for opposing direction
229th	S of Evergreen	Evergreen	NB	755	83	86	166	4.0%	96.0%	80	835	1480	56%	1157	**835**	Difference Method	Absolute difference >10% --> Used difference only
	Evergreen	S of Evergreen	SB	385	94	107	427	14.2%	340.1%	320	705	1694	83%	1200	**705**	Difference Method	Absolute difference >10% --> Used difference only
	Evergreen	N of Evergreen	NB	120	87	105	533	20.5%	492.1%	428	548	711	26%	629	**548**	Difference Method	Absolute difference >10% --> Used difference only
	N of Evergreen	Evergreen	SB	235	48	75	718	55.8%	1340.0%	643	878	3384	118%	2131	**878**	Difference Method	Absolute difference >10% --> Used difference only
235th	S of Evergreen	Evergreen	NB	70	828	827	812	-0.1%	-1.9%	-15	55	69	23%	62	**55**	Difference Method	Absolute difference >10% --> Used difference only
	Evergreen	S of Evergreen	SB	10	262	269	442	2.7%	66.0%	173	183	17	167%	100	**183**	Difference Method	Absolute difference >10% --> Used difference only
	Evergreen	N of Evergreen	NB	30	267	272	385	1.8%	42.4%	113	143	43	108%	93	**143**	Difference Method	Absolute difference >10% --> Used difference only
	N of Evergreen	Evergreen	SB	95	101	116	477	14.9%	357.4%	361	456	435	5%	445	**456**	Difference Method	To be consistent with method used for opposing direction
253rd	S of Evergreen	Evergreen	NB	71											**71**	Manual	
	Evergreen	S of Evergreen	SB	76											**76**	Manual	
	Evergreen	N of Evergreen	NB	7	1	7	156	620.0%	14880.0%	149	156	1049	148%	602	**156**	Difference Method	Not in Base Model - Used Difference
	N of Evergreen	Evergreen	SB	3	1	22	534	2132.0%	51168.0%	512	515	1538	100%	1026	**515**	Difference Method	Not in Base Model - Used Difference
Sewell Rd	S of Evergreen	Evergreen	NB	0											**0**	Manual	
	Evergreen	S of Evergreen	SB	10											**10**	Manual	
	Evergreen	N of Evergreen	NB	20	25	27	85	9.6%	230.4%	58	78	66	16%	72	**78**	Difference Method	Absolute difference >10% --> Used difference only
	N of Evergreen	Evergreen	SB	10	21	41	523	95.6%	2294.9%	482	492	239	69%	366	**492**	Difference Method	Absolute difference >10% --> Used difference only
	S of Meek	Meek Rd	NB	15	8	15	185	88.5%	2124.0%	170	185	334	57%	259	**185**	Difference Method	Absolute difference >10% --> Used difference only
	Meek Rd	S of Meek	SB	10	1	3	51	200.0%	4800.0%	48	58	490	158%	274	**58**	Difference Method	Absolute difference >10% --> Used difference only
273rd	N of Evergreen	Evergreen	SB	5											**5**	Manual	
	Evergreen	N of Evergreen	NB	5											**5**	Manual	
25th Ave	S of Evergreen	Evergreen	NB	935	766	765	739	-0.1%	-3.4%	-26	909	903	1%	906	906	Average of Difference and Growth	
	Evergreen	S of Evergreen	SB	230	242	247	374	2.2%	52.4%	127	357	350	2%	354	354	Average of Difference and Growth	
15th Ave	S of Evergreen	Evergreen	NB	715	207	204	125	-1.6%	-38.0%	-79	636	443	36%	540	636	Difference Method	Absolute difference >10% --> Used difference only
	Evergreen	S of Evergreen	SB	315	261	263	321	0.9%	22.1%	58	373	385	3%	379	373	Difference Method	To be consistent with method used for opposing direction
Genentech Access	E of Brookwood Pkwy	Brookwood Pkwy	WB	15											**15**	Manual	
	Brookwood Pkwy	E of Brookwood Pkwy	EB	0											**0**	Manual	
	Brookwood Pkwy	W of Brookwood Pkwy	WB	5											**5**	Manual	
	W of Brookwood Pkwy	Brookwood Pkwy	EB	100											**100**	Manual	

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Table 2: 2035 Link Volume Calculations for the PM Peak Period

Road	From	To	Direction	Volumes	Model	Interpolated Model	Model	2010-2035 Model Comparison			2035 Volume Estimates				Forecast Used	Method Used	Comments
				2011	2010	2011	2035	Annual Growth	Total Growth	Volume Growth	Volume Difference	Volume Growth	Absolute Difference	Average			
Huffman Street	E of Brookwood Pkwy	Brookwood Pkwy	WB	141	247	247	235	-0.2%	-4.7%	-12	129	134	4%	132	**129**	Difference Method	To be consistent with method used for opposing direction
	Brookwood Pkwy	E of Brookwood Pkwy	EB	46	10	28	471	184.4%	4425.6%	443	489	2082	124%	1285	**489**	Difference Method	Absolute difference >10% --> Used difference only
	Brookwood Pkwy	W of Brookwood Pkwy	WB	3	1	13	296	1180.0%	28320.0%	283	286	853	99%	569	**286**	Difference Method	Not in Base Model - Used Difference
	W of Brookwood Pkwy	Brookwood Pkwy	EB	3	1	47	1155	4616.0%	110784.0%	1108	1111	3327	100%	2219	**1111**	Difference Method	Not in Base Model - Used Difference
Rock Creek	E of Corn Pass	Corn Pass	WB	170	138	138	138	0.0%	0.0%	0	170	170	0%	170	170	Difference Method	To be consistent with method used for opposing direction
	Corn Pass	E of Corn Pass	EB	405	308	319	579	3.5%	84.5%	260	665	747	12%	706	665	Difference Method	Absolute difference >10% --> Used difference only
Croeni	S of Jacobson	Jacobson Rd	NB	55	166	171	298	3.2%	76.3%	127	182	97	61%	139	**182**	Difference Method	Absolute difference >10% --> Used difference only
	Jacobson Rd	S of Jacobson	SB	60	76	76	85	0.5%	11.4%	9	69	67	3%	68	**69**	Difference Method	To be consistent with method used for opposing direction
	Jacobson Rd	N of Jacobson	NB	15	5	6	40	28.0%	672.0%	34	49	116	82%	82	**49**	Difference Method	Absolute difference >10% --> Used difference only
	N of Jacobson	Jacobson Rd	SB	60	3	3	13	13.3%	320.0%	10	70	252	113%	161	**70**	Difference Method	Absolute difference >10% --> Used difference only
Century	S of Jacobson	Jacobson Rd	NB	56	1	30	736	2940.0%	70560.0%	706	762	39570	192%	20166	**762**	Difference Method	Not in Base Model - Used Difference
	Jacobson Rd	S of Jacobson	SB	41	1	12	287	1144.0%	27456.0%	275	316	11298	189%	5807	**316**	Difference Method	Not in Base Model - Used Difference
	Jacobson Rd	N of Jacobson	NB	3	1	23	544	2172.0%	52128.0%	521	524	1567	100%	1046	**524**	Difference Method	Not in Base Model - Used Difference
	N of Jacobson	Jacobson Rd	SB	3	1	2	17	64.0%	1536.0%	15	18	49	91%	34	**18**	Difference Method	Not in Base Model - Used Difference
Groveland	N of Groveland	Groveland	SB	2											**5**	Manual	
	Groveland	N of Groveland	NB	2											**5**	Manual	
	E of Groveland	Groveland	WB	11											**10**	Manual	
	Groveland	E of Groveland	EB	11											**10**	Manual	
	Groveland	W of Groveland	WB	11											**10**	Manual	
	W of Groveland	Groveland	EB	11											**10**	Manual	
	S of West Union	West Union	NB	1											**5**	Manual	
	West Union	S of West Union	SB	2											**5**	Manual	
	West Union	N of West Union	NB	10											**10**	Manual	
	N of West Union	West Union	SB	5											**5**	Manual	
Schaff Road	E of Helvetia Rd	Helvetia Rd	WB	2	13	19	156	44.0%	1056.0%	137	139	23	143%	81	**139**	Difference Method	Absolute difference >10% --> Used difference only
	Helvetia Rd	E of Helvetia Rd	EB	2	53	55	98	3.4%	81.5%	43	45	4	170%	24	**45**	Difference Method	Absolute difference >10% --> Used difference only
Pubols Road	E of Helvetia Rd	Helvetia Rd	WB	5	5	5	15	8.0%	192.0%	10	15	15	0%	15	15	Manual	
	Helvetia Rd	E of Helvetia Rd	EB	5	5	7	50	36.0%	864.0%	43	48	48	0%	48	50	Manual	
Dick Road	S of West Union	West Union	NB	20	5	28	583	462.4%	11097.6%	555	575	2240	118%	1407	**575**	Difference Method	Absolute difference >10% --> Used difference only
	West Union	S of West Union	SB	10	3	4	30	36.0%	864.0%	26	36	96	91%	66	**36**	Difference Method	Absolute difference >10% --> Used difference only
	West Union	N of West Union	NB	15											**20**	Manual	
	N of West Union	West Union	SB	20											**25**	Manual	
Jackson Quarry	West Union	N of West Union	EB	40											40	Manual	
	N of West Union	West Union	WB	35											35	Manual	
Wagon Way	W of Corn Pass	Corn Pass	EB	275	314	345	1083	9.8%	235.1%	738	1013	922	9%	967	**1013**	Difference Method	To be consistent with method used for opposing direction
	Corn Pass	W of Corn Pass	WB	235	125	131	281	5.0%	119.8%	150	385	517	29%	451	**385**	Difference Method	Absolute difference >10% --> Used difference only
	Corn Pass	E of Corn Pass	EB	5											**5**	Manual	
	E of Corn Pass	Corn Pass	WB	5											**5**	Manual	
Scott Church Road	Jackson School	W of Jackson School	WB	165	241	246	359	2.0%	47.0%	113	278	243	14%	260	278	Difference Method	Absolute difference >10% --> Used difference only
	W of Jackson School	Jackson School	EB	135	152	152	160	0.2%	5.1%	8	143	142	1%	142	143	Difference Method	Absolute difference >10% --> Used difference only

Greater than 10% difference between difference and growth methods

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

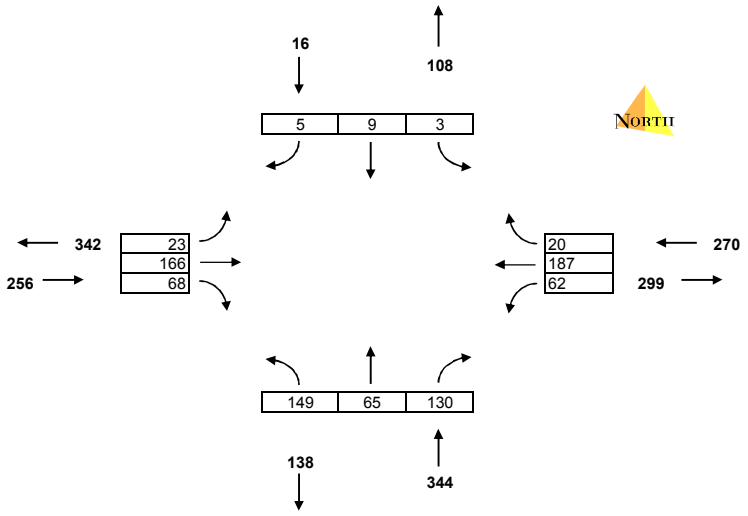
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Jackson School Rd @ West Union Rd
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: West Union Rd
NORTH-SOUTH ROAD: Jackson School Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	65	40	60	5	30	10	10	55	40	40	65	10
OUTPUT FUTURE	**149**	**65**	**130**	**3**	**9**	**5**	**23**	**166**	**68**	**62**	**187**	**20**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	165	110	45	60	105	140	115	120	430	430
OUTPUT FUTURE	**344**	**138**	**16**	**108**	**256**	**342**	**270**	**299**	887	887
INPUT FUTURE	339	138	16	108	253	342	266	299	874	887



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

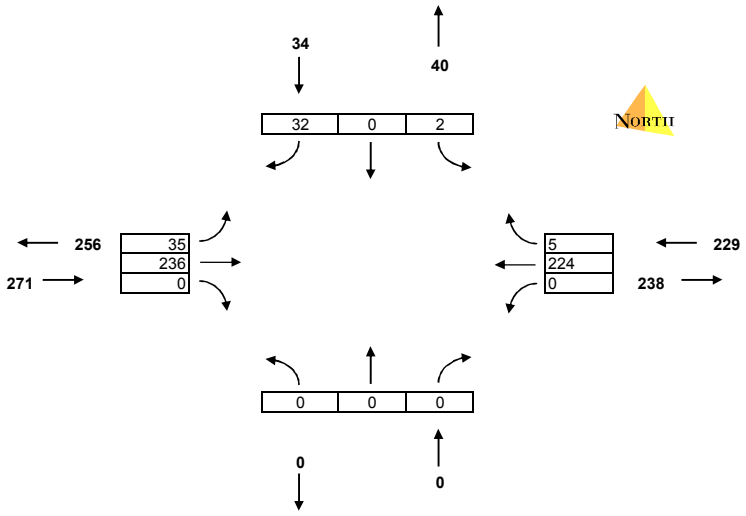
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Jackson Quarry Rd @ West Union Rd
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: West Union Rd
NORTH-SOUTH ROAD: Jackson Quarry Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	0	0	5	0	30	30	90	0	0	75	10
OUTPUT FUTURE	**0**	**0**	**0**	**2**	**0**	**32**	**35**	**236**	**0**	**0**	**224**	**5**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	0	0	35	40	120	105	85	95	240	240
OUTPUT FUTURE	**0**	**0**	**34**	**40**	**271**	**256**	**229**	**238**	534	534
INPUT FUTURE	0	0	35	40	299	256	236	238	569	534



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

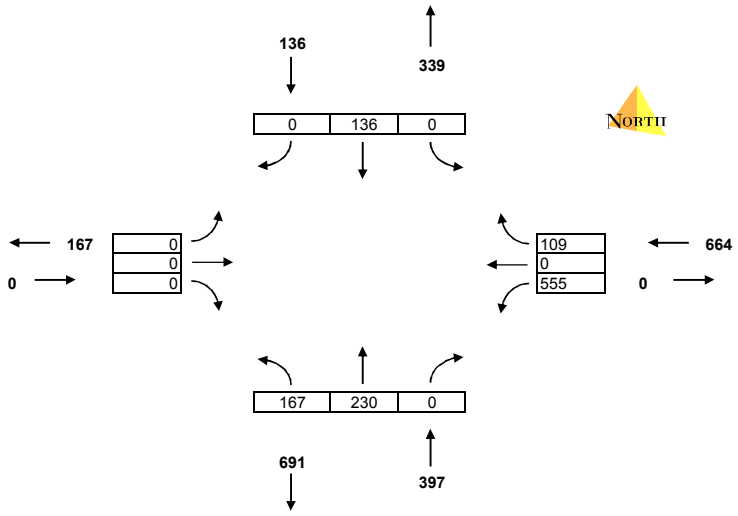
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Jackson School Rd @ US 26 WB Ramps
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: US 26 WB Ramps
NORTH-SOUTH ROAD: Jackson School Rd.

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	75	100	0	0	105	0	0	0	0	500	0	60
OUTPUT FUTURE	**167**	**230**	**0**	**0**	**136**	**0**	**0**	**0**	**0**	**555**	**0**	**109**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	175	605	105	160	0	75	560	0	840	840
OUTPUT FUTURE	**397**	**691**	**136**	**339**	**0**	**167**	**664**	**0**	1,198	1,198
INPUT FUTURE	399	691	138	339	0	167	673	0	1,210	1,198



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

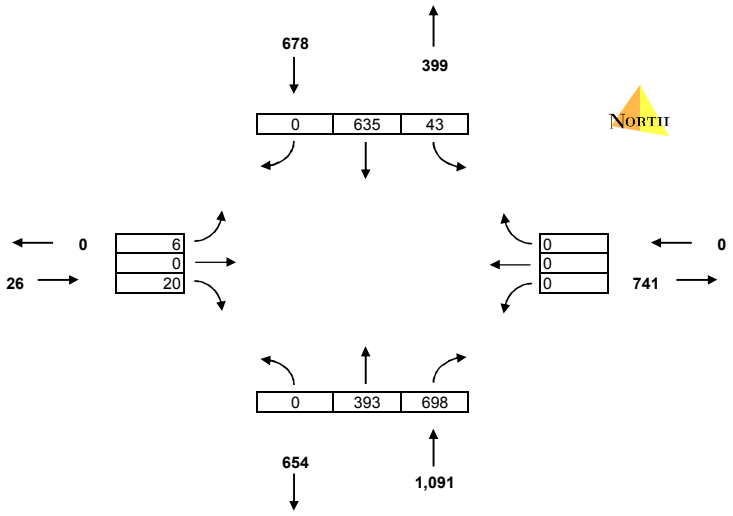
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Jackson School Rd @ US 26 EB Ramps
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: US 26 EB Ramps
NORTH-SOUTH ROAD: Jackson School Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	170	565	45	560	0	5	0	25	0	0	0
OUTPUT FUTURE	**0**	**393**	**698**	**43**	**635**	**0**	**6**	**0**	**20**	**0**	**0**	**0**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	735	585	605	175	30	0	0	610	1,370	1,370
OUTPUT FUTURE	**1,091**	**654**	**678**	**399**	**26**	**0**	**0**	**741**	1,794	1,794
INPUT FUTURE	1,112	654	691	399	26	0	0	741	1,830	1,794



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

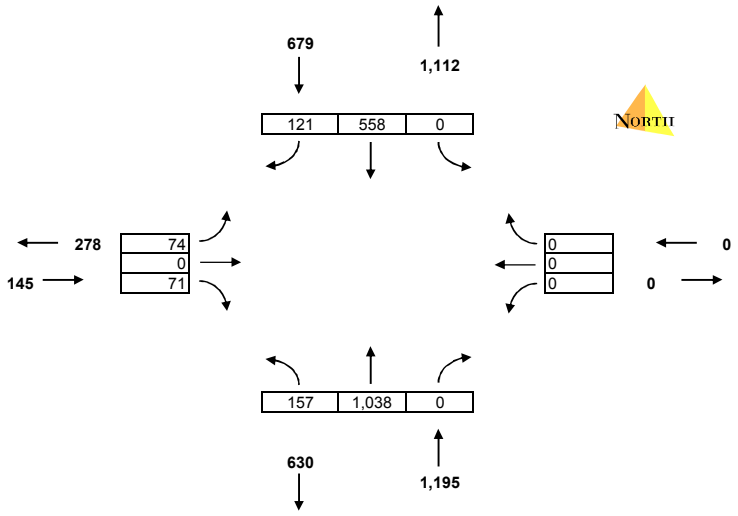
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Jackson School Rd @ Scott Church Rd
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Scott Church Rd
NORTH-SOUTH ROAD: Jackson School Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	25	620	0	0	435	140	115	0	20	0	0	0
OUTPUT FUTURE	**157**	**1,038**	**0**	**0**	**558**	**121**	**74**	**0**	**71**	**0**	**0**	**0**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	645	455	575	735	135	165	0	0	1,355	1,355
OUTPUT FUTURE	**1,195**	**630**	**679**	**1,112**	**145**	**278**	**0**	**0**	2,020	2,020
INPUT FUTURE	1,196	630	654	1,112	143	278	0	0	1,993	2,020



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

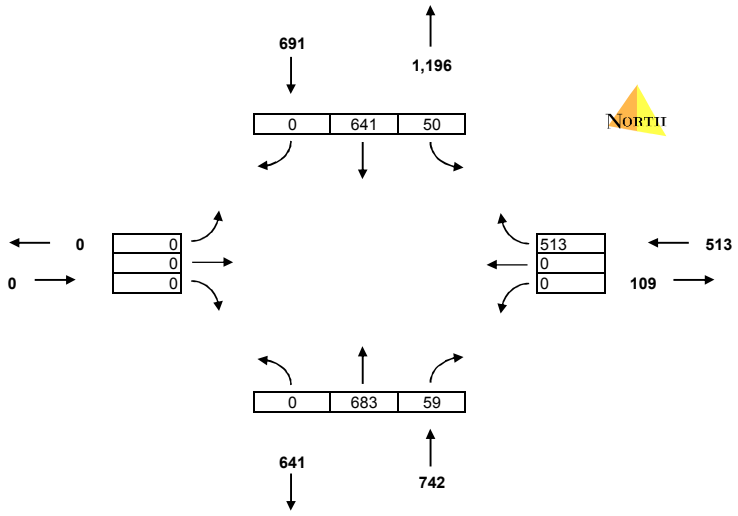
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Jackson School Rd @ Meek Rd
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Meek Rd.
NORTH-SOUTH ROAD: Jackson School Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	630	5	20	435	0	0	0	0	0	0	15
OUTPUT FUTURE	**0**	**683**	**59**	**50**	**641**	**0**	**0**	**0**	**0**	**0**	**0**	**513**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	635	435	455	645	0	0	15	25	1,105	1,105
OUTPUT FUTURE	**742**	**641**	**691**	**1,196**	**0**	**0**	**513**	**109**	1,946	1,946
INPUT FUTURE	776	641	630	1,196	0	0	539	109	1,945	1,946



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

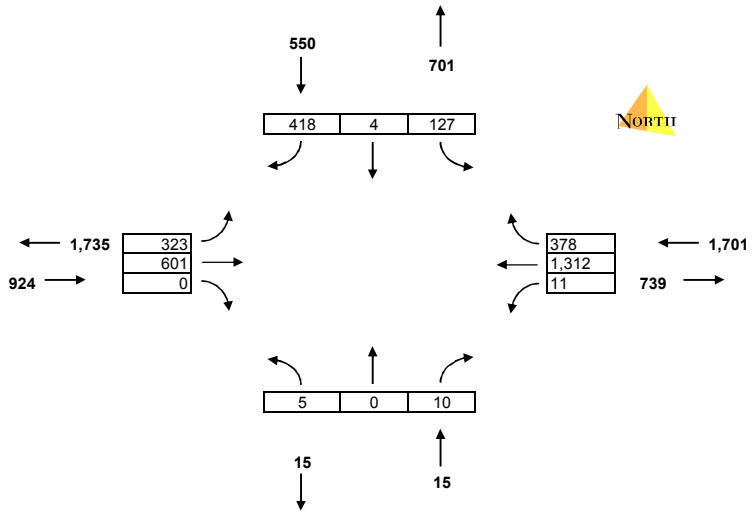
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Jackson School Rd @ Evergreen Rd
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Rd.
NORTH-SOUTH ROAD: Jackson School Rd.

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	5	0	10	95	5	320	315	360	0	10	700	320
OUTPUT FUTURE	**5**	**0**	**10**	**127**	**4**	**418**	**323**	**601**	**0**	**11**	**1,312**	**378**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	15	15	420	635	675	1,025	1,030	465	2,140	2,140
OUTPUT FUTURE	**15**	**15**	**550**	**701**	**924**	**1,735**	**1,701**	**739**	3,190	3,190
INPUT FUTURE	15	15	550	701	925	1,735	1,701	739	3,190	3,190



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

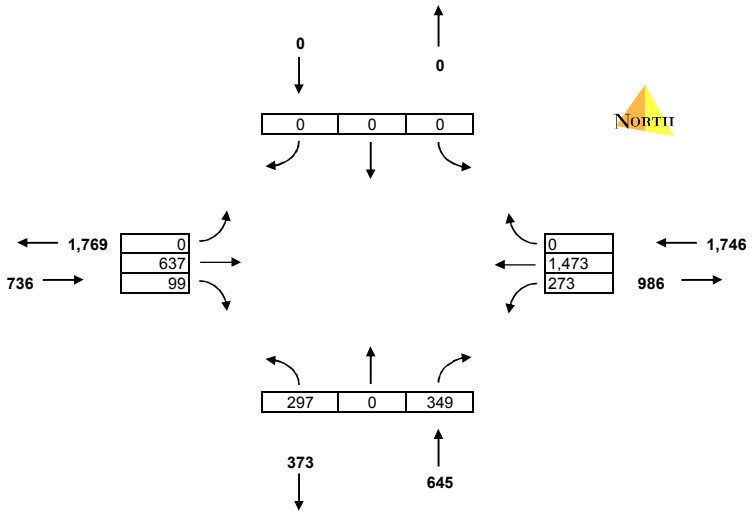
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : 15th Avenue @ Evergreen Rd
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Rd.
NORTH-SOUTH ROAD: 15th Avenue

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	300	0	415	0	0	0	0	345	80	235	725	0
OUTPUT FUTURE	**297**	**0**	**349**	**0**	**0**	**0**	**0**	**637**	**99**	**273**	**1,473**	**0**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	715	315	0	0	425	1,025	960	760	2,100	2,100
OUTPUT FUTURE	**645**	**373**	**0**	**0**	**736**	**1,769**	**1,746**	**986**	3,128	3,128
INPUT FUTURE	636	373	0	0	726	1,769	1,720	986	3,083	3,128



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

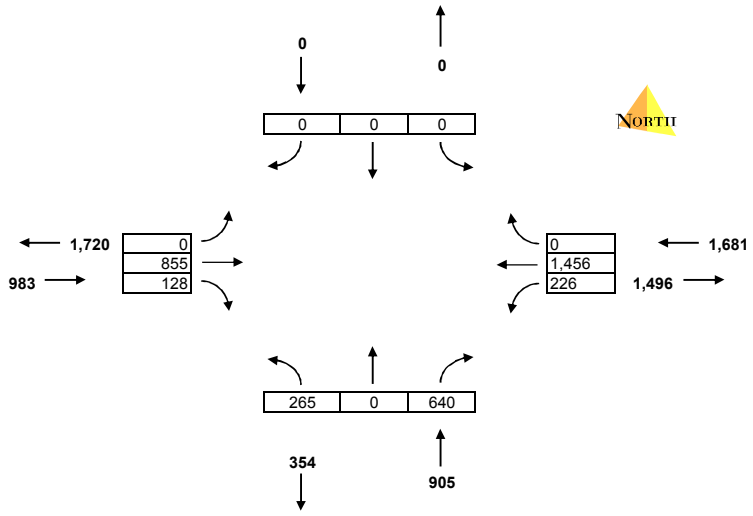
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : 25th Avenue @ Evergreen Rd
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Rd.
NORTH-SOUTH ROAD: 25th Avenue

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	205	0	730	0	0	0	0	675	85	145	755	0
OUTPUT FUTURE	**265**	**0**	**640**	**0**	**0**	**0**	**0**	**855**	**128**	**226**	**1,456**	**0**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	935	230	0	0	760	960	900	1,405	2,595	2,595
OUTPUT FUTURE	**905**	**354**	**0**	**0**	**983**	**1,720**	**1,681**	**1,496**	3,570	3,570
INPUT FUTURE	906	354	0	0	986	1,720	1,679	1,496	3,571	3,570



* Turn Calculation Output from NCHRP 255

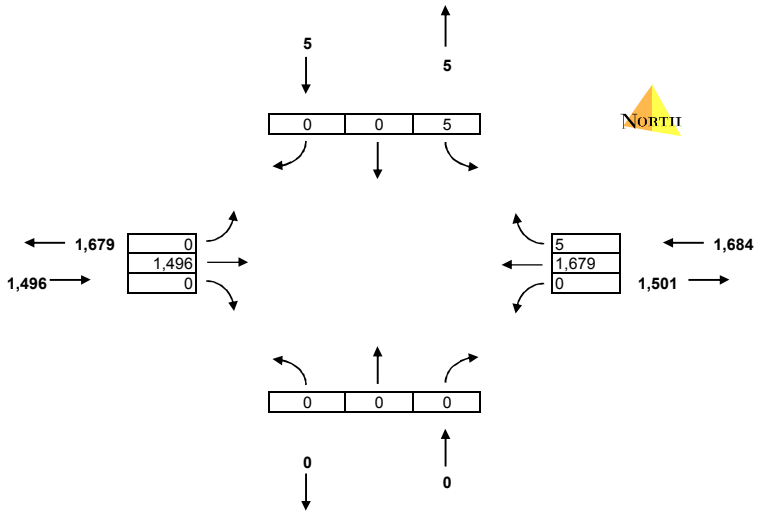
Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION :	Eggiman Rd @ Evergreen Rd		
SCENARIO :	2035 Baseline		
PEAK HOUR :	PM		
BASE YEAR :	2011	EAST-WEST ROAD:	Evergreen Rd.
FUTURE YEAR :	2035	NORTH-SOUTH ROAD:	Eggiman Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	0	0	5	0	0	0	1,405	0	0	900	5
OUTPUT FUTURE	**0**	**0**	**0**	**5**	**0**	**0**	**0**	**1,496**	**0**	**0**	**1,679**	**5**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	0	0	5	5	1,405	900	905	1,410	2,315	2,315
OUTPUT FUTURE	**0**	**0**	**5**	**5**	**1,496**	**1,679**	**1,684**	**1,501**	3,185	3,185
INPUT FUTURE	0	0	5	5	1,496	1,679	1,686	1,501	3,187	3,185



* Turn Calculation Output from NCHRP 255

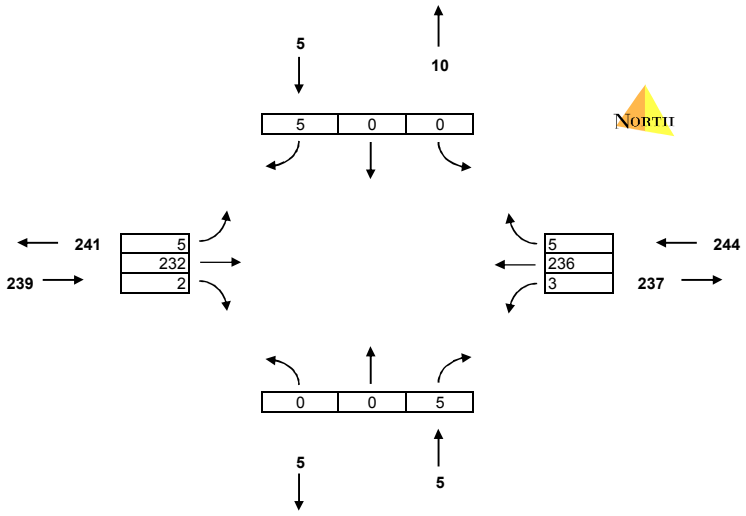
Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION :	Groveland Rd @ West Union Rd.		
SCENARIO :	2035 Baseline		
PEAK HOUR :	PM		
BASE YEAR :	2011	EAST-WEST ROAD:	West Union Rd.
FUTURE YEAR :	2035	NORTH-SOUTH ROAD:	Groveland Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	0	1	0	0	5	5	90	1	1	85	5
OUTPUT FUTURE	**0**	**0**	**5**	**0**	**0**	**5**	**5**	**232**	**2**	**3**	**236**	**5**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	1	2	5	10	96	90	91	91	193	193
OUTPUT FUTURE	**5**	**5**	**5**	**10**	**239**	**241**	**244**	**237**	493	493
INPUT FUTURE	5	5	5	10	239	241	244	237	493	493



* Turn Calculation Output from NCHRP 255

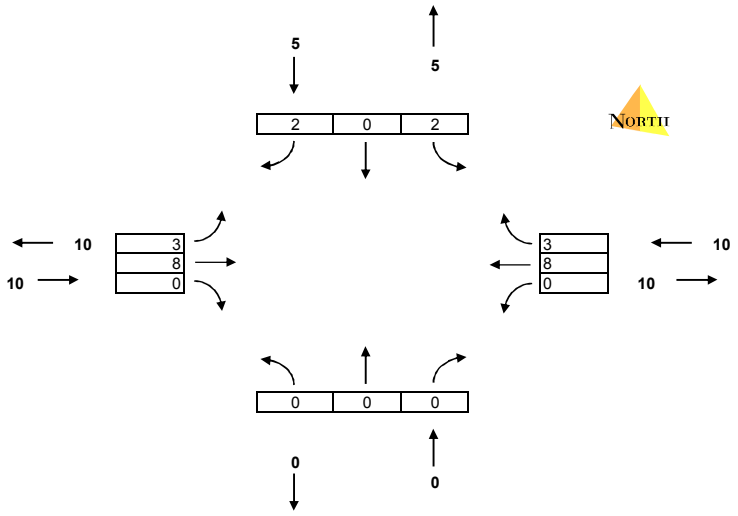
Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION :	Groveland Rd @ Groveland Dr		
SCENARIO :	2035 Baseline		
PEAK HOUR :	PM		
BASE YEAR :	2011	EAST-WEST ROAD:	Groveland Dr.
FUTURE YEAR :	2035	NORTH-SOUTH ROAD:	Groveland Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	0	0	1	0	1	1	10	0	0	10	1
OUTPUT FUTURE	**0**	**0**	**0**	**2**	**0**	**2**	**3**	**8**	**0**	**0**	**8**	**3**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	0	0	2	2	11	11	11	11	24	24
OUTPUT FUTURE	**0**	**0**	**5**	**5**	**10**	**10**	**10**	**10**	25	25
INPUT FUTURE	0	0	5	5	10	10	10	10	25	25



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

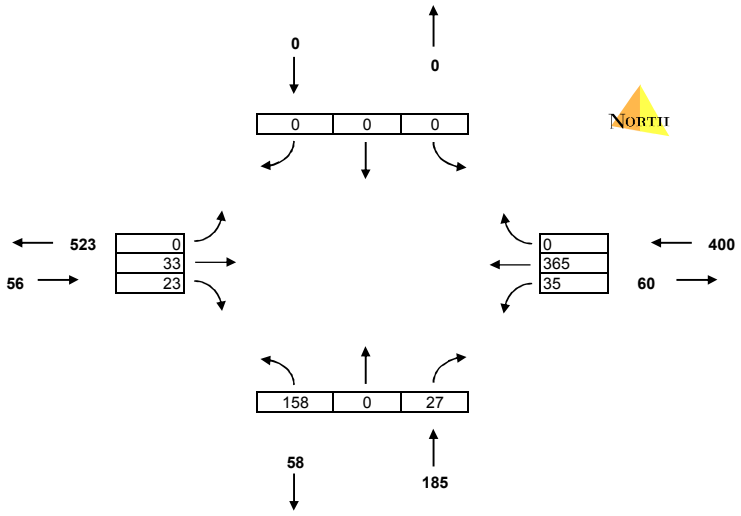
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Sewell Rd @ Meek Rd
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Meek Rd.
NORTH-SOUTH ROAD: Sewell Rd.

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	10	0	5	0	0	0	0	10	5	5	25	0
OUTPUT FUTURE	**158**	**0**	**27**	**0**	**0**	**0**	**0**	**33**	**23**	**35**	**365**	**0**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	15	10	0	0	15	35	30	15	60	60
OUTPUT FUTURE	**185**	**58**	**0**	**0**	**56**	**523**	**400**	**60**	641	641
INPUT FUTURE	185	58	0	0	56	523	400	60	641	641



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

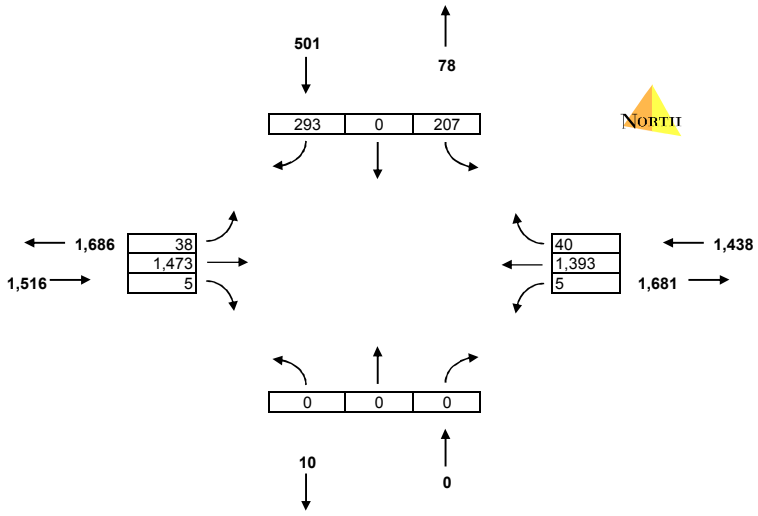
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Sewell Rd @ Evergreen Rd
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Rd.
NORTH-SOUTH ROAD: Sewell Rd.

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	0	0	5	0	5	10	1,395	5	5	900	10
OUTPUT FUTURE	**0**	**0**	**0**	**207**	**0**	**293**	**38**	**1,473**	**5**	**5**	**1,393**	**40**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	0	10	10	20	1,410	905	915	1,400	2,335	2,335
OUTPUT FUTURE	**0**	**10**	**501**	**78**	**1,516**	**1,686**	**1,438**	**1,681**	3,455	3,455
INPUT FUTURE	0	10	492	78	1,501	1,686	1,405	1,681	3,398	3,455



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

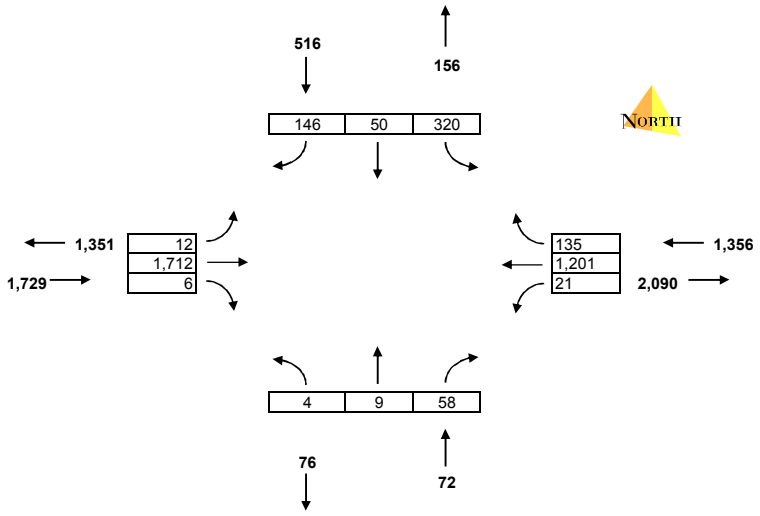
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Meier-Jurgen Rd @ Evergreen Rd
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Rd.
NORTH-SOUTH ROAD: Meier-Jurgen Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	10	1	60	1	1	1	1	1,360	30	45	890	5
OUTPUT FUTURE	**4**	**9**	**58**	**320**	**50**	**146**	**12**	**1,712**	**6**	**21**	**1,201**	**135**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	71	76	3	7	1,391	901	940	1,421	2,405	2,405
OUTPUT FUTURE	**72**	**76**	**516**	**156**	**1,729**	**1,351**	**1,356**	**2,090**	3,673	3,673
INPUT FUTURE	71	76	515	156	1,708	1,351	1,380	2,090	3,673	3,673



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

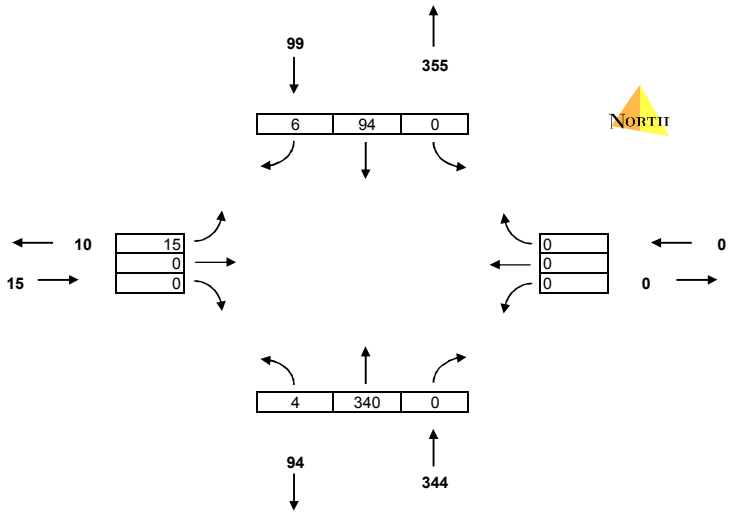
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Helvetia Rd North @ West Union Rd
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: West Union Rd.
NORTH-SOUTH ROAD: Helvetia Rd. North

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	5	135	0	0	60	5	15	0	0	0	0	0
OUTPUT FUTURE	**4**	**340**	**0**	**0**	**94**	**6**	**15**	**0**	**0**	**0**	**0**	**0**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	140	60	65	150	15	10	0	0	220	220
OUTPUT FUTURE	**344**	**94**	**99**	**355**	**15**	**10**	**0**	**0**	459	459
INPUT FUTURE	339	94	104	355	15	10	0	0	458	459



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

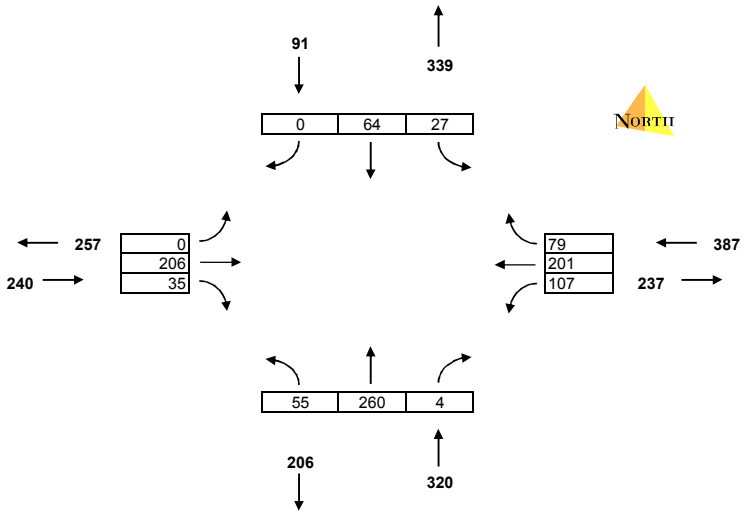
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Helvetia Rd Middle @ West Union Rd
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: West Union Rd.
NORTH-SOUTH ROAD: Helvetia Rd. Middle

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	35	120	5	15	45	0	0	70	15	85	70	20
OUTPUT FUTURE	**55**	**260**	**4**	**27**	**64**	**0**	**0**	**206**	**35**	**107**	**201**	**79**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	160	145	60	140	85	105	175	90	480	480
OUTPUT FUTURE	**320**	**206**	**91**	**339**	**240**	**257**	**387**	**237**	1,039	1,039
INPUT FUTURE	323	206	94	339	249	257	393	237	1,059	1,039



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

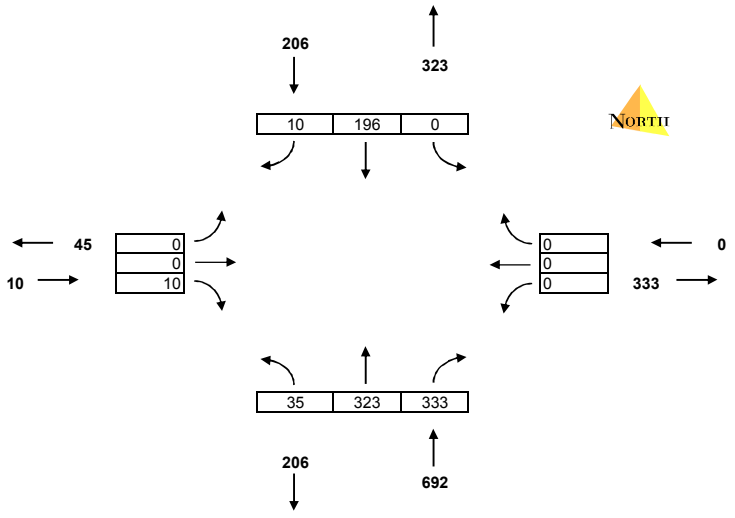
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Helvetia Rd South @ West Union Rd
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: West Union Rd.
NORTH-SOUTH ROAD: Helvetia Rd. South

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	35	160	270	0	135	10	0	0	10	0	0	0
OUTPUT FUTURE	**35**	**323**	**333**	**0**	**196**	**10**	**0**	**0**	**10**	**0**	**0**	**0**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	465	145	145	160	10	45	0	270	620	620
OUTPUT FUTURE	**692**	**206**	**206**	**323**	**10**	**45**	**0**	**333**	908	908
INPUT FUTURE	693	206	206	323	10	45	0	333	909	908



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

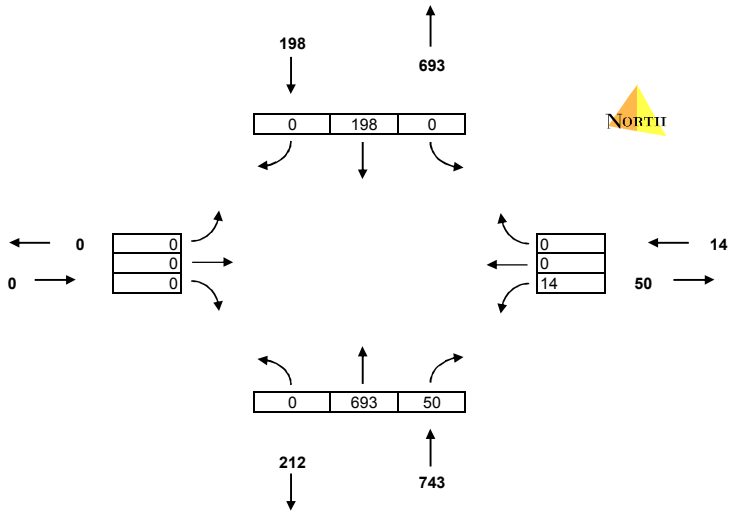
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Helvetia Rd @ Pubols Rd
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Pubols Rd.
NORTH-SOUTH ROAD: Helvetia Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	465	5	0	145	0	0	0	0	5	0	0
OUTPUT FUTURE	**0**	**693**	**50**	**0**	**198**	**0**	**0**	**0**	**0**	**14**	**0**	**0**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	470	150	145	465	0	0	5	5	620	620
OUTPUT FUTURE	**743**	**212**	**198**	**693**	**0**	**0**	**14**	**50**	955	955
INPUT FUTURE	698	212	206	693	0	0	15	50	919	955



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

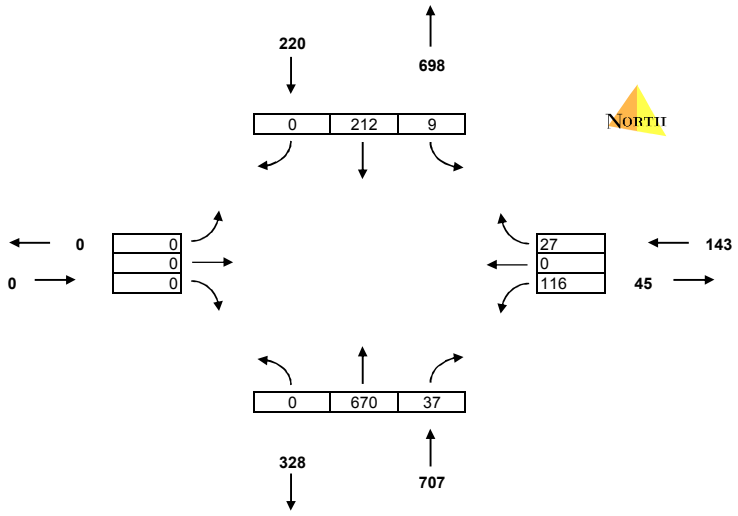
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Helvetia Rd @ Schaff Rd
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Schaff Rd.
NORTH-SOUTH ROAD: Helvetia Rd.

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	470	1	1	150	0	0	0	0	1	0	1
OUTPUT FUTURE	**0**	**670**	**37**	**9**	**212**	**0**	**0**	**0**	**0**	**116**	**0**	**27**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	471	151	151	471	0	0	2	2	624	624
OUTPUT FUTURE	**707**	**328**	**220**	**698**	**0**	**0**	**143**	**45**	1,070	1,070
INPUT FUTURE	722	328	212	698	0	0	139	45	1,073	1,070



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

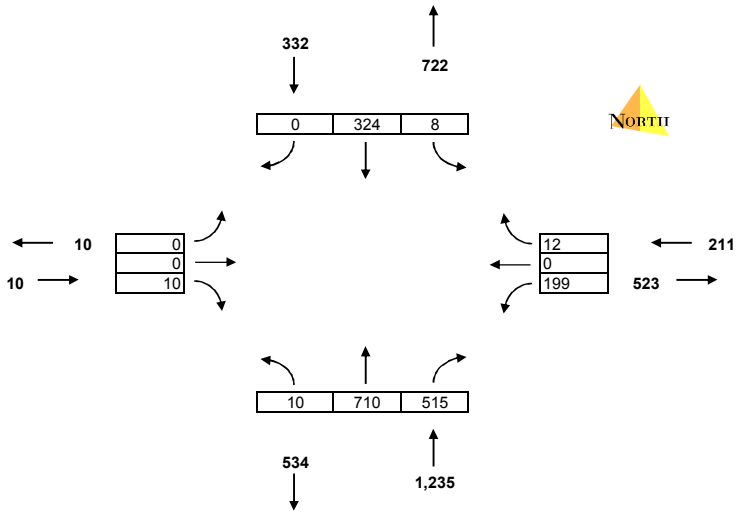
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Helvetia Rd @ Jacobson Rd
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Jacobson Rd.
NORTH-SOUTH ROAD: Helvetia Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	10	460	500	5	145	0	0	0	10	175	0	10
OUTPUT FUTURE	**10**	**710**	**515**	**8**	**324**	**0**	**0**	**0**	**10**	**199**	**0**	**12**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	970	330	150	470	10	10	185	505	1,315	1,315
OUTPUT FUTURE	**1,235**	**534**	**332**	**722**	**10**	**10**	**211**	**523**	1,788	1,788
INPUT FUTURE	1,232	534	328	722	10	10	208	523	1,778	1,788



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

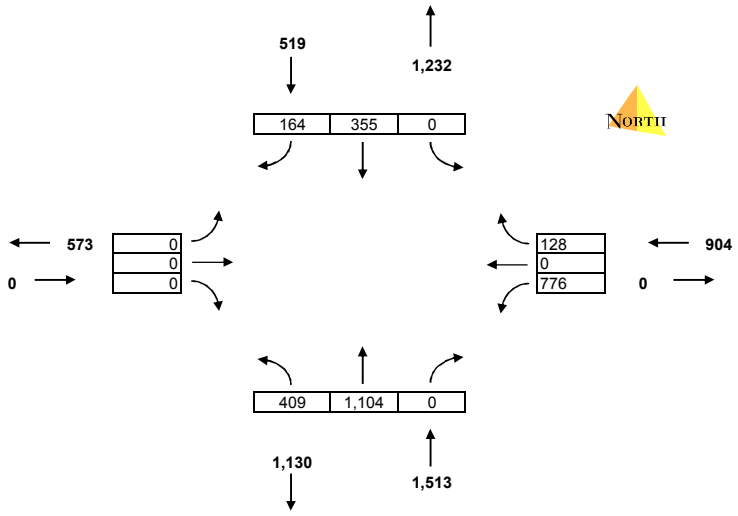
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Brookwood Pkwy @ US26 WB Ramps
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: US26 WB Ramps
NORTH-SOUTH ROAD: Brookwood Pkwy.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	215	885	0	0	265	65	0	0	0	640	0	85
OUTPUT FUTURE	**409**	**1,104**	**0**	**0**	**355**	**164**	**0**	**0**	**0**	**776**	**0**	**128**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	1,100	905	330	970	0	280	725	0	2,155	2,155
OUTPUT FUTURE	**1,513**	**1,130**	**519**	**1,232**	**0**	**573**	**904**	**0**	2,935	2,935
INPUT FUTURE	1,552	1,130	534	1,232	0	573	930	0	3,015	2,935



* Turn Calculation Output from NCHRP 255

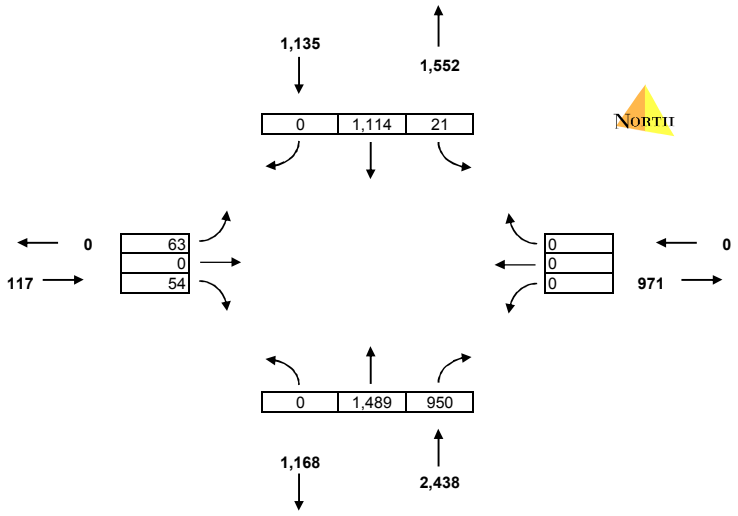
Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION :	Brookwood Pkwy @ US26 EB Ramps		
SCENARIO :	2035 Baseline		
PEAK HOUR :	PM		
BASE YEAR :	2011	EAST-WEST ROAD:	US26 EB Ramps
FUTURE YEAR :	2035	NORTH-SOUTH ROAD:	Brookwood Pkwy.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	1,030	780	20	885	0	70	0	60	0	0	0
OUTPUT FUTURE	**0**	**1,489**	**950**	**21**	**1,114**	**0**	**63**	**0**	**54**	**0**	**0**	**0**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	1,810	945	905	1,100	130	0	0	800	2,845	2,845
OUTPUT FUTURE	**2,438**	**1,168**	**1,135**	**1,552**	**117**	**0**	**0**	**971**	3,691	3,691
INPUT FUTURE	2,440	1,168	1,130	1,552	117	0	0	971	3,687	3,691



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

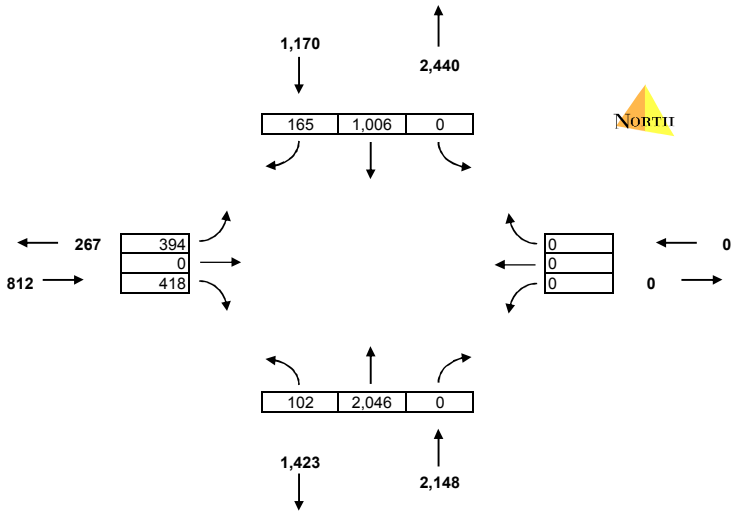
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Brookwood Pkwy @ Meek Rd
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Meek Rd.
NORTH-SOUTH ROAD: Brookwood Pkwy.

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	25	1,805	0	0	930	15	5	0	15	0	0	0
OUTPUT FUTURE	**102**	**2,046**	**0**	**0**	**1,006**	**165**	**394**	**0**	**418**	**0**	**0**	**0**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	1,830	945	945	1,810	20	40	0	0	2,795	2,795
OUTPUT FUTURE	**2,148**	**1,423**	**1,170**	**2,440**	**812**	**267**	**0**	**0**	4,130	4,130
INPUT FUTURE	2,112	1,423	1,168	2,440	804	267	0	0	4,084	4,130



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

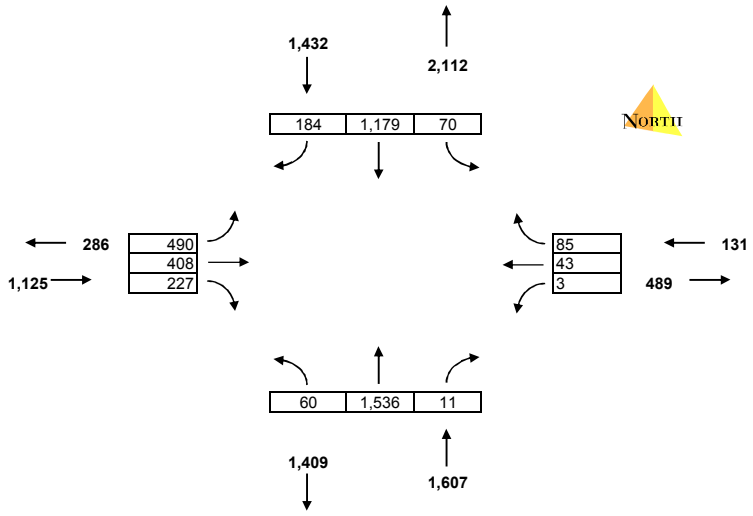
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Brookwood Pkwy @ Huffman St
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Huffman St.
NORTH-SOUTH ROAD: Brookwood Pkwy.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	1	1,700	15	30	915	1	1	1	1	10	1	130
OUTPUT FUTURE	**60**	**1,536**	**11**	**70**	**1,179**	**184**	**490**	**408**	**227**	**3**	**43**	**85**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	1,716	926	946	1,831	3	3	141	46	2,806	2,806
OUTPUT FUTURE	**1,607**	**1,409**	**1,432**	**2,112**	**1,125**	**286**	**131**	**489**	4,295	4,295
INPUT FUTURE	1,581	1,409	1,423	2,112	1,111	286	129	489	4,244	4,295



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

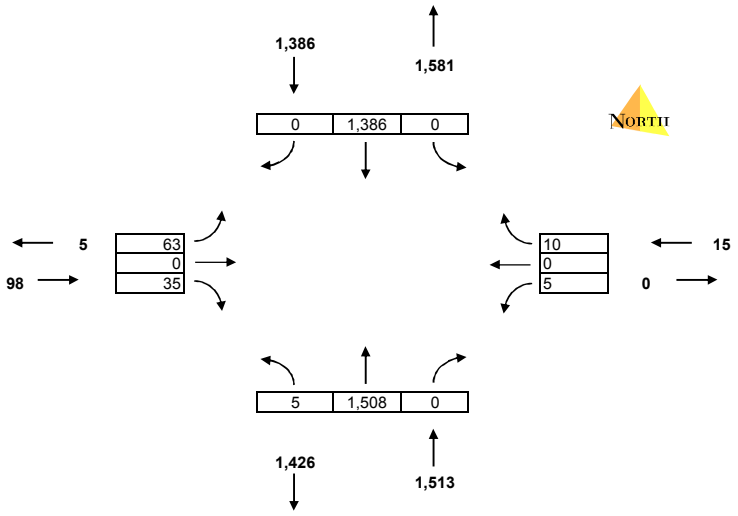
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Brookwood Pkwy @ Genetech Access
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Genetech Access
NORTH-SOUTH ROAD: Brookwood Pkwy.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	5	1,640	0	0	925	0	65	0	35	5	0	10
OUTPUT FUTURE	**5**	**1,508**	**0**	**0**	**1,386**	**0**	**63**	**0**	**35**	**5**	**0**	**10**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	1,645	965	925	1,715	100	5	15	0	2,685	2,685
OUTPUT FUTURE	**1,513**	**1,426**	**1,386**	**1,581**	**98**	**5**	**15**	**0**	3,012	3,012
INPUT FUTURE	1,541	1,426	1,409	1,581	100	5	15	0	3,065	3,012



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

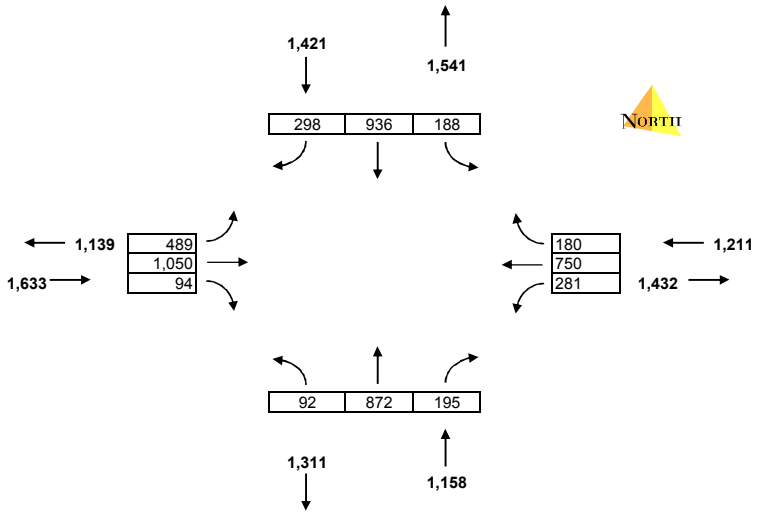
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Brookwood Pkwy @ Evergreen Rd
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Rd.
NORTH-SOUTH ROAD: Brookwood Pkwy.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	100	930	95	65	670	230	600	590	110	170	490	115
OUTPUT FUTURE	**92**	**872**	**195**	**188**	**936**	**298**	**489**	**1,050**	**94**	**281**	**750**	**180**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	1,125	950	965	1,645	1,300	820	775	750	4,165	4,165
OUTPUT FUTURE	**1,158**	**1,311**	**1,421**	**1,541**	**1,633**	**1,139**	**1,211**	**1,432**	5,423	5,423
INPUT FUTURE	1,160	1,311	1,426	1,541	1,635	1,139	1,214	1,432	5,435	5,423



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

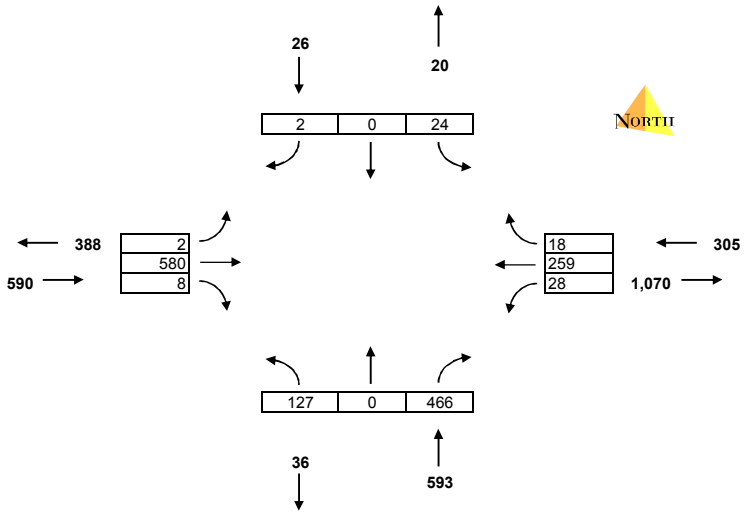
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Century Blvd @ West Union Rd
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: West Union Rd.
NORTH-SOUTH ROAD: Century Blvd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	10	0	10	15	0	5	5	350	5	5	155	10
OUTPUT FUTURE	**127**	**0**	**466**	**24**	**0**	**2**	**2**	**580**	**8**	**28**	**259**	**18**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	20	10	20	15	360	170	170	375	570	570
OUTPUT FUTURE	**593**	**36**	**26**	**20**	**590**	**388**	**305**	**1,070**	1,513	1,513
INPUT FUTURE	575	36	25	20	571	388	297	1,070	1,468	1,513



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

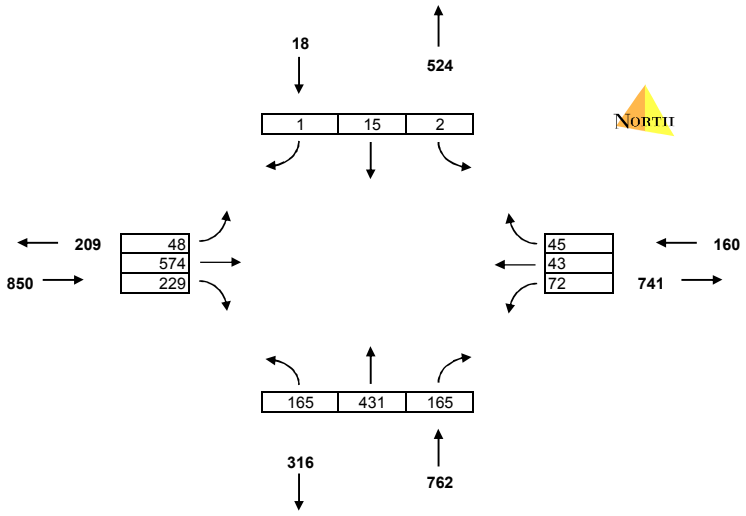
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Century Blvd @ Jacobson Rd
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Jacobson Rd.
NORTH-SOUTH ROAD: Century Blvd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	40	1	15	1	1	1	1	470	30	10	100	1
OUTPUT FUTURE	**165**	**431**	**165**	**2**	**15**	**1**	**48**	**574**	**229**	**72**	**43**	**45**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	56	41	3	3	501	141	111	486	671	671
OUTPUT FUTURE	**762**	**316**	**18**	**524**	**850**	**209**	**160**	**741**	1,790	1,790
INPUT FUTURE	762	316	18	524	849	209	160	741	1,789	1,790



* Turn Calculation Output from NCHRP 255

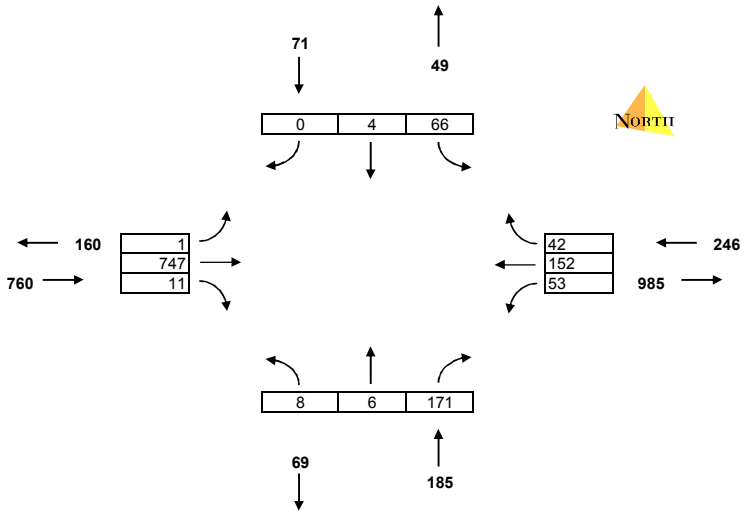
Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION :	Croeni Rd @ Jacobson Rd		
SCENARIO :	2035 Baseline		
PEAK HOUR :	PM		
BASE YEAR :	2011	EAST-WEST ROAD:	Jacobson Rd.
FUTURE YEAR :	2035	NORTH-SOUTH ROAD:	Croeni Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	30	5	20	40	15	5	5	450	40	5	80	5
OUTPUT FUTURE	**8**	**6**	**171**	**66**	**4**	**0**	**1**	**747**	**11**	**53**	**152**	**42**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	55	60	60	15	495	115	90	510	700	700
OUTPUT FUTURE	**185**	**69**	**71**	**49**	**760**	**160**	**246**	**985**	1,262	1,262
INPUT FUTURE	182	69	70	49	741	160	265	985	1,257	1,262



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

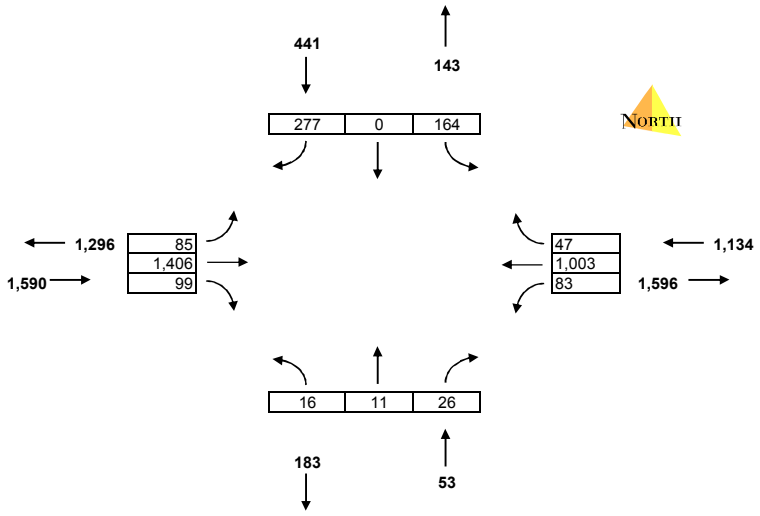
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : 235th Ave @ Evergreen Pkwy
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Pkwy.
NORTH-SOUTH ROAD: 235th Ave.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	25	5	40	35	0	60	15	875	5	5	755	10
OUTPUT FUTURE	**16**	**11**	**26**	**164**	**0**	**277**	**85**	**1,406**	**99**	**83**	**1,003**	**47**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	70	10	95	30	895	840	770	950	1,830	1,830
OUTPUT FUTURE	**53**	**183**	**441**	**143**	**1,590**	**1,296**	**1,134**	**1,596**	3,219	3,219
INPUT FUTURE	55	183	456	143	1,642	1,296	1,172	1,596	3,325	3,219



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

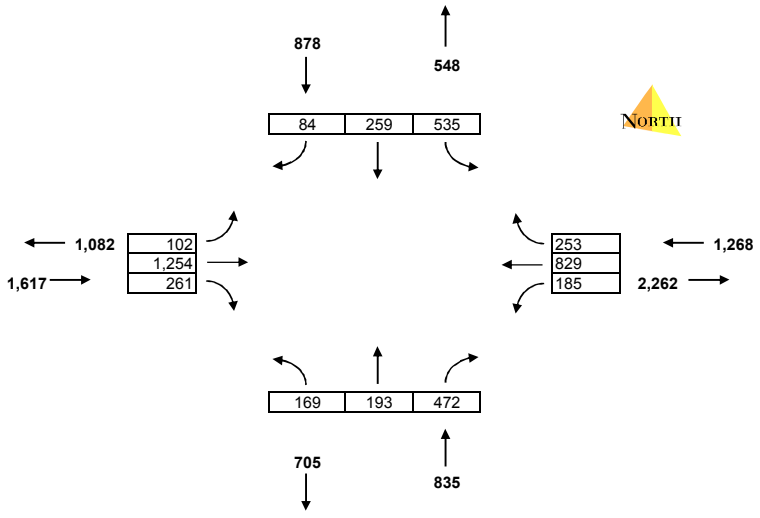
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : 229th Ave @ Evergreen Pkwy
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Pkwy.
NORTH-SOUTH ROAD: 229th Ave.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	85	40	630	170	55	10	10	790	110	220	555	70
OUTPUT FUTURE	**169**	**193**	**472**	**535**	**259**	**84**	**102**	**1,254**	**261**	**185**	**829**	**253**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	755	385	235	120	910	650	845	1,590	2,745	2,745
OUTPUT FUTURE	**835**	**705**	**878**	**548**	**1,617**	**1,082**	**1,268**	**2,262**	4,597	4,597
INPUT FUTURE	835	705	878	548	1,618	1,082	1,266	2,262	4,598	4,597



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

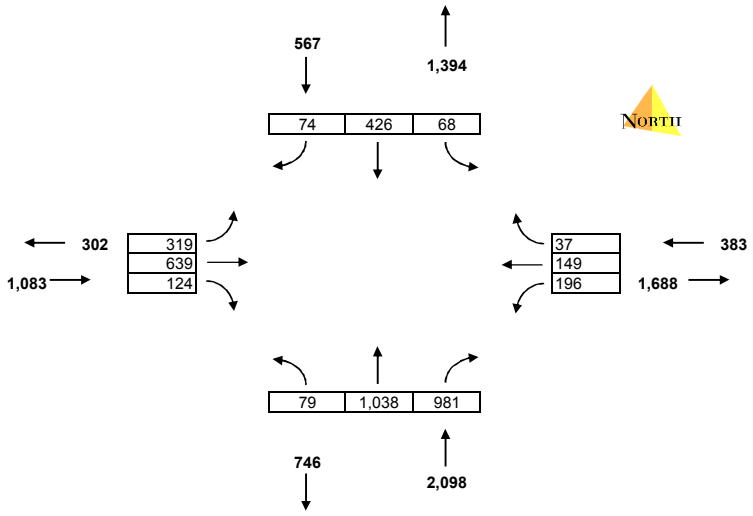
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Cornelius Pass Rd @ West Union Rd
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: West Union Rd.
NORTH-SOUTH ROAD: Cornelius Pass Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	60	850	680	25	395	30	115	195	95	225	75	20
OUTPUT FUTURE	**79**	**1,038**	**981**	**68**	**426**	**74**	**319**	**639**	**124**	**196**	**149**	**37**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	1,590	715	450	985	405	165	320	900	2,765	2,765
OUTPUT FUTURE	**2,098**	**746**	**567**	**1,394**	**1,083**	**302**	**383**	**1,688**	4,130	4,130
INPUT FUTURE	2,059	746	559	1,394	1,064	302	377	1,688	4,058	4,130



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

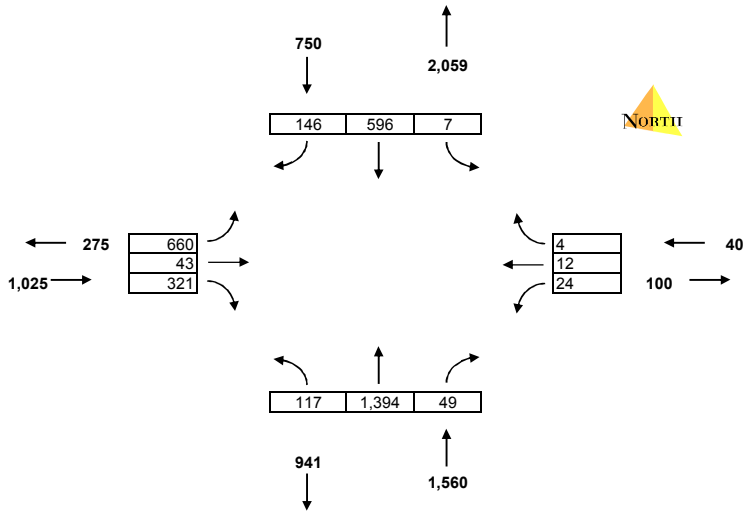
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Cornelius Pass Rd @ Jacobson Rd
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Jacobson Rd.
NORTH-SOUTH ROAD: Cornelius Pass Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	40	1,250	60	10	650	55	335	30	180	30	5	5
OUTPUT FUTURE	**117**	**1,394**	**49**	**7**	**596**	**146**	**660**	**43**	**321**	**24**	**12**	**4**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	1,350	860	715	1,590	545	100	40	100	2,650	2,650
OUTPUT FUTURE	**1,560**	**941**	**750**	**2,059**	**1,025**	**275**	**40**	**100**	3,375	3,375
INPUT FUTURE	1,553	941	746	2,059	1,020	275	40	100	3,359	3,375



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

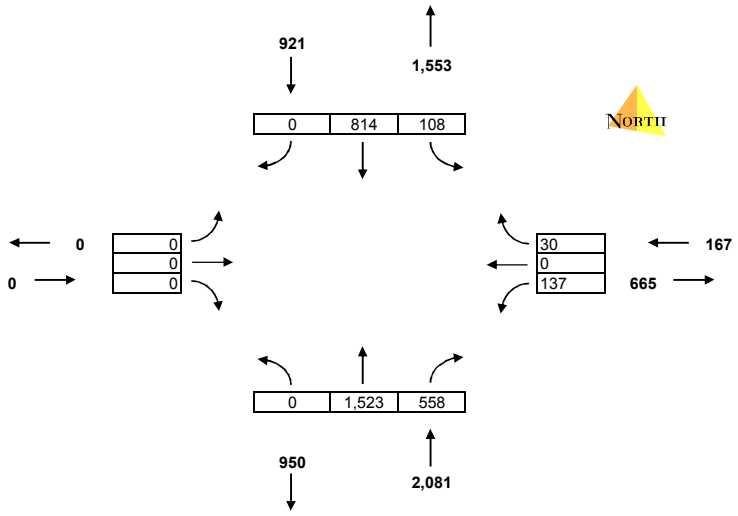
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Cornelius Pass Rd @ Rock Creek Blvd
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Rock Creek Blvd.
NORTH-SOUTH ROAD: Cornelius Pass Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	1,325	345	60	810	0	0	0	0	145	0	25
OUTPUT FUTURE	**0**	**1,523**	**558**	**108**	**814**	**0**	**0**	**0**	**0**	**137**	**0**	**30**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	1,670	955	870	1,350	0	0	170	405	2,710	2,710
OUTPUT FUTURE	**2,081**	**950**	**921**	**1,553**	**0**	**0**	**167**	**665**	3,169	3,169
INPUT FUTURE	2,102	950	941	1,553	0	0	170	665	3,214	3,169



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

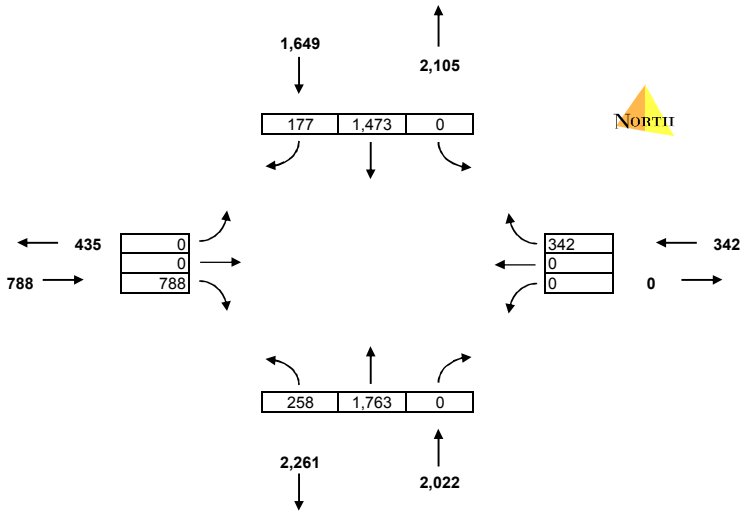
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Cornelius Pass Rd @ US 26 WB Ramps
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: US 26 WB Ramps
NORTH-SOUTH ROAD: Cornelius Pass Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	270	1,550	0	0	995	180	0	0	700	0	0	300
OUTPUT FUTURE	**258**	**1,763**	**0**	**0**	**1,473**	**177**	**0**	**0**	**788**	**0**	**0**	**342**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	1,820	1,695	1,175	1,850	700	450	300	0	3,995	3,995
OUTPUT FUTURE	**2,022**	**2,261**	**1,649**	**2,105**	**788**	**435**	**342**	**0**	4,801	4,801
INPUT FUTURE	2,049	2,261	1,649	2,105	787	435	347	0	4,832	4,801



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

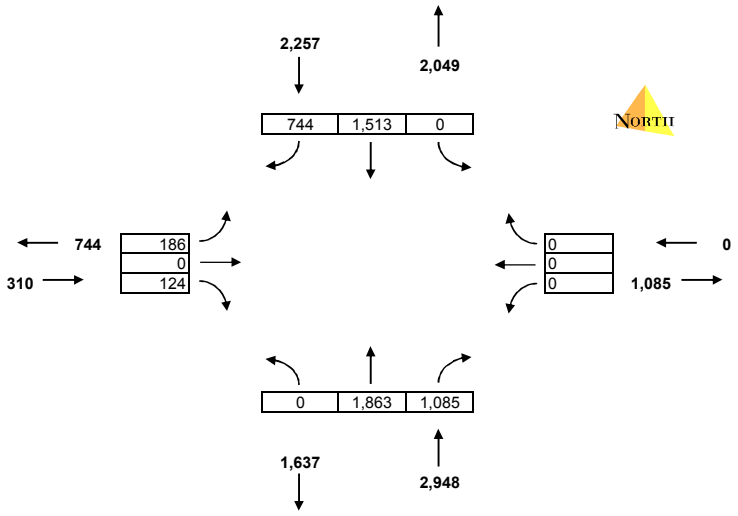
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Cornelius Pass Rd @ US 26 EB Ramps
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: US 26 EB Ramps
NORTH-SOUTH ROAD: Cornelius Pass Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	1,655	920	0	1,395	300	165	0	125	0	0	0
OUTPUT FUTURE	**0**	**1,863**	**1,085**	**0**	**1,513**	**744**	**186**	**0**	**124**	**0**	**0**	**0**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	2,575	1,520	1,695	1,820	290	300	0	920	4,560	4,560
OUTPUT FUTURE	**2,948**	**1,637**	**2,257**	**2,049**	**310**	**744**	**0**	**1,085**	5,516	5,516
INPUT FUTURE	2,968	1,637	2,261	2,049	312	744	0	1,085	5,541	5,516



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

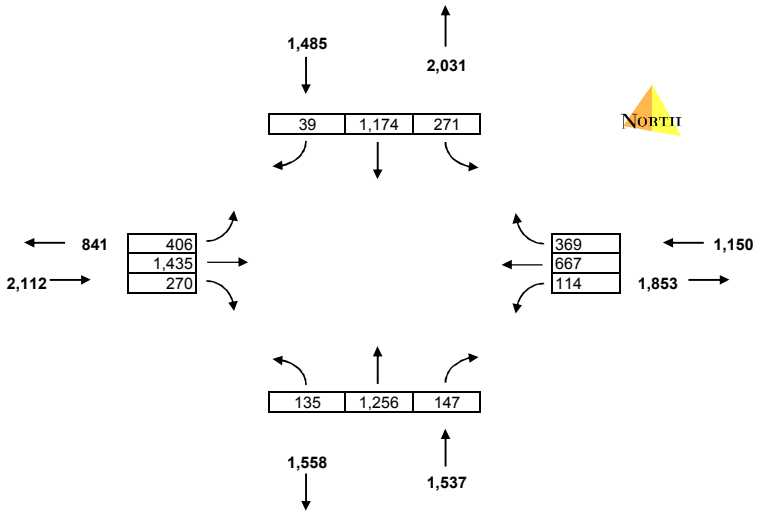
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Cornelius Pass Rd @ Evergreen Pkwy
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Pkwy.
NORTH-SOUTH ROAD: Cornelius Pass Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	55	1,070	80	230	985	25	380	860	160	80	355	410
OUTPUT FUTURE	**135**	**1,256**	**147**	**271**	**1,174**	**39**	**406**	**1,435**	**270**	**114**	**667**	**369**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	1,205	1,225	1,240	1,860	1,400	435	845	1,170	4,690	4,690
OUTPUT FUTURE	**1,537**	**1,558**	**1,485**	**2,031**	**2,112**	**841**	**1,150**	**1,853**	6,283	6,283
INPUT FUTURE	1,524	1,558	1,470	2,031	2,092	841	1,140	1,853	6,226	6,283



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

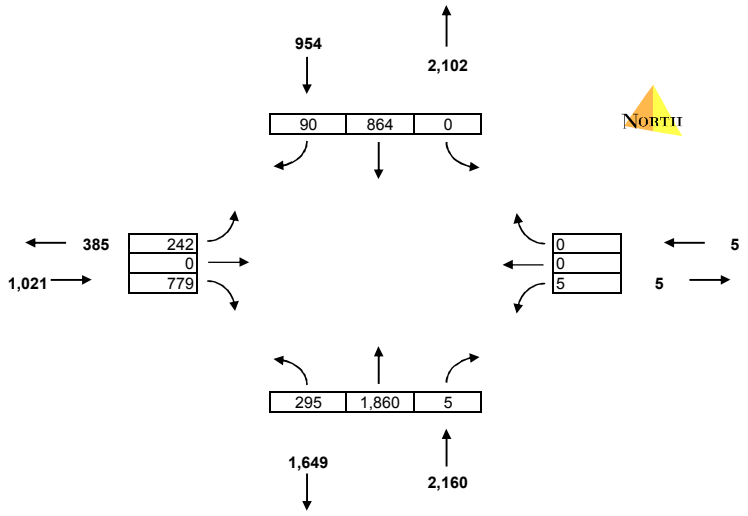
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Cornelius Pass Rd @ Wagon Way
SCENARIO : 2035 Baseline
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Wagon Way
NORTH-SOUTH ROAD: Cornelius Pass Rd.

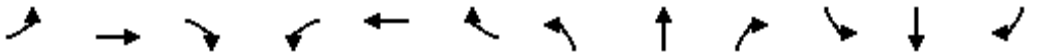
	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	205	1,640	5	0	925	30	30	0	245	5	0	0
OUTPUT FUTURE	**295**	**1,860**	**5**	**0**	**864**	**90**	**242**	**0**	**779**	**5**	**0**	**0**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	1,850	1,175	955	1,670	275	235	5	5	3,085	3,085
OUTPUT FUTURE	**2,160**	**1,649**	**954**	**2,102**	**1,021**	**385**	**5**	**5**	4,141	4,141
INPUT FUTURE	2,105	1,649	950	2,102	1,013	385	5	5	4,074	4,141



* Turn Calculation Output from NCHRP 255

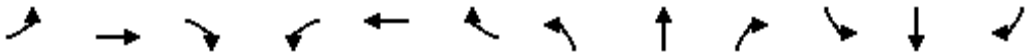
Appendix B. Intersection Operations Analysis



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	540	2	40	45	110	0	0	185	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	0	568	2	42	47	116	0	0	195	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						23						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	406	405	195	405	405	116	195			116		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	406	405	195	405	405	116	195			116		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.3	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.4	2.3			2.2		
p0 queue free %	100	100	100	0	100	95	97			100		
cM capacity (veh/h)	517	519	852	536	519	918	1355			1486		

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	613	47	116	195	2
Volume Left	568	47	0	0	0
Volume Right	42	0	0	0	2
cSH	575	1355	1700	1700	1700
Volume to Capacity	1.06	0.03	0.07	0.11	0.00
Queue Length 95th (ft)	441	3	0	0	0
Control Delay (s)	79.6	7.8	0.0	0.0	0.0
Lane LOS	F	A			
Approach Delay (s)	79.6	2.3		0.0	
Approach LOS	F				

Intersection Summary				
Average Delay	50.5			
Intersection Capacity Utilization	53.1%	ICU Level of Service		A
Analysis Period (min)	15			



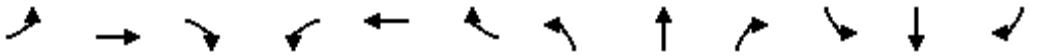
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	10	2	155	0	0	0	0	145	580	65	660	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	11	2	163	0	0	0	0	153	611	68	695	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			11									
Median type								TWLTL			None	
Median storage veh)								2				
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	984	984	695	985	984	153	695			153		
vC1, stage 1 conf vol	832	832		153	153							
vC2, stage 2 conf vol	153	153		833	832							
vCu, unblocked vol	984	984	695	985	984	153	695			153		
tC, single (s)	7.4	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)	6.4	5.5		6.1	5.5							
tF (s)	3.8	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	96	99	63	100	100	100	100			95		
cM capacity (veh/h)	295	352	441	212	353	899	910			1381		

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	176	153	611	68	695
Volume Left	11	0	0	68	0
Volume Right	163	0	611	0	0
cSH	475	1700	1700	1381	1700
Volume to Capacity	0.37	0.09	0.36	0.05	0.41
Queue Length 95th (ft)	42	0	0	4	0
Control Delay (s)	17.9	0.0	0.0	7.7	0.0
Lane LOS	C			A	
Approach Delay (s)	17.9	0.0		0.7	
Approach LOS	C				

Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	53.1%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	645	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3374					
Flt Permitted	1.00					
Satd. Flow (perm)	3374					
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	750	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	750	0	0	0	0	0
Heavy Vehicles (%)	7%	0%	0%	0%	0%	0%
Turn Type						
Protected Phases	4					
Permitted Phases						
Actuated Green, G (s)	20.0					
Effective Green, g (s)	20.0					
Actuated g/C Ratio	1.00					
Clearance Time (s)	4.0					
Lane Grp Cap (vph)	3374					
v/s Ratio Prot	c0.22					
v/s Ratio Perm						
v/c Ratio	0.22					
Uniform Delay, d1	0.0					
Progression Factor	1.00					
Incremental Delay, d2	0.2					
Delay (s)	0.2					
Level of Service	A					
Approach Delay (s)	0.2			0.0	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM Average Control Delay	0.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	20.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	21.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	450	1245	2	5	390	100	2	5	5	215	2	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1	4.7		4.8	4.7	4.7		5.2			5.6	5.6
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.94			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.95	1.00
Satd. Flow (prot)	1752	1809		1805	1743	1583		1777			1758	1599
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.94			0.72	1.00
Satd. Flow (perm)	1752	1809		1805	1743	1583		1681			1325	1599
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	500	1383	2	6	433	111	2	6	6	239	2	389
RTOR Reduction (vph)	0	0	0	0	0	52	0	5	0	0	0	329
Lane Group Flow (vph)	500	1385	0	6	433	59	0	9	0	0	241	60
Heavy Vehicles (%)	3%	5%	0%	0%	9%	2%	0%	0%	0%	3%	0%	1%
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases						6	8			4		4
Actuated Green, G (s)	34.5	79.7		0.9	45.8	45.8		17.0			16.6	16.6
Effective Green, g (s)	35.9	81.1		2.3	47.2	47.2		18.4			18.0	18.0
Actuated g/C Ratio	0.31	0.70		0.02	0.41	0.41		0.16			0.15	0.15
Clearance Time (s)	6.5	6.1		6.2	6.1	6.1		6.6			7.0	7.0
Vehicle Extension (s)	2.6	3.2		2.7	3.2	3.2		1.8			1.8	1.8
Lane Grp Cap (vph)	540	1259		36	706	641		265			205	247
v/s Ratio Prot	c0.29	c0.77		0.00	0.25							
v/s Ratio Perm						0.04		0.01			c0.18	0.04
v/c Ratio	0.93	1.10		0.17	0.61	0.09		0.03			1.18	0.24
Uniform Delay, d1	39.0	17.7		56.2	27.4	21.4		41.5			49.2	43.3
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	21.9	57.4		1.8	1.6	0.1		0.0			118.3	0.2
Delay (s)	60.9	75.1		58.0	29.0	21.5		41.5			167.5	43.5
Level of Service	E	E		E	C	C		D			F	D
Approach Delay (s)		71.3			27.8			41.5			90.9	
Approach LOS		E			C			D			F	

Intersection Summary			
HCM Average Control Delay	67.4	HCM Level of Service	E
HCM Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	116.5	Sum of lost time (s)	15.4
Intersection Capacity Utilization	101.1%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1230	225	340	425	110	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.8		5.3	4.8	6.1	6.1
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3406		1787	3312	1719	1599
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3406		1787	3312	1719	1599
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1295	237	358	447	116	274
RTOR Reduction (vph)	14	0	0	0	0	239
Lane Group Flow (vph)	1518	0	358	447	116	35
Heavy Vehicles (%)	4%	1%	1%	9%	5%	1%
Turn Type			Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	41.4		19.3	67.4	11.3	11.3
Effective Green, g (s)	42.8		20.7	68.8	11.8	11.8
Actuated g/C Ratio	0.47		0.23	0.75	0.13	0.13
Clearance Time (s)	6.2		6.7	6.2	6.6	6.6
Vehicle Extension (s)	3.2		2.6	3.2	2.0	2.0
Lane Grp Cap (vph)	1593		404	2490	222	206
v/s Ratio Prot	c0.45		c0.20	0.13	c0.07	
v/s Ratio Perm						0.02
v/c Ratio	0.95		0.89	0.18	0.52	0.17
Uniform Delay, d1	23.4		34.3	3.3	37.2	35.5
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	13.1		20.1	0.0	1.0	0.1
Delay (s)	36.5		54.3	3.3	38.2	35.6
Level of Service	D		D	A	D	D
Approach Delay (s)	36.5			26.0	36.4	
Approach LOS	D			C	D	

Intersection Summary			
HCM Average Control Delay	33.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	91.5	Sum of lost time (s)	16.2
Intersection Capacity Utilization	79.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1275	215	575	655	110	275
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1		6.0	5.1	5.9	6.0
Lane Util. Factor	0.95		0.97	0.95	1.00	0.88
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3468		3400	3505	1656	2682
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3468		3400	3505	1656	2682
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1342	226	605	689	116	289
RTOR Reduction (vph)	13	0	0	0	0	22
Lane Group Flow (vph)	1555	0	605	689	116	267
Heavy Vehicles (%)	2%	1%	3%	3%	9%	6%
Turn Type			Prot			custom
Protected Phases	2		1	6	3	
Permitted Phases						1 8
Actuated Green, G (s)	44.0		17.2	68.6	11.6	36.1
Effective Green, g (s)	45.4		18.6	70.0	13.0	32.4
Actuated g/C Ratio	0.48		0.20	0.74	0.14	0.34
Clearance Time (s)	6.5		7.4	6.5	7.3	
Vehicle Extension (s)	3.2		2.3	3.2	2.3	
Lane Grp Cap (vph)	1675		673	2610	229	924
v/s Ratio Prot	c0.45		c0.18	0.20	c0.07	
v/s Ratio Perm						0.10
v/c Ratio	0.93		0.90	0.26	0.51	0.29
Uniform Delay, d1	22.8		36.8	3.8	37.5	22.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	9.5		14.6	0.1	1.0	0.1
Delay (s)	32.2		51.4	3.9	38.6	22.5
Level of Service	C		D	A	D	C
Approach Delay (s)	32.2			26.1	27.1	
Approach LOS	C			C	C	

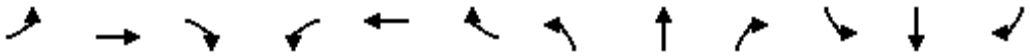
Intersection Summary			
HCM Average Control Delay	29.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	94.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	2	5	40	2	5	5	365	225	20	490	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	2	2	6	44	2	6	6	406	250	22	544	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			None	
Median storage veh)								2				
Upstream signal (ft)								305				
pX, platoon unblocked	0.78	0.78		0.78	0.78	0.78				0.78		
vC, conflicting volume	1138	1257	546	1138	1133	531	547			656		
vC1, stage 1 conf vol	590	590		542	542							
vC2, stage 2 conf vol	548	667		597	591							
vCu, unblocked vol	1036	1188	546	1036	1029	257	547			417		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.5	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.6	2.2			2.2		
p0 queue free %	99	99	99	88	99	99	99			98		
cM capacity (veh/h)	383	344	542	383	386	555	1033			899		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	10	52	661	569
Volume Left	2	44	6	22
Volume Right	6	6	250	2
cSH	444	396	1033	899
Volume to Capacity	0.02	0.13	0.01	0.02
Queue Length 95th (ft)	2	11	0	2
Control Delay (s)	13.3	15.5	0.1	0.7
Lane LOS	B	C	A	A
Approach Delay (s)	13.3	15.5	0.1	0.7
Approach LOS	B	C		

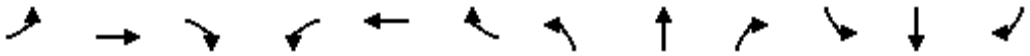
Intersection Summary				
Average Delay	1.1			
Intersection Capacity Utilization	53.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	1880	0	150	10	445	0	0	510	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.6	3.6	3.6	2.0	3.0			3.0	
Lane Util. Factor				0.95	0.95	1.00	1.00	1.00			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.99	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1615	1421	1863			3585	
Flt Permitted				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (perm)				1681	1681	1615	1421	1863			3585	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	1979	0	158	11	468	0	0	537	26
RTOR Reduction (vph)	0	0	0	0	0	16	0	0	0	0	4	0
Lane Group Flow (vph)	0	0	0	989	990	142	11	468	0	0	559	0
Heavy Vehicles (%)	0%	0%	0%	2%	0%	0%	27%	2%	0%	0%	0%	0%
Turn Type				Perm		Perm	Prot					
Protected Phases					4		1	6			2	
Permitted Phases				4		4						
Actuated Green, G (s)				37.0	37.0	37.0	1.3	23.0			17.7	
Effective Green, g (s)				38.4	38.4	38.4	3.3	25.0			19.7	
Actuated g/C Ratio				0.55	0.55	0.55	0.05	0.36			0.28	
Clearance Time (s)				5.0	5.0	5.0	4.0	5.0			5.0	
Vehicle Extension (s)				2.3	2.3	2.3	2.3	3.0			5.2	
Lane Grp Cap (vph)				922	922	886	67	665			1009	
v/s Ratio Prot							0.01	c0.25			0.16	
v/s Ratio Perm				0.59	0.59	0.09						
v/c Ratio				1.07	1.07	0.16	0.16	0.70			0.55	
Uniform Delay, d1				15.8	15.8	7.8	32.0	19.3			21.4	
Progression Factor				1.00	1.00	1.00	0.91	0.95			1.00	
Incremental Delay, d2				51.1	51.5	0.0	0.6	5.9			2.2	
Delay (s)				66.9	67.3	7.9	29.9	24.3			23.6	
Level of Service				E	E	A	C	C			C	
Approach Delay (s)		0.0			62.7			24.4			23.6	
Approach LOS		A			E			C			C	

Intersection Summary			
HCM Average Control Delay	50.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	6.6
Intersection Capacity Utilization	119.6%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	75	0	345	0	0	0	0	380	510	35	2355	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.6	3.6					3.0	3.0	2.0	3.0	
Lane Util. Factor		1.00	1.00					1.00	1.00	1.00	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1805	1442					1776	1553	1805	3574	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1805	1442					1776	1553	1805	3574	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	79	0	363	0	0	0	0	400	537	37	2479	0
RTOR Reduction (vph)	0	0	13	0	0	0	0	0	170	0	0	0
Lane Group Flow (vph)	0	79	350	0	0	0	0	400	367	37	2479	0
Heavy Vehicles (%)	0%	0%	12%	0%	0%	0%	0%	7%	4%	0%	1%	0%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		8						6		5	2	
Permitted Phases	8		8						6			
Actuated Green, G (s)		7.0	7.0					45.9	45.9	3.1	53.0	
Effective Green, g (s)		8.4	8.4					47.9	47.9	5.1	55.0	
Actuated g/C Ratio		0.12	0.12					0.68	0.68	0.07	0.79	
Clearance Time (s)		5.0	5.0					5.0	5.0	4.0	5.0	
Vehicle Extension (s)		2.3	2.3					4.7	4.7	2.3	4.7	
Lane Grp Cap (vph)		217	173					1215	1063	132	2808	
v/s Ratio Prot								0.23		0.02	c0.69	
v/s Ratio Perm		0.04	c0.24						0.24			
v/c Ratio		0.36	2.02					0.33	0.35	0.28	0.88	
Uniform Delay, d1		28.3	30.8					4.5	4.6	30.7	5.2	
Progression Factor		1.00	1.00					1.00	1.00	1.21	0.53	
Incremental Delay, d2		0.6	479.6					0.7	0.9	0.2	1.5	
Delay (s)		28.9	510.4					5.2	5.5	37.3	4.3	
Level of Service		C	F					A	A	D	A	
Approach Delay (s)		424.4			0.0			5.4			4.8	
Approach LOS		F			A			A			A	

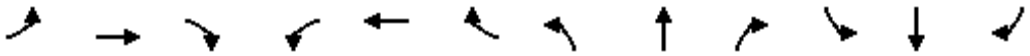
Intersection Summary			
HCM Average Control Delay	52.5	HCM Level of Service	D
HCM Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	6.6
Intersection Capacity Utilization	119.6%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	545	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3539					
Flt Permitted	1.00					
Satd. Flow (perm)	3539					
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	592	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	592	0	0	0	0	0
Turn Type						
Protected Phases	4					
Permitted Phases						
Actuated Green, G (s)	20.0					
Effective Green, g (s)	20.0					
Actuated g/C Ratio	1.00					
Clearance Time (s)	4.0					
Lane Grp Cap (vph)	3539					
v/s Ratio Prot	c0.17					
v/s Ratio Perm						
v/c Ratio	0.17					
Uniform Delay, d1	0.0					
Progression Factor	1.00					
Incremental Delay, d2	0.1					
Delay (s)	0.1					
Level of Service	A					
Approach Delay (s)	0.1			0.0	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM Average Control Delay	0.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	20.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	18.4%	ICU Level of Service	A
Analysis Period (min)	15		

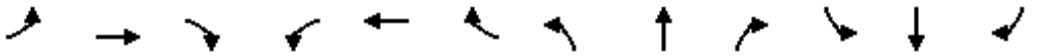
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	135	10	60	0	2	0	320	755	5	2	2145	555
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	142	11	63	0	2	0	337	795	5	2	2258	584
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											227	
pX, platoon unblocked	0.23	0.23	0.23	0.23	0.23		0.23					
vC, conflicting volume	3626	4028	1421	2673	4317	400	2842			800		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	5769	7545	0	1552	8825	400	2302			800		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	0	74	0	0	100	0			100		
cM capacity (veh/h)	0	0	247	0	0	605	50			832		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	216	2	337	530	270	1131	1713
Volume Left	142	0	337	0	0	2	0
Volume Right	63	0	0	0	5	0	584
cSH	0	0	50	1700	1700	832	1700
Volume to Capacity	Err	Err	6.72	0.31	0.16	0.00	1.01
Queue Length 95th (ft)	Err	Err	Err	0	0	0	0
Control Delay (s)	Err	Err	2733.0	0.0	0.0	0.1	0.0
Lane LOS	F	F	F			A	
Approach Delay (s)	Err	Err	809.8			0.0	
Approach LOS	F	F					

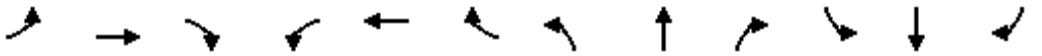
Intersection Summary				
Average Delay	Err			
Intersection Capacity Utilization	126.4%	ICU Level of Service	H	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	145	45	55	5	345	55	305	880	10	75	1805	270
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.0	4.5		4.5	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.92		1.00	0.98		1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1708		1805	1829		1770	3465		1787	3470	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1708		1805	1829		1770	3465		1787	3470	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	153	47	58	5	363	58	321	926	11	79	1900	284
RTOR Reduction (vph)	0	31	0	0	5	0	0	1	0	0	10	0
Lane Group Flow (vph)	153	74	0	5	416	0	321	936	0	79	2174	0
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	2%	4%	3%	1%	2%	2%
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	10.0	35.6		3.6	29.2		15.0	60.7		8.1	53.8	
Effective Green, g (s)	9.5	35.1		3.6	28.7		14.5	60.7		8.1	53.8	
Actuated g/C Ratio	0.08	0.28		0.03	0.23		0.12	0.49		0.07	0.43	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	136	483		52	423		207	1696		117	1506	
v/s Ratio Prot	c0.09	0.04		0.00	c0.23		c0.18	0.27		0.04	c0.63	
v/s Ratio Perm												
v/c Ratio	1.12	0.15		0.10	0.98		1.55	0.55		0.68	1.44	
Uniform Delay, d1	57.2	33.3		58.6	47.4		54.7	22.1		56.7	35.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	114.7	0.1		0.6	39.3		270.3	0.3		13.1	203.4	
Delay (s)	171.9	33.4		59.2	86.8		325.0	22.5		69.8	238.5	
Level of Service	F	C		E	F		F	C		E	F	
Approach Delay (s)		115.6			86.4			99.7			232.6	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM Average Control Delay	170.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.31		
Actuated Cycle Length (s)	124.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	119.5%	ICU Level of Service	H
Analysis Period (min)	15		

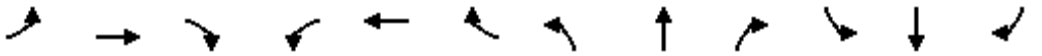
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	10	0	0	0	0	1195	10	0	1630	240
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	11	0	0	0	0	1258	11	0	1716	253
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1086			1190	
pX, platoon unblocked	0.70	0.70	0.58	0.70	0.70	0.77	0.58			0.77		
vC, conflicting volume	2345	2984	858	2132	3232	634	1968			1268		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	559	1479	0	253	1835	0	1220			747		
tC, single (s)	7.5	6.5	7.1	7.5	6.5	6.9	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	98	100	100	100	100			100		
cM capacity (veh/h)	289	88	612	468	53	838	322			669		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	11	0	839	430	858	858	253
Volume Left	0	0	0	0	0	0	0
Volume Right	11	0	0	11	0	0	253
cSH	612	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.02	0.00	0.49	0.25	0.50	0.50	0.15
Queue Length 95th (ft)	1	0	0	0	0	0	0
Control Delay (s)	11.0	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	B	A					
Approach Delay (s)	11.0	0.0	0.0		0.0		
Approach LOS	B	A					

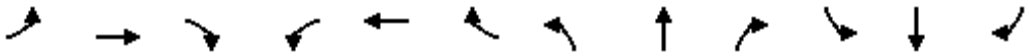
Intersection Summary				
Average Delay	0.0			
Intersection Capacity Utilization	55.1%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	255	620	110	220	880	100	175	885	275	75	750	815
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.6	4.1		2.6	4.1	4.1	2.0	3.5	3.5	2.0	3.5	3.5
Lane Util. Factor	0.97	0.95		0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.88
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3483		3072	3610	1568	1719	3312	1495	1719	3312	2450
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3483		3072	3610	1568	1719	3312	1495	1719	3312	2450
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	268	653	116	232	926	105	184	932	289	79	789	858
RTOR Reduction (vph)	0	16	0	0	0	69	0	0	172	0	0	44
Lane Group Flow (vph)	268	753	0	232	926	36	184	932	117	79	789	814
Heavy Vehicles (%)	2%	1%	3%	14%	0%	3%	5%	9%	8%	5%	9%	16%
Turn Type	Prot			Prot		Perm	Prot		custom	Prot		custom
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases						4			2			2 3
Actuated Green, G (s)	5.0	23.5		9.4	27.9	27.9	7.0	30.0	26.9	3.9	26.9	37.4
Effective Green, g (s)	6.4	24.9		10.8	29.3	29.3	9.0	32.0	28.9	5.9	28.9	39.4
Actuated g/C Ratio	0.07	0.29		0.13	0.34	0.34	0.10	0.37	0.34	0.07	0.34	0.46
Clearance Time (s)	4.0	5.5		4.0	5.5	5.5	4.0	5.5	5.5	4.0	5.5	
Vehicle Extension (s)	2.3	3.1		2.3	3.1	3.1	2.4	3.1	3.1	2.4	3.1	
Lane Grp Cap (vph)	256	1011		387	1233	535	180	1235	504	118	1116	1125
v/s Ratio Prot	c0.08	0.22		c0.08	c0.26		c0.11	c0.28		0.05	0.24	
v/s Ratio Perm						0.02			0.08			0.33
v/c Ratio	1.05	0.74		0.60	0.75	0.07	1.02	0.75	0.23	0.67	0.71	0.72
Uniform Delay, d1	39.7	27.6		35.5	25.0	19.0	38.4	23.5	20.5	39.0	24.8	18.8
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	69.1	3.0		1.9	2.6	0.1	73.0	2.7	0.2	11.9	2.1	2.3
Delay (s)	108.8	30.6		37.4	27.7	19.1	111.4	26.2	20.7	50.9	26.8	21.1
Level of Service	F	C		D	C	B	F	C	C	D	C	C
Approach Delay (s)		50.8			28.7			36.2			25.1	
Approach LOS		D			C			D			C	

Intersection Summary			
HCM Average Control Delay	33.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	85.8	Sum of lost time (s)	4.6
Intersection Capacity Utilization	75.4%	ICU Level of Service	D
Analysis Period (min)	15		

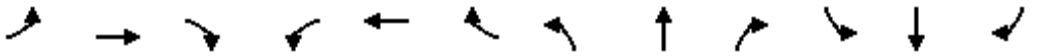
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	85	565	150	385	1060	470	265	215	215	210	150	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	4.7	4.7	5.8	4.6		6.4	5.5	6.4	6.4	5.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	3406	1599	1787	3331		1736	1881	1583	1626	1755	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1805	3406	1599	1787	3331		1736	1881	1583	1626	1755	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	89	595	158	405	1116	495	279	226	226	221	158	84
RTOR Reduction (vph)	0	0	111	0	41	0	0	0	36	0	18	0
Lane Group Flow (vph)	89	595	47	405	1570	0	279	226	190	221	224	0
Heavy Vehicles (%)	0%	6%	1%	1%	4%	2%	4%	1%	2%	11%	4%	0%
Turn Type	Prot		Perm	Prot			Prot		custom	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						1 8			
Actuated Green, G (s)	5.0	29.7	29.7	16.8	41.6		12.8	21.3	44.4	10.8	19.3	
Effective Green, g (s)	6.4	31.1	31.1	18.2	43.0		13.6	22.1	39.7	11.6	20.1	
Actuated g/C Ratio	0.06	0.30	0.30	0.17	0.41		0.13	0.21	0.38	0.11	0.19	
Clearance Time (s)	7.2	6.1	6.1	7.2	6.0		7.2	6.3		7.2	6.3	
Vehicle Extension (s)	2.4	3.1	3.1	2.4	3.1		2.4	3.6		2.4	3.6	
Lane Grp Cap (vph)	110	1005	472	309	1359		224	394	596	179	335	
v/s Ratio Prot	0.05	0.17		c0.23	c0.47		c0.16	0.12		0.14	c0.13	
v/s Ratio Perm			0.03						0.12			
v/c Ratio	0.81	0.59	0.10	1.31	1.15		1.25	0.57	0.32	1.23	0.67	
Uniform Delay, d1	48.9	31.7	27.0	43.6	31.2		45.9	37.4	23.3	46.9	39.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	32.9	1.0	0.1	161.1	78.5		142.2	2.2	0.2	144.3	5.3	
Delay (s)	81.8	32.7	27.1	204.7	109.7		188.1	39.6	23.5	191.2	44.8	
Level of Service	F	C	C	F	F		F	D	C	F	D	
Approach Delay (s)		36.8			128.8			91.3			114.7	
Approach LOS		D			F			F			F	

Intersection Summary			
HCM Average Control Delay	101.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	105.4	Sum of lost time (s)	17.7
Intersection Capacity Utilization	94.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	185	60	705	580	35	55	365	195	45	950	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5	4.0	4.0	5.5		4.0	5.5	5.5	4.0	5.5	
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00		1.00	1.00	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1456	1827	1302	3502	1844		1703	1610	1568	1597	3253	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1456	1827	1302	3502	1844		1703	1610	1568	1597	3253	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	63	195	63	742	611	37	58	384	205	47	1000	168
RTOR Reduction (vph)	0	0	7	0	2	0	0	0	89	0	15	0
Lane Group Flow (vph)	63	195	56	742	646	0	58	384	116	47	1153	0
Heavy Vehicles (%)	24%	4%	24%	0%	1%	21%	6%	18%	3%	13%	9%	6%
Turn Type	Prot		custom	Prot			Prot		custom	Prot		
Protected Phases	3			7	4		1	6		5	2	
Permitted Phases		8	1 8						6 7			
Actuated Green, G (s)	4.0	17.2	21.2	22.6	35.8		4.0	28.2	50.8	3.0	27.2	
Effective Green, g (s)	4.0	17.2	21.2	22.6	35.8		4.0	28.2	50.8	3.0	27.2	
Actuated g/C Ratio	0.04	0.19	0.24	0.25	0.40		0.04	0.31	0.56	0.03	0.30	
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	5.5		4.0	5.5	
Vehicle Extension (s)	2.4	3.2		2.5	3.2		2.3	3.2		2.2	3.2	
Lane Grp Cap (vph)	65	349	307	879	734		76	504	885	53	983	
v/s Ratio Prot	c0.04			0.21	c0.35		c0.03	0.24		0.03	c0.35	
v/s Ratio Perm		0.11	0.04						0.07			
v/c Ratio	0.97	0.56	0.18	0.84	0.88		0.76	0.76	0.13	0.89	1.17	
Uniform Delay, d1	42.9	33.0	27.5	32.0	25.1		42.5	27.9	9.2	43.3	31.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	99.5	2.0	0.2	7.3	11.8		33.7	10.4	0.0	81.2	88.9	
Delay (s)	142.5	35.0	27.6	39.4	36.9		76.2	38.3	9.3	124.5	120.3	
Level of Service	F	C	C	D	D		E	D	A	F	F	
Approach Delay (s)		54.6			38.2			32.5			120.4	
Approach LOS		D			D			C			F	

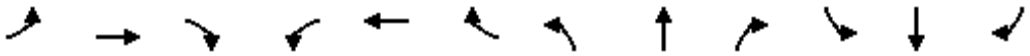
Intersection Summary			
HCM Average Control Delay	66.6	HCM Level of Service	E
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	88.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBR	WBR2	NBL	NBT	SBT
Lane Configurations					
Volume (vph)	1645	615	75	755	1145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	5.0	5.0
Lane Util. Factor	1.00	0.88	1.00	0.95	0.95
Frt	0.86	0.85	1.00	1.00	1.00
Flt Protected	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1596	2656	1656	3312	3438
Flt Permitted	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1596	2656	1656	3312	3438
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1732	647	79	795	1205
RTOR Reduction (vph)	162	158	0	0	0
Lane Group Flow (vph)	1570	489	79	795	1205
Heavy Vehicles (%)	3%	7%	9%	9%	5%
Turn Type	custom	custom	Prot		
Protected Phases			1	6	2
Permitted Phases	4	4			
Actuated Green, G (s)	36.3	36.3	7.3	45.5	34.2
Effective Green, g (s)	36.3	36.3	7.3	45.5	34.2
Actuated g/C Ratio	0.40	0.40	0.08	0.50	0.38
Clearance Time (s)	4.0	4.0	4.0	5.0	5.0
Vehicle Extension (s)	2.3	2.3	2.3	4.5	4.5
Lane Grp Cap (vph)	638	1062	133	1660	1295
v/s Ratio Prot			c0.05	0.24	c0.35
v/s Ratio Perm	c0.98	0.18			
v/c Ratio	2.46	0.46	0.59	0.48	0.93
Uniform Delay, d1	27.2	20.0	40.3	14.9	27.2
Progression Factor	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	662.0	0.2	5.4	0.4	12.2
Delay (s)	689.3	20.2	45.7	15.2	39.4
Level of Service	F	C	D	B	D
Approach Delay (s)				18.0	39.4
Approach LOS				B	D

Intersection Summary			
HCM Average Control Delay	284.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.61		
Actuated Cycle Length (s)	90.8	Sum of lost time (s)	13.0
Intersection Capacity Utilization	Err%	ICU Level of Service	H
Analysis Period (min)	15		

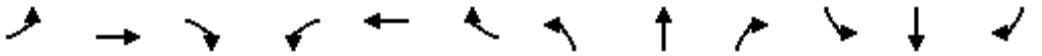
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	165	2	240	0	0	0	0	665	545	0	2445	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					5.0	5.0		5.0	
Lane Util. Factor		1.00	1.00					0.91	0.91		0.91	
Frt		1.00	0.85					0.97	0.85		1.00	
Flt Protected		0.95	1.00					1.00	1.00		1.00	
Satd. Flow (prot)		1475	1583					3143	1400		5036	
Flt Permitted		0.95	1.00					1.00	1.00		1.00	
Satd. Flow (perm)		1475	1583					3143	1400		5036	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	174	2	253	0	0	0	0	700	574	0	2574	0
RTOR Reduction (vph)	0	0	2	0	0	0	0	33	146	0	0	0
Lane Group Flow (vph)	0	176	251	0	0	0	0	851	244	0	2574	0
Heavy Vehicles (%)	23%	0%	2%	0%	0%	0%	0%	7%	5%	0%	3%	0%
Turn Type	Perm		Perm						Perm			
Protected Phases		8						6			2	
Permitted Phases	8		8						6			
Actuated Green, G (s)		14.4	14.4					39.0	39.0		39.0	
Effective Green, g (s)		14.4	14.4					39.0	39.0		39.0	
Actuated g/C Ratio		0.23	0.23					0.63	0.63		0.63	
Clearance Time (s)		4.0	4.0					5.0	5.0		5.0	
Vehicle Extension (s)		2.3	2.3					4.5	4.5		4.5	
Lane Grp Cap (vph)		340	365					1964	875		3148	
v/s Ratio Prot								0.27			c0.51	
v/s Ratio Perm		0.12	c0.16						0.17			
v/c Ratio		0.52	0.69					0.43	0.28		0.82	
Uniform Delay, d1		21.0	21.9					6.0	5.3		9.0	
Progression Factor		1.00	1.00					1.00	1.00		1.00	
Incremental Delay, d2		0.8	4.6					0.3	0.3		1.9	
Delay (s)		21.8	26.5					6.3	5.6		10.9	
Level of Service		C	C					A	A		B	
Approach Delay (s)		24.6			0.0			6.1			10.9	
Approach LOS		C			A			A			B	

Intersection Summary			
HCM Average Control Delay	10.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	62.4	Sum of lost time (s)	9.0
Intersection Capacity Utilization	69.6%	ICU Level of Service	C
Analysis Period (min)	15		

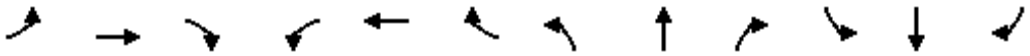
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	465	95	75	1035	175	280	840	65	260	835	310
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.6	4.1		2.6	4.1		2.6	4.1		2.6	4.1	2.6
Lane Util. Factor	0.97	0.95		1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.97		1.00	0.98		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	2918	3210		1805	3467		1703	3378		1805	3438	1538
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	2918	3210		1805	3467		1703	3378		1805	3438	1538
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	63	489	100	79	1089	184	295	884	68	274	879	326
RTOR Reduction (vph)	0	17	0	0	13	0	0	5	0	0	0	84
Lane Group Flow (vph)	63	572	0	79	1260	0	295	947	0	274	879	242
Heavy Vehicles (%)	20%	5%	32%	0%	2%	1%	6%	6%	2%	0%	5%	5%
Turn Type	Prot			Prot			Prot			Prot		custom
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												5 6
Actuated Green, G (s)	3.9	30.1		5.4	31.6		14.1	29.2		14.1	29.2	47.3
Effective Green, g (s)	5.3	31.5		6.8	33.0		15.5	30.6		15.5	30.6	48.7
Actuated g/C Ratio	0.05	0.32		0.07	0.34		0.16	0.31		0.16	0.31	0.50
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	5.5		4.0	5.5	
Vehicle Extension (s)	2.3	3.1		2.4	3.1		2.4	3.1		2.4	3.1	
Lane Grp Cap (vph)	158	1034		126	1170		270	1057		286	1076	766
v/s Ratio Prot	0.02	0.18		c0.04	c0.36		c0.17	c0.28		0.15	0.26	
v/s Ratio Perm												0.16
v/c Ratio	0.40	0.55		0.63	1.08		1.09	0.90		0.96	0.82	0.32
Uniform Delay, d1	44.7	27.3		44.3	32.4		41.1	32.1		40.8	31.0	14.6
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.0	0.7		7.9	49.6		81.8	10.0		41.4	4.9	0.2
Delay (s)	45.7	28.0		52.2	82.0		122.9	42.0		82.2	35.9	14.8
Level of Service	D	C		D	F		F	D		F	D	B
Approach Delay (s)		29.7			80.2			61.2			39.8	
Approach LOS		C			F			E			D	

Intersection Summary			
HCM Average Control Delay	55.6	HCM Level of Service	E
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	97.8	Sum of lost time (s)	9.3
Intersection Capacity Utilization	91.5%	ICU Level of Service	F
Analysis Period (min)	15		

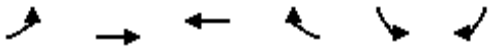
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	25	165	70	60	185	20	150	65	130	2	10	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	27	176	74	64	197	21	160	69	138	2	11	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	218			250			612	612	213	636	638	207
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	218			250			612	612	213	636	638	207
tC, single (s)	4.1			4.2			7.2	6.5	6.2	7.1	6.5	6.4
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.6	4.0	3.3	3.5	4.0	3.5
p0 queue free %	98			95			56	82	83	99	97	99
cM capacity (veh/h)	1363			1293			362	383	832	268	370	785

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	277	282	367	18
Volume Left	27	64	160	2
Volume Right	74	21	138	5
cSH	1363	1293	466	416
Volume to Capacity	0.02	0.05	0.79	0.04
Queue Length 95th (ft)	1	4	177	3
Control Delay (s)	0.9	2.1	35.8	14.0
Lane LOS	A	A	E	B
Approach Delay (s)	0.9	2.1	35.8	14.0
Approach LOS			E	B

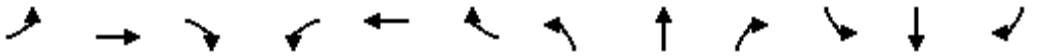
Intersection Summary			
Average Delay	15.1		
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	35	235	225	5	2	30
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	37	250	239	5	2	32
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	245				566	242
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	245				566	242
tC, single (s)	4.1				6.4	6.3
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.4
p0 queue free %	97				100	96
cM capacity (veh/h)	1333				475	785

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	287	245	34
Volume Left	37	0	2
Volume Right	0	5	32
cSH	1333	1700	754
Volume to Capacity	0.03	0.14	0.05
Queue Length 95th (ft)	2	0	4
Control Delay (s)	1.2	0.0	10.0
Lane LOS	A		B
Approach Delay (s)	1.2	0.0	10.0
Approach LOS			B

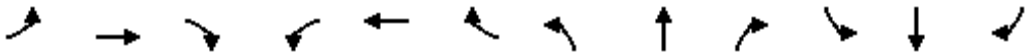
Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	39.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	555	2	110	165	235	0	0	135	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	0	0	597	2	118	177	253	0	0	145	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						23						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	754	753	145	753	753	253	145			253		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	754	753	145	753	753	253	145			253		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	100	100	100	0	99	85	88			100		
cM capacity (veh/h)	250	299	907	296	299	767	1449			1324		

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	717	177	253	145	2
Volume Left	597	177	0	0	0
Volume Right	118	0	0	0	2
cSH	336	1449	1700	1700	1700
Volume to Capacity	2.14	0.12	0.15	0.09	0.00
Queue Length 95th (ft)	1319	10	0	0	0
Control Delay (s)	546.3	7.8	0.0	0.0	0.0
Lane LOS	F	A			
Approach Delay (s)	546.3	3.2		0.0	
Approach LOS	F				

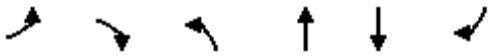
Intersection Summary				
Average Delay	303.7			
Intersection Capacity Utilization	94.1%	ICU Level of Service		F
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	2	20	0	0	0	0	395	745	45	645	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	5	2	22	0	0	0	0	425	801	48	694	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			11									
Median type								TWLTL			None	
Median storage veh)								2				
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1215	1215	694	1216	1215	425	694			425		
vC1, stage 1 conf vol	790	790		425	425							
vC2, stage 2 conf vol	425	425		791	790							
vCu, unblocked vol	1215	1215	694	1216	1215	425	694			425		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	99	95	100	100	100	100			96		
cM capacity (veh/h)	329	342	446	318	347	634	911			1145		

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	29	425	801	48	694
Volume Left	5	0	0	48	0
Volume Right	22	0	801	0	0
cSH	603	1700	1700	1145	1700
Volume to Capacity	0.05	0.25	0.47	0.04	0.41
Queue Length 95th (ft)	4	0	0	3	0
Control Delay (s)	14.1	0.0	0.0	8.3	0.0
Lane LOS	B			A	
Approach Delay (s)	14.1	0.0		0.5	
Approach LOS	B				

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	94.1%	ICU Level of Service	F	
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	120	25	155	1020	560	120
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	133	28	172	1133	622	133
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2167	689	756			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2167	689	756			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	94	80			
cM capacity (veh/h)	42	441	864			

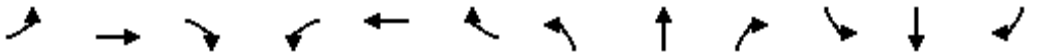
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	161	1306	756
Volume Left	133	172	0
Volume Right	28	0	133
cSH	50	864	1700
Volume to Capacity	3.24	0.20	0.44
Queue Length 95th (ft)	Err	19	0
Control Delay (s)	Err	6.6	0.0
Lane LOS	F	A	
Approach Delay (s)	Err	6.6	0.0
Approach LOS	F		

Intersection Summary			
Average Delay	728.8		
Intersection Capacity Utilization	117.2%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	490	685	60	50	535
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	544	761	67	56	594
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1500	794			828	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1500	794			828	
tC, single (s)	6.4	6.2			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.3	
p0 queue free %	100	0			93	
cM capacity (veh/h)	126	391			778	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	544	828	650
Volume Left	0	0	56
Volume Right	544	67	0
cSH	391	1700	778
Volume to Capacity	1.39	0.49	0.07
Queue Length 95th (ft)	670	0	6
Control Delay (s)	219.0	0.0	1.9
Lane LOS	F		A
Approach Delay (s)	219.0	0.0	1.9
Approach LOS	F		

Intersection Summary			
Average Delay	59.6		
Intersection Capacity Utilization	106.6%	ICU Level of Service	G
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	325	580	2	10	1310	420	5	2	10	125	5	420
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1	4.7		4.8	4.7	4.7		5.2			5.6	5.6
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.92			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.95	1.00
Satd. Flow (prot)	1787	1844		1805	1881	1599		1719			1778	1568
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.92			0.72	1.00
Satd. Flow (perm)	1787	1844		1805	1881	1599		1599			1344	1568
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	342	611	2	11	1379	442	5	2	11	132	5	442
RTOR Reduction (vph)	0	0	0	0	0	64	0	9	0	0	0	156
Lane Group Flow (vph)	342	613	0	11	1379	378	0	9	0	0	137	286
Heavy Vehicles (%)	1%	3%	0%	0%	1%	1%	0%	0%	0%	2%	0%	3%
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases						6	8			4		4
Actuated Green, G (s)	16.5	88.1		1.0	72.3	72.3		17.0			16.6	16.6
Effective Green, g (s)	17.9	89.5		2.4	73.7	73.7		18.4			18.0	18.0
Actuated g/C Ratio	0.14	0.72		0.02	0.59	0.59		0.15			0.14	0.14
Clearance Time (s)	6.5	6.1		6.2	6.1	6.1		6.6			7.0	7.0
Vehicle Extension (s)	2.6	3.2		2.7	3.2	3.2		1.8			1.8	1.8
Lane Grp Cap (vph)	256	1320		35	1109	943		235			194	226
v/s Ratio Prot	c0.19	0.33		0.01	c0.73							
v/s Ratio Perm						0.24		0.01			0.10	c0.18
v/c Ratio	1.34	0.46		0.31	1.24	0.40		0.04			0.71	1.27
Uniform Delay, d1	53.5	7.6		60.5	25.6	13.8		45.7			51.0	53.5
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	175.3	0.3		4.3	117.3	0.3		0.0			9.2	150.1
Delay (s)	228.8	7.8		64.8	143.0	14.1		45.7			60.2	203.6
Level of Service	F	A		E	F	B		D			E	F
Approach Delay (s)		87.0			111.4			45.7			169.7	
Approach LOS		F			F			D			F	

Intersection Summary			
HCM Average Control Delay	114.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.26		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	15.4
Intersection Capacity Utilization	113.6%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	635	100	275	1445	295	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.8		5.3	4.8	6.1	6.1
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3501		1787	3574	1787	1615
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3501		1787	3574	1787	1615
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	706	111	306	1606	328	389
RTOR Reduction (vph)	18	0	0	0	0	293
Lane Group Flow (vph)	799	0	306	1606	328	96
Heavy Vehicles (%)	1%	1%	1%	1%	1%	0%
Turn Type			Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	17.3		12.2	36.2	15.5	15.5
Effective Green, g (s)	18.7		13.6	37.6	16.0	16.0
Actuated g/C Ratio	0.29		0.21	0.58	0.25	0.25
Clearance Time (s)	6.2		6.7	6.2	6.6	6.6
Vehicle Extension (s)	3.2		2.6	3.2	2.0	2.0
Lane Grp Cap (vph)	1015		377	2083	443	401
v/s Ratio Prot	0.23		0.17	c0.45	c0.18	
v/s Ratio Perm						0.06
v/c Ratio	0.79		0.81	0.77	0.74	0.24
Uniform Delay, d1	21.1		24.2	10.2	22.3	19.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	4.2		12.3	1.8	5.7	0.1
Delay (s)	25.2		36.5	12.0	28.1	19.5
Level of Service	C		D	B	C	B
Approach Delay (s)	25.2			15.9	23.4	
Approach LOS	C			B	C	

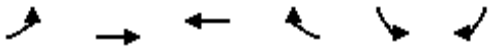
Intersection Summary			
HCM Average Control Delay	19.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	64.5	Sum of lost time (s)	10.9
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	855	130	225	1455	265	640
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1		6.0	5.1	5.9	6.0
Lane Util. Factor	0.95		0.97	0.95	1.00	0.88
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3494		3367	3574	1787	2814
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3494		3367	3574	1787	2814
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	900	137	237	1532	279	674
RTOR Reduction (vph)	18	0	0	0	0	49
Lane Group Flow (vph)	1019	0	237	1532	279	625
Heavy Vehicles (%)	1%	3%	4%	1%	1%	1%
Turn Type			Prot			custom
Protected Phases	2		1	6	3	
Permitted Phases						1 8
Actuated Green, G (s)	22.1		6.1	35.6	14.1	27.5
Effective Green, g (s)	23.5		7.5	37.0	15.5	23.8
Actuated g/C Ratio	0.37		0.12	0.58	0.24	0.37
Clearance Time (s)	6.5		7.4	6.5	7.3	
Vehicle Extension (s)	3.2		2.3	3.2	2.3	
Lane Grp Cap (vph)	1293		398	2082	436	1055
v/s Ratio Prot	0.29		0.07	c0.43	c0.16	
v/s Ratio Perm						0.22
v/c Ratio	0.79		0.60	0.74	0.64	0.59
Uniform Delay, d1	17.8		26.6	9.7	21.5	15.9
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	3.3		1.8	1.4	2.5	0.7
Delay (s)	21.1		28.4	11.1	24.0	16.6
Level of Service	C		C	B	C	B
Approach Delay (s)	21.1			13.4	18.8	
Approach LOS	C			B	B	

Intersection Summary			
HCM Average Control Delay	16.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	63.5	Sum of lost time (s)	11.0
Intersection Capacity Utilization	64.1%	ICU Level of Service	C
Analysis Period (min)	15		

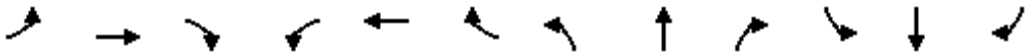
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	2	1495	1680	5	5	2
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	2	1574	1768	5	5	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1774				2562	887
vC1, stage 1 conf vol					1771	
vC2, stage 2 conf vol					791	
vCu, unblocked vol	1774				2562	887
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	99				95	99
cM capacity (veh/h)	356				116	291

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	2	787	787	1179	595	7
Volume Left	2	0	0	0	0	5
Volume Right	0	0	0	0	5	2
cSH	356	1700	1700	1700	1700	140
Volume to Capacity	0.01	0.46	0.46	0.69	0.35	0.05
Queue Length 95th (ft)	0	0	0	0	0	4
Control Delay (s)	15.2	0.0	0.0	0.0	0.0	32.1
Lane LOS	C					D
Approach Delay (s)	0.0			0.0		32.1
Approach LOS						D

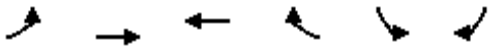
Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	230	2	2	235	5	0	2	5	0	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	5	242	2	2	247	5	0	2	5	0	0	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	253			244			513	511	243	514	509	250
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	253			244			513	511	243	514	509	250
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	99	100	100	99
cM capacity (veh/h)	1324			1334			470	467	801	467	467	794

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	249	255	7	5
Volume Left	5	2	0	0
Volume Right	2	5	5	5
cSH	1324	1334	665	794
Volume to Capacity	0.00	0.00	0.01	0.01
Queue Length 95th (ft)	0	0	1	1
Control Delay (s)	0.2	0.1	10.5	9.6
Lane LOS	A	A	B	A
Approach Delay (s)	0.2	0.1	10.5	9.6
Approach LOS			B	A

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	25.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	2	10	10	2	2	2
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	2	12	12	2	2	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	14				29	13
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	14				29	13
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1617				989	1073

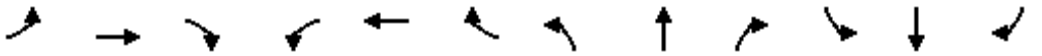
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	14	14	5
Volume Left	2	0	2
Volume Right	0	2	2
cSH	1617	1700	1029
Volume to Capacity	0.00	0.01	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	1.2	0.0	8.5
Lane LOS	A		A
Approach Delay (s)	1.2	0.0	8.5
Approach LOS			A

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	35	25	35	365	160	25
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	39	28	39	406	178	28
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			67		536	53
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			67		536	53
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			97		63	97
cM capacity (veh/h)			1548		478	1020

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	67	444	206
Volume Left	0	39	178
Volume Right	28	0	28
cSH	1700	1548	515
Volume to Capacity	0.04	0.03	0.40
Queue Length 95th (ft)	0	2	48
Control Delay (s)	0.0	0.9	16.6
Lane LOS		A	C
Approach Delay (s)	0.0	0.9	16.6
Approach LOS			C

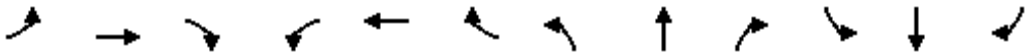
Intersection Summary			
Average Delay	5.3		
Intersection Capacity Utilization	44.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	40	1455	5	5	1395	40	2	2	2	205	2	290
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	42	1532	5	5	1468	42	2	2	2	216	2	305
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												14
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1511			1537			2364	3139	768	2353	3121	755
vC1, stage 1 conf vol							1618	1618		1500	1500	
vC2, stage 2 conf vol							746	1521		853	1621	
vCu, unblocked vol	1511			1537			2364	3139	768	2353	3121	755
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	91			99			78	98	99	0	98	14
cM capacity (veh/h)	449			438			10	96	348	114	107	355

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	42	1021	516	5	979	532	6	523
Volume Left	42	0	0	5	0	0	2	216
Volume Right	0	0	5	0	0	42	2	305
cSH	449	1700	1700	438	1700	1700	25	225
Volume to Capacity	0.09	0.60	0.30	0.01	0.58	0.31	0.25	2.32
Queue Length 95th (ft)	8	0	0	1	0	0	19	1048
Control Delay (s)	13.9	0.0	0.0	13.3	0.0	0.0	188.8	642.6
Lane LOS	B			B			F	F
Approach Delay (s)	0.4			0.0			188.8	642.6
Approach LOS							F	F

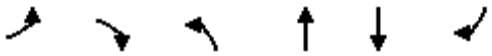
Intersection Summary				
Average Delay	93.3			
Intersection Capacity Utilization	71.1%	ICU Level of Service		C
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	10	1710	5	20	1200	135	10	10	60	320	50	145
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	11	1800	5	21	1263	142	11	11	63	337	53	153
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1405			1805			2676	3271	903	2366	3203	703
vC1, stage 1 conf vol							1824	1824		1376	1376	
vC2, stage 2 conf vol							853	1447		989	1826	
vCu, unblocked vol	1405			1805			2676	3271	903	2366	3203	703
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			94			83	89	77	0	41	60
cM capacity (veh/h)	492			337			63	97	280	105	89	385

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1	SB 2
Volume Total	11	1200	605	21	842	563	84	337	205
Volume Left	11	0	0	21	0	0	11	337	0
Volume Right	0	0	5	0	0	142	63	0	153
cSH	492	1700	1700	337	1700	1700	169	105	208
Volume to Capacity	0.02	0.71	0.36	0.06	0.50	0.33	0.50	3.21	0.99
Queue Length 95th (ft)	2	0	0	5	0	0	61	Err	215
Control Delay (s)	12.5	0.0	0.0	16.4	0.0	0.0	45.9	Err	106.6
Lane LOS	B			C			E	F	F
Approach Delay (s)	0.1			0.2			45.9	6253.3	
Approach LOS							E	F	

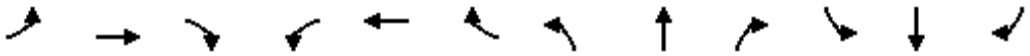
Intersection Summary				
Average Delay	877.4			
Intersection Capacity Utilization	78.5%	ICU Level of Service	D	
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	15	0	5	350	90	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	17	0	6	389	100	6
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	503	103	106			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	503	103	106			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	100	100			
cM capacity (veh/h)	530	958	1498			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	17	394	106
Volume Left	17	6	0
Volume Right	0	0	6
cSH	530	1498	1700
Volume to Capacity	0.03	0.00	0.06
Queue Length 95th (ft)	2	0	0
Control Delay (s)	12.0	0.1	0.0
Lane LOS	B	A	
Approach Delay (s)	12.0	0.1	0.0
Approach LOS	B		

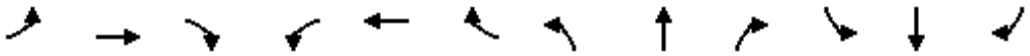
Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	32.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	205	35	95	200	80	55	275	5	25	65	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	223	38	103	217	87	60	299	5	27	71	0

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	261	408	60	304	27	71
Volume Left (vph)	0	103	60	0	27	0
Volume Right (vph)	38	87	0	5	0	0
Hadj (s)	-0.09	-0.05	0.50	-0.01	0.50	0.00
Departure Headway (s)	6.1	5.8	7.2	6.7	7.9	7.3
Degree Utilization, x	0.44	0.66	0.12	0.57	0.06	0.14
Capacity (veh/h)	550	594	470	503	388	415
Control Delay (s)	13.7	19.4	10.0	17.0	10.2	10.4
Approach Delay (s)	13.7	19.4	15.8		10.3	
Approach LOS	B	C	C		B	

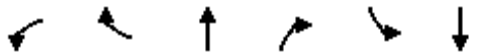
Intersection Summary				
Delay	16.1			
HCM Level of Service	C			
Intersection Capacity Utilization	64.3%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	10	0	0	0	35	335	335	0	185	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	11	0	0	0	38	364	364	0	201	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			None	
Median storage veh)								2				
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	647	1011	207	840	834	546	212			728		
vC1, stage 1 conf vol	207	207		622	622							
vC2, stage 2 conf vol	440	804		217	212							
vCu, unblocked vol	647	1011	207	840	834	546	212			728		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	100	100	100	97			100		
cM capacity (veh/h)	542	368	839	434	438	541	1370			885		

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	11	38	728	212
Volume Left	0	38	0	0
Volume Right	11	0	364	11
cSH	839	1370	1700	885
Volume to Capacity	0.01	0.03	0.43	0.00
Queue Length 95th (ft)	1	2	0	0
Control Delay (s)	9.3	7.7	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	9.3	0.4		0.0
Approach LOS	A			

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	48.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	15	2	705	50	5	190
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	15	2	727	52	5	196
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	959	753			778	
vC1, stage 1 conf vol	753					
vC2, stage 2 conf vol	206					
vCu, unblocked vol	959	753			778	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	100			99	
cM capacity (veh/h)	444	413			847	

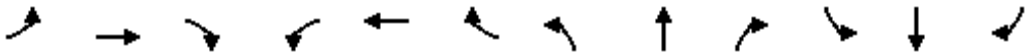
Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	18	778	5	196
Volume Left	15	0	5	0
Volume Right	2	52	0	0
cSH	440	1700	847	1700
Volume to Capacity	0.04	0.46	0.01	0.12
Queue Length 95th (ft)	3	0	0	0
Control Delay (s)	13.5	0.0	9.3	0.0
Lane LOS	B		A	
Approach Delay (s)	13.5	0.0	0.2	
Approach LOS	B			

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	50.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	115	25	725	35	10	200
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	121	26	763	37	11	211
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			TWLTL
Median storage veh)						2
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1013	782			800	
vC1, stage 1 conf vol	782					
vC2, stage 2 conf vol	232					
vCu, unblocked vol	1013	782			800	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	72	93			99	
cM capacity (veh/h)	428	398			832	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	147	800	11	211
Volume Left	121	0	11	0
Volume Right	26	37	0	0
cSH	422	1700	832	1700
Volume to Capacity	0.35	0.47	0.01	0.12
Queue Length 95th (ft)	38	0	1	0
Control Delay (s)	18.0	0.0	9.4	0.0
Lane LOS	C		A	
Approach Delay (s)	18.0	0.0	0.4	
Approach LOS	C			

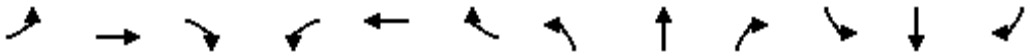
Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	10	190	0	10	15	750	530	10	305	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	11	200	0	11	16	789	558	11	321	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			None	
Median storage veh)								2				
Upstream signal (ft)								305				
pX, platoon unblocked	0.41	0.41		0.41	0.41	0.41				0.41		
vC, conflicting volume	1454	1722	322	1454	1444	1068	323			1347		
vC1, stage 1 conf vol	343	343		1100	1100							
vC2, stage 2 conf vol	1111	1379		354	344							
vCu, unblocked vol	1388	2038	322	1388	1365	454	323			1130		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	1	100	96	99			96		
cM capacity (veh/h)	181	92	723	202	201	252	1248			258		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	11	211	1363	334
Volume Left	0	200	16	11
Volume Right	11	11	558	2
cSH	723	204	1248	258
Volume to Capacity	0.01	1.03	0.01	0.04
Queue Length 95th (ft)	1	233	1	3
Control Delay (s)	10.0	121.5	0.6	1.6
Lane LOS	B	F	A	A
Approach Delay (s)	10.0	121.5	0.6	1.6
Approach LOS	B	F		

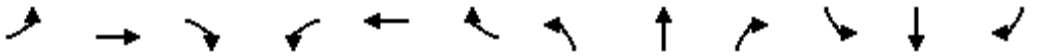
Intersection Summary			
Average Delay	14.1		
Intersection Capacity Utilization	102.9%	ICU Level of Service	G
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	755	0	130	350	1165	0	0	380	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.6	3.6	3.6	2.0	7.0			3.0	
Lane Util. Factor				0.95	0.95	1.00	1.00	1.00			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.96	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1715	1715	1615	1787	1881			3476	
Flt Permitted				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (perm)				1715	1715	1615	1787	1881			3476	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	795	0	137	368	1226	0	0	400	132
RTOR Reduction (vph)	0	0	0	0	0	36	0	0	0	0	40	0
Lane Group Flow (vph)	0	0	0	397	398	101	368	1226	0	0	492	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%
Turn Type				Perm		Perm	Prot					
Protected Phases					4		1	6			2	
Permitted Phases				4		4						
Actuated Green, G (s)				16.7	16.7	16.7	18.9	43.3			20.4	
Effective Green, g (s)				18.1	18.1	18.1	20.9	41.3			22.4	
Actuated g/C Ratio				0.26	0.26	0.26	0.30	0.59			0.32	
Clearance Time (s)				5.0	5.0	5.0	4.0	5.0			5.0	
Vehicle Extension (s)				2.3	2.3	2.3	2.3	3.0			5.2	
Lane Grp Cap (vph)				443	443	418	534	1110			1112	
v/s Ratio Prot							0.21	c0.65			0.14	
v/s Ratio Perm				0.23	0.23	0.06						
v/c Ratio				0.90	0.90	0.24	0.69	1.10			0.44	
Uniform Delay, d1				25.0	25.1	20.5	21.7	14.4			18.9	
Progression Factor				1.00	1.00	1.00	0.67	1.32			1.00	
Incremental Delay, d2				20.0	20.3	0.2	0.3	48.5			1.3	
Delay (s)				45.0	45.3	20.7	14.9	67.4			20.1	
Level of Service				D	D	C	B	E			C	
Approach Delay (s)		0.0			41.6			55.3			20.1	
Approach LOS		A			D			E			C	

Intersection Summary			
HCM Average Control Delay	45.0	HCM Level of Service	D
HCM Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	95.0%	ICU Level of Service	F
Analysis Period (min)	15		

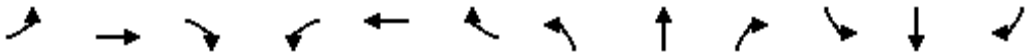
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	65	2	55	0	0	0	0	1450	960	20	1115	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0					5.0	5.0	4.0	5.0	
Lane Util. Factor		1.00	1.00					1.00	1.00	1.00	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1812	1615					1881	1599	1805	3610	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1812	1615					1881	1599	1805	3610	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	68	2	57	0	0	0	0	1510	1000	21	1161	0
RTOR Reduction (vph)	0	0	52	0	0	0	0	0	253	0	0	0
Lane Group Flow (vph)	0	70	5	0	0	0	0	1510	747	21	1161	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		8						6		5	2	
Permitted Phases	8		8						6			
Actuated Green, G (s)		6.2	6.2					48.4	48.4	1.4	53.8	
Effective Green, g (s)		6.2	6.2					48.4	48.4	1.4	53.8	
Actuated g/C Ratio		0.09	0.09					0.69	0.69	0.02	0.77	
Clearance Time (s)		5.0	5.0					5.0	5.0	4.0	5.0	
Vehicle Extension (s)		2.3	2.3					4.7	4.7	2.3	4.7	
Lane Grp Cap (vph)		160	143					1301	1106	36	2775	
v/s Ratio Prot								c0.80		0.01	c0.32	
v/s Ratio Perm		0.04	0.00						0.47			
v/c Ratio		0.44	0.04					1.16	0.68	0.58	0.42	
Uniform Delay, d1		30.2	29.2					10.8	6.3	34.0	2.8	
Progression Factor		1.00	1.00					1.00	1.00	1.24	0.14	
Incremental Delay, d2		1.1	0.1					81.2	3.3	11.3	0.3	
Delay (s)		31.4	29.2					92.0	9.6	53.4	0.7	
Level of Service		C	C					F	A	D	A	
Approach Delay (s)		30.4			0.0			59.2			1.6	
Approach LOS		C			A			E			A	

Intersection Summary			
HCM Average Control Delay	40.4	HCM Level of Service	D
HCM Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	95.0%	ICU Level of Service	F
Analysis Period (min)	15		

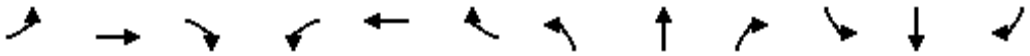
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	395	2	420	0	2	0	100	2015	2	1	1005	165
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	416	2	442	0	2	0	105	2121	2	1	1058	174
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											227	
pX, platoon unblocked	0.89	0.89	0.89	0.89	0.89		0.89					
vC, conflicting volume	2419	3481	616	3307	3566	1062	1232			2123		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2344	3543	307	3347	3640	1062	1002			2123		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	52	28	100	44	100	83			100		
cM capacity (veh/h)	9	4	615	0	4	223	619			260		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	860	2	105	1414	709	530	703
Volume Left	416	0	105	0	0	1	0
Volume Right	442	0	0	0	2	0	174
cSH	17	4	619	1700	1700	260	1700
Volume to Capacity	49.28	0.56	0.17	0.83	0.42	0.00	0.41
Queue Length 95th (ft)	Err	20	15	0	0	0	0
Control Delay (s)	Err	1351.2	12.0	0.0	0.0	0.1	0.0
Lane LOS	F	F	B			A	
Approach Delay (s)	Err	1351.2	0.6			0.1	
Approach LOS	F	F					

Intersection Summary				
Average Delay	1990.1			
Intersection Capacity Utilization	144.2%	ICU Level of Service	H	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	555	410	175	5	45	75	60	1485	15	70	1225	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.0	4.5		4.5	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.96		1.00	0.91		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1779		1805	1677		1770	3569		1805	3551	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1779		1805	1677		1770	3569		1805	3551	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	584	432	184	5	47	79	63	1563	16	74	1289	137
RTOR Reduction (vph)	0	11	0	0	52	0	0	1	0	0	7	0
Lane Group Flow (vph)	584	605	0	5	74	0	63	1578	0	74	1419	0
Heavy Vehicles (%)	2%	2%	2%	0%	2%	3%	2%	1%	0%	0%	0%	2%
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	36.1	46.1		3.4	13.4		5.0	46.1		4.0	45.1	
Effective Green, g (s)	35.6	45.6		3.4	12.9		4.5	46.1		4.0	45.1	
Actuated g/C Ratio	0.31	0.39		0.03	0.11		0.04	0.40		0.03	0.39	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	545	702		53	187		69	1423		62	1385	
v/s Ratio Prot	c0.33	c0.34		0.00	0.04		0.04	c0.44		c0.04	0.40	
v/s Ratio Perm												
v/c Ratio	1.07	0.86		0.09	0.39		0.91	1.11		1.19	1.02	
Uniform Delay, d1	40.0	32.1		54.6	47.7		55.4	34.8		55.8	35.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	59.1	10.5		0.6	1.0		78.2	59.7		175.8	30.7	
Delay (s)	99.1	42.6		55.2	48.7		133.6	94.5		231.6	65.9	
Level of Service	F	D		E	D		F	F		F	E	
Approach Delay (s)		70.1			49.0			96.0			74.1	
Approach LOS		E			D			F			E	

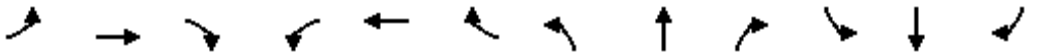
Intersection Summary			
HCM Average Control Delay	80.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	115.6	Sum of lost time (s)	8.5
Intersection Capacity Utilization	93.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	35	0	0	15	0	1565	2	0	1350	55
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	0	39	0	0	17	0	1739	2	0	1500	61
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1086			1190	
pX, platoon unblocked	0.76	0.76	0.63	0.76	0.76	0.76	0.63			0.76		
vC, conflicting volume	2386	3241	750	2529	3301	871	1561			1741		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	747	1879	0	936	1958	191	733			1339		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	94	100	100	97	100			100		
cM capacity (veh/h)	224	55	693	159	49	625	559			395		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	39	17	1159	582	750	750	61
Volume Left	0	0	0	0	0	0	0
Volume Right	39	17	0	2	0	0	61
cSH	693	625	1700	1700	1700	1700	1700
Volume to Capacity	0.06	0.03	0.68	0.34	0.44	0.44	0.04
Queue Length 95th (ft)	4	2	0	0	0	0	0
Control Delay (s)	10.5	10.9	0.0	0.0	0.0	0.0	0.0
Lane LOS	B	B					
Approach Delay (s)	10.5	10.9	0.0		0.0		
Approach LOS	B	B					

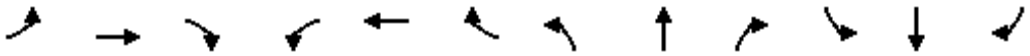
Intersection Summary				
Average Delay	0.2			
Intersection Capacity Utilization	53.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	490	1050	95	280	750	180	95	880	195	185	900	300
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.6	4.1		2.6	4.1	4.1	2.0	3.5	3.5	2.0	3.5	3.5
Lane Util. Factor	0.97	0.95		0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.88
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3303	3556		3502	3610	1615	1787	3574	1599	1805	3610	2842
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3303	3556		3502	3610	1615	1787	3574	1599	1805	3610	2842
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	516	1105	100	295	789	189	100	926	205	195	947	316
RTOR Reduction (vph)	0	8	0	0	0	98	0	0	130	0	0	78
Lane Group Flow (vph)	516	1197	0	295	789	91	100	926	75	195	947	238
Heavy Vehicles (%)	6%	0%	3%	0%	0%	0%	1%	1%	1%	0%	0%	0%
Turn Type	Prot			Prot		Perm	Prot		custom	Prot		custom
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases						4			2			2 3
Actuated Green, G (s)	7.0	31.4		7.0	31.4	31.4	5.0	26.2	26.2	5.0	26.2	38.7
Effective Green, g (s)	8.4	32.8		8.4	32.8	32.8	7.0	28.2	28.2	7.0	28.2	40.7
Actuated g/C Ratio	0.09	0.37		0.09	0.37	0.37	0.08	0.32	0.32	0.08	0.32	0.46
Clearance Time (s)	4.0	5.5		4.0	5.5	5.5	4.0	5.5	5.5	4.0	5.5	
Vehicle Extension (s)	2.3	3.1		2.3	3.1	3.1	2.4	3.1	3.1	2.4	3.1	
Lane Grp Cap (vph)	313	1316		332	1336	598	141	1138	509	143	1149	1306
v/s Ratio Prot	c0.16	c0.34		0.08	0.22		0.06	0.26		c0.11	c0.26	
v/s Ratio Perm						0.06			0.05			0.08
v/c Ratio	1.65	0.91		0.89	0.59	0.15	0.71	0.81	0.15	1.36	0.82	0.18
Uniform Delay, d1	40.1	26.5		39.6	22.5	18.6	39.8	27.8	21.6	40.8	27.9	14.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	305.8	9.5		23.4	0.7	0.1	13.7	4.6	0.1	201.9	4.9	0.1
Delay (s)	345.9	36.0		63.1	23.2	18.7	53.6	32.4	21.7	242.7	32.9	14.2
Level of Service	F	D		E	C	B	D	C	C	F	C	B
Approach Delay (s)		128.9			31.8			32.3			56.9	
Approach LOS		F			C			C			E	

Intersection Summary			
HCM Average Control Delay	67.7	HCM Level of Service	E
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	88.6	Sum of lost time (s)	12.2
Intersection Capacity Utilization	88.0%	ICU Level of Service	E
Analysis Period (min)	15		

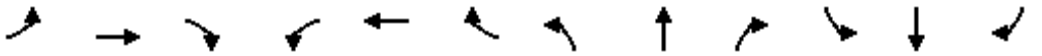
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	580	10	30	260	20	125	2	465	25	0	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	2	624	11	32	280	22	134	2	500	27	0	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	301			634			980	999	629	1484	994	290
vC1, stage 1 conf vol							633	633		355	355	
vC2, stage 2 conf vol							346	366		1129	639	
vCu, unblocked vol	301			634			980	999	629	1484	994	290
tC, single (s)	4.4			4.3			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.5			2.4			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			96			68	99	0	0	100	100
cM capacity (veh/h)	1103			848			416	416	486	0	398	754

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	2	634	32	301	134	502	29
Volume Left	2	0	32	0	134	0	27
Volume Right	0	11	0	22	0	500	2
cSH	1103	1700	848	1700	416	486	0
Volume to Capacity	0.00	0.37	0.04	0.18	0.32	1.03	Err
Queue Length 95th (ft)	0	0	3	0	34	370	Err
Control Delay (s)	8.3	0.0	9.4	0.0	17.7	79.4	Err
Lane LOS	A		A		C	F	F
Approach Delay (s)	0.0		0.9		66.4		Err
Approach LOS					F		F

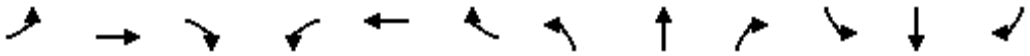
Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	66.7%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	615	230	25	110	45	165	430	100	75	15	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.0	4.0	4.0	4.0		4.0	4.5	4.0	4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1863	1455	1203	1769		1752	1863	1495	1770	1863	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	1863	1455	1203	1769		1752	1863	1495	1770	1863	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	56	683	256	28	122	50	183	478	111	83	17	0
RTOR Reduction (vph)	0	0	138	0	16	0	0	0	47	0	0	0
Lane Group Flow (vph)	56	683	118	28	156	0	183	478	64	83	17	0
Heavy Vehicles (%)	2%	2%	11%	50%	3%	2%	3%	2%	8%	2%	2%	2%
Turn Type	Prot		Perm	Prot			Prot		pt+ov	Prot		
Protected Phases	1	6		5	2		7	4	4 5	3	8	
Permitted Phases			6									
Actuated Green, G (s)	3.8	35.0	35.0	3.0	34.2		11.8	24.2	31.2	5.2	17.6	
Effective Green, g (s)	3.3	35.0	35.0	3.0	34.2		11.8	23.7	31.2	4.7	17.1	
Actuated g/C Ratio	0.04	0.42	0.42	0.04	0.41		0.14	0.28	0.37	0.06	0.21	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	70	782	611	43	725		248	529	559	100	382	
v/s Ratio Prot	c0.03	c0.37		0.02	0.09		c0.10	c0.26	0.04	0.05	0.01	
v/s Ratio Perm			0.08									
v/c Ratio	0.80	0.87	0.19	0.65	0.22		0.74	0.90	0.11	0.83	0.04	
Uniform Delay, d1	39.7	22.2	15.3	39.7	15.9		34.3	28.7	17.1	39.0	26.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	45.2	10.5	0.1	27.3	0.1		10.3	18.7	0.1	40.1	0.0	
Delay (s)	84.9	32.7	15.4	67.0	16.0		44.6	47.5	17.1	79.1	26.6	
Level of Service	F	C	B	E	B		D	D	B	E	C	
Approach Delay (s)		31.2			23.2			42.4			70.2	
Approach LOS		C			C			D			E	

Intersection Summary			
HCM Average Control Delay	36.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	83.4	Sum of lost time (s)	8.5
Intersection Capacity Utilization	76.7%	ICU Level of Service	D
Analysis Period (min)	15		

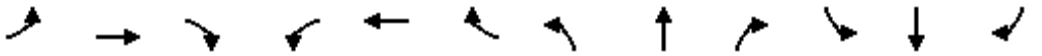
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	795	10	55	150	40	30	5	170	65	15	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	2	874	11	60	165	44	33	5	187	71	16	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	209			885			1183	1213	879	1375	1197	187
vC1, stage 1 conf vol							884	884		308	308	
vC2, stage 2 conf vol							299	330		1068	889	
vCu, unblocked vol	209			885			1183	1213	879	1375	1197	187
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.5
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.6
p0 queue free %	100			92			90	98	47	0	94	99
cM capacity (veh/h)	1374			773			315	333	350	60	288	791

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	2	885	60	209	33	192	71	22
Volume Left	2	0	60	0	33	0	71	0
Volume Right	0	11	0	44	0	187	0	5
cSH	1374	1700	773	1700	315	349	60	342
Volume to Capacity	0.00	0.52	0.08	0.12	0.10	0.55	1.18	0.06
Queue Length 95th (ft)	0	0	6	0	9	79	148	5
Control Delay (s)	7.6	0.0	10.0	0.0	17.8	27.3	288.0	16.2
Lane LOS	A		B		C	D	F	C
Approach Delay (s)	0.0		2.3		25.9		224.0	
Approach LOS					D		F	

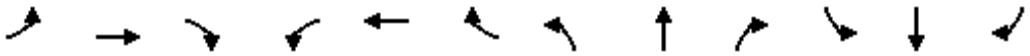
Intersection Summary				
Average Delay	18.6			
Intersection Capacity Utilization	70.1%	ICU Level of Service		C
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	85	1405	95	85	1005	45	15	10	25	165	5	275
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	5.2	5.2	7.3	5.2		6.7	6.7	6.7	6.7	6.7	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.99	1.00	0.95	1.00	
Satd. Flow (prot)	1687	3574	1615	1805	3520		1466	1723	1568	1703	1620	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.37	0.89	1.00	0.75	1.00	
Satd. Flow (perm)	1687	3574	1615	1805	3520		569	1546	1568	1341	1620	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	89	1479	100	89	1058	47	16	11	26	174	5	289
RTOR Reduction (vph)	0	0	45	0	3	0	0	0	21	0	159	0
Lane Group Flow (vph)	89	1479	55	89	1102	0	13	14	5	174	135	0
Heavy Vehicles (%)	7%	1%	0%	0%	2%	0%	17%	0%	3%	6%	0%	0%
Turn Type	Prot		Perm	Prot			Perm		Perm	Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2				8		8	4		
Actuated Green, G (s)	6.7	34.8	34.8	4.8	33.7		13.1	13.1	13.1	13.1	13.1	
Effective Green, g (s)	6.7	34.8	34.8	4.8	33.7		13.1	13.1	13.1	13.1	13.1	
Actuated g/C Ratio	0.09	0.48	0.48	0.07	0.47		0.18	0.18	0.18	0.18	0.18	
Clearance Time (s)	6.5	5.2	5.2	7.3	5.2		6.7	6.7	6.7	6.7	6.7	
Vehicle Extension (s)	2.6	3.1	3.1	2.3	3.1		2.4	2.4	2.4	2.4	2.4	
Lane Grp Cap (vph)	157	1730	782	121	1650		104	282	286	244	295	
v/s Ratio Prot	c0.05	c0.41		0.05	0.31						0.08	
v/s Ratio Perm			0.03				0.02	0.01	0.00	c0.13		
v/c Ratio	0.57	0.85	0.07	0.74	0.67		0.12	0.05	0.02	0.71	0.46	
Uniform Delay, d1	31.2	16.3	9.9	32.9	14.8		24.6	24.3	24.1	27.6	26.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.9	4.4	0.0	18.9	1.0		0.4	0.0	0.0	8.7	0.7	
Delay (s)	35.2	20.7	9.9	51.8	15.8		25.0	24.3	24.1	36.3	27.0	
Level of Service	D	C	A	D	B		C	C	C	D	C	
Approach Delay (s)		20.8			18.5			24.4			30.4	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM Average Control Delay	21.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	71.9	Sum of lost time (s)	13.2
Intersection Capacity Utilization	76.8%	ICU Level of Service	D
Analysis Period (min)	15		

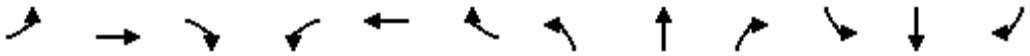
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	100	1255	260	185	830	255	170	195	470	535	260	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	4.7	4.7	5.8	4.6		6.4	5.5	6.4	6.4	5.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	3574	1615	1787	3417		1805	1792	1599	1736	1830	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1805	3574	1615	1787	3417		1805	1792	1599	1736	1830	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	105	1321	274	195	874	268	179	205	495	563	274	89
RTOR Reduction (vph)	0	0	192	0	25	0	0	0	3	0	10	0
Lane Group Flow (vph)	105	1321	82	195	1117	0	179	205	492	563	353	0
Heavy Vehicles (%)	0%	1%	0%	1%	1%	5%	0%	6%	1%	4%	0%	0%
Turn Type	Prot		Perm	Prot			Prot		custom	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						1 8			
Actuated Green, G (s)	5.0	32.6	32.6	7.8	35.5		13.6	29.0	43.1	17.8	33.2	
Effective Green, g (s)	6.4	34.0	34.0	9.2	36.9		14.4	29.8	38.4	18.6	34.0	
Actuated g/C Ratio	0.06	0.30	0.30	0.08	0.32		0.13	0.26	0.34	0.16	0.30	
Clearance Time (s)	7.2	6.1	6.1	7.2	6.0		7.2	6.3		7.2	6.3	
Vehicle Extension (s)	2.4	3.1	3.1	2.4	3.1		2.4	3.6		2.4	3.6	
Lane Grp Cap (vph)	101	1066	482	144	1106		228	468	539	283	546	
v/s Ratio Prot	0.06	c0.37		c0.11	c0.33		0.10	0.11		c0.32	c0.19	
v/s Ratio Perm			0.05						c0.31			
v/c Ratio	1.04	1.24	0.17	1.35	1.01		0.79	0.44	0.91	1.99	0.65	
Uniform Delay, d1	53.8	40.0	29.6	52.4	38.6		48.3	35.1	36.2	47.7	34.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	100.7	115.8	0.2	197.9	29.5		15.5	0.8	19.9	457.7	2.8	
Delay (s)	154.5	155.8	29.7	250.3	68.1		63.8	35.9	56.1	505.4	37.6	
Level of Service	F	F	C	F	E		E	D	E	F	D	
Approach Delay (s)		135.4			94.6			53.0			322.0	
Approach LOS		F			F			D			F	

Intersection Summary			
HCM Average Control Delay	144.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.48		
Actuated Cycle Length (s)	114.0	Sum of lost time (s)	33.4
Intersection Capacity Utilization	107.3%	ICU Level of Service	G
Analysis Period (min)	15		

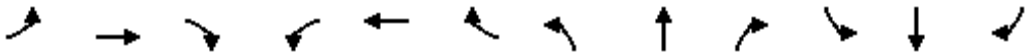
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	320	640	125	265	85	30	80	1020	960	70	425	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5	4.0	4.0	5.5		4.0	5.5	5.5	4.0	5.5	
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00		1.00	1.00	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1752	1900	1568	3433	1699		1597	1827	1615	1671	3331	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1752	1900	1568	3433	1699		1597	1827	1615	1671	3331	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	330	660	129	273	88	31	82	1052	990	72	438	77
RTOR Reduction (vph)	0	0	52	0	12	0	0	0	46	0	14	0
Lane Group Flow (vph)	330	660	77	273	107	0	82	1052	944	72	501	0
Heavy Vehicles (%)	3%	0%	3%	2%	8%	6%	13%	4%	0%	8%	7%	0%
Turn Type	Prot		custom	Prot			Prot		custom	Prot		
Protected Phases	3			7	4		1	6		5	2	
Permitted Phases		8	1 8						6 7			
Actuated Green, G (s)	10.0	31.5	40.6	6.0	27.5		9.1	38.5	44.5	5.0	34.4	
Effective Green, g (s)	10.0	31.5	40.6	6.0	27.5		9.1	38.5	44.5	5.0	34.4	
Actuated g/C Ratio	0.10	0.32	0.41	0.06	0.28		0.09	0.38	0.44	0.05	0.34	
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	5.5		4.0	5.5	
Vehicle Extension (s)	2.4	3.2		2.5	3.2		2.3	3.2		2.2	3.2	
Lane Grp Cap (vph)	175	599	637	206	467		145	703	719	84	1146	
v/s Ratio Prot	c0.19			c0.08	0.06		0.05	c0.58		c0.04	0.15	
v/s Ratio Perm		c0.35	0.05						0.58			
v/c Ratio	1.89	1.10	0.12	1.33	0.23		0.57	1.50	1.31	0.86	0.44	
Uniform Delay, d1	45.0	34.2	18.5	47.0	28.0		43.6	30.8	27.8	47.1	25.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.10	0.76	0.69	1.00	1.00	
Incremental Delay, d2	419.4	67.8	0.0	176.0	0.3		0.3	224.1	142.1	52.3	1.2	
Delay (s)	464.4	102.1	18.6	223.0	28.3		48.2	247.4	161.2	99.5	26.5	
Level of Service	F	F	B	F	C		D	F	F	F	C	
Approach Delay (s)		199.3			163.9			199.5			35.5	
Approach LOS		F			F			F			D	

Intersection Summary			
HCM Average Control Delay	173.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.34		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	114.9%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	660	45	400	35	10	5	115	1395	50	15	660	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	5.5		4.0	5.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.87		1.00	0.95		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1615		1805	1811		1641	3523		1805	3369	
Flt Permitted	0.75	1.00		0.31	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1392	1615		589	1811		1641	3523		1805	3369	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	695	47	421	37	11	5	121	1468	53	16	695	147
RTOR Reduction (vph)	0	128	0	0	3	0	0	2	0	0	18	0
Lane Group Flow (vph)	695	340	0	37	13	0	121	1519	0	16	824	0
Heavy Vehicles (%)	2%	0%	2%	0%	0%	0%	10%	2%	0%	0%	4%	6%
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8								
Actuated Green, G (s)	43.0	43.0		43.0	43.0		9.6	41.5		2.0	33.9	
Effective Green, g (s)	43.0	43.0		43.0	43.0		9.6	41.5		2.0	33.9	
Actuated g/C Ratio	0.43	0.43		0.43	0.43		0.10	0.42		0.02	0.34	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	5.5		4.0	5.5	
Vehicle Extension (s)	1.6	1.6		1.6	1.6		2.6	3.1		2.6	3.1	
Lane Grp Cap (vph)	599	694		253	779		158	1462		36	1142	
v/s Ratio Prot		0.21			0.01		c0.07	c0.43		0.01	0.24	
v/s Ratio Perm	c0.50			0.06								
v/c Ratio	1.16	0.49		0.15	0.02		0.77	1.04		0.44	0.72	
Uniform Delay, d1	28.5	20.6		17.3	16.4		44.1	29.2		48.5	28.9	
Progression Factor	1.00	1.00		1.00	1.00		0.90	0.80		1.48	0.48	
Incremental Delay, d2	89.6	0.2		0.1	0.0		14.1	30.8		4.9	2.9	
Delay (s)	118.1	20.8		17.4	16.4		53.6	54.2		76.8	16.7	
Level of Service	F	C		B	B		D	D		E	B	
Approach Delay (s)		79.0			17.1			54.2			17.8	
Approach LOS		E			B			D			B	

Intersection Summary			
HCM Average Control Delay	53.0	HCM Level of Service	D
HCM Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	98.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	135	35	1525	560	110	995
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		5.0	4.0	4.0	5.5
Lane Util. Factor	0.97		0.95	1.00	1.00	0.95
Frt	0.97		1.00	0.85	1.00	1.00
Flt Protected	0.96		1.00	1.00	0.95	1.00
Satd. Flow (prot)	3303		3505	1599	1805	3438
Flt Permitted	0.96		1.00	1.00	0.95	1.00
Satd. Flow (perm)	3303		3505	1599	1805	3438
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	142	37	1605	589	116	1047
RTOR Reduction (vph)	28	0	0	56	0	0
Lane Group Flow (vph)	151	0	1605	533	116	1047
Heavy Vehicles (%)	4%	4%	3%	1%	0%	5%
Turn Type				custom	Prot	
Protected Phases	4		6		5	2
Permitted Phases				4 6		
Actuated Green, G (s)	11.1		65.5	81.6	10.4	79.4
Effective Green, g (s)	11.1		65.5	76.6	10.4	79.4
Actuated g/C Ratio	0.11		0.66	0.77	0.10	0.79
Clearance Time (s)	4.0		5.0		4.0	5.5
Vehicle Extension (s)	2.2		2.4		2.6	2.4
Lane Grp Cap (vph)	367		2296	1225	188	2730
v/s Ratio Prot	0.05		c0.46		c0.06	0.30
v/s Ratio Perm				c0.33		
v/c Ratio	0.41		0.70	0.43	0.62	0.38
Uniform Delay, d1	41.4		11.0	4.1	42.9	3.1
Progression Factor	1.00		0.34	0.01	0.97	0.74
Incremental Delay, d2	0.4		0.6	0.0	4.0	0.3
Delay (s)	41.8		4.4	0.1	45.5	2.6
Level of Service	D		A	A	D	A
Approach Delay (s)	41.8		3.2			6.9
Approach LOS	D		A			A

Intersection Summary			
HCM Average Control Delay	6.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	64.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBR	WBR2	NBL	NBT	SBT
Lane Configurations					
Volume (vph)	790	340	260	1820	1520
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	5.0	5.0
Lane Util. Factor	1.00	0.88	1.00	0.95	0.95
Frt	0.86	0.85	1.00	1.00	1.00
Flt Protected	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1611	2707	1770	3539	3505
Flt Permitted	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1611	2707	1770	3539	3505
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	814	351	268	1876	1567
RTOR Reduction (vph)	163	9	0	0	0
Lane Group Flow (vph)	651	342	268	1876	1567
Heavy Vehicles (%)	2%	5%	2%	2%	3%
Turn Type	custom	custom	Prot		
Protected Phases			1	6	2
Permitted Phases	4	4			
Actuated Green, G (s)	36.0	36.0	11.0	50.0	35.0
Effective Green, g (s)	36.0	36.0	11.0	50.0	35.0
Actuated g/C Ratio	0.38	0.38	0.12	0.53	0.37
Clearance Time (s)	4.0	4.0	4.0	5.0	5.0
Vehicle Extension (s)	2.3	2.3	2.3	4.5	4.5
Lane Grp Cap (vph)	610	1026	205	1863	1291
v/s Ratio Prot			c0.15	0.53	c0.45
v/s Ratio Perm	c0.40	0.13			
v/c Ratio	1.07	0.33	1.31	1.01	1.21
Uniform Delay, d1	29.5	21.0	42.0	22.5	30.0
Progression Factor	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	55.5	0.1	168.9	22.6	103.6
Delay (s)	85.0	21.1	210.9	45.1	133.6
Level of Service	F	C	F	D	F
Approach Delay (s)				65.8	133.6
Approach LOS				E	F

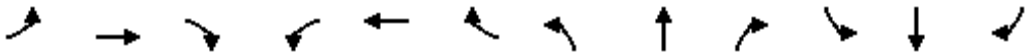
Intersection Summary			
HCM Average Control Delay	87.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.16		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	Err%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Volume (veh/h)	0	2160	1520	195	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.97	0.97	0.90	0.90
Hourly flow rate (vph)	0	2400	1567	201	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		258	829			
pX, platoon unblocked	0.76				0.60	0.76
vC, conflicting volume	1768				2767	784
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1380				809	86
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	383				193	732

Direction, Lane #	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	1200	1200	784	784	201
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	201
cSH	1700	1700	1700	1700	1700
Volume to Capacity	0.71	0.71	0.46	0.46	0.12
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS					
Approach Delay (s)	0.0		0.0		
Approach LOS					

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	63.0%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	185	0	125	0	0	0	0	1895	1085	0	1565	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					5.0	5.0		5.0	
Lane Util. Factor		1.00	1.00					0.91	0.91		0.91	
Frt		1.00	0.85					0.99	0.85		1.00	
Flt Protected		0.95	1.00					1.00	1.00		1.00	
Satd. Flow (prot)		1719	1553					3345	1441		5085	
Flt Permitted		0.95	1.00					1.00	1.00		1.00	
Satd. Flow (perm)		1719	1553					3345	1441		5085	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	191	0	129	0	0	0	0	1954	1119	0	1613	0
RTOR Reduction (vph)	0	0	26	0	0	0	0	9	315	0	0	0
Lane Group Flow (vph)	0	191	103	0	0	0	0	2135	614	0	1613	0
Heavy Vehicles (%)	5%	0%	4%	0%	0%	0%	0%	2%	2%	0%	2%	0%
Turn Type	Perm		Perm						Perm			
Protected Phases		8						6			2	
Permitted Phases	8		8						6			
Actuated Green, G (s)		12.5	12.5					41.9	41.9		41.9	
Effective Green, g (s)		12.5	12.5					41.9	41.9		41.9	
Actuated g/C Ratio		0.20	0.20					0.66	0.66		0.66	
Clearance Time (s)		4.0	4.0					5.0	5.0		5.0	
Vehicle Extension (s)		2.3	2.3					4.5	4.5		4.5	
Lane Grp Cap (vph)		339	306					2211	952		3361	
v/s Ratio Prot								c0.64			0.32	
v/s Ratio Perm		0.11	0.07						0.43			
v/c Ratio		0.56	0.34					0.97	0.64		0.48	
Uniform Delay, d1		23.0	21.9					10.1	6.4		5.3	
Progression Factor		1.00	1.00					1.00	1.00		1.00	
Incremental Delay, d2		1.6	0.4					12.1	1.9		0.2	
Delay (s)		24.5	22.3					22.2	8.2		5.5	
Level of Service		C	C					C	A		A	
Approach Delay (s)		23.6			0.0			18.0			5.5	
Approach LOS		C			A			B			A	

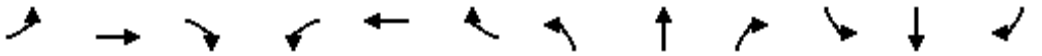
Intersection Summary			
HCM Average Control Delay	14.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	63.4	Sum of lost time (s)	9.0
Intersection Capacity Utilization	81.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Volume (veh/h)	0	2080	1565	745	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	0	2364	1778	847	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		227	826			
pX, platoon unblocked	0.72				0.51	0.72
vC, conflicting volume	2625				3384	1016
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1891				421	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	230				286	784

Direction, Lane #	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	1182	1182	711	711	1202
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	847
cSH	1700	1700	1700	1700	1700
Volume to Capacity	0.70	0.70	0.42	0.42	0.71
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS					
Approach Delay (s)	0.0		0.0		
Approach LOS					

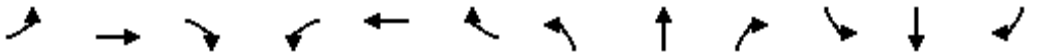
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	81.7%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	405	1435	270	115	665	370	135	1255	145	270	1175	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5		4.0	5.5		4.0	5.5	4.0
Lane Util. Factor	0.97	0.95		1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.98		1.00	0.95		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3467	3513		1787	3371		1770	3491		1752	3539	1538
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3467	3513		1787	3371		1770	3491		1752	3539	1538
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	422	1495	281	120	693	385	141	1307	151	281	1224	42
RTOR Reduction (vph)	0	13	0	0	63	0	0	7	0	0	0	23
Lane Group Flow (vph)	422	1763	0	120	1015	0	141	1451	0	281	1224	19
Heavy Vehicles (%)	1%	0%	2%	1%	1%	2%	2%	2%	0%	3%	2%	5%
Turn Type	Prot			Prot			Prot			Prot		custom
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												5 6
Actuated Green, G (s)	15.0	42.5		7.0	34.5		8.0	39.5		12.0	43.5	55.5
Effective Green, g (s)	15.0	42.5		7.0	34.5		8.0	39.5		12.0	43.5	55.5
Actuated g/C Ratio	0.12	0.35		0.06	0.29		0.07	0.33		0.10	0.36	0.46
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	5.5		4.0	5.5	
Vehicle Extension (s)	2.3	3.1		2.4	3.1		2.4	3.1		2.4	3.1	
Lane Grp Cap (vph)	433	1244		104	969		118	1149		175	1283	711
v/s Ratio Prot	c0.12	c0.50		0.07	0.30		0.08	c0.42		c0.16	c0.35	
v/s Ratio Perm												0.01
v/c Ratio	0.97	1.42		1.15	1.05		1.19	1.26		1.61	0.95	0.03
Uniform Delay, d1	52.3	38.8		56.5	42.8		56.0	40.2		54.0	37.3	17.6
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	36.3	192.6		135.5	42.0		144.5	125.2		297.5	15.4	0.0
Delay (s)	88.6	231.3		192.0	84.8		200.5	165.5		351.5	52.7	17.6
Level of Service	F	F		F	F		F	F		F	D	B
Approach Delay (s)		203.9			95.5			168.6			106.0	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM Average Control Delay	152.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.41		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	24.5
Intersection Capacity Utilization	124.8%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	240	2	680	5	2	2	295	1845	20	2	1030	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.0		4.0	5.5		4.0	5.5	5.5
Lane Util. Factor		1.00	1.00		1.00		0.97	0.95		1.00	0.95	1.00
Frt		1.00	0.85		0.97		1.00	1.00		1.00	1.00	0.85
Flt Protected		0.95	1.00		0.97		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1810	1553		1638		3433	3525		1805	3471	1568
Flt Permitted		0.72	1.00		0.89		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1371	1553		1506		3433	3525		1805	3471	1568
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	253	2	716	5	2	2	311	1942	21	2	1084	95
RTOR Reduction (vph)	0	0	138	0	1	0	0	0	0	0	0	35
Lane Group Flow (vph)	0	255	578	0	8	0	311	1963	0	2	1084	60
Heavy Vehicles (%)	0%	0%	4%	17%	0%	0%	2%	2%	25%	0%	4%	3%
Turn Type	Perm		Perm	Perm			Prot			Prot		Perm
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8		8	4								2
Actuated Green, G (s)		31.5	31.5		32.0		11.6	53.5		1.0	42.9	42.9
Effective Green, g (s)		31.5	31.5		32.0		11.6	53.5		1.0	42.9	42.9
Actuated g/C Ratio		0.32	0.32		0.32		0.12	0.54		0.01	0.43	0.43
Clearance Time (s)		4.5	4.5		4.0		4.0	5.5		4.0	5.5	5.5
Vehicle Extension (s)		1.4	1.4		2.3		2.3	2.4		2.6	2.4	2.4
Lane Grp Cap (vph)		432	489		482		398	1886		18	1489	673
v/s Ratio Prot							c0.09	c0.56		0.00	0.31	
v/s Ratio Perm		0.19	c0.37		0.01							0.04
v/c Ratio		0.59	1.18		0.02		0.78	1.04		0.11	0.73	0.09
Uniform Delay, d1		28.8	34.2		23.2		43.0	23.2		49.1	23.7	16.9
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.24	0.64	0.29
Incremental Delay, d2		1.4	100.9		0.0		9.1	32.2		2.0	3.0	0.2
Delay (s)		30.3	135.2		23.2		52.1	55.4		62.8	18.3	5.1
Level of Service		C	F		C		D	E		E	B	A
Approach Delay (s)		107.6			23.2			55.0			17.3	
Approach LOS		F			C			D			B	

Intersection Summary			
HCM Average Control Delay	56.4	HCM Level of Service	E
HCM Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	87.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Appendix C. Intersection Queuing Analysis

Intersection: 30: US-26 WB JS Rd On-ramp & Jackson School Rd

Movement	WB	WB	B33	NB
Directions Served	LT	R	T	L
Maximum Queue (ft)	1156	600	235	39
Average Queue (ft)	677	177	98	8
95th Queue (ft)	1472	628	526	31
Link Distance (ft)	1366		940	
Upstream Blk Time (%)	10		1	
Queuing Penalty (veh)	0		0	
Storage Bay Dist (ft)		575		375
Storage Blk Time (%)	26	0		
Queuing Penalty (veh)	11	1		

Intersection: 40: US-26 EB JS Rd Off-ramp & Jackson School Rd

Movement	EB	EB	SB
Directions Served	LT	R	L
Maximum Queue (ft)	58	182	34
Average Queue (ft)	12	50	8
95th Queue (ft)	42	137	29
Link Distance (ft)	1666		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		275	375
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 41: US-26 EB JS Rd On-ramp &

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	455	466
Average Queue (ft)	197	217
95th Queue (ft)	446	467
Link Distance (ft)	1044	1044
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 200: Schaaf Rd & Helvetia Rd

Movement	WB	NB	SB
Directions Served	LR	TR	L
Maximum Queue (ft)	72	14	44
Average Queue (ft)	20	0	10
95th Queue (ft)	45	7	34
Link Distance (ft)	1680	1387	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			250
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 210: Groveland Dr & Helvetia Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	34	78	138	271
Average Queue (ft)	8	23	8	33
95th Queue (ft)	28	53	59	156
Link Distance (ft)	816	1665	218	1387
Upstream Blk Time (%)			0	
Queuing Penalty (veh)			0	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 220: US-26 WB Helvetia On-ramp & Helvetia Rd

Movement	WB	WB	WB	B221	B222	NB	NB	SB	SB
Directions Served	L	LT	R	T	T	L	T	T	TR
Maximum Queue (ft)	681	682	50	746	1062	67	470	240	250
Average Queue (ft)	649	651	39	614	855	8	176	132	131
95th Queue (ft)	712	710	60	1021	1495	36	375	223	228
Link Distance (ft)	604	604		661	1025		606	218	218
Upstream Blk Time (%)	17	17		22	24			3	4
Queuing Penalty (veh)	0	0		0	0			9	10
Storage Bay Dist (ft)			25			150			
Storage Blk Time (%)		61	8				11		
Queuing Penalty (veh)		91	73				1		

Intersection: 230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy

Movement	EB	EB	B234	NB	NB	SB	SB	SB
Directions Served	LT	R	T	T	R	L	T	T
Maximum Queue (ft)	1212	325	2460	177	29	349	667	660
Average Queue (ft)	1181	323	2111	42	1	42	537	548
95th Queue (ft)	1231	332	3128	131	21	189	796	797
Link Distance (ft)	1110		2410	168	168		606	606
Upstream Blk Time (%)	89		65	0			12	16
Queuing Penalty (veh)	0		0	2			146	185
Storage Bay Dist (ft)		300				175		
Storage Blk Time (%)	2	89					40	
Queuing Penalty (veh)	6	67					14	

Intersection: 231: US-26 EB Helvetia On-ramp &

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	298	316
Average Queue (ft)	106	126
95th Queue (ft)	238	257
Link Distance (ft)	991	991
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 240: Meek Rd & Brookwood Pkwy

Movement	EB	B242	WB	NB	NB	NB	SB	SB
Directions Served	LTR	T	LTR	L	T	TR	LT	TR
Maximum Queue (ft)	621	3188	83	1100	1920	1948	225	223
Average Queue (ft)	621	2609	43	1076	1862	1668	165	165
95th Queue (ft)	628	3925	91	1140	2133	2394	252	249
Link Distance (ft)	584	3172	241		1904	1904	168	168
Upstream Blk Time (%)	100	53			44	17	19	20
Queuing Penalty (veh)	0	0			238	95	261	271
Storage Bay Dist (ft)				1000				
Storage Blk Time (%)				76	77			
Queuing Penalty (veh)				288	247			

Intersection: 250: Huffman St & Brookwood Pkwy

Movement	EB	EB	WB	WB	B252	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	T	L	T	TR	L	T	TR
Maximum Queue (ft)	440	2606	244	3496	159	1025	1228	1232	125	1956	1960
Average Queue (ft)	427	1637	16	2373	34	992	1161	917	60	1893	1901
95th Queue (ft)	490	2878	144	3872	236	1139	1406	1582	120	2050	2043
Link Distance (ft)		3943		3652	918		1126	1126		1904	1904
Upstream Blk Time (%)				7			67	32		20	22
Queuing Penalty (veh)				0			400	190		219	243
Storage Bay Dist (ft)	350		350			1000			100		
Storage Blk Time (%)	88			79		51	35		3	55	
Queuing Penalty (veh)	87			4		224	106		29	42	

Intersection: 260: Genentech & Brookwood Pkwy

Movement	EB	NB	NB
Directions Served	R	T	TR
Maximum Queue (ft)	31	1022	1099
Average Queue (ft)	7	808	800
95th Queue (ft)	25	1399	1442
Link Distance (ft)		1004	1004
Upstream Blk Time (%)		21	19
Queuing Penalty (veh)		126	119
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 261: Genentech &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 270: Evergreen Pkwy & Brookwood Pkwy

Movement	EB	EB	EB	EB	B151	B151	B150	B150	WB	WB	WB	WB
Directions Served	L	L	T	TR	T	T	T	T	L	L	T	T
Maximum Queue (ft)	524	575	1834	1827	862	845	1524	1518	259	349	1416	1410
Average Queue (ft)	495	539	1307	1096	357	352	375	376	118	144	499	521
95th Queue (ft)	592	670	2365	2236	1000	990	1424	1431	229	297	1392	1388
Link Distance (ft)			1748	1748	769	769	1991	1991			4284	4284
Upstream Blk Time (%)			46	17	29	27	3	3				
Queuing Penalty (veh)			0	0	0	0	0	0				
Storage Bay Dist (ft)	475	475							250	250		
Storage Blk Time (%)	79	76	0						1	2	18	14
Queuing Penalty (veh)	243	231	0						5	8	40	14

Intersection: 270: Evergreen Pkwy & Brookwood Pkwy

Movement	WB	NB	NB	NB	NB	B271	B271	SB	SB	SB	SB	SB
Directions Served	R	L	T	T	R	T	T	L	T	T	R	R
Maximum Queue (ft)	462	225	1388	1388	400	1951	1963	118	439	439	378	354
Average Queue (ft)	103	176	1215	1194	208	1013	1017	51	217	222	183	198
95th Queue (ft)	383	285	1650	1676	514	2444	2451	107	386	385	327	332
Link Distance (ft)			1294	1294		1921	1921		1004	1004		
Upstream Blk Time (%)			41	40		22	22					
Queuing Penalty (veh)			0	0		0	0					
Storage Bay Dist (ft)	375	175			350			475			350	350
Storage Blk Time (%)	9	21	64	54	0				0	2	0	0
Queuing Penalty (veh)	40	96	111	147	0				0	14	1	1

Intersection: 360: US-26 WB NB Corn Pass Off-ramp & Cornelius Pass Rd

Movement	EB	B365	B366	WB	WB	NB	NB	NB	SB	SB
Directions Served	R	T	T	>	>	L	T	T	T	T
Maximum Queue (ft)	292	746	924	196	218	102	144	178	262	272
Average Queue (ft)	10	35	63	100	103	26	46	64	138	161
95th Queue (ft)	124	300	495	166	172	69	111	139	278	297
Link Distance (ft)	412	859	1128	1542	1542		725	725	141	141
Upstream Blk Time (%)	0	1	1						6	9
Queuing Penalty (veh)	0	0	0						37	53
Storage Bay Dist (ft)						325				
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 361: Cornelius Pass Rd &

Movement	SB	SB
Directions Served	T	T
Maximum Queue (ft)	162	174
Average Queue (ft)	19	21
95th Queue (ft)	98	102
Link Distance (ft)	740	740
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		1
Queuing Penalty (veh)		3

Intersection: 363: US-26 WB Corn Pass On-ramp &

Movement	NW
Directions Served	L
Maximum Queue (ft)	87
Average Queue (ft)	15
95th Queue (ft)	58
Link Distance (ft)	152
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 370: US-26 EB Corn Pass Off-ramp & Cornelius Pass Rd

Movement	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	T	TR	R	T	T	T
Maximum Queue (ft)	233	198	133	153	81	214	220	220
Average Queue (ft)	109	92	53	76	42	121	155	152
95th Queue (ft)	192	158	106	132	66	219	242	234
Link Distance (ft)		304	1073	1073	1073	115	115	115
Upstream Blk Time (%)						5	9	9
Queuing Penalty (veh)						43	72	71
Storage Bay Dist (ft)	200							
Storage Blk Time (%)	1	0						
Queuing Penalty (veh)	2	0						

Intersection: 371: Cornelius Pass Rd &

Movement	SB	SB	SB
Directions Served	T	T	TR
Maximum Queue (ft)	100	140	205
Average Queue (ft)	7	19	32
95th Queue (ft)	47	84	123
Link Distance (ft)	725	725	725
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 373: Int

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	124	131
Average Queue (ft)	53	78
95th Queue (ft)	92	114
Link Distance (ft)	895	895
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 376: US-26 EB Corn Pass Off-ramp &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 377: US-26 WB Corn Pass Off-ramp &

Movement	WB
Directions Served	>
Maximum Queue (ft)	31
Average Queue (ft)	2
95th Queue (ft)	20
Link Distance (ft)	365
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 379: Int

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	135	160
Average Queue (ft)	68	90
95th Queue (ft)	113	135
Link Distance (ft)	254	254
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 390: Wagon Way & Cornelius Pass Rd

Movement	EB	EB	WB	NB	NB	NB	NB	SB	SB	SB	B350	B350
Directions Served	LT	R	LR	L	L	T	TR	T	T	R	T	T
Maximum Queue (ft)	125	220	48	350	357	210	176	840	855	225	2031	2062
Average Queue (ft)	57	84	4	206	123	47	65	807	816	137	1378	1436
95th Queue (ft)	115	163	26	327	308	166	134	879	852	283	2329	2361
Link Distance (ft)		322	347			740	740	749	749		2324	2324
Upstream Blk Time (%)		0						22	39		1	1
Queuing Penalty (veh)		0						0	0		0	0
Storage Bay Dist (ft)	100			300	300					125		
Storage Blk Time (%)	4	6		4	1			51	50	0		
Queuing Penalty (veh)	5	3		22	3			0	126	1		

Network Summary

Network wide Queuing Penalty: 5194

Intersection: 30: US-26 WB JS Rd On-ramp & Jackson School Rd

Movement	WB	WB	B33	NB	NB
Directions Served	LT	R	T	L	T
Maximum Queue (ft)	2007	600	455	56	5
Average Queue (ft)	1957	553	392	18	0
95th Queue (ft)	2101	815	532	50	4
Link Distance (ft)	1895		387		631
Upstream Blk Time (%)	65		65		
Queuing Penalty (veh)	0		0		
Storage Bay Dist (ft)		575		375	
Storage Blk Time (%)	71	1			
Queuing Penalty (veh)	78	6			

Intersection: 40: US-26 EB JS Rd Off-ramp & Jackson School Rd

Movement	EB	NB	NB	B43	SB
Directions Served	LT	T	R	T	L
Maximum Queue (ft)	29	666	425	1536	59
Average Queue (ft)	6	587	399	1229	13
95th Queue (ft)	24	904	555	2127	41
Link Distance (ft)	1666	577		1484	
Upstream Blk Time (%)		34		32	
Queuing Penalty (veh)		0		0	
Storage Bay Dist (ft)			400		375
Storage Blk Time (%)		0	43		
Queuing Penalty (veh)		1	167		

Intersection: 41: US-26 EB JS Rd On-ramp & Jackson School

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	992	1156
Average Queue (ft)	952	1120
95th Queue (ft)	1002	1209
Link Distance (ft)	1044	1044
Upstream Blk Time (%)		66
Queuing Penalty (veh)		259
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 200: Schaaf Rd & Helvetia Rd

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	125	30
Average Queue (ft)	53	5
95th Queue (ft)	102	23
Link Distance (ft)	1680	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		250
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 210: Groveland Dr & Helvetia Rd

Movement	EB	WB	NB	SB
Directions Served	LR	LR	LTR	LTR
Maximum Queue (ft)	31	1139	153	197
Average Queue (ft)	6	769	15	16
95th Queue (ft)	25	1313	83	98
Link Distance (ft)	382	1665	218	1387
Upstream Blk Time (%)			0	
Queuing Penalty (veh)			1	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 220: US-26 WB Helvetia On-ramp & Helvetia Rd

Movement	WB	WB	WB	B221	B222	NB	NB	SB	SB
Directions Served	L	LT	R	T	T	L	T	T	TR
Maximum Queue (ft)	680	681	50	732	1044	324	626	150	156
Average Queue (ft)	662	666	43	713	919	192	356	79	89
95th Queue (ft)	702	699	57	857	1437	329	611	132	142
Link Distance (ft)	604	604		661	1025		606	218	218
Upstream Blk Time (%)	33	39		47	45		1		
Queuing Penalty (veh)	0	0		0	0		22		
Storage Bay Dist (ft)			25			150			
Storage Blk Time (%)		72	39			9	20		
Queuing Penalty (veh)		94	147			107	70		

Intersection: 230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy

Movement	EB	EB	B234	NB	NB	SB	SB	SB
Directions Served	LT	R	T	T	R	L	T	T
Maximum Queue (ft)	1177	20	1685	183	76	64	11	16
Average Queue (ft)	857	6	641	68	4	14	1	1
95th Queue (ft)	1526	25	1947	189	48	42	12	12
Link Distance (ft)	1110		2410	168	168		606	606
Upstream Blk Time (%)	55		3	2	0			
Queuing Penalty (veh)	0		0	19	0			
Storage Bay Dist (ft)		300				175		
Storage Blk Time (%)	79							
Queuing Penalty (veh)	43							

Intersection: 231: US-26 EB Helvetia On-ramp & Brookwood

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	288	297
Average Queue (ft)	143	165
95th Queue (ft)	270	288
Link Distance (ft)	991	991
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 240: Meek Rd & Brookwood Pkwy

Movement	EB	B242	WB	NB	NB	NB	SB	SB
Directions Served	LTR	T	LTR	L	T	TR	LT	TR
Maximum Queue (ft)	620	3165	34	130	257	83	44	55
Average Queue (ft)	611	3155	4	39	30	4	2	5
95th Queue (ft)	626	3172	19	88	151	41	25	27
Link Distance (ft)	549	3146	241		1904	1904	168	168
Upstream Blk Time (%)	99	99						
Queuing Penalty (veh)	0	0						
Storage Bay Dist (ft)				100				
Storage Blk Time (%)				0	1			
Queuing Penalty (veh)				1	1			

Intersection: 250: Huffman St & Brookwood Pkwy

Movement	EB	EB	B2	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	T	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	440	4011	649	36	215	125	1122	1121	124	336	409
Average Queue (ft)	430	3591	426	4	88	62	951	935	54	192	227
95th Queue (ft)	479	4972	909	22	165	126	1328	1342	116	331	370
Link Distance (ft)		3943	628		3652		1126	1126		1904	1904
Upstream Blk Time (%)		23	19				19	17			
Queuing Penalty (veh)		0	0				142	129			
Storage Bay Dist (ft)	350			350		100			100		
Storage Blk Time (%)	37	15				7	53		4	21	
Queuing Penalty (veh)	219	83				53	32		27	15	

Intersection: 260: Genentech & Brookwood Pkwy

Movement	EB	WB	NB	NB	SB	SB
Directions Served	R	R	T	TR	T	T
Maximum Queue (ft)	47	54	507	535	80	78
Average Queue (ft)	18	14	210	203	18	14
95th Queue (ft)	41	44	688	683	132	117
Link Distance (ft)		334	1004	1004	1126	1126
Upstream Blk Time (%)			0	0		
Queuing Penalty (veh)			0	1		
Storage Bay Dist (ft)						
Storage Blk Time (%)						0
Queuing Penalty (veh)						0

Intersection: 261: Genentech &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 270: Evergreen Pkwy & Brookwood Pkwy

Movement	EB	EB	EB	EB	B1	B1	WB	WB	WB	WB	WB	NB
Directions Served	L	L	T	TR	T	T	L	L	T	T	R	L
Maximum Queue (ft)	525	575	4297	4297	1995	1989	297	328	346	363	143	225
Average Queue (ft)	522	574	3990	3868	1362	1358	170	186	180	190	24	116
95th Queue (ft)	531	575	5165	5349	2740	2749	299	324	319	302	91	237
Link Distance (ft)			4215	4215	1951	1951			4284	4284		
Upstream Blk Time (%)			65	38	38	39						
Queuing Penalty (veh)			0	0	0	0						
Storage Bay Dist (ft)	475	475					250	250			375	175
Storage Blk Time (%)	67	87	1				8	11	1			1
Queuing Penalty (veh)	351	457	7				31	41	2			4

Intersection: 270: Evergreen Pkwy & Brookwood Pkwy

Movement	NB	NB	NB	B271	B271	SB	SB	SB	SB	SB
Directions Served	T	T	R	T	T	L	T	T	R	R
Maximum Queue (ft)	1017	1051	400	16	17	490	684	705	347	118
Average Queue (ft)	622	638	168	1	2	297	433	423	42	31
95th Queue (ft)	1113	1146	473	15	22	583	825	777	208	100
Link Distance (ft)	1294	1294		1921	1921		1004	1004		
Upstream Blk Time (%)	0	1					6	0		
Queuing Penalty (veh)	0	0					39	1		
Storage Bay Dist (ft)			350			475			350	350
Storage Blk Time (%)	58	34				18	1	12		
Queuing Penalty (veh)	55	67				80	2	37		

Intersection: 360: US-26 WB NB Corn Pass Off-ramp & Cornelius Pass Rd

Movement	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	R	>	>	L	T	T	T	T
Maximum Queue (ft)	98	168	188	350	853	824	278	315
Average Queue (ft)	5	90	105	336	731	678	241	266
95th Queue (ft)	61	146	166	407	1089	1041	319	288
Link Distance (ft)	412	1542	1542		725	725	141	141
Upstream Blk Time (%)					36	9	22	48
Queuing Penalty (veh)					368	89	167	368
Storage Bay Dist (ft)				325				
Storage Blk Time (%)				64	1			
Queuing Penalty (veh)				581	1			

Intersection: 361: Cornelius Pass Rd &

Movement	NB	NB	SB	SB	SB
Directions Served	T	T	T	T	R
Maximum Queue (ft)	206	249	826	783	200
Average Queue (ft)	27	38	375	508	83
95th Queue (ft)	138	175	821	887	244
Link Distance (ft)	141	141	740	740	
Upstream Blk Time (%)	1	2	1	5	
Queuing Penalty (veh)	13	25	7	44	
Storage Bay Dist (ft)					75
Storage Blk Time (%)				42	
Queuing Penalty (veh)				82	

Intersection: 363: US-26 WB Corn Pass On-ramp &

Movement	WB	NW
Directions Served	T	L
Maximum Queue (ft)	5	132
Average Queue (ft)	0	50
95th Queue (ft)	4	114
Link Distance (ft)	197	152
Upstream Blk Time (%)		0
Queuing Penalty (veh)		0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 370: US-26 EB Corn Pass Off-ramp & Cornelius Pass Rd

Movement	EB	EB	NB	NB	NB	B382	B382	B382	SB	SB	SB
Directions Served	LT	R	T	TR	R	T	T	T	T	T	T
Maximum Queue (ft)	271	338	1164	1166	1149	3108	3120	3100	199	215	196
Average Queue (ft)	152	77	892	916	848	1351	1377	1361	80	85	82
95th Queue (ft)	275	294	1510	1481	1524	3696	3733	3751	158	160	150
Link Distance (ft)		287	1071	1071	1071	3799	3799	3799	116	116	116
Upstream Blk Time (%)	4	6	23	31	14	4	4	4	2	2	1
Queuing Penalty (veh)	0	19	0	0	0	0	0	0	10	10	8
Storage Bay Dist (ft)	200										
Storage Blk Time (%)	14	2									
Queuing Penalty (veh)	18	4									

Intersection: 371: Cornelius Pass Rd &

Movement	NB	NB	SB	SB	SB
Directions Served	T	T	T	T	TR
Maximum Queue (ft)	217	202	148	807	489
Average Queue (ft)	145	110	12	136	108
95th Queue (ft)	284	242	140	598	387
Link Distance (ft)	116	116	725	725	725
Upstream Blk Time (%)	22	8		1	
Queuing Penalty (veh)	232	78		4	
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 373: CP NB &

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	404	432
Average Queue (ft)	150	180
95th Queue (ft)	323	358
Link Distance (ft)	882	882
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 376: US-26 EB Corn Pass Off-ramp &

Movement	EB	WB
Directions Served	R	T
Maximum Queue (ft)	156	382
Average Queue (ft)	19	167
95th Queue (ft)	127	447
Link Distance (ft)	365	255
Upstream Blk Time (%)	0	20
Queuing Penalty (veh)	1	140
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 377: US-26 WB Corn Pass Off-ramp &

Movement	WB	WB
Directions Served	>	>
Maximum Queue (ft)	452	441
Average Queue (ft)	310	313
95th Queue (ft)	567	551
Link Distance (ft)	365	365
Upstream Blk Time (%)	25	24
Queuing Penalty (veh)	94	89
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 379: CP SB &

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	369	359
Average Queue (ft)	325	320
95th Queue (ft)	371	348
Link Distance (ft)	254	254
Upstream Blk Time (%)	78	84
Queuing Penalty (veh)	291	313
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 382: Bend

Movement	SB
Directions Served	T
Maximum Queue (ft)	703
Average Queue (ft)	64
95th Queue (ft)	501
Link Distance (ft)	1071
Upstream Blk Time (%)	0
Queuing Penalty (veh)	1
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 390: Wagon Way & Cornelius Pass Rd

Movement	EB	EB	B393	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	T	LTR	L	L	T	TR	L	T	T	R
Maximum Queue (ft)	125	425	846	72	161	464	862	854	85	779	802	225
Average Queue (ft)	108	398	822	10	90	161	477	522	4	388	442	82
95th Queue (ft)	158	408	835	41	154	398	898	931	22	711	759	238
Link Distance (ft)		322	801	354			740	740		749	749	
Upstream Blk Time (%)		55	59				3	5		1	4	
Queuing Penalty (veh)		0	0				33	54		0	0	
Storage Bay Dist (ft)	100				300	300			100			125
Storage Blk Time (%)	21	51					14			39	48	
Queuing Penalty (veh)	144	123					41			1	44	

Intersection: 390: Wagon Way & Cornelius Pass Rd

Movement	B350	B350
Directions Served	T	T
Maximum Queue (ft)	30	128
Average Queue (ft)	3	12
95th Queue (ft)	36	83
Link Distance (ft)	1296	1296
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 6386

Appendix D. Freeway Operations Analysis

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Eastbound
Agency or Company	David Evans & Associates, Inc.	Junction	Cornelius Pass Rd Interchange
Date Performed	3-30-12	Jurisdiction	ODOT
Analysis Time Period	AM Peak	Analysis Year	2035 Baseline

Project Description Eastbound Off-ramp to Cornelius Pass Rd

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2795	0.95	Level	4	0	0.980	1.00	3001
Ramp	405	0.95	Level	4	0	0.980	1.00	435
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)
P_{FM} = using Equation (Exhibit 25-5)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)
LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)
S_R = mph (Exhibit 25-19)
S_0 = mph (Exhibit 25-19)
S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = 1.000 using Equation (Exhibit 25-12)
V_{12} = 3001 pc/h
V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3001	Exhibit 25-14	4600	No
$V_{FO} = V_F - V_R$	2566	Exhibit 25-14	4600	No
V_R	435	Exhibit 25-3	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3001	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 16.6 (pc/mi/ln)
LOS = B (Exhibit 25-4)

Speed Determination

D_s = 0.467 (Exhibit 25-19)
S_R = 51.6 mph (Exhibit 25-19)
S_0 = N/A mph (Exhibit 25-19)
S = 51.6 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Eastbound
Agency or Company	David Evans & Associates, Inc.	Junction	Cornelius Pass Rd Interchange
Date Performed	3-30-12	Jurisdiction	ODOT
Analysis Time Period	AM Peak Period	Analysis Year	2035 Baseline

Project Description: Northbound to Eastbound On-ramp from Cornelius Pass Rd

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2735	0.95	Level	4	0	0.980	1.00	2937
Ramp	545	0.95	Level	4	0	0.980	1.00	585
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)
P_{FM} = 0.591 using Equation (Exhibit 25-5)
V_{12} = 1737 pc/h
V_3 or V_{av34} 1200 pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3522	Exhibit 25-7		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2322	Exhibit 25-7	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 20.2 (pc/mi/ln)
LOS = C (Exhibit 25-4)

Speed Determination

M_S = 0.326 (Exibit 25-19)
S_R = 54.1 mph (Exhibit 25-19)
S_0 = 57.5 mph (Exhibit 25-19)
S = 55.2 mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = using Equation (Exhibit 25-12)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 25-14		
$V_{FO} = V_F - V_R$		Exhibit 25-14		
V_R		Exhibit 25-3		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 25-14		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)
LOS = (Exhibit 25-4)

Speed Determination

D_s = (Exhibit 25-19)
S_R = mph (Exhibit 25-19)
S_0 = mph (Exhibit 25-19)
S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Eastbound
Agency or Company	David Evans & Associates, Inc.	Junction	Cornelius Pass Rd Interchange
Date Performed	3-30-12	Jurisdiction	ODOT
Analysis Time Period	AM Peak Period	Analysis Year	2035 Baseline

Project Description: Southbound to Eastbound On-ramp from Cornelius Pass Rd

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2390	0.95	Level	4	0	0.980	1.00	2566
Ramp	345	0.95	Level	4	0	0.980	1.00	370
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.585 using Equation (Exhibit 25-5)

V_{12} = 1500 pc/h

V_3 or V_{av34} 1066 pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2936	Exhibit 25-7		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1870	Exhibit 25-7	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 18.3 (pc/mi/ln)

LOS = B (Exhibit 25-4)

Speed Determination

M_S = 0.329 (Exibit 25-19)

S_R = 54.1 mph (Exhibit 25-19)

S_0 = 58.0 mph (Exhibit 25-19)

S = 55.4 mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-12)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 25-14		
$V_{FO} = V_F - V_R$		Exhibit 25-14		
V_R		Exhibit 25-3		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 25-14		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

D_s = (Exhibit 25-19)

S_R = mph (Exhibit 25-19)

S_0 = mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Cornelius Pass Rd Interchange
Date Performed	3-30-12	Jurisdiction	ODOT
Analysis Time Period	AM Peak	Analysis Year	2035 Baseline

Project Description: Westbound Off-ramp to northbound Cornelius Pass Rd

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	5785	0.95	Level	4	0	0.980	1.00	6211
Ramp	615	0.95	Level	4	0	0.980	1.00	660
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)
P_{FM} = using Equation (Exhibit 25-5)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)
LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)
S_R = mph (Exhibit 25-19)
S_0 = mph (Exhibit 25-19)
S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = 0.574 using Equation (Exhibit 25-12)
V_{12} = 3848 pc/h
V_3 or V_{av34} 2363 pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	6211	Exhibit 25-14	6900	No
$V_{FO} = V_F - V_R$	5551	Exhibit 25-14	6900	No
V_R	660	Exhibit 25-3	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3848	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 23.8 (pc/mi/ln)
LOS = C (Exhibit 25-4)

Speed Determination

D_s = 0.487 (Exhibit 25-19)
S_R = 51.2 mph (Exhibit 25-19)
S_0 = 60.5 mph (Exhibit 25-19)
S = 54.4 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Cornelius Pass Rd Interchange
Date Performed	3-30-12	Jurisdiction	ODOT
Analysis Time Period	AM Peak	Analysis Year	2035 Baseline

Project Description: Westbound LOOP Off-ramp to southbound Cornelius Pass Rd

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☐ Yes ☐ On		☐ Yes ☐ On
☑ No ☐ Off		☑ No ☐ Off
L_{up} = ft	S_{FF} = 60.0 mph S_{FR} = 35.0 mph	L_{down} = ft
V_u = veh/h	Sketch (show lanes, L_A, L_D, V_R, V_f)	V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	5170	0.95	Level	4	0	0.980	1.00	5551
Ramp	1645	0.95	Level	4	0	0.980	1.00	1766
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = using Equation (Exhibit 25-5)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)

S_R = mph (Exhibit 25-19)

S_0 = mph (Exhibit 25-19)

S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.540 using Equation (Exhibit 25-12)

V_{12} = 3810 pc/h

V_3 or V_{av34} 1741 pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	5551	Exhibit 25-14	6900	No
$V_{FO} = V_F - V_R$	3785	Exhibit 25-14	6900	No
V_R	1766	Exhibit 25-3	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3810	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 23.5 (pc/mi/ln)

LOS = C (Exhibit 25-4)

Speed Determination

D_s = 0.587 (Exhibit 25-19)

S_R = 49.4 mph (Exhibit 25-19)

S_0 = 62.9 mph (Exhibit 25-19)

S = 53.0 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Cornelius Pass Rd Interchange
Date Performed	3-30-12	Jurisdiction	ODOT
Analysis Time Period	AM Peak Period	Analysis Year	2035 Baseline

Project Description Westbound On-ramp from Cornelius Pass Rd

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3525	0.95	Level	4	0	0.980	1.00	3785
Ramp	400	0.95	Level	4	0	0.980	1.00	429
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 using Equation (Exhibit 25-5)

V_{12} = 3785 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4214	Exhibit 25-7		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4214	Exhibit 25-7	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 35.3 (pc/mi/ln)

LOS = E (Exhibit 25-4)

Speed Determination

M_S = 0.553 (Exibit 25-19)

S_R= 50.0 mph (Exhibit 25-19)

S_0= N/A mph (Exhibit 25-19)

S = 50.0 mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-12)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 25-14		
$V_{FO} = V_F - V_R$		Exhibit 25-14		
V_R		Exhibit 25-3		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 25-14		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

D_s = (Exhibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Eastbound
Agency or Company	David Evans & Associates, Inc.	Junction	Brookwood Interchange
Date Performed	3-30-12	Jurisdiction	ODOT
Analysis Time Period	AM Peak	Analysis Year	2035 Baseline

Project Description Eastbound Off-ramp to Brookwood

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2670	0.95	Level	4	0	0.980	1.00	2867
Ramp	420	0.95	Level	4	0	0.980	1.00	451
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)
P_{FM} = using Equation (Exhibit 25-5)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)
LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)
S_R = mph (Exhibit 25-19)
S_0 = mph (Exhibit 25-19)
S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = 1.000 using Equation (Exhibit 25-12)
V_{12} = 2867 pc/h
V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2867	Exhibit 25-14	4600	No
$V_{FO} = V_F - V_R$	2416	Exhibit 25-14	4600	No
V_R	451	Exhibit 25-3	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2867	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 15.4 (pc/mi/ln)
LOS = B (Exhibit 25-4)

Speed Determination

D_s = 0.469 (Exhibit 25-19)
S_R = 51.6 mph (Exhibit 25-19)
S_0 = N/A mph (Exhibit 25-19)
S = 51.6 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Eastbound
Agency or Company	David Evans & Associates, Inc.	Junction	Brookwood Interchange
Date Performed	3-30-12	Jurisdiction	ODOT
Analysis Time Period	AM Peak Period	Analysis Year	2035 Baseline

Project Description: Eastbound On-ramp from Brookwood

Inputs

Upstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2250	0.95	Level	4	0	0.980	1.00	2416
Ramp	545	0.95	Level	4	0	0.980	1.00	585
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 using Equation (Exhibit 25-5)

V_{12} = 2416 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3001	Exhibit 25-7		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3001	Exhibit 25-7	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 26.0 (pc/mi/ln)

LOS = C (Exhibit 25-4)

Speed Determination

M_S = 0.371 (Exibit 25-19)

S_R = 53.3 mph (Exhibit 25-19)

S_0 = N/A mph (Exhibit 25-19)

S = 53.3 mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-12)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 25-14		
$V_{FO} = V_F - V_R$		Exhibit 25-14		
V_R		Exhibit 25-3		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 25-14		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

D_s = (Exhibit 25-19)

S_R = mph (Exhibit 25-19)

S_0 = mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Brookwood Interchange
Date Performed	3-30-12	Jurisdiction	ODOT
Analysis Time Period	AM Peak	Analysis Year	2035 Baseline

Project Description Westbound Off-ramp to Brookwood

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3925	0.95	Level	4	0	0.980	1.00	4214
Ramp	2030	0.95	Level	4	0	0.980	1.00	2180
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)
P_{FM} = using Equation (Exhibit 25-5)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)
LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)
S_R = mph (Exhibit 25-19)
S_0 = mph (Exhibit 25-19)
S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = 1.000 using Equation (Exhibit 25-12)
V_{12} = 4214 pc/h
V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4214	Exhibit 25-14	4600	No
$V_{FO} = V_F - V_R$	2034	Exhibit 25-14	4600	No
V_R	2180	Exhibit 25-3	2000	Yes

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4214	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 27.0 (pc/mi/ln)
LOS = F (Exhibit 25-4)

Speed Determination

D_s = 0.624 (Exhibit 25-19)
S_R = 48.8 mph (Exhibit 25-19)
S_0 = N/A mph (Exhibit 25-19)
S = 48.8 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Brookwood Interchange
Date Performed	3-30-12	Jurisdiction	ODOT
Analysis Time Period	AM Peak Period	Analysis Year	2035 Baseline

Project Description: Westbound On-ramp from Brookwood

Inputs

Upstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	1895	0.95	Level	4	0	0.980	1.00	2035
Ramp	35	0.95	Level	4	0	0.980	1.00	38
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 using Equation (Exhibit 25-5)

V_{12} = 2035 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2073	Exhibit 25-7		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2073	Exhibit 25-7	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 19.1 (pc/mi/ln)

LOS = B (Exhibit 25-4)

Speed Determination

M_S = 0.323 (Exibit 25-19)

S_R = 54.2 mph (Exhibit 25-19)

S_0 = N/A mph (Exhibit 25-19)

S = 54.2 mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-12)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 25-14		
$V_{FO} = V_F - V_R$		Exhibit 25-14		
V_R		Exhibit 25-3		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 25-14		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

D_s = (Exhibit 25-19)

S_R = mph (Exhibit 25-19)

S_0 = mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Eastbound
Agency or Company	David Evans & Associates, Inc.	Junction	Jackson School Interchange
Date Performed	3-30-12	Jurisdiction	ODOT
Analysis Time Period	AM Peak	Analysis Year	2035 Baseline

Project Description Eastbound Off-ramp to Jackson School Rd

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2190	0.95	Level	4	0	0.980	1.00	2351
Ramp	165	0.95	Level	4	0	0.980	1.00	177
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)
P_{FM} = using Equation (Exhibit 25-5)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)
LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)
S_R = mph (Exhibit 25-19)
S_0 = mph (Exhibit 25-19)
S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = 1.000 using Equation (Exhibit 25-12)
V_{12} = 2351 pc/h
V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2351	Exhibit 25-14	4600	No
$V_{FO} = V_F - V_R$	2174	Exhibit 25-14	4600	No
V_R	177	Exhibit 25-3	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2351	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 11.0 (pc/mi/ln)
LOS = B (Exhibit 25-4)

Speed Determination

D_s = 0.444 (Exhibit 25-19)
S_R = 52.0 mph (Exhibit 25-19)
S_0 = N/A mph (Exhibit 25-19)
S = 52.0 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Eastbound
Agency or Company	David Evans & Associates, Inc.	Junction	Jackson School Rd Interchange
Date Performed	3-30-12	Jurisdiction	ODOT
Analysis Time Period	AM Peak Period	Analysis Year	2035 Baseline

Project Description: Eastbound On-ramp from Jackson School Rd

Inputs

Upstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2025	0.95	Level	4	0	0.980	1.00	2174
Ramp	645	0.95	Level	4	0	0.980	1.00	693
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 using Equation (Exhibit 25-5)

V_{12} = 2174 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2867	Exhibit 25-7		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2867	Exhibit 25-7	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 24.4 (pc/mi/ln)

LOS = C (Exhibit 25-4)

Speed Determination

M_S = 0.355 (Exibit 25-19)

S_R = 53.6 mph (Exhibit 25-19)

S_0 = N/A mph (Exhibit 25-19)

S = 53.6 mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-12)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 25-14		
$V_{FO} = V_F - V_R$		Exhibit 25-14		
V_R		Exhibit 25-3		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 25-14		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

D_s = (Exhibit 25-19)

S_R = mph (Exhibit 25-19)

S_0 = mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Jackson School Rd Interchange
Date Performed	3-30-12	Jurisdiction	ODOT
Analysis Time Period	AM Peak	Analysis Year	2035 Baseline

Project Description: Westbound Off-ramp to Jackson School Rd

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	1930	0.95	Level	4	0	0.980	1.00	2072
Ramp	580	0.95	Level	4	0	0.980	1.00	623
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)
P_{FM} = using Equation (Exhibit 25-5)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)
LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)
S_R = mph (Exhibit 25-19)
S_0 = mph (Exhibit 25-19)
S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = 1.000 using Equation (Exhibit 25-12)
V_{12} = 2072 pc/h
V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2072	Exhibit 25-14	4600	No
$V_{FO} = V_F - V_R$	1449	Exhibit 25-14	4600	No
V_R	623	Exhibit 25-3	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2072	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 8.6 (pc/mi/ln)
LOS = A (Exhibit 25-4)

Speed Determination

D_s = 0.484 (Exhibit 25-19)
S_R = 51.3 mph (Exhibit 25-19)
S_0 = N/A mph (Exhibit 25-19)
S = 51.3 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Jackson School Rd Interchange
Date Performed	3-30-12	Jurisdiction	ODOT
Analysis Time Period	AM Peak Period	Analysis Year	2035 Baseline

Project Description Westbound On-ramp from Jackson School Rd

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1350	0.95	Level	4	0	0.980	1.00	1449
Ramp	50	0.95	Level	4	0	0.980	1.00	54
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 using Equation (Exhibit 25-5)

V_{12} = 1449 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	1503	Exhibit 25-7		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1503	Exhibit 25-7	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 14.0 (pc/mi/ln)

LOS = B (Exhibit 25-4)

Speed Determination

M_S = 0.304 (Exibit 25-19)

S_R = 54.5 mph (Exhibit 25-19)

S_0 = N/A mph (Exhibit 25-19)

S = 54.5 mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-12)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 25-14		
$V_{FO} = V_F - V_R$		Exhibit 25-14		
V_R		Exhibit 25-3		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 25-14		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

D_s = (Exhibit 25-19)

S_R = mph (Exhibit 25-19)

S_0 = mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Eastbound
Agency or Company	David Evans & Associates, Inc.	Junction	Cornelius Pass Rd Interchange
Date Performed	3-30-12	Jurisdiction	ODOT
Analysis Time Period	PM Peak	Analysis Year	2035 Baseline

Project Description Eastbound Off-ramp to Cornelius Pass Rd

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3800	0.95	Level	1	0	0.995	1.00	4020
Ramp	310	0.96	Level	1	0	0.995	1.00	325
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)
P_{FM} = using Equation (Exhibit 25-5)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)
LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)
S_R = mph (Exhibit 25-19)
S_0 = mph (Exhibit 25-19)
S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = 1.000 using Equation (Exhibit 25-12)
V_{12} = 4020 pc/h
V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4020	Exhibit 25-14	4600	No
$V_{FO} = V_F - V_R$	3695	Exhibit 25-14	4600	No
V_R	325	Exhibit 25-3	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4020	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 25.3 (pc/mi/ln)
LOS = C (Exhibit 25-4)

Speed Determination

D_s = 0.457 (Exhibit 25-19)
S_R = 51.8 mph (Exhibit 25-19)
S_0 = N/A mph (Exhibit 25-19)
S = 51.8 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Eastbound
Agency or Company	David Evans & Associates, Inc.	Junction	Cornelius Pass Rd Interchange
Date Performed	3-30-12	Jurisdiction	ODOT
Analysis Time Period	PM Peak Period	Analysis Year	2035 Baseline

Project Description: Northbound to Eastbound On-Ramp from Cornelius Pass Rd

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4235	0.95	Level	1	0	0.995	1.00	4480
Ramp	1085	0.96	Level	1	0	0.995	1.00	1136
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.591 using Equation (Exhibit 25-5)

V_{12} = 2650 pc/h

V_3 or V_{av34} 1830 pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	5616	Exhibit 25-7		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3786	Exhibit 25-7	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 31.3 (pc/mi/ln)

LOS = D (Exhibit 25-4)

Speed Determination

M_S = 0.458 (Exibit 25-19)

S_R = 51.8 mph (Exhibit 25-19)

S_0 = 55.2 mph (Exhibit 25-19)

S = 52.8 mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-12)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 25-14		
$V_{FO} = V_F - V_R$		Exhibit 25-14		
V_R		Exhibit 25-3		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 25-14		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

D_s = (Exhibit 25-19)

S_R = mph (Exhibit 25-19)

S_0 = mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Eastbound
Agency or Company	David Evans & Associates, Inc.	Junction	Cornelius Pass Rd Interchange
Date Performed	3-30-12	Jurisdiction	ODOT
Analysis Time Period	PM Peak Period	Analysis Year	2035 Baseline
Project Description	Southbound to Eastbound On-Ramp from Cornelius Pass Rd		

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3490	0.95	Level	1	0	0.995	1.00	3692
Ramp	745	0.96	Level	1	0	0.995	1.00	780
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)
P_{FM} = 0.591 using Equation (Exhibit 25-5)
V_{12} = 2184 pc/h
V_3 or V_{av34} 1508 pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4472	Exhibit 25-7		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2964	Exhibit 25-7	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 25.1 (pc/mi/ln)
LOS = C (Exhibit 25-4)

Speed Determination

M_S = 0.362 (Exibit 25-19)
S_R = 53.5 mph (Exhibit 25-19)
S_0 = 56.4 mph (Exhibit 25-19)
S = 54.4 mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = using Equation (Exhibit 25-12)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 25-14		
$V_{FO} = V_F - V_R$		Exhibit 25-14		
V_R		Exhibit 25-3		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 25-14		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)
LOS = (Exhibit 25-4)

Speed Determination

D_s = (Exhibit 25-19)
S_R = mph (Exhibit 25-19)
S_0 = mph (Exhibit 25-19)
S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Cornelius Pass Rd Interchange
Date Performed	3-30-12	Jurisdiction	ODOT
Analysis Time Period	PM Peak	Analysis Year	2035 Baseline

Project Description Westbound Off-ramp to northbound Cornelius Pass Rd

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4375	0.95	Level	1	0	0.995	1.00	4628
Ramp	340	0.95	Level	3	0	0.985	1.00	363
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)
P_{FM} = using Equation (Exhibit 25-5)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)
LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)
S_R = mph (Exhibit 25-19)
S_0 = mph (Exhibit 25-19)
S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = 0.628 using Equation (Exhibit 25-12)
V_{12} = 3040 pc/h
V_3 or V_{av34} 1588 pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4628	Exhibit 25-14	6900	No
$V_{FO} = V_F - V_R$	4265	Exhibit 25-14	6900	No
V_R	363	Exhibit 25-3	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3040	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 16.9 (pc/mi/ln)
LOS = B (Exhibit 25-4)

Speed Determination

D_s = 0.461 (Exhibit 25-19)
S_R = 51.7 mph (Exhibit 25-19)
S_0 = 63.5 mph (Exhibit 25-19)
S = 55.2 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Cornelius Pass Rd Interchange
Date Performed	3-30-12	Jurisdiction	ODOT
Analysis Time Period	PM Peak	Analysis Year	2035 Baseline

Project Description: Westbound LOOP Off-ramp to southbound Cornelius Pass Rd

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☐ Yes ☐ On		☐ Yes ☐ On
☑ No ☐ Off		☑ No ☐ Off
L_{up} = ft	S_{FF} = 60.0 mph S_{FR} = 35.0 mph	L_{down} = ft
V_u = veh/h	Sketch (show lanes, L_A, L_D, V_R, V_f)	V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4035	0.95	Level	1	0	0.995	1.00	4269
Ramp	790	0.95	Level	3	0	0.985	1.00	844
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = using Equation (Exhibit 25-5)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)

S_R = mph (Exhibit 25-19)

S_0 = mph (Exhibit 25-19)

S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.614 using Equation (Exhibit 25-12)

V_{12} = 2948 pc/h

V_3 or V_{av34} 1321 pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4269	Exhibit 25-14	6900	No
$V_{FO} = V_F - V_R$	3425	Exhibit 25-14	6900	No
V_R	844	Exhibit 25-3	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2948	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 16.1 (pc/mi/ln)

LOS = B (Exhibit 25-4)

Speed Determination

D_s = 0.504 (Exhibit 25-19)

S_R = 50.9 mph (Exhibit 25-19)

S_0 = 64.6 mph (Exhibit 25-19)

S = 54.5 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Cornelius Pass Rd Interchange
Date Performed	3-30-12	Jurisdiction	ODOT
Analysis Time Period	PM Peak Period	Analysis Year	2035 Baseline

Project Description Westbound On-ramp from Cornelius Pass Rd

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3245	0.95	Level	1	0	0.995	1.00	3433
Ramp	455	0.95	Level	3	0	0.985	1.00	486
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)
P_{FM} = 1.000 using Equation (Exhibit 25-5)
V_{12} = 3433 pc/h
V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes,V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3919	Exhibit 25-7		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3919	Exhibit 25-7	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 32.7 (pc/mi/ln)
LOS = D (Exhibit 25-4)

Speed Determination

M_S = 0.482 (Exibit 25-19)
S_R= 51.3 mph (Exhibit 25-19)
S_0= N/A mph (Exhibit 25-19)
S = 51.3 mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = using Equation (Exhibit 25-12)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes,V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 25-14		
$V_{FO} = V_F - V_R$		Exhibit 25-14		
V_R		Exhibit 25-3		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 25-14		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)
LOS = (Exhibit 25-4)

Speed Determination

D_s = (Exhibit 25-19)
S_R= mph (Exhibit 25-19)
S_0= mph (Exhibit 25-19)
S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Eastbound
Agency or Company	David Evans & Associates, Inc.	Junction	Brookwood Interchange
Date Performed	3-30-12	Jurisdiction	ODOT
Analysis Time Period	PM Peak	Analysis Year	2035 Baseline

Project Description Eastbound - Off-ramp to Brookwood

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph
Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2950	0.95	Level	1	0	0.995	1.00	3121
Ramp	120	0.95	Level	1	0	0.995	1.00	127
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)
P_{FM} = using Equation (Exhibit 25-5)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)
LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)
S_R = mph (Exhibit 25-19)
S_0 = mph (Exhibit 25-19)
S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = 1.000 using Equation (Exhibit 25-12)
V_{12} = 3121 pc/h
V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3121	Exhibit 25-14	4600	No
$V_{FO} = V_F - V_R$	2994	Exhibit 25-14	4600	No
V_R	127	Exhibit 25-3	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3121	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 17.6 (pc/mi/ln)
LOS = B (Exhibit 25-4)

Speed Determination

D_s = 0.439 (Exhibit 25-19)
S_R = 52.1 mph (Exhibit 25-19)
S_0 = N/A mph (Exhibit 25-19)
S = 52.1 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Eastbound
Agency or Company	David Evans & Associates, Inc.	Junction	Brookwood Interchange
Date Performed	3-30-12	Jurisdiction	ODOT
Analysis Time Period	PM Peak Period	Analysis Year	2035 Baseline

Project Description: Eastbound On-ramp from Brookwood

Inputs

Upstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2830	0.95	Level	1	0	0.995	1.00	2994
Ramp	800	0.95	Level	1	0	0.995	1.00	846
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 using Equation (Exhibit 25-5)

V_{12} = 2994 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3840	Exhibit 25-7		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3840	Exhibit 25-7	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 32.5 (pc/mi/ln)

LOS = D (Exhibit 25-4)

Speed Determination

M_S = 0.474 (Exibit 25-19)

S_R = 51.5 mph (Exhibit 25-19)

S_0 = N/A mph (Exhibit 25-19)

S = 51.5 mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-12)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 25-14		
$V_{FO} = V_F - V_R$		Exhibit 25-14		
V_R		Exhibit 25-3		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 25-14		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

D_s = (Exhibit 25-19)

S_R = mph (Exhibit 25-19)

S_0 = mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Brookwood Interchange
Date Performed	3-30-12	Jurisdiction	ODOT
Analysis Time Period	PM Peak	Analysis Year	2035 Baseline

Project Description Westbound Off-ramp to Brookwood

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph
Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3700	0.95	Level	1	0	0.995	1.00	3914
Ramp	885	0.95	Level	3	0	0.985	1.00	946
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)
P_{FM} = using Equation (Exhibit 25-5)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)
LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)
S_R = mph (Exhibit 25-19)
S_0 = mph (Exhibit 25-19)
S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = 1.000 using Equation (Exhibit 25-12)
V_{12} = 3914 pc/h
V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3914	Exhibit 25-14	4600	No
$V_{FO} = V_F - V_R$	2968	Exhibit 25-14	4600	No
V_R	946	Exhibit 25-3	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3914	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 24.4 (pc/mi/ln)
LOS = C (Exhibit 25-4)

Speed Determination

D_s = 0.513 (Exhibit 25-19)
S_R = 50.8 mph (Exhibit 25-19)
S_0 = N/A mph (Exhibit 25-19)
S = 50.8 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Brookwood Interchange
Date Performed	3-30-12	Jurisdiction	ODOT
Analysis Time Period	PM Peak Period	Analysis Year	2035 Baseline

Project Description: Westbound On-ramp from Brookwood

Inputs

Upstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2815	0.95	Level	1	0	0.995	1.00	2978
Ramp	475	0.95	Level	3	0	0.985	1.00	508
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 using Equation (Exhibit 25-5)

V_{12} = 2978 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3486	Exhibit 25-7		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3486	Exhibit 25-7	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 29.9 (pc/mi/ln)

LOS = D (Exhibit 25-4)

Speed Determination

M_S = 0.420 (Exibit 25-19)

S_R = 52.4 mph (Exhibit 25-19)

S_0 = N/A mph (Exhibit 25-19)

S = 52.4 mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-12)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 25-14		
$V_{FO} = V_F - V_R$		Exhibit 25-14		
V_R		Exhibit 25-3		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 25-14		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

D_s = (Exhibit 25-19)

S_R = mph (Exhibit 25-19)

S_0 = mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Eastbound
Agency or Company	David Evans & Associates, Inc.	Junction	Jackson School Rd Interchange
Date Performed	3-30-12	Jurisdiction	ODOT
Analysis Time Period	PM Peak	Analysis Year	2035 Baseline

Project Description Eastbound Off-ramp to Jackson School Rd

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2185	0.95	Level	1	0	0.995	1.00	2312
Ramp	25	0.96	Level	1	0	0.995	1.00	26
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)
P_{FM} = using Equation (Exhibit 25-5)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)
LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)
S_R = mph (Exhibit 25-19)
S_0 = mph (Exhibit 25-19)
S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = 1.000 using Equation (Exhibit 25-12)
V_{12} = 2312 pc/h
V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2312	Exhibit 25-14	4600	No
$V_{FO} = V_F - V_R$	2286	Exhibit 25-14	4600	No
V_R	26	Exhibit 25-3	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2312	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 10.6 (pc/mi/ln)
LOS = B (Exhibit 25-4)

Speed Determination

D_s = 0.430 (Exhibit 25-19)
S_R = 52.3 mph (Exhibit 25-19)
S_0 = N/A mph (Exhibit 25-19)
S = 52.3 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Eastbound
Agency or Company	David Evans & Associates, Inc.	Junction	Jackson School Rd Interchange
Date Performed	3-30-12	Jurisdiction	ODOT
Analysis Time Period	PM Peak Period	Analysis Year	2035 Baseline

Project Description: Eastbound On-Ramp from Jackson School Rd

Inputs

Upstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2160	0.95	Level	1	0	0.995	1.00	2285
Ramp	790	0.96	Level	1	0	0.995	1.00	827
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 using Equation (Exhibit 25-5)

V_{12} = 2285 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3112	Exhibit 25-7		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3112	Exhibit 25-7	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 26.2 (pc/mi/ln)

LOS = C (Exhibit 25-4)

Speed Determination

M_S = 0.374 (Exibit 25-19)

S_R = 53.3 mph (Exhibit 25-19)

S_0 = N/A mph (Exhibit 25-19)

S = 53.3 mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-12)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 25-14		
$V_{FO} = V_F - V_R$		Exhibit 25-14		
V_R		Exhibit 25-3		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 25-14		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

D_s = (Exhibit 25-19)

S_R = mph (Exhibit 25-19)

S_0 = mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Jackson School Rd Interchange
Date Performed	3-30-12	Jurisdiction	ODOT
Analysis Time Period	PM Peak	Analysis Year	2035 Baseline

Project Description Westbound Off-ramp to Jackson School Rd

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3290	0.95	Level	1	0	0.995	1.00	3480
Ramp	665	0.95	Level	3	0	0.985	1.00	711
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)
P_{FM} = using Equation (Exhibit 25-5)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)
LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)
S_R = mph (Exhibit 25-19)
S_0 = mph (Exhibit 25-19)
S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = 1.000 using Equation (Exhibit 25-12)
V_{12} = 3480 pc/h
V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3480	Exhibit 25-14	4600	No
$V_{FO} = V_F - V_R$	2769	Exhibit 25-14	4600	No
V_R	711	Exhibit 25-3	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3480	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 20.7 (pc/mi/ln)
LOS = C (Exhibit 25-4)

Speed Determination

D_s = 0.492 (Exhibit 25-19)
S_R = 51.1 mph (Exhibit 25-19)
S_0 = N/A mph (Exhibit 25-19)
S = 51.1 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Jackson School Rd Interchange
Date Performed	3-30-12	Jurisdiction	ODOT
Analysis Time Period	PM Peak Period	Analysis Year	2035 Baseline

Project Description: Westbound On-ramp from Jackson School Rd

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2625	0.95	Level	1	0	0.995	1.00	2777
Ramp	170	0.95	Level	3	0	0.985	1.00	182
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 using Equation (Exhibit 25-5)

V_{12} = 2777 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2959	Exhibit 25-7		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2959	Exhibit 25-7	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 25.3 (pc/mi/ln)

LOS = C (Exhibit 25-4)

Speed Determination

M_S = 0.361 (Exibit 25-19)

S_R = 53.5 mph (Exhibit 25-19)

S_0 = N/A mph (Exhibit 25-19)

S = 53.5 mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-12)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 25-14		
$V_{FO} = V_F - V_R$		Exhibit 25-14		
V_R		Exhibit 25-3		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 25-14		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

D_s = (Exhibit 25-19)

S_R = mph (Exhibit 25-19)

S_0 = mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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Appendix D:

Technical Memorandum #4: Future 2035 Build Conditions

US 26/Brookwood Parkway/Helvetia Road Interchange Area Management Plan

Hillsboro and Washington County, Oregon

Technical Memorandum #4:

Future Build Conditions

Prepared for

Oregon Department of Transportation, Region 1
123 NW Flanders Street
Portland, Oregon 97209-4012

Prepared by

David Evans and Associates, Inc.
2100 SW River Parkway
Portland, Oregon 97201

June 2012

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1. INTRODUCTION

This technical memorandum uses 2035 land use, develops traffic volume forecasts, and analyzes traffic operations for the future (2035) build conditions for the US 26/Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP). Build conditions are evaluated for roads in the IAMP Study Area using the same land use as was used for the baseline condition analysis. The roadway scenario analyzed for the build condition assumes the construction of the Jobs and Transportation Act (JTA) Project interchange improvements plus local roadway improvements funded by the JTA and planned projects in the City of Hillsboro and Washington County Transportation System Plans (TSPs).

IAMP Study Area

The IAMP Study Area includes a section of the US 26 corridor and the accompanying local road networks serving North Hillsboro including land encompassed by Cornelius Pass Road (at US 26 mile point [MP] 62.53) on the east, Evergreen Parkway on the south, Jackson School Road (at US 26 MP 58.42) on the west, and West Union Road on the north, as shown in **Figure 1**. Existing and planned land uses and activities within the IAMP Study Area inform the IAMP planning process.

IAMP Management Area

The IAMP Management Area, also delineated in **Figure 1**, includes the land within 1,320 feet to the north and south of the interchange ramp terminals, extending beyond Schaaf Road to the north and beyond Huffman Road to the south. To the east and west of the interchange, this IAMP Management Area includes land that may be affected by realignment of an existing facility or planned construction of a new facility. Land that is within the larger IAMP Study Area but not within the smaller IAMP Management Area is not subject to the provisions in the IAMP.

2. 2035 LAND USE

There are two key areas within the IAMP Study Area designated for future planning and development: the North Hillsboro Industrial Area/Sanctuary and the UGB expansion area (see **Figure 1**). Information from the existing concept plans for these areas has been incorporated into the US 26/Brookwood Parkway/Helvetia Road IAMP.

The North Hillsboro Industrial Area covers two areas north and south of the US 26/Brookwood Parkway/Helvetia Road Interchange that overlap the IAMP Study Area. The Industrial Sanctuary (IS) zone that implements the North Hillsboro Industrial Area Community Plan retains and strengthens the requirements for large lots and restrictions on commercial development. However, it also broadens allowable industrial uses and still allows commercial, retail, office, and service support uses. Permitted uses are industrial services, manufacturing and production, public safety facilities, warehousing and distribution, wholesale sales, and utility facilities. There are multiple conditional and limited uses as well. Commercial nodes are limited to less than 20,000 square feet in three areas that support industrial uses. The North Hillsboro Industrial Area Community Plan also establishes a planning foundation for possible future UGB expansions.

On October 20, 2011, the Metro Council decided to expand the region's Urban Growth Boundary (UGB), including a 330-acre (358.89 acres including roads and right-of-way) area north of Hillsboro, in the vicinity of Meek Road and south of US 26, for the purposes of attracting future large-site industrial employers. After adoption of the IAMP, the City of Hillsboro plans to start the planning process required by Metro's Urban Growth Management Functional Plan Title 11: Planning for New Urban Areas (Metro Code section 3.07) to allow for the future planning and development of the 358.89-acre area. The City of Hillsboro will annex the land areas within the UGB for future industrial land uses.

The areas outside the Metro UGB will remain designated for rural uses.

All of the year 2035 scenarios using the regional transportation model include the North Hillsboro Industrial Area and the UGB expansion area. Travel demand model assumptions for households and employment in the IAMP study area for the base year (2010) and future year (2035) are shown in **Table 1**.

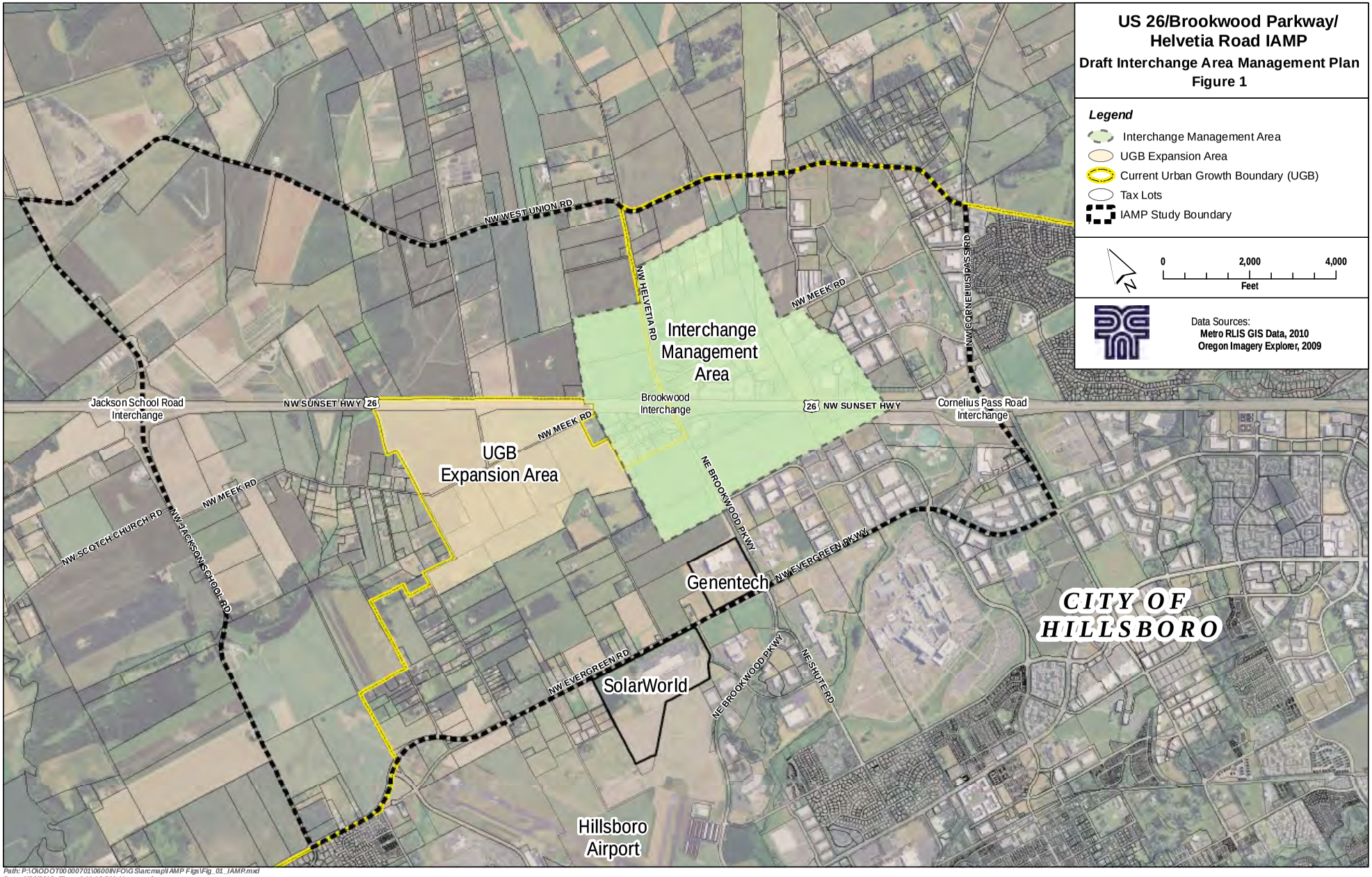
Table 1. IAMP Households and Employment for Base Year 2010 and Future Year 2035[3]

	2010[1]	2035[2]	Difference
Households	298	353	56
Employment	4,876	29,716	24,840

Notes:

1. 2010 data based on Metro's household and employment allocation.
2. 2035 data based on City of Hillsboro's household and employment allocation.
3. Household and Employment data based on 14 Traffic Analysis Zones: 1252, 1253, 1254, 25% of 1255, 1257, 1258, 1259, 1260, 1261, 1270, 1271, 1272, 1273, and 1274.

Figure 1.



Path: P:\OIO\OT000070\10600\INFO\GIS\arcmap\IAMP Figs\Fig_01_IAMP.mxd
Date: 4/30/2012 Time: 4:41:19 PM User: mmf

As shown in **Table 1**, the number of households in the IAMP Study Area is projected to grow by approximately 20 percent from 2010 to 2035. The number of jobs in the IAMP Study Area is expected to grow to a total in 2035 that is more than six times the current number. As shown in **Table 2**, this growth in households and employment will increase in the number of vehicle trips entering and exiting the IAMP Study Area.

Table 2. IAMP Entering and Exiting Volumes for Base Year 2010 and Future Year 2035[3]

	Entering and Exiting Trips		
	2010[1]	**2035**[2]	**Difference**
AM Peak Hour	1,925	9,275	7,350
PM Peak Hour	2,250	9,650	7,400

Notes:

1. 2010 data based on Metro's household and employment allocation.
2. 2035 data based on City of Hillsboro's household and employment allocation.
3. Trip data based on 14 Traffic Analysis Zones: 1252, 1253, 1254, 25% of 1255, 1257, 1258, 1259, 1260, 1261, 1270, 1271, 1272, 1273, and 1274.

3. 2035 BUILD TRANSPORTATION NETWORK

The future build transportation network is based on a financially constrained transportation system. The financially constrained system will include projects from Metro's adopted 2035 Regional Transportation System Plan (RTP) and both the city and the county adopted TSPs. Projects in local community plans were not included in the analysis.

Within the IAMP Management Area, the 2035 build scenario assumes that, in addition to the city and county TSP projects, the JTA Project (described below) is constructed and that Jacobson Road is realigned to the north to improve access spacing between the new JTA interchange and Jacobson Road. The following sections outline the components of the JTA Project, the improvements needed to support the JTA Project, and the local street connection projects that are within the IAMP Study Area.

The JTA Project

The JTA Project will address existing operation and safety issues and address anticipated future travel demand in North Hillsboro. These improvements are directed at enabling job development of the employment areas within the City of Hillsboro. The JTA-funded interchange improvements include:

- The westbound-to-southbound loop ramp on US 26 and an additional travel lane southbound across the Brookwood Parkway/Helvetia Road overcrossing of US 26 will alleviate the safety issue along US 26 at the westbound exit ramp.

- Intersection and storage improvements for the US 26 eastbound entrance ramp will provide more storage for vehicles entering the freeway and reduce potential conflicts on Brookwood Parkway.

- Improved bicycle and pedestrian facilities will reduce conflicts between modes.

- Jacobson Road is realigned to the north to improve access spacing between the new JTA interchange and Jacobson Road.

Improvements to Support the JTA Project

In addition, four road improvement projects are necessary to support the JTA project within the IAMP Management Area.

- **Brookwood Parkway:** The new interchange loop ramp requires three lanes southbound to accommodate the amount of traffic expected to use the interchange in the AM peak period and to access industrial lands. Three lanes northbound from Evergreen Road to the eastbound US 26 ramp terminal will provide storage for vehicles entering US 26 eastbound in the PM peak period and reduce potential conflicts on Brookwood Parkway.

- **253rd Avenue (Meek Road):** 253rd Avenue will be widened to three lanes with bike lanes and sidewalks from Evergreen Parkway to Meek Road to provide an alternate route once Meek Road is cut off from Brookwood Parkway to address interchange spacing standards and safety concerns. It will also provide access to industrial lands and a parallel route to Brookwood Parkway.

- **Groveland Drive Realignment:** In order to improve safety and meet access spacing standards, Groveland Drive is to be reconnected to Helvetia Road across from Schaaf Road. The loop ramp precludes Groveland Drive from connecting to Helvetia Road at the current location. Schaaf Road is the southernmost practical connection point that avoids the grove of trees and the floodplain in the northwestern quadrant of the interchange.

- **Huffman Street east of 253rd Avenue:** Huffman Street is required to access undeveloped industrial land within the UGB and provide a parallel route to Evergreen Parkway. Five lanes will be needed on Huffman Street between Brookwood Parkway and 253rd Avenue to accommodate traffic accessing the industrial lands while preserving capacity for through movements. Huffman Street in combination with the 253rd Avenue extension provides an alternate route once Meek Road is cut off from Brookwood Parkway due to interchange spacing standards and safety concerns.

Local Street Connections

The following projects were identified in local TSPs and concept plans. Oregon Department of Transportation (ODOT), Washington County, and the City of Hillsboro will continue to work in partnership in planning for future road improvements to address the traffic safety and access issues in the vicinity of the US 26/Brookwood Parkway/Helvetia Road Interchange. Projects not addressed as part of the JTA-funded interchange improvements or through excess JTA funding will be further evaluated in the updates to the Washington County and City of Hillsboro TSPs. Potential projects are:

- **Huffman Street west of 253rd Avenue:** Huffman Street west of 253rd Avenue is needed to access industrial lands and provide a parallel route to Evergreen Parkway.

- **264th Avenue:** 264th Avenue is needed to provide a parallel local route to Jackson School Road and to access industrial lands.

- **Schaaf Road:** Schaaf Road east of Helvetia Road is needed to access industrial lands and provides a parallel route to Jacobson Road and will extend to connect to Century Boulevard.

- **Connector Road:** New connector road will connect Jacobson Road to Schaaf Road northeast of the interchange.

The complete list of projects within the IAMP Study Area that are to be included in the 2035 build scenario are shown in **Figure 2** and listed in **Table 3**. Projects included in the build scenario are indicated with a check mark. Projects in local community plans were not included in the travel demand model and not checked in Table 3.

Table 3. Build Improvement Projects

Figure 2: Map Reference #	Project Name	Project Description	Included in Baseline	Included in Build
JTA	JTA Project	Add westbound-to-southbound loop ramp on US 26; add an additional travel lane southbound across Brookwood Pkwy, intersection and storage improvements, improved bicycle and pedestrian facilities; realign Jacobson Rd		✓
1	253rd Avenue	Build 3 lanes with bike lanes and sidewalks from Evergreen Pkwy to Meek Rd (baseline only from Evergreen Pkwy to Huffman St)	✓	✓
2	Groveland Dr Realignment	Construct 2-lane rural connector from Helvetia Rd to Groveland Dr		✓
3	Brookwood Pkwy	Widen to 3 lanes northbound and 3 lanes southbound, and construct with bike lanes and sidewalks from Huffman St to US 26 eastbound ramp terminal		✓
4	Huffman St	Build 5 lanes with bike lanes and sidewalks from Brookwood Pkwy to 253rd Ave (3 lanes in baseline)	✓	✓
5	Brookwood Pkwy	Widen to 3 lanes northbound and 3 lanes southbound, and construct with bike lanes and sidewalks from Evergreen Pkwy to Huffman St		✓
6	231st Ave/ Century Blvd	Construct 2-/3-lane US 26 overpass with bike lanes and sidewalks, connecting existing segments from Bennett St. to West Union Rd	✓	✓
7	Huffman St	Build 3 lanes with bike lanes and sidewalks from 253rd Ave to Sewell Rd	✓	✓
8	264th Ave	Build 3 lanes with bike lanes and sidewalks from Evergreen Pkwy to Meek Rd		
9	Jacobson Road	Widen and add bike and pedestrian facilities at Jacobson Rd at Helvetia Rd	✓	✓
10	Century Blvd	Construct 3-lane roadway with bike lanes and sidewalks at Jacobson Rd and Century Blvd	✓	✓
11	Jacobson Rd to Schaaf Rd	Construct 3-lane roadway with bike lanes and sidewalks from Jacobson Rd to Schaaf Rd		
12	Schaaf Rd	Construct 3-lane roadway with bike lanes and sidewalks from Helvetia Rd to Century Blvd		
13	Helvetia Rd	Construct 3-lane roadway with bike lanes and sidewalks from Jacobson Rd to Schaaf Rd	✓	✓
14	Helvetia Rd	Construct 3-lane roadway with bike lanes and sidewalks from Schaaf Rd to West Union Rd	✓	✓
15	West Union Rd	Construct 3-lane roadway with bike lanes and sidewalks from Helvetia Rd to Cornelius Pass Rd	✓	✓

4. FORECASTS OF FUTURE BUILD TRAFFIC

The future build traffic volumes were developed from travel demand forecasting models. Travel demand models have been in use since the 1950s and employ a market-based approach by considering both transportation supply and travel demand for producing traffic forecasts. The model relies on socioeconomic data (e.g., households and employment) to determine travel demand and system attributes (e.g., roadway capacity, speeds, and distances) to represent the transportation supply.

The regional travel demand model is based on City of Hillsboro land uses and the Washington County Westside Travel Demand Model. The travel demand model for this analysis was developed for a base year of 2010 and a forecast year of 2035.

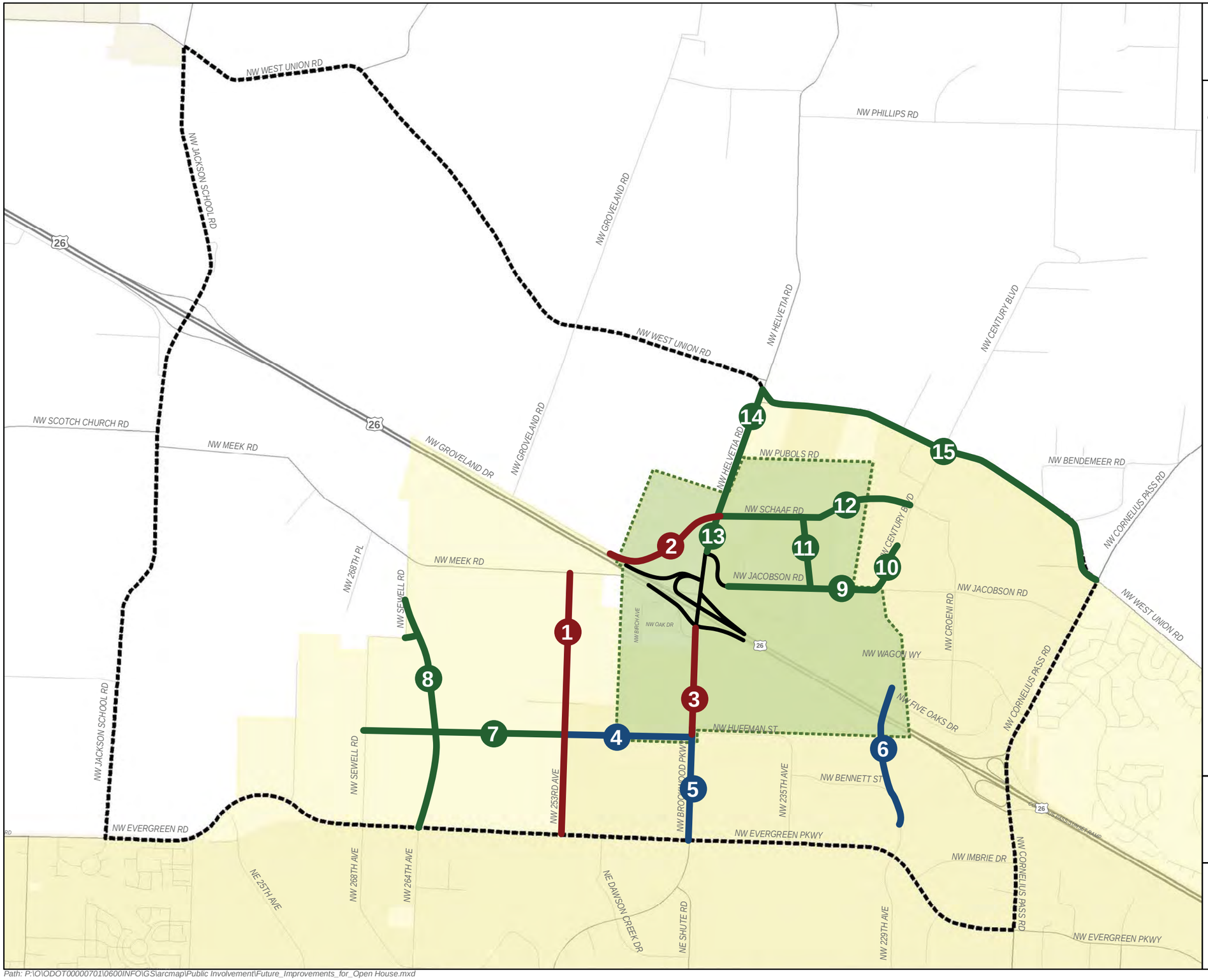
Future traffic forecasts were developed for 39 intersections in the IAMP Study Area. Forecasts were based on the 2010 and 2035 regional travel demand models and the 2011 existing traffic data. The process followed the procedures from ODOT's Analysis Procedures Manual (APM).[1] To convert travel demand model link volumes to design hour intersection turning-movement volumes, the link-based post-processing method outlined in the APM was used.

The APM instructs the user to use the two most commonly used link-based methods for determining future traffic volumes—the growth method and the difference method. The growth method uses growth equations to calculate future design hour volumes. Caution is advised when using this method, because it may severely overestimate growth on links that have low traffic volumes in the base year of the analysis and large volumes in the future year. Therefore, the difference method should be used in areas that have large differences between base year and future year model link volumes. The APM states that both methods should be compared using a spreadsheet, and areas with large percentage or absolute differences should use the difference method and areas that have similar base and future year model link volumes can use one or the other method, or an average of the two methods.

Therefore, for this build condition analysis, when the difference between the growth and difference methods was large (greater than 10 percent), the difference method was used. When the difference between the two methods was small (less than 10 percent), the average of the growth and difference methods was used. This technique is consistent with the preferred method identified in the National Cooperative Highway Research Program (NCHRP) Report 255. The forecasted approach (link) volumes and existing turning-movement volumes were then input into a NCHRP Report 255 spreadsheet and, through an iterative process, future build 2035 turning-movement volumes were calculated.

[1] Analysis Procedures Manual, Oregon Department of Transportation, Transportation Development Division Planning Section, Transportation Planning and Analysis Unit, Salem, Oregon, April 2006, Section 4.64. Updated January 2011.

Figure 2. Proposed IAMP Improvement Projects



Legend

- IAMP Study Boundary
- Urban Growth Boundary (UGB)
- City Limits
- Interchange Management Area
- JTA Interchange Project
- Tier 1 Projects
- Tier 2 Projects
- Tier 3 Projects

Discussion Draft

Revised April 2012

N

0 1,000 2,000 4,000

Feet

Data Sources:
Metro RLIS GIS Data, 2010
City of Hillsboro
Washington County

Path: P:\O\ODOT00000701\0600\INFO\GS\arcmap\Public Involvement\Future_Improvements_for_Open House.mxd
Date: 3/8/2012 Time: 1:29:33 PM User: axjb

The link-based process was also used for the US 26 freeway forecasts. Interchange ramp volumes were held constant based on the intersection forecasts, and the freeway mainline volumes were balanced outward from the freeway segment between the Cornelius Pass Road and Brookwood Parkway/Helvetia Road interchanges. **Figures 3** through **5** depict 2035 build AM and PM traffic volumes. The worksheets are provided in **Appendix A**.

Based on planned population growth and expected land uses, there will be an average traffic volume growth rate from 2011 to 2035 of approximately 50 percent for the AM peak hour and approximately 45 percent for the PM peak hour for roadways within the IAMP Study Area. Traffic volume growth varies throughout the IAMP Study Area, with some intersections experiencing a minimal growth of approximately 2 percent. Intersections near areas of intense land use changes have forecasted traffic volumes that are more than double the existing traffic volumes.

Average daily traffic (ADT) volumes were calculated at several points in the IAMP Study Area. The ADT volumes were developed using the same methodology described in *Technical Memorandum #2: Existing Conditions Analysis* and were estimated using the forecasted 2035 PM peak hour volumes described above. **Figure 6** shows the estimated ADT volumes for the IAMP Study Area.

5. TRAFFIC OPERATIONS

Operational Criteria

Transportation engineers have established various methods for measuring traffic operations of roadways and intersections. Most jurisdictions use either volume-to-capacity (v/c) ratio or level of service (LOS) to establish performance criteria. Both the LOS and v/c ratio concepts require consideration of factors that include traffic demand, capacity of the intersection or roadway, delay, frequency of interruptions in traffic flow, relative freedom for traffic maneuvers, driving comfort, convenience, and operating cost.

Volume-to-Capacity (V/C) Ratio

A comparison of traffic volume demand to intersection capacity is one method of evaluating how well an intersection is operating. This comparison is presented as a v/c ratio. A v/c ratio of less than 1.00 indicates that the volume is less than capacity. When the v/c ratio is closer to zero, traffic conditions are generally good, with little congestion and low delays for most intersection movements. As the v/c ratio approaches 1.00, traffic becomes more congested and unstable, with longer delays.

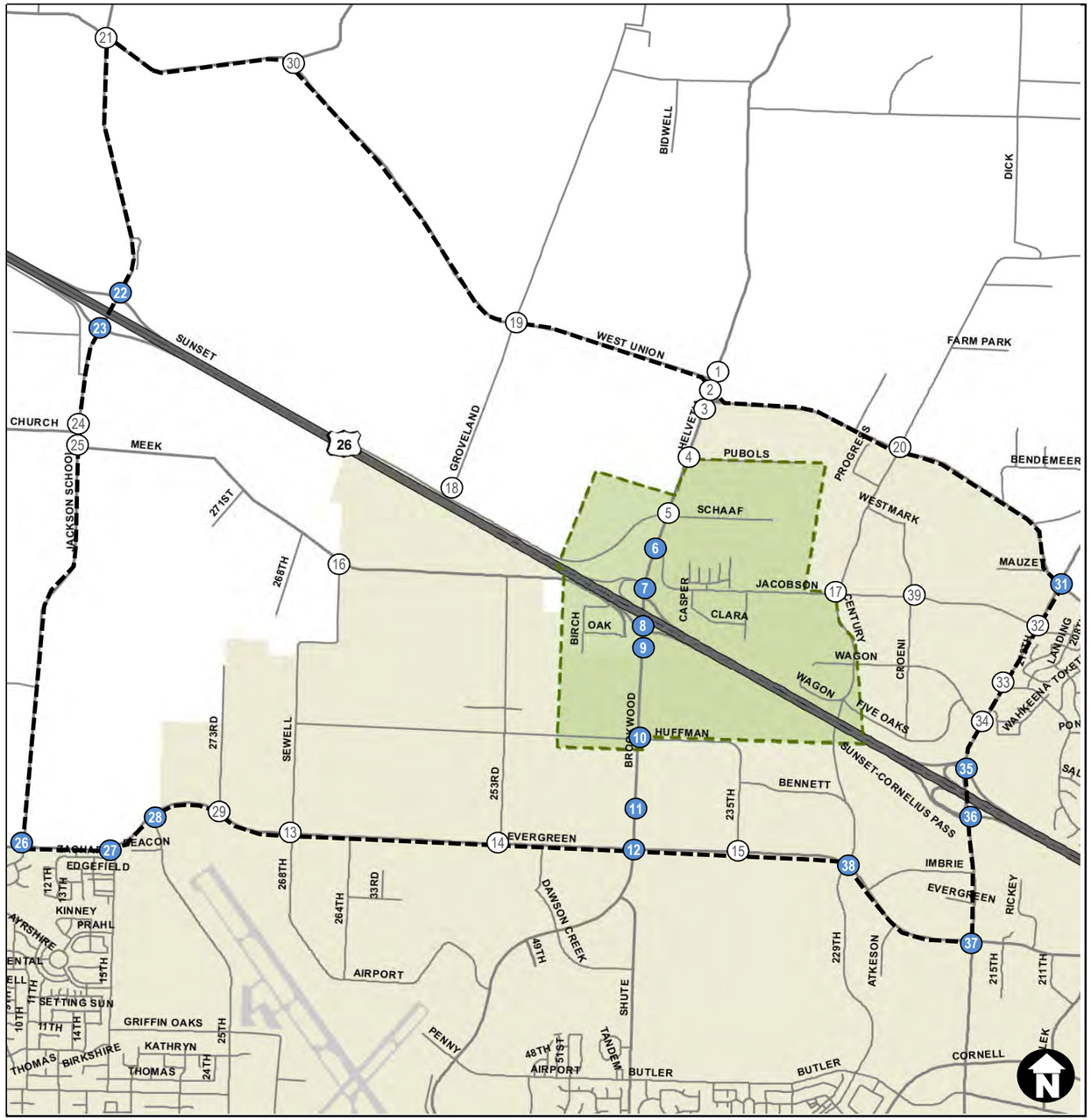
Level of Service (LOS)

LOS is also a widely recognized and accepted measure and descriptor of traffic operations. At both STOP-controlled and signalized intersections, LOS is a function of control delay, which includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. Six standards have been established, ranging from LOS A, where there is little or no delay, to LOS F, where there is delay of more than 50 seconds at unsignalized intersections, or more than 80 seconds at signalized intersections.

It should be noted that, although delays can sometimes be long for some movements at a STOP-controlled intersection, the v/c ratio may indicate that there is adequate capacity to process the demand for that movement. Similarly, at signalized intersections, some movements, particularly side street approaches or left turns onto side streets, may experience longer delays because they receive only a small portion of the green time during a signal cycle, but their v/c ratio may be relatively low. For these reasons, it is important to examine both v/c ratio and LOS when evaluating overall intersection operations. Both are reported in the following section.

Operational Standards

The Oregon Highway Plan (OHP) has established several policies that enforce general objectives and approaches for maintaining highway mobility. Of these policies, the Highway Mobility Standards (Policy 1F) establish maximum v/c ratio standards for peak hour operating conditions for all highways in Oregon based on the location and classification of the highway segment being examined. The OHP policy also specifies that the v/c ratio standards be maintained for ODOT facilities through a 20-year horizon.



Helvetia Rd @ Jacobson Rd
6

	2 →	
560 ↓	15 ↘	30 ←
		530 ↑ 210 ↱

TEV = 1347

Brookwood Pkwy @ US26 WB Ramps
7

	S of Int 260* ↰	
0 ↓	580	
1910 ↰		45 ↑ 740

TEV = 3535

Brookwood Pkwy @ US26 EB Ramps
8

2455 ↓	35 ↘	
95 ↱		
0 →		430 ↑ 535
375 ↲		

TEV = 3925

Brookwood Pkwy @ Meek Rd
9

Side Street Access Closed in Mitigation Scenario

TEV = 3795

Brookwood Pkwy @ Huffman Street
10

315 ↓	2335 ↓	115 ↘ 70 ← 350 ↰ 5
140 ↱		
45 →		225 ↑ 755 ↱ 10
55 ↲		

TEV = 4420

Brookwood Pkwy @ Genentech Access
11

285 ↓	2120 ↓	0 ↰
		990 ↑ 15 ↱
10 ↲		

TEV = 3420

Brookwood Pkwy @ Evergreen Pkwy
12

1110 ↓	935 ↓	85 ↘ 80 ← 840 ↰ 185
215 ↱		
640 →		185 ↑ 710 ↱ 255
115 ↲		

TEV = 5355

Jackson Sch Rd @ US26 WB Ramps
22

0 ↓	185 ↓	45 ← 0 ↰ 555
		45 ↑ 115

TEV = 945

Jackson Sch Rd @ US26 EB Ramps
23

685 ↓	55 ↘	
10 ↱		
0 →		150 ↑ 580
150 ↲		

TEV = 1630

Jackson Sch Rd @ Evergreen Pkwy
26

320 ↓	2 ↓	130 ↘ 70 ← 395 ↰ 5
475 ↱		
1275 →		2 ↱ 5 ↑ 5 ↱
2 ↲		

TEV = 2686

15th Avenue @ Evergreen Pkwy
27

	405 ←	
	325 ↰	
1210 →		95 ↱ 270 ↑
200 ↲		

TEV = 2505

25th Avenue @ Evergreen Pkwy
28

	630 ←	
	610 ↰	
1280 →		95 ↱ 315 ↑
175 ↲		

TEV = 3105

Cornelius Pass Rd @ West Union Rd
31

105 ↓	690 ↓	55 ↘ 170 ← 705 ↰ 940
170 ↱		
235 →		30 ↑ 540 ↱ 215
45 ↲		

TEV = 3900

Cornelius Pass Rd @ US26 WB Ramps
35

310 ↓	1075 ↓	575 ↰
		80 ↑ 745
1540 ↲		

TEV = 4325

Cornelius Pass Rd @ US26 EB Ramps
36

345 ↓	2270 ↓	
165 ↱		
0 →		↑ 660 ↱ 540
215 ↲		

TEV = 4195

Cornelius Pass Rd @ Evergreen Pkwy
37

285 ↓	870 ↓	220 ↘ 180 ← 1030 ↰ 75
55 ↱		
480 →		275 ↑ 835 ↱ 75
90 ↲		

TEV = 4470

229th Avenue @ Evergreen Pkwy
38

75 ↓	150 ↓	205 ↘ 440 ← 975 ↰ 385
80 ↱		
555 →		270 ↑ 220 ↱ 235
150 ↲		

TEV = 3740

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Legend

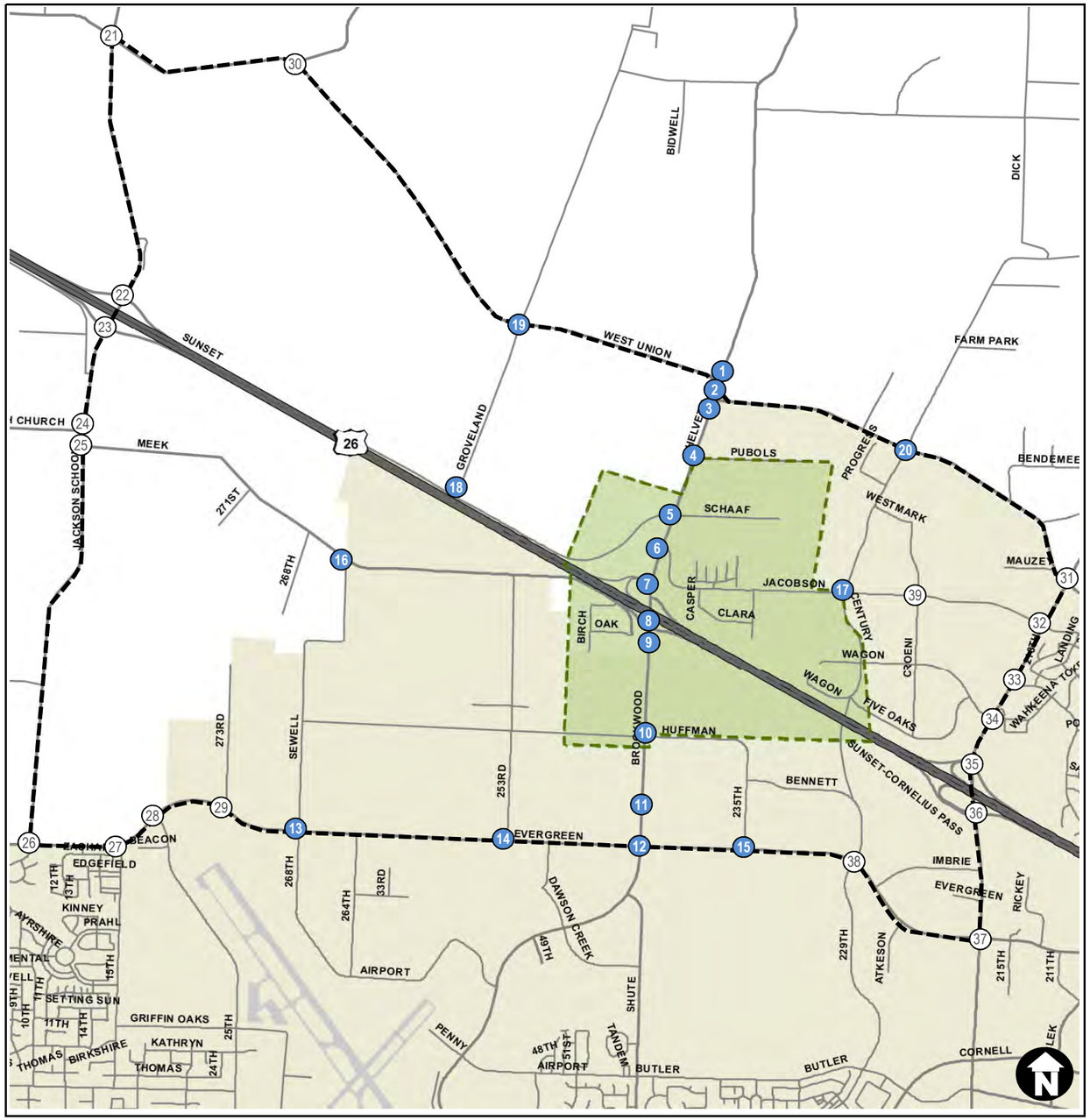
- 123 — Peak Hour Volume
- → — Turning Movement
- TEV: — Total Entering Volume
- (##) — Intersection evaluated
- (##) — Intersection not evaluated in AM Peak Hour
- IAMP Study Boundary
- Interchange Management Area
- Urban Growth Boundary

*Westbound right-turn movement occurs south of intersection and is included in the northbound through.

FIGURE 3

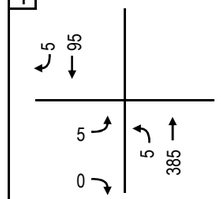
2035 Build
Turning Movement Traffic Volumes
AM Peak Hour

US 26 / Brookwood / Helvetia IAMP



Helvetia Rd North @ West Union Rd

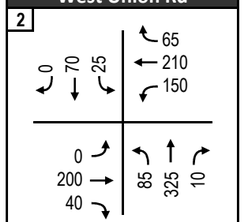
1



TEV = 495

Helvetia Rd Middle @ West Union Rd

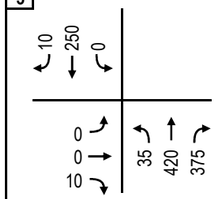
2



TEV = 1180

Helvetia Rd South @ West Union Rd

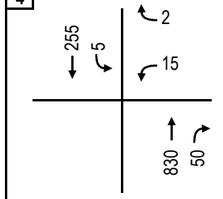
3



TEV = 1100

Helvetia Rd @ Pubols Rd

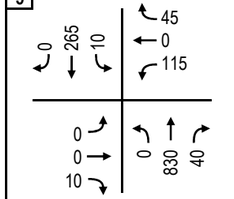
4



TEV = 1157

Helvetia Rd @ Schaff Rd

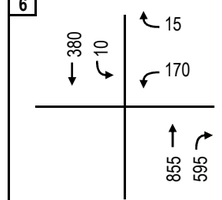
5



TEV = 1315

Helvetia Rd @ Jacobson Rd

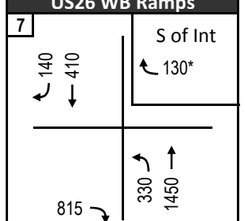
6



TEV = 2025

Brookwood Pkwy @ US26 WB Ramps

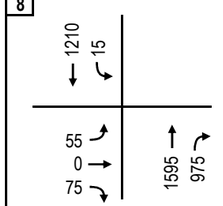
7



TEV = 3275

Brookwood Pkwy @ US26 EB Ramps

8



TEV = 3925

Brookwood Pkwy @ Meek Rd

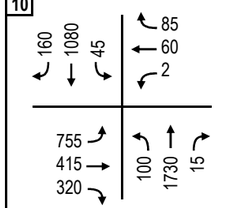
9

Side street access closed in Mitigation scenario

TEV = 0

Brookwood Pkwy @ Huffman Street

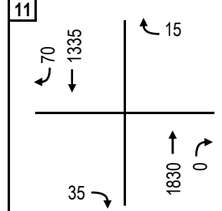
10



TEV = 4767

Brookwood Pkwy @ Genentech Access

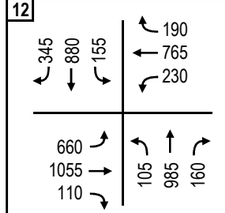
11



TEV = 3290

Brookwood Pkwy @ Evergreen Pkwy

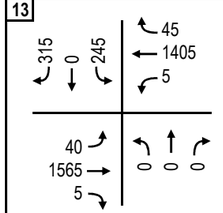
12



TEV = 5640

Sewell Rd @ Evergreen Pkwy

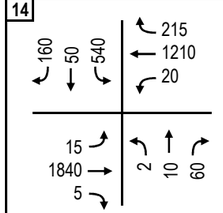
13



TEV = 3625

Meier-Jurgen Rd @ Evergreen Pkwy

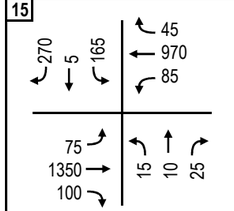
14



TEV = 4127

235th Avenue @ Evergreen Pkwy

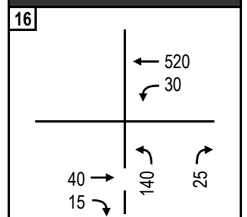
15



TEV = 3115

Sewell Rd @ Meek Rd

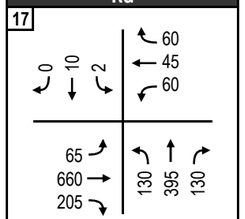
16



TEV = 770

Century Blvd @ Jacobson Rd

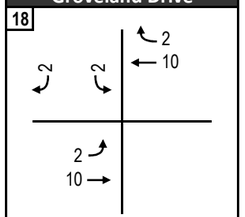
17



TEV = 1762

Groveland Rd @ Groveland Drive

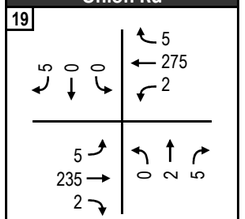
18



TEV = 28

Groveland Rd @ West Union Rd

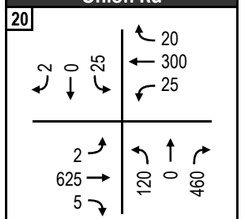
19



TEV = 536

Century Blvd @ West Union Rd

20



TEV = 1584

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Legend

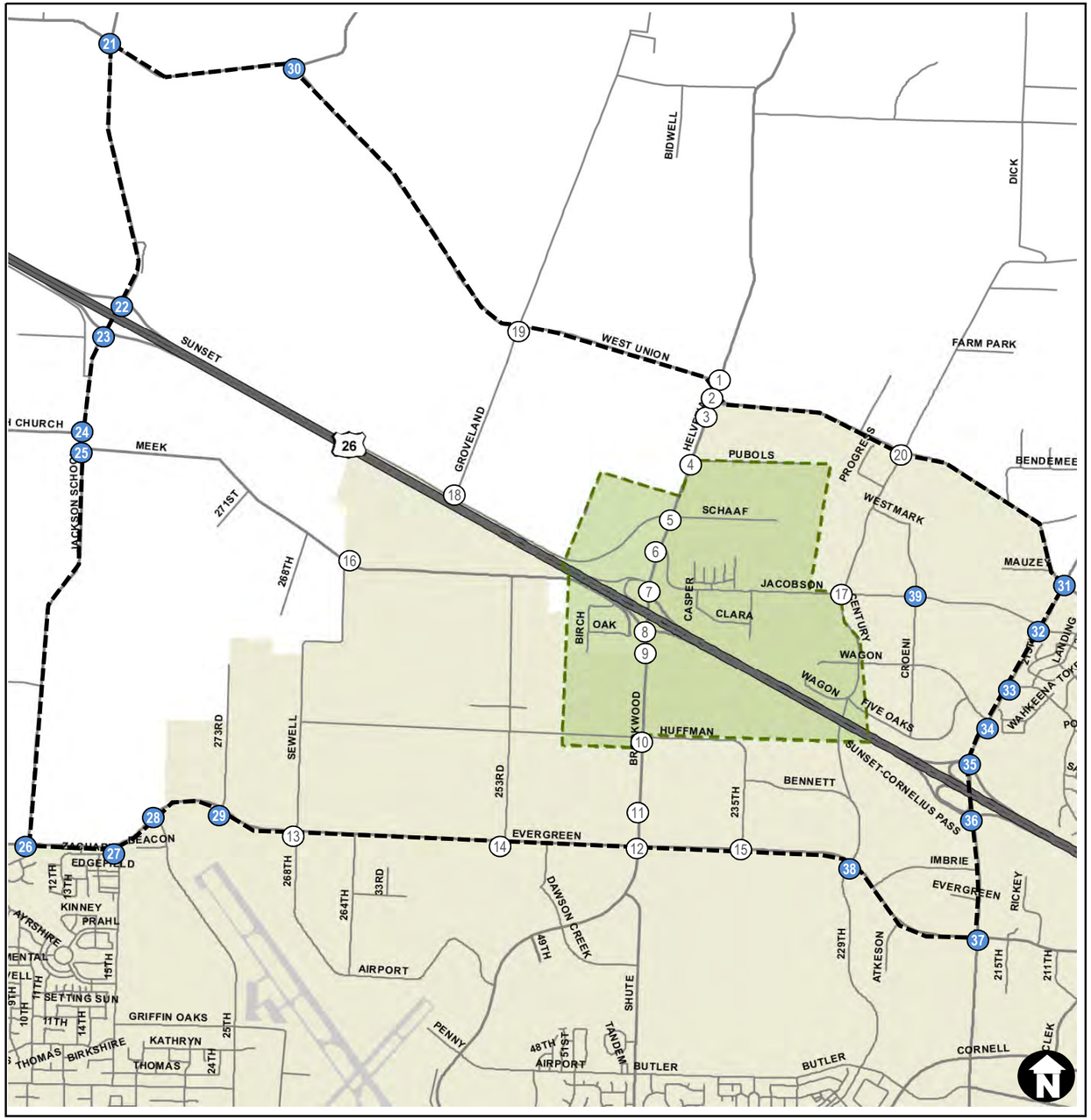
123	Peak Hour Volume	##	Intersection volumes shown		IAMP Study Boundary
→	Turning Movement	##	Intersection volumes shown on separate figure		Interchange Management Area
TEV:	Total Entering Volume				Urban Growth Boundary

*Westbound right-turn movement occurs south of intersection and is included in the northbound through.

FIGURE 4

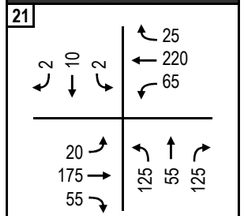
2035 Build
Turning Movement Traffic Volumes
PM Peak Hour

US 26 / Brookwood / Helvetia IAMP



Jackson Sch Rd @ West Union Rd

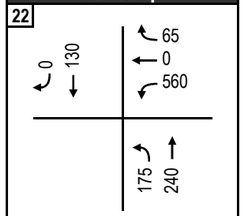
21



TEV = 879

Jackson Sch Rd @ US26 WB Ramps

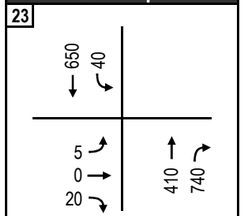
22



TEV = 1170

Jackson Sch Rd @ US26 EB Ramps

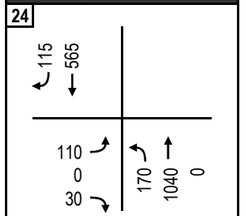
23



TEV = 1865

Jackson Sch Rd @ Scotch Church Rd

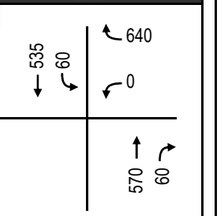
24



TEV = 2030

Jackson Sch Rd @ Meek Rd

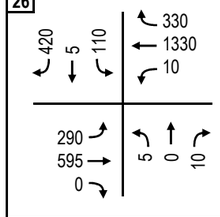
25



TEV = 1865

Jackson Sch Rd @ Evergreen Pkwy

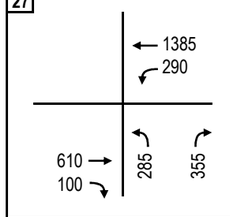
26



TEV = 3105

15th Avenue @ Evergreen Pkwy

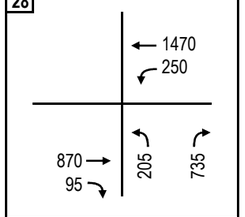
27



TEV = 3025

25th Avenue @ Evergreen Pkwy

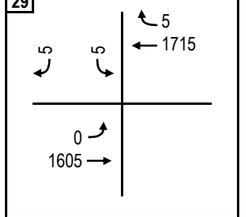
28



TEV = 3625

Eggiman Rd @ Evergreen Pkwy

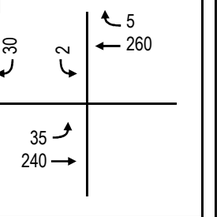
29



TEV = 3335

Jackson Quarry Rd @ West Union Rd

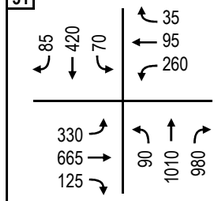
30



TEV = 572

Cornelius Pass Rd @ West Union Rd

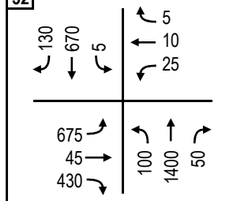
31



TEV = 4165

Cornelius Pass Rd @ Jacobson Rd

32



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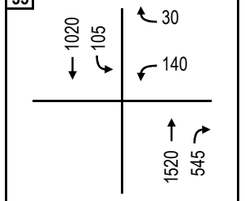
Cornelius Pass Rd @ Rock Creek Blvd

33



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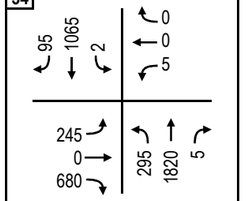
Cornelius Pass Rd @ Wagon Way

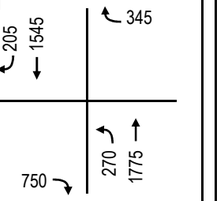
34



TEV = 4212

Cornelius Pass Rd @ US26 WB Ramps

35



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Cornelius Pass Rd @ US26 EB Ramps

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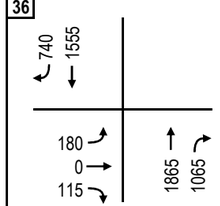
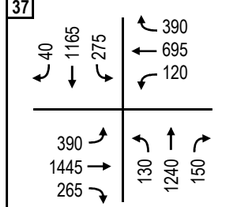


TEV = 5520

Cornelius Pass Rd @ Evergreen Pkwy

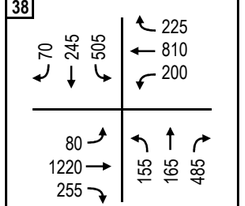
37



TEV = 6305

229th Avenue @ Evergreen Pkwy

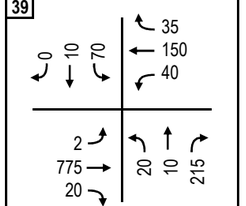
38



TEV = 4415

Croeni Rd @ Jacobson Rd

39



TEV = 1347

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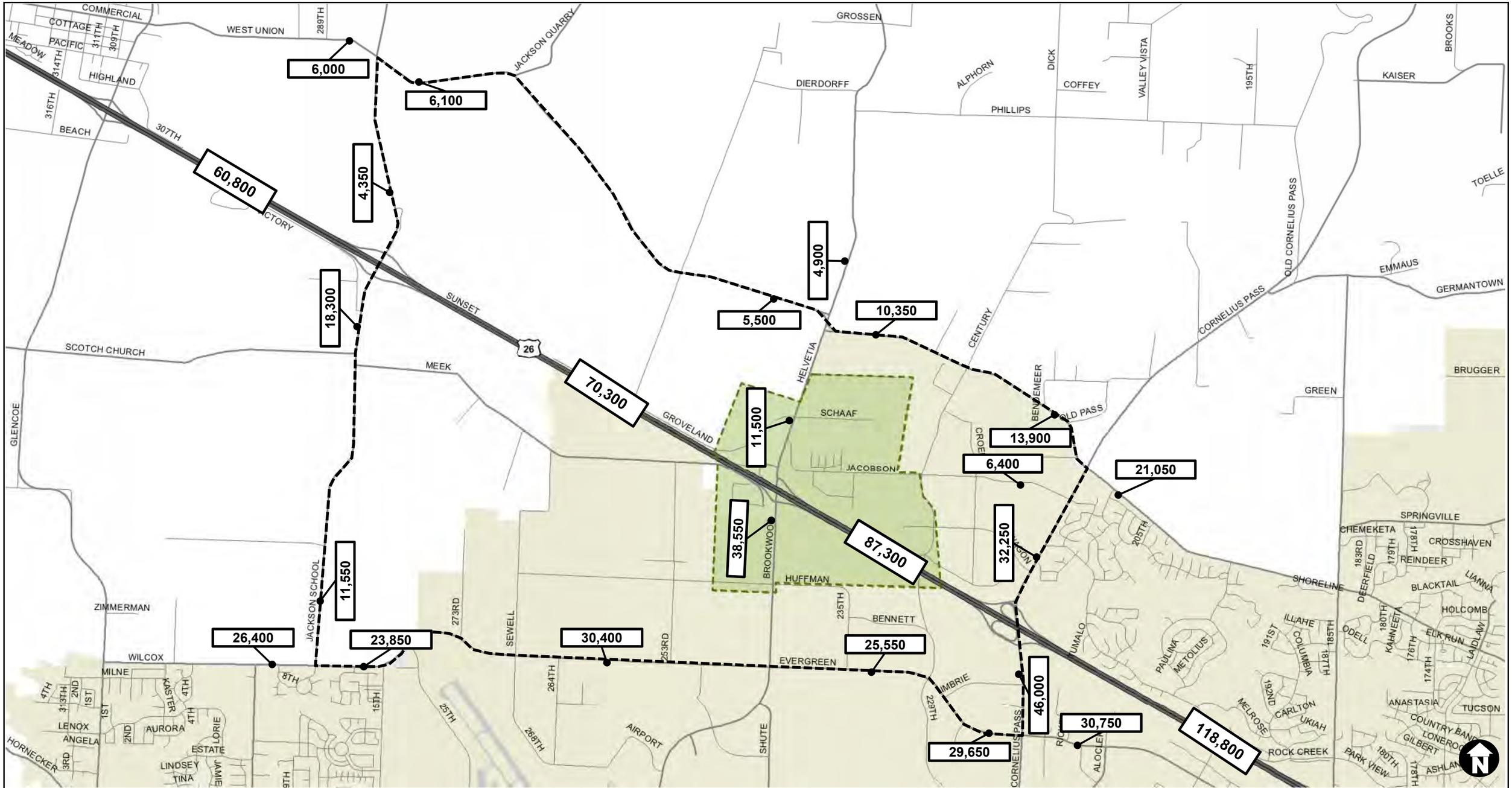
Legend

123	Peak Hour Volume	(##)	Intersection volumes shown		IAMP Study Boundary
→	Turning Movement	(##)	Intersection volumes shown on separate figure		Interchange Management Area
TEV:	Total Entering Volume				Urban Growth Boundary

FIGURE 5

2035 Build
Turning Movement Traffic Volumes
PM Peak Hour

US 26 / Brookwood / Helvetia IAMP



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Legend

- IAMP Study Boundary
- Interchange Management Area
- Urban Growth Boundary
- 15,000 — 2035 Average Daily Traffic (ADT)

FIGURE 6

2035 Build Conditions Average Daily Traffic

US 26 / Brookwood / Helvetia IAMP

Hillsboro, Washington County, and Metro also have their own performance standards. Hillsboro uses LOS as a performance standard, while Washington County and Metro use v/c ratio standards. For the existing conditions, **Table 4** below provides a summary of applicable operational standards for each jurisdiction. These standards are outlined in their corresponding TSPs and master plans. Generally, where approaches are maintained by different jurisdictions, the more restrictive of the performance standards is applied.

Table 4. Summary of Operational Standards for Existing Conditions

Jurisdiction	Operational Standard
ODOT	
Outside Metro UGB and not within another UGB[1]	0.70 v/c
US 26, west of Sylvan, inside Metro UGB[2]	0.99 v/c (1st hour)
US 26 Ramp Terminals, inside the Metro UGB	0.85
US 26 Ramp Terminals, outside Metro UGB	0.70
City of Hillsboro[3]	LOS D
Washington County[4]	
Inside UGB	0.99 v/c
Outside UGB	0.90 v/c
Metro[5]	0.99 v/c

1. Existing requirements outlined in 2009 OHP Mobility Standard Guidelines Table 6 and based on v/c.
2. Existing requirements outlined in 2009 OHP Mobility Standard Guidelines Table 6 and based on v/c and Metro interim regional mobility policy standards as outlined in the 2035 RTP, Table 2.4.
3. City of Hillsboro operating standards outlined in the Hillsboro Comprehensive Plan, Section 13.D.
4. Washington County operating standards outlined in Washington County Comprehensive Plan.
5. Metro 2035 Regional Transportation Plan.

Traffic Operations Analysis Procedures

All operations were evaluated using the methodology outlined in the *2000 Highway Capacity Manual* (HCM) along with the procedures outlined in ODOT's Analysis Procedures Manual (APM). The Synchro/SimTraffic analysis software was selected to perform the intersection analysis, since it can provide the v/c ratio and LOS output of an HCM analysis as well as consider the systematic interaction of the intersections with regard to queuing and delays.

Synchro is a macroscopic model similar to the Highway Capacity Software (HCS), and like the HCS, is based on the 2000 HCM. The Synchro model explicitly evaluates traffic operations under coordinated and uncoordinated systems of signalized and unsignalized intersections. The v/c ratios and LOS presented in this report are based on the Synchro model output.

SimTraffic animates traffic flow based on input volumes and signal timing and allows viewing of traffic flow under saturated traffic conditions, where traffic may spill over from one intersection to another. It is particularly effective at evaluating closely spaced intersections. For locations were HCM is not applicable, the SimTraffic model was run multiple times using different arrival patterns to determine how sensitive traffic operations are in response to subtle variations in traffic flows. If it is determined that the use of SimTraffic is needed, the 95th percentile queues from the SimTraffic model are also evaluated.

As noted above, the results from both Synchro and SimTraffic are considered in this report. Because these programs evaluate operations using different methodologies, the analysis results sometimes vary; however, the differences are generally minor unless saturated or congested conditions are present. Under saturated conditions, SimTraffic queuing and delays present results that reflect how congested intersections impact each other, while Synchro represents intersection performance in isolation and may reflect better performance results.

6. FUTURE BASELINE TRAFFIC OPERATIONS

Traffic analysis for the 2035 build scenario was performed for the 39 IAMP Study Area intersections and for the merge-diverge sections of the freeway.

Intersection Operations

Traffic operations were evaluated at all 39 IAMP Study Area intersections during the PM peak hour and at 17 key AM peak hour intersections as analyzed under the baseline alternative. **Figures 7** through **9** present the v/c ratios and LOS performance by lane group for the IAMP Study Area intersections. **Table 5** below summarizes the intersections that exceed operational standards for ODOT, City of Hillsboro, or Washington County for the 2035 build scenario. Detailed analysis worksheets are presented in **Appendix B**.

Table 5. 2035 Build Intersections Where Operational Standards Are Not Met[1]

Int. X	Intersection	Critical Movement[2] AM (PM)	AM		PM		Jurisdiction Where Operational Standard Not Met[3]
			V/C Ratio	LOS	V/C Ratio	LOS	
IAMP Management Area							
6	Helvetia Rd @ Jacobson Rd	WB L (WB L)	0.18	C	**>1.0**	**F**	All
7	Brookwood Pkwy @ US26 WB Ramps	Overall	**0.97**	C	0.58	A	ODOT
IAMP Study Area							
22	Jackson School Rd @ US26 WB Ramps	Overall	**>1.0**	**F**	**>1.0**	**F**	All
24	Jackson School Rd @ Scotch Church Rd	(EB L/R)	Not analyzed in AM Peak Hour		**>1.0**	**F**	Wash Co, Hillsboro
25	Jackson School Rd @ Meek Rd	(WB L/R)	Not analyzed in AM Peak Hour		**>1.0**	**F**	Wash Co, Hillsboro
26	Jackson School Rd @ Evergreen Pkwy	Overall	**>1.0**	**E**	**>1.0**	**F**	Wash Co, Hillsboro
13	Sewell Rd @ Evergreen Pkwy	(SB L)	Not analyzed in AM Peak Hour		**>1.0**	**F**	Wash Co, Hillsboro
14	Meier-Jurgen Rd @ Evergreen Pkwy	(SB L)	Not analyzed in AM Peak Hour		**>1.0**	**F**	Wash Co, Hillsboro
20	Century Blvd @ West Union Rd	(SB L/T/R)	Not analyzed in AM Peak Hour		**>1.0**	**F**	Wash Co, Hillsboro
39	Croeni Rd @ Jacobson Rd	(SB L)	Not analyzed in AM Peak Hour		**>1.0**	**F**	Wash Co, Hillsboro
38	229th Avenue @ Evergreen Pkwy	Overall	1.00	**F**	**>1.0**	**F**	Wash Co, Hillsboro
31	Cornelius Pass Rd @ West Union Rd	Overall	>1.0	**F**	**>1.0**	**F**	Wash Co, Hillsboro
32	Cornelius Pass Rd @ Jacobson Rd	Overall	Not analyzed in AM Peak Hour		**>1.0**	E	ODOT, Wash Co
35	Cornelius Pass Rd @ US26 WB Ramps	Overall	**>1.0**	**F**	**>1.0**	**E**	All
36	Cornelius Pass Rd @ US26 EB Ramps	Overall	0.74	A	**0.88**	B	ODOT
37	Cornelius Pass Rd @ Evergreen Pkwy	Overall	0.88	D	**>1.0**	**F**	Wash Co, Hillsboro
34	Cornelius Pass Rd @ Wagon Way	Overall	Not analyzed in AM Peak Hour		**>1.0**	**D**	ODOT, Wash Co

For intersection approaches NB = northbound, SB = southbound, EB = eastbound, and WB = westbound. At the intersection approach L = left-turn movement, T = through movement, and R=right-turn movement. Some approaches have shared lanes where two or more travel movements may be permitted, as indicated with a slash.

Notes:
1. Shaded results indicate an intersection that fails to meet operational standards.
2. The critical movement at a signalized intersection is the overall operation of the intersection. The critical movement at an unsignalized intersection is the stopped (or yield) movement with the worst v/c ratio.
3. "All" indicates the following jurisdictions: ODOT, City of Hillsboro, and Washington County.

The 2035 build scenario shows improvement from the baseline condition. All intersections analyzed within the IAMP Management Area are forecast to meet operational standards with the exception of two intersections. The Brookwood Parkway at US 26 westbound ramp terminal would operate with a v/c ratio of 0.97 during the AM peak hour, which exceeds the Oregon Highway Plan standard of 0.85. The JTA Project and Brookwood Parkway improvements would

improve intersection operations near US 26 within the IAMP Management Area. Even though the westbound ramp terminal is forecast to exceed the OHP v/c standard, the Brookwood Interchange ramp terminals would not impact US 26 operations as they are forecast to under the Baseline scenario. Under Build conditions, the ramp terminals will operate at an overall intersection LOS of C or better during the AM and PM peak hours and improve safety. The proposed intersection design will maintain safe stopping sight distance for all off ramps under the forecast 2035 traffic volumes.

In addition to the westbound ramp terminal, Helvetia Road at Jacobson Road will not meet operational standards during the PM peak hour. Similar to the baseline scenario, vehicles turning left from Jacobson Road would experience long delays waiting for gaps in traffic on Helvetia Road. A future project (not evaluated in this memorandum) connecting Jacobson Road to Schaaf Road east of Helvetia Road will lead to the conversion of Jacobson Road at Helvetia Road to right-in/right-out and reroute left-turning traffic to the intersection of Schaaf Road at Helvetia Road. It is assumed that this intersection would be signalized and once signalized this intersection will be able to accommodate the additional left-turning traffic.

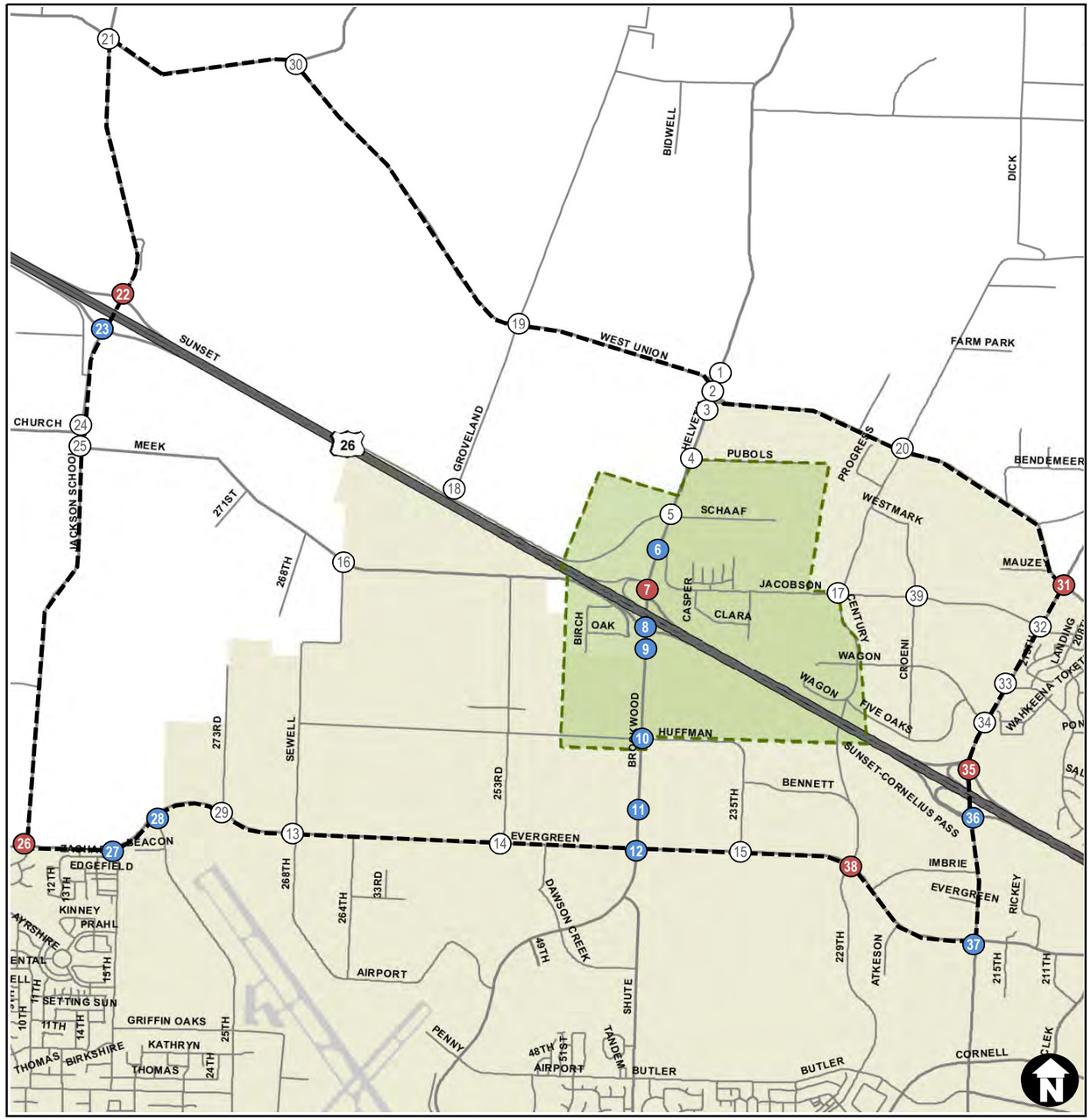
Within the IAMP Study Area, many of the same intersections that failed to meet operational standards under the baseline scenario would also fail to meet them under the build scenario. With the build scenario, 15 intersections would fail to meet operational standards compared to 16 intersections that would fail to meet operational standards with the baseline scenario.

For intersections that fail to meet City of Hillsboro, Washington County, or ODOT standards, improvements may be pursued by the jurisdictions that would result in these intersections operating below the appropriate standards. Improvements may include (but are not limited to) signalizing intersections, optimizing signal timing, providing protected turn movements, adding turn lanes, and adding through lanes and/or additional ramp meter storage. These improvements will be addressed in local TSPs.

Operational Justification for Improvements that Support the JTA

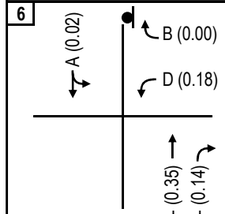
The proposed improvements in the IAMP Study Area will allow Brookwood Parkway and the intersection of Brookwood Parkway at Huffman Street to operate within operational standards. Under the 2035 build conditions, Brookwood Parkway is expected to have an ADT of 38,500 vehicles, which would result in peak period/peak direction demand of approximately 2,600 vehicles and would require three lanes of traffic in each direction. Huffman Street is estimated to have an ADT of 18,000 vehicles and a peak period/peak direction volume of approximately 1,500 vehicles. This will require two lanes in each direction on Huffman Street.

In addition, the turn lanes required at the intersection Brookwood Parkway and Huffman Street will allow the intersection to meet operational standards. Under 2035 baseline conditions, the intersection of Brookwood Parkway at Huffman Street would be operating at a LOS F with a v/c ratio greater than 1.0, resulting in long queues along both Brookwood Parkway and Huffman Street. The proposed improvements to the intersection of Huffman Street with Brookwood



Helvetia Rd @ Jacobson Rd

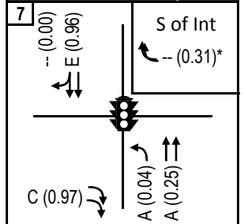
6



V/C: 0.18	LOS: D

Brookwood Pkwy @ US26 WB Ramps

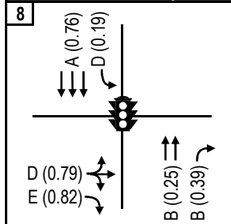
7



V/C: 0.97	LOS: C

Brookwood Pkwy @ US26 EB Ramps

8



V/C: 0.77	LOS: B

Brookwood Pkwy @ Meek Rd

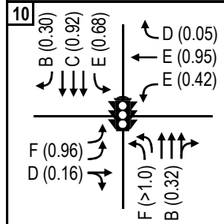
9

Side street access closed in Build scenario

V/C: 0.00	LOS: --

Brookwood Pkwy @ Huffman Street

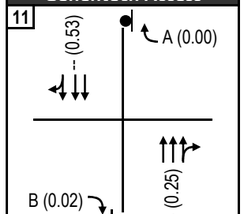
10



V/C: 0.93	LOS: D

Brookwood Pkwy @ Genentech Access

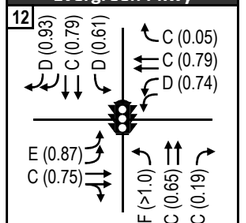
11



V/C: 0.02	LOS: B

Brookwood Pkwy @ Evergreen Pkwy

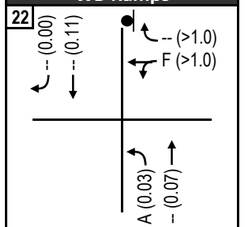
12



V/C: 0.86	LOS: D

Jackson Sch Rd @ US26 WB Ramps

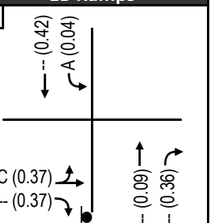
22



V/C: >1.0	LOS: F

Jackson Sch Rd @ US26 EB Ramps

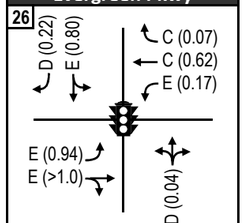
23



V/C: 0.37	LOS: C

Jackson Sch Rd @ Evergreen Pkwy

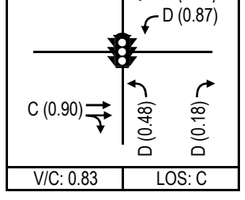
26



V/C: >1.0	LOS: E

15th Avenue @ Evergreen Pkwy

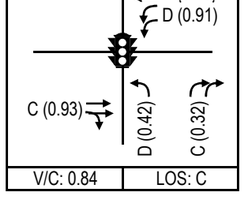
27



V/C: 0.83	LOS: C

25th Avenue @ Evergreen Pkwy

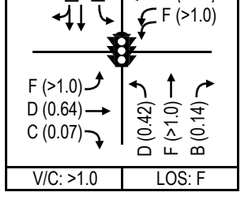
28



V/C: 0.84	LOS: C

Cornelius Pass Rd @ West Union Rd

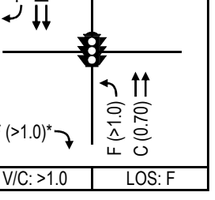
31



V/C: >1.0	LOS: F

Cornelius Pass Rd @ US26 WB Ramps

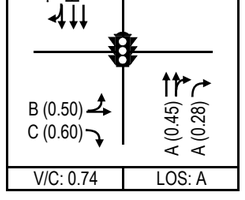
35



V/C: >1.0	LOS: F

Cornelius Pass Rd @ US26 EB Ramps

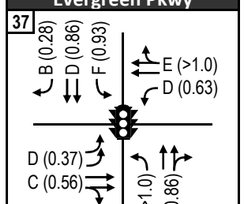
36



V/C: 0.74	LOS: A

Cornelius Pass Rd @ Evergreen Pkwy

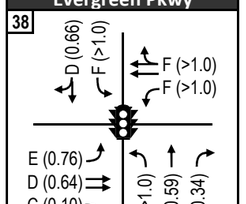
37



V/C: 0.88	LOS: D

229th Avenue @ Evergreen Pkwy

38



V/C: 1.00	LOS: F

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Legend

- Signalized inersection
- STOP Controlled Approach
- Lane Configuration
- IAMP Study Boundary
- **V/C:** Volume-to-Capacity Ratio
- **LOS:** Level of Service
- **A (0.01)** Lane Group LOS (V/C)
- Interchange Management Area
- Intersection evaluated
- Intersection fails operational standard
- Intersection not evaluated in AM Peak Hour
- V/C: 0.01 | LOS: A Overall Intersection Operations**
- Urban Growth Boundary
- -- LOS not reported for free movements

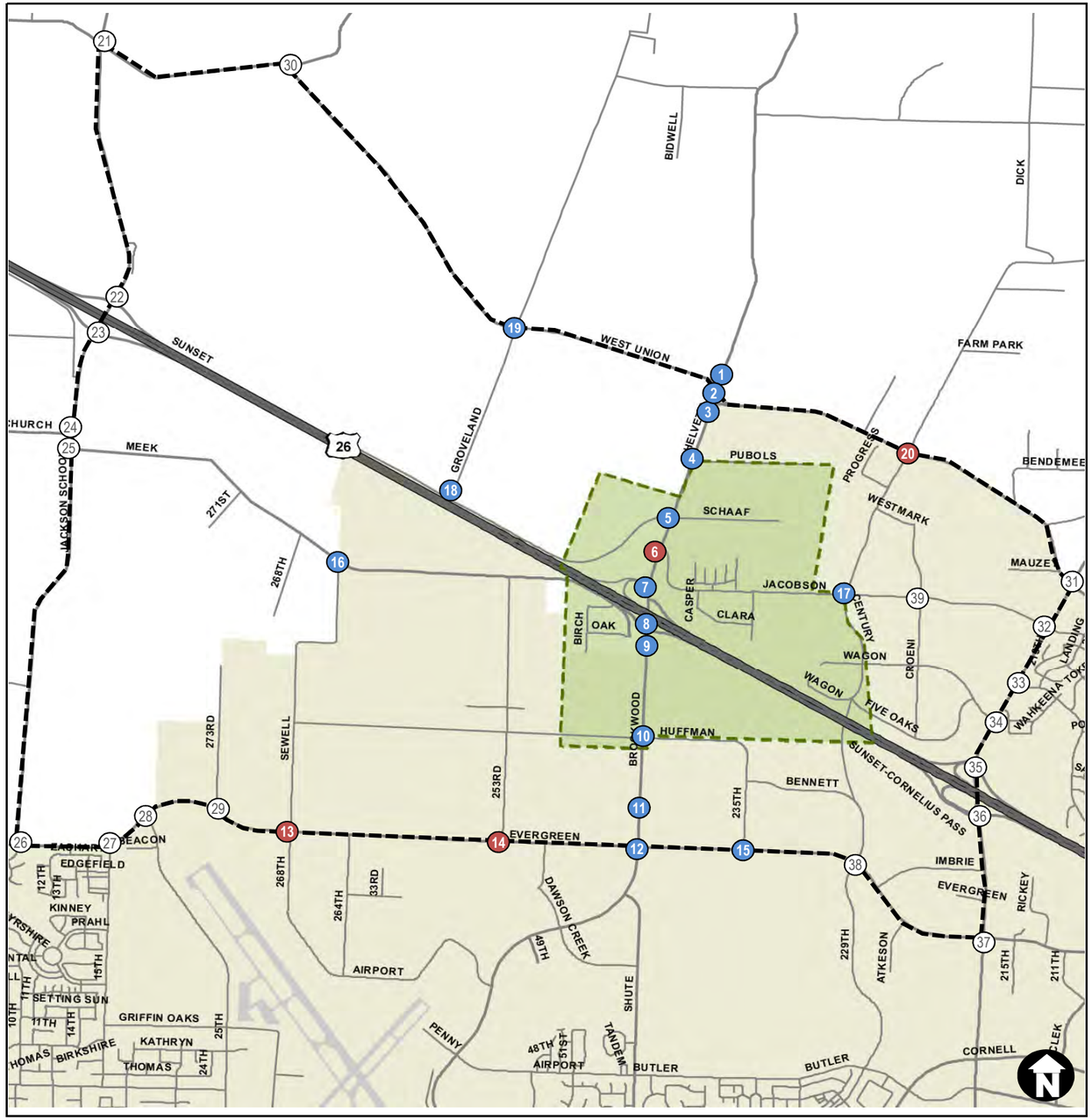
* V/C for unsignalized movement not accounted for in overall signalized intersection operations

**Overall stop-controlled intersection operations reported for worst stopped movement

FIGURE 7

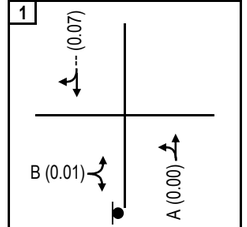
2035 Build Operations AM Peak Hour

US 26 / Brookwood / Helvetia IAMP



Helvetia Rd North @ West Union Rd

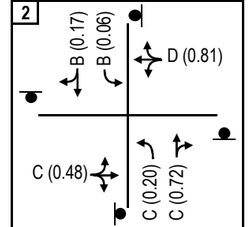
1



V/C: 0.01 | LOS: B

Helvetia Rd Middle @ West Union Rd

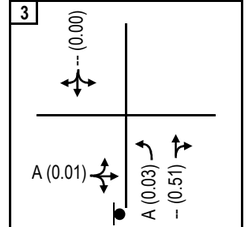
2



V/C: 0.81 | LOS: D

Helvetia Rd South @ West Union Rd

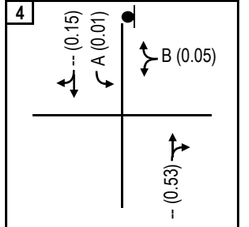
3



V/C: 0.01 | LOS: A

Helvetia Rd @ Pubols Rd

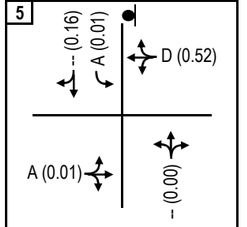
4



V/C: 0.05 | LOS: B

Helvetia Rd @ Schaff Rd

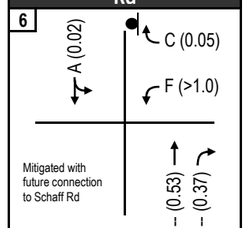
5



V/C: 0.52 | LOS: D

Helvetia Rd @ Jacobson Rd

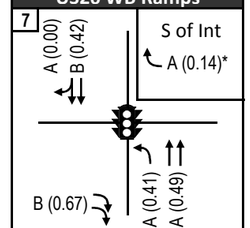
6



V/C: >1.0 | LOS: F

Brookwood Pkwy @ US26 WB Ramps

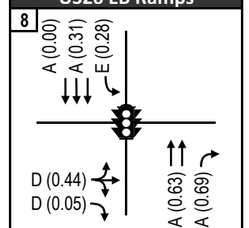
7



V/C: 0.58 | LOS: A

Brookwood Pkwy @ US26 EB Ramps

8



V/C: 0.66 | LOS: A

Brookwood Pkwy @ Meek Rd

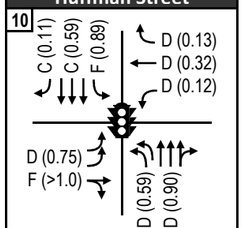
9

Side street access closed in Build scenario

V/C: 0.00 | LOS: --

Brookwood Pkwy @ Huffman Street

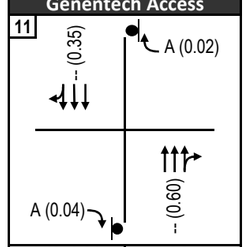
10



V/C: 0.99 | LOS: D

Brookwood Pkwy @ Genentech Access

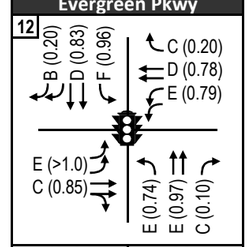
11



V/C: 0.04 | LOS: A

Brookwood Pkwy @ Evergreen Pkwy

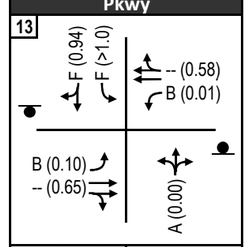
12



V/C: 0.91 | LOS: D

Sewell Rd @ Evergreen Pkwy

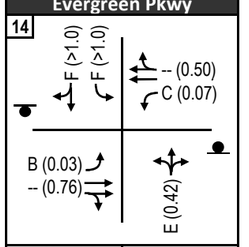
13



V/C: >1.0 | LOS: F

Meier-Jurgen Rd @ Evergreen Pkwy

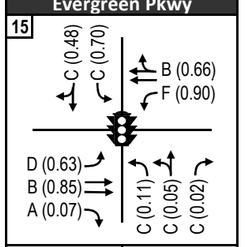
14



V/C: >1.0 | LOS: F

235th Avenue @ Evergreen Pkwy

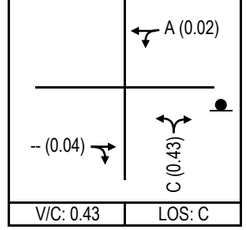
15



V/C: 0.73 | LOS: C

Sewell Rd @ Meek Rd

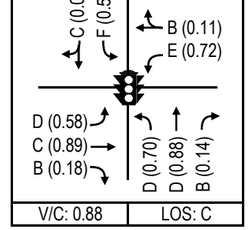
16



V/C: 0.43 | LOS: C

Century Blvd @ Jacobson Rd

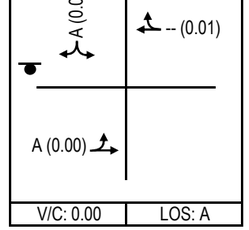
17



V/C: 0.88 | LOS: C

Groveland Rd @ Groveland Drive

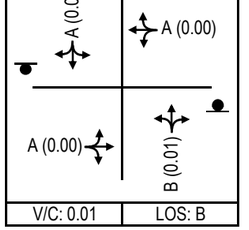
18



V/C: 0.00 | LOS: A

Groveland Rd @ West Union Rd

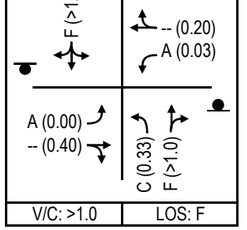
19



V/C: 0.01 | LOS: B

Century Blvd @ West Union Rd

20



V/C: >1.0 | LOS: F

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Legend

- Signalized inersection
- STOP Controlled Approach
- Lane Configuration
- IAMP Study Boundary
- **V/C:** Volume-to-Capacity Ratio
- **LOS:** Level of Service
- **A (0.01)** Lane Group LOS (V/C)
- Interchange Management Area
- Intersection evaluated
- Intersection fails operational standard
- Intersection volumes shown on separate figure
- V/C: 0.01 | LOS: A Overall Intersection Operations**
- Urban Growth Boundary
- -- LOS not reported for free movements

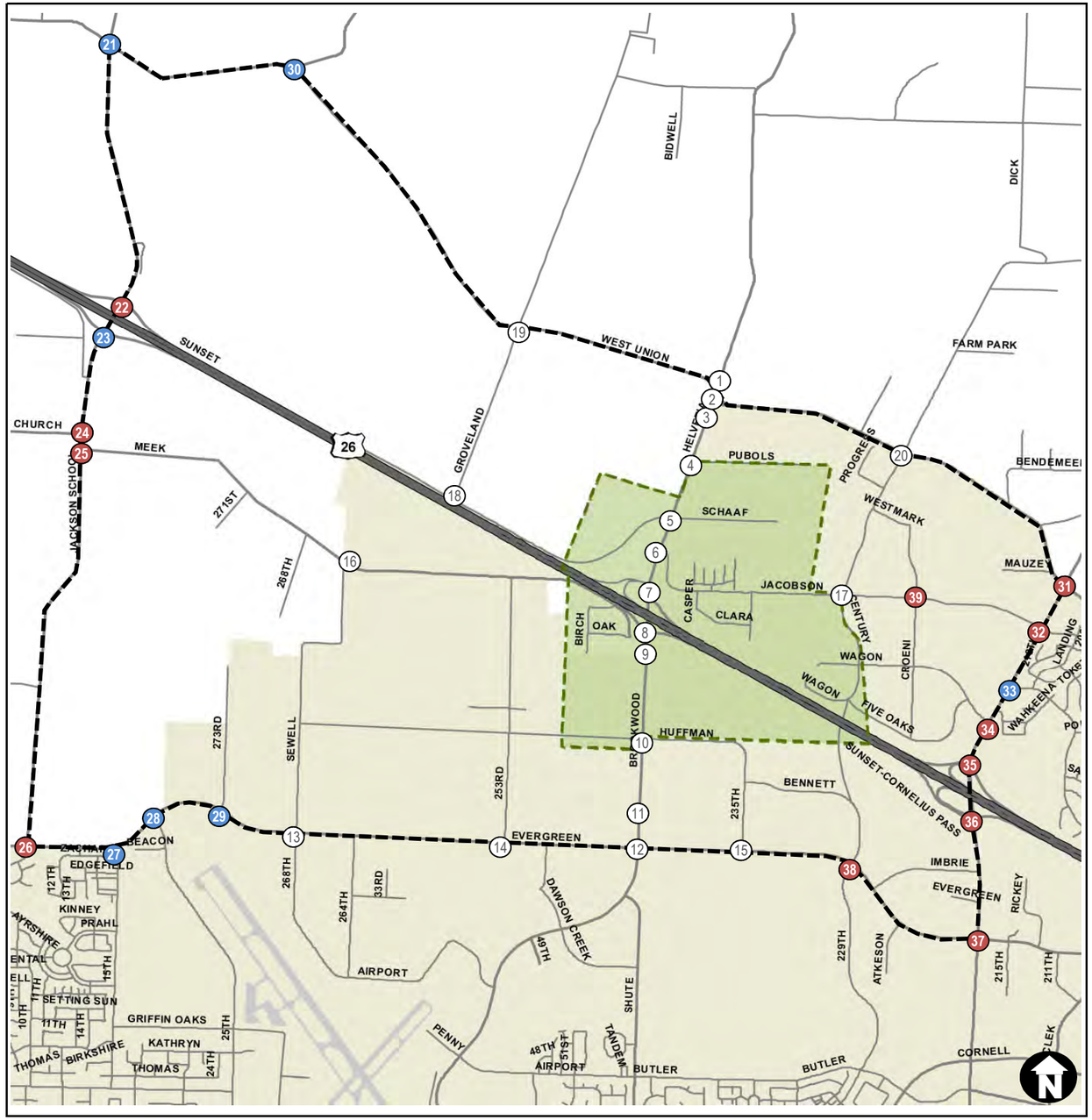
* V/C for unsignalized movement not accounted for in overall signalized intersection operations

**Overall stop-controlled intersection operations reported for worst stopped movement

FIGURE 8

2035 Build Operations PM Peak Hour

US 26 / Brookwood / Helvetia IAMP



Jackson Sch Rd @ West Union Rd
21

V/C: 0.71	LOS: D

Jackson Sch Rd @ US26 WB Ramps
22

V/C: >1.0	LOS: F

Jackson Sch Rd @ US26 EB Ramps
23

V/C: 0.05	LOS: B

Jackson Sch Rd @ Scotch Church Rd
24

V/C: >1.0	LOS: F

Jackson Sch Rd @ Meek Rd
25

V/C: >1.0	LOS: F

Jackson Sch Rd @ Evergreen Pkwy
26

V/C: >1.0	LOS: F

15th Avenue @ Evergreen Pkwy
27

V/C: 0.73	LOS: B

25th Avenue @ Evergreen Pkwy
28

V/C: 0.74	LOS: B

Eggiman Rd @ Evergreen Pkwy
29

V/C: 0.07	LOS: D

Jackson Quarry Rd @ West Union Rd
30

V/C: 0.05	LOS: B

Cornelius Pass Rd @ West Union Rd
31

V/C: >1.0	LOS: F

Cornelius Pass Rd @ Jacobson Rd
32

V/C: >1.0	LOS: E

Cornelius Pass Rd @ Rock Creek Blvd
33

V/C: 0.65	LOS: A

Cornelius Pass Rd @ Wagon Way
34

V/C: >1.0	LOS: D

Cornelius Pass Rd @ US26 WB Ramps
35

V/C: >1.0	LOS: E

Cornelius Pass Rd @ US26 EB Ramps
36

V/C: 0.88	LOS: B

Cornelius Pass Rd @ Evergreen Pkwy
37

V/C: >1.0	LOS: F

229th Avenue @ Evergreen Pkwy
38

V/C: >1.0	LOS: F

Croeni Rd @ Jacobson Rd
39

V/C: >1.0	LOS: F

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Legend

- Signalized inersection
- STOP Controlled Approach
- Lane Configuration
- IAMP Study Boundary
- **V/C:** Volume-to-Capacity Ratio
- **LOS:** Level of Service
- **A (0.01)** Lane Group LOS (V/C)
- Interchange Management Area
- ## Intersection evaluated
- ## Intersection fails operational standard
- (##) Intersection volumes shown on separate figure
- V/C: 0.01 | LOS: A Overall Intersection Operations**
- Urban Growth Boundary
- -- LOS not reported for free movements

* V/C for unsignalized movement not accounted for in overall signalized intersection operations

**Overall stop-controlled intersection operations reported for worst stopped movement

FIGURE 9

2035 Build Operations PM Peak Hour

US 26 / Brookwood / Helvetia IAMP

Parkway under the build scenario would result in an LOS of D and a v/c ratio of 0.99. These will meet the City of Hillsboro and Washington County operational standards.

The following projects are justified based on need for access to industrial lands or as an alternative to a closed access near the Brookwood Parkway/Helvetia Road Interchange and not based on operational needs:

- 253rd Avenue north of Evergreen Parkway
- Groveland Drive Realignment
- Huffman Street East of 253rd Avenue
- Huffman Street West of 253rd Avenue
- 264th Avenue
- Schaaf Road

Queuing

Queuing was evaluated at the Jackson School Road Interchange, at the Cornelius Pass Road Interchange, and along Brookwood Parkway/Helvetia Road from Jacobson Road to Evergreen Parkway. **Table 6** below illustrates the approach and time period when queuing would be expected to extend into the upstream intersections for the IAMP Management Area and the IAMP Study Area under the 2035 build conditions.

Table 6. 2035 Build Intersections with Queue Spillback

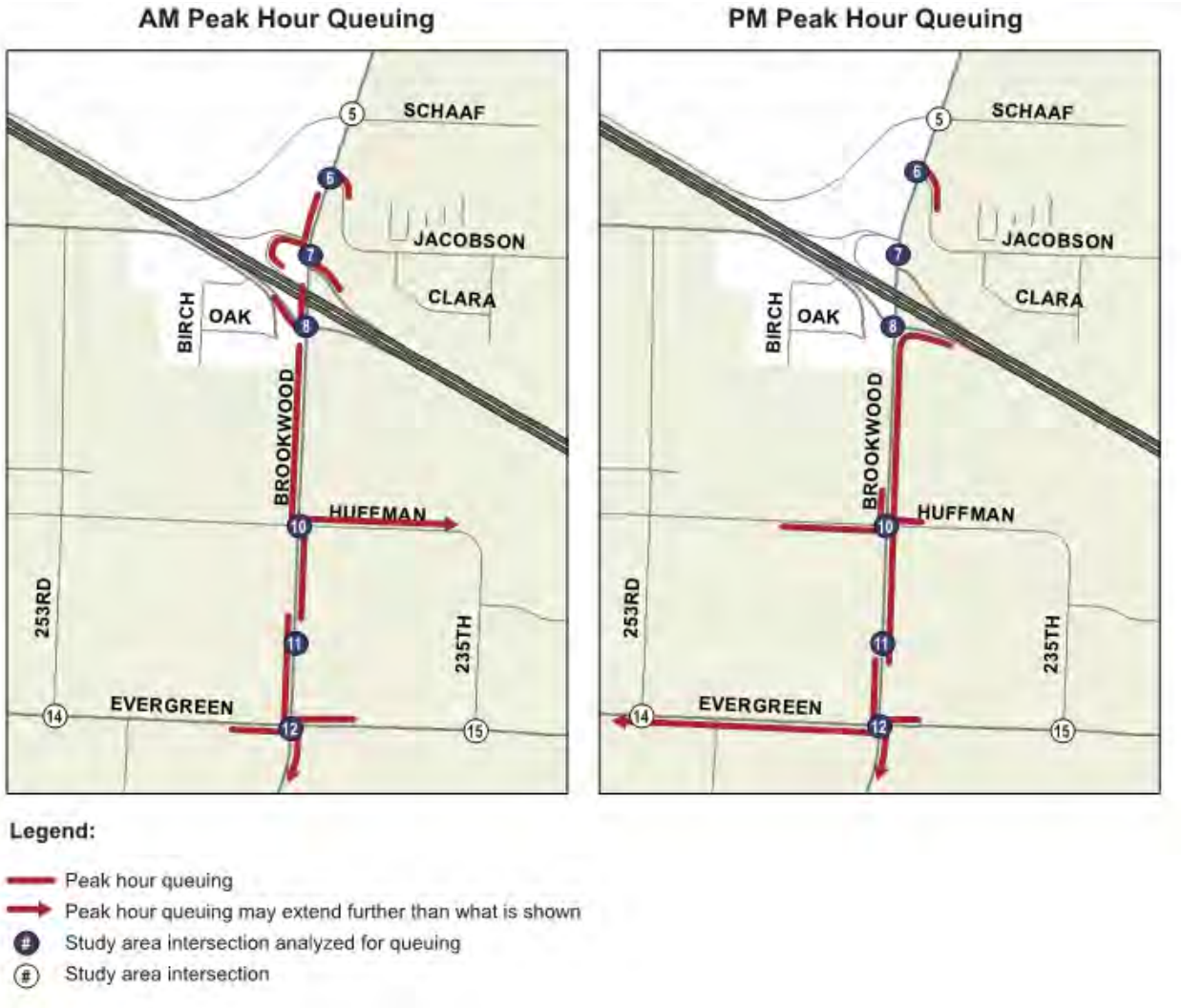
Intersection with Queue Spillback		Direction & Movement	Peak Period	
			AM	PM
IAMP Management Area				
10	Brookwood Pkwy @ Huffman Street	WBT	■	
IAMP Study Area				
22	Jackson School Rd @ US26 WB Ramps	WBLT	■	■
23	Jackson School Rd @ US26 EB Ramps	NBT		■
12	Brookwood Pkwy @ Evergreen Pkwy	EBTR		■
		NBT	■	■
		SBT	■	
		SBR	■	
35	Cornelius Pass Rd @ US26 WB Ramps	NBT		■
		SBT		■
36	Cornelius Pass Rd @ US26 EB Ramps	NBT		■
		SBT		■

■ = Queue spillback during peak period.
NB = northbound, SB = southbound, EB = eastbound, and WB = westbound. At the intersection approach L = left-turn movement, T = through movement, and R=right-turn movement.

The only intersection for the 2035 build scenario within the IAMP Management Area that is forecast to spill back into an upstream intersection is Brookwood Parkway at Huffman Street during the AM peak hour. The large number of southbound vehicles on Brookwood Parkway

requires the majority of the intersection green time each cycle. This results in longer queues on the minor street approaches. Although more traffic would be on Brookwood Parkway (there would be no metering effect at the ramp terminals as is the case under the baseline scenario), the queuing would not extend into the Brookwood Parkway eastbound ramp terminal. In addition, queue spillback would not occur from the ramp terminals at Brookwood Parkway onto US 26, as is forecast under the baseline scenario. **Figure 10** shows the extent of expected queuing along Brookwood Parkway/Helvetia Road under the build scenario.

Figure 10. 2035 Build Condition – Brookwood Parkway Queue Spillback



During the PM peak hour, queuing primarily occurs in the northbound direction and on the minor street approaches of Jacobson Road, Huffman Street, and Evergreen Parkway. The Brookwood Parkway/Helvetia Road eastbound on-ramp spills back from the ramp meter onto Brookwood Parkway under the build scenario but not under the baseline scenario, because demand (which is similar under both the baseline and build scenarios) being able to reach the on-ramp under the build scenario and not under the baseline scenario. In the baseline scenario,

vehicles are unable to reach the interchange from Meek Road, Huffman Street, and Evergreen Parkway. The northbound Brookwood Parkway queuing extends from the eastbound US 26 ramp meter to south of the Genentech access. Within the IAMP Study Area, two intersections in the AM peak hour and five in the PM peak hour would have queuing with spillback into upstream intersections. This is a slight improvement over the baseline condition, which is forecast to have three intersections in the AM and five intersections in the PM that would have queuing with spillback. Detailed queuing worksheets are presented in **Appendix C**.

Freeway Analysis

HCS was used to determine freeway operations along US 26 between the Jackson School Road interchanges and the Cornelius Pass Road Interchange for the 2035 build scenario. **Figure 11** summarizes the v/c ratios for US 26 in the IAMP Study Area mainline, and for the merge and diverge areas. During the AM and PM peak hours, US 26 within the IAMP Study Area (between the Jackson School Road interchanges and the Cornelius Pass Road Interchange) would operate within the ODOT standards in the OHP. The westbound mainline segment between the Brookwood Parkway/Helvetia Road off-ramps is forecast to operate at v/c ratios of 0.90 and 0.83 for the AM and PM peak hours, respectively. This is less than the OHP standard of 0.99.

With the addition of the westbound loop off-ramp to southbound Brookwood Parkway, the v/c ratio for the build scenario diverge to Brookwood Parkway/Helvetia Road meets the standards, while the single off-ramp under the baseline scenario is forecast to operate above ODOT standards. Under build conditions, the westbound off-ramp to northbound Helvetia Road would operate with a v/c ratio of 0.14 and the westbound off-ramp to southbound Brookwood Parkway would operate with a v/c ratio of 0.54. During the PM peak hour, the westbound off-ramp to northbound Helvetia Road would operate with a v/c ratio of 0.07 and the westbound off-ramp to southbound Brookwood Parkway would operate with a v/c ratio of 0.23. Detailed analysis worksheets are presented in **Appendix D**.

7. FUTURE BUILD TRAFFIC SAFETY CONSIDERATIONS

Local Network

The build scenario operations analysis reveals several long-term traffic safety issues that need consideration. Long delays and extensive queues may cause drivers to engage in riskier actions, such as running lights or traveling longer distances in the two-way left-turn lane to go around queues, which could result in more turning, angle, and sideswipe collisions. On unsignalized side streets, longer delays may increase the likelihood that drivers would accept shorter gaps in the mainline traffic, putting them at risk for turning or angle collisions. Where congestion is expected to worsen, it is safe to assume that current safety concerns would be exacerbated.

Highway

Congestion at the Brookwood/Helvetia westbound ramp terminal with US 26 is improved compared under the future build scenario compared to the baseline conditions, which should result in improved safety on US 26 and on the US 26 westbound off-ramps.

8. BICYCLE AND PEDESTRIAN FACILITIES

Washington County has recently completed a Suitability Mapping process as part of their Bicycle and Pedestrian Improvement Prioritization Project. The segment of Brookwood Parkway south of the US 26/Brookwood Parkway interchange scored at a High Level, with Helvetia Road scoring at a Medium Level, indicating areas where bicycle and pedestrian improvements will likely have the highest impact on the largest number of existing and potential users. The development of the US 26/Brookwood Parkway IAMP provides ODOT, Washington County, and the City of Hillsboro with a planning framework to fully consider and plan for future bicycle and sidewalk improvements within and near the IAMP Management Area and extending beyond to the larger planning area.

The JTA funded US 26/Brookwood Parkway Interchange improvement project includes both bicycle and sidewalk facilities. The interchange re-design will include stripped bike lanes and sidewalks on both sides of the bridge structure crossing US 26. The bike lanes and sidewalks will terminate at the north and south end of interchange structure as bicycle and pedestrian facilities do not currently exist on either Brookwood Parkway to the south or Helvetia Road to the north of the interchange. Washington County's 2020 Transportation Plan calls for sidewalks and bike lanes on Brookwood Parkway south of the interchange, and newly developed design options add flexibility to the design of these facilities. Sidewalks and bike facilities are also planned for on Helvetia Road adjacent to the urban area north of the interchange; improvements to Helvetia Road sections adjacent to the rural lands would be consistent with rural roadway design standards. Some sidewalk and bike facility improvements would be included with future Helvetia Road improvement projects for the IAMP Management Area, but it is expected that these improvements to the north will be limited to the immediate interchange area. In addition, the City of Hillsboro will include sidewalks and bike lanes in their plans and designs for the North Hillsboro UGB expansion area southwest of the interchange. In Section 4 Transportation and Circulation Improvement Projects, the project description includes pedestrian and bicycle improvements for projects within the IAMP Study Area.

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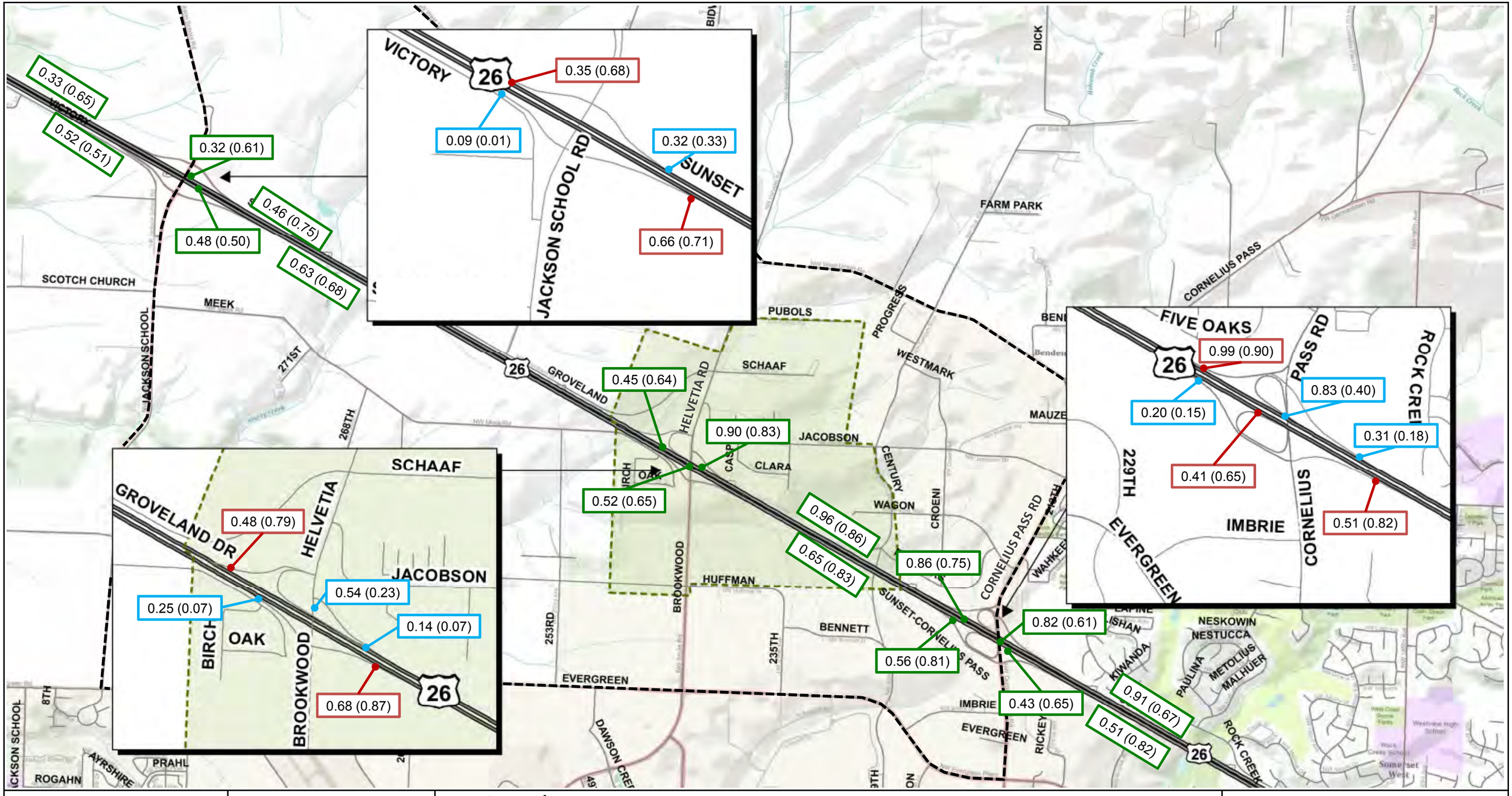

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Legend

- Mainline — **0.50 (0.65)** AM (PM) Volume-to-Capacity Ratio
- Merge
- Diverge

Note:
A third eastbound mainline lane assumed east of Cornelius Pass Road

- IAMP Study Boundary
- Interchange Management Area
- Urban Growth Boundary

FIGURE 11

2035 Build Conditions
Freeway Operations
AM and PM Peak Hours

US 26 / Brookwood / Helvetia IAMP

Appendix A. Traffic Volume Development

Project: Brookwood IAMP
Job #: ODOT0000-0701
Subject: ***AM Build Turning Movement Volumes***
Created: 6/8/2011
Rev. Date: 5/7/2012

	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - AM Peak	2035 Build NCHRP 255-Link Unbalanced	Difference (Volume Balancing)	2035 Build NCHRP 255-Link Balanced
22	30	Jackson Sch Rd @ US26 WB Ramps	NBL	35	45	0	45
	30	16 hr Turning Movement Count	NBT	40	120	(5)	115
	30	Count Date: 5/25/2011	NBR	0	0	0	0
	30	2011	SBL	0	0	0	0
	30		SBT	110	185	0	185
	30		SBR	0	0	0	0
	30	AM Peak Hour: 7:15 AM-8:15 AM	EBL	0	0	0	0
	30	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	0	0	0	0
	30		EBR	0	0	0	0
	30		WBL	370	555	0	555
	30	PHF:	WBT	0	0	0	0
	30	0.87	WBR	25	45	0	45
			TEV	**580**	**950**	**-5**	**945**
23	40	Jackson Sch Rd @ US26 EB Ramps	NBL	0	0	0	0
	40	16 hr Turning Movement Count	NBT	70	150	0	150
	40	Count Date: 5/25/2011	NBR	560	580	0	580
	40	2011	SBL	55	55	0	55
	40		SBT	425	675	10	685
	40		SBR	0	0	0	0
	40	AM Peak Hour: 7:00 AM-8:00 AM	EBL	5	10	0	10
	40	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	0	0	0	0
	40		EBR	80	150	0	150
	40		WBL	0	0	0	0
	40	PHF:	WBT	0	0	0	0
	40	0.86	WBR	0	0	0	0
			TEV	**1195**	**1620**	**10**	**1630**
26	70	Jackson Sch Rd @ Evergreen Rd	NBL	0	0	2	2
	70	16 hr Turning Movement Count	NBT	5	5	0	5
	70	Count Date: 5/25/2011	NBR	5	5	0	5
	70	2011	SBL	160	130	0	130
	70		SBT	0	0	2	2
	70		SBR	300	320	0	320
	70	AM Peak Hour: 7:15 AM-8:15 AM	EBL	375	475	0	475
	70	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	590	1,275	0	1,275
	70		EBR	0	0	2	2
	70		WBL	5	5	0	5
	70	PHF:	WBT	215	360	35	395
	70	0.87	WBR	90	70	0	70
			TEV	**1745**	**2645**	**41**	**2686**
27	80	15th Avenue @ Evergreen Rd	NBL	95	95	0	95
	80	2 hr AM/PM Turning Movement Count	NBT	0	0	0	0
	80	Count Date: 10/19/2010	NBR	190	270	0	270
	80	2010	SBL	0	0	0	0
	80		SBT	0	0	0	0
	80		SBR	0	0	0	0
	80	AM Peak Hour: 7:30 AM-8:30 AM	EBL	0	0	0	0
	80	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	550	1,215	(5)	1,210
	80		EBR	205	200	0	200
	80		WBL	335	325	0	325
	80	PHF:	WBT	265	405	0	405
	80	0.89	WBR	0	0	0	0
			TEV	**1640**	**2510**	**-5**	**2505**

Project: Brookwood IAMP
Job #: ODOT0000-0701
Subject: ***AM Build Turning Movement Volumes***
Created: 6/8/2011
Rev. Date: 5/7/2012

	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - AM Peak	2035 Build NCHRP 255-Link Unbalanced	Difference (Volume Balancing)	2035 Build NCHRP 255-Link Balanced
28	90	25th Avenue @ Evergreen Rd	NBL	60	95	0	95
	90	2 hr AM/PM Turning Movement Count	NBT	0	0	0	0
	90	Count Date: 10/19/2010	NBR	160	315	0	315
	90	2010	SBL	0	0	0	0
	90		SBT	0	0	0	0
	90		SBR	0	0	0	0
	90	AM Peak Hour: 7:45 AM-8:45 AM	EBL	0	0	0	0
	90	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	630	1,280	0	1,280
	90		EBR	110	175	0	175
	90		WBL	540	610	0	610
	90	PHF:	WBT	540	630	0	630
	90	0.89	WBR	0	0	0	0
			TEV	**2040**	**3105**	**0**	**3105**
6	210	Helvetia Rd @ Jacobson Rd	NBL	5	5	(5)	0
	210	3 hr AM/PM Turning Movement Count	NBT	145	530	0	530
	210	Count Date: 5/25/2011	NBR	210	225	(15)	210
	210	2011	SBL	10	15	0	15
	210		SBT	305	560	0	560
	210		SBR	0	0	0	0
	210	AM Peak Hour: 7:15 AM-8:15 AM	EBL	0	0	0	0
	210	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	0	0	0	0
	210		EBR	5	5	(5)	0
	210		WBL	165	10	20	30
	210	PHF:	WBT	0	0	0	0
	210	0.79	WBR	5	2	0	2
			TEV	**870**	**1352**	**-5**	**1347**
7	220	Brookwood Pkwy @ US26 WB Ramps	NBL	55	45	0	45
	220	16 hr Turning Movement Count	NBT	320	480	260	740
	220	Count Date: 5/25/2011	NBR	0	0	0	0
	220	2011	SBL	0	0	0	0
	220		SBT	450	580	0	580
	220		SBR	25	10	(10)	0
	220	AM Peak Hour: 7:30 AM-8:30 AM	EBL	0	0	0	0
	220	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	0	0	0	0
	220		EBR	0	1,910	0	1,910
	220		WBL	1260	0	0	0
	220	PHF:	WBT	0	0	0	0
	220	0.82	WBR	40	260	0	260
			TEV	**2150**	**3285**	**250**	**3535**
8	230	Brookwood Pkwy @ US26 EB Ramps	NBL	0	0	0	0
	230	16 hr Turning Movement Count	NBT	315	465	(35)	430
	230	Count Date: 5/25/2011	NBR	465	535	0	535
	230	2011	SBL	40	35	0	35
	230		SBT	1670	2,465	(10)	2,455
	230		SBR	0	0	0	0
	230	AM Peak Hour: 7:30 AM-8:30 AM	EBL	60	95	0	95
	230	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	0	0	0	0
	230		EBR	175	375	0	375
	230		WBL	0	0	0	0
	230	PHF:	WBT	0	0	0	0
	230	0.91	WBR	0	0	0	0
			TEV	**2725**	**3970**	**-45**	**3925**

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	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - AM Peak	2035 Build NCHRP 255-Link Unbalanced	Difference (Volume Balancing)	2035 Build NCHRP 255-Link Balanced
9	240	Brookwood Pkwy @ Meek Rd	NBL	10	2	(2)	0
	240	3 hr AM/PM Turning Movement Count	NBT	765	1,020	(1,020)	0
	240	Count Date: 5/25/2011	NBR	5	0	0	0
	240	2011	SBL	0	0	0	0
	240		SBT	1840	2,980	(2,980)	0
	240		SBR	5	2	(2)	0
	240	AM Peak Hour: 7:30 AM-8:30 AM	EBL	15	0	0	0
	240	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	5	0	0	0
	240		EBR	20	0	0	0
	240		WBL	0	0	0	0
	240	PHF:	WBT	0	0	0	0
	240	0.90	WBR	0	0	0	0
			TEV	**2665**	**4004**	**-4004**	**0**
10	250	Brookwood Pkwy @ Huffman Street	NBL	1	225	0	225
	250	3 hr AM/PM Turning Movement Count	NBT	740	800	(45)	755
	250	Count Date: 5/25/2011	NBR	30	10	0	10
	250	2011	SBL	120	110	5	115
	250		SBT	1740	2,090	245	2,335
	250		SBR	1	590	(275)	315
	250	AM Peak Hour: 7:30 AM-8:30 AM	EBL	1	135	5	140
	250	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	1	45	0	45
	250		EBR	1	55	0	55
	250		WBL	5	5	0	5
	250	PHF:	WBT	1	350	0	350
	250	0.89	WBR	40	70	0	70
			TEV	**2675**	**4485**	**-65**	**4420**
11	260	Brookwood Pkwy @ Genentech Access	NBL	25	40	(40)	0
	260	3 hr AM/PM Turning Movement Count	NBT	835	1,085	(95)	990
	260	Count Date: 5/25/2011	NBR	10	10	5	15
	260	2011	SBL	5	5	(5)	0
	260		SBT	1735	2,100	20	2,120
	260		SBR	80	65	220	285
	260	AM Peak Hour: 7:30 AM-8:30 AM	EBL	5	5	(5)	0
	260	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	0	0	0	0
	260		EBR	10	10	0	10
	260		WBL	0	0	0	0
	260	PHF:	WBT	0	0	0	0
	260	0.89	WBR	0	0	0	0
			TEV	**2705**	**3320**	**100**	**3420**
12	270	Brookwood Pkwy @ Evergreen Rd	NBL	60	145	40	185
	270	16 hr Turning Movement Count	NBT	595	855	(145)	710
	270	Count Date: 5/25/2011	NBR	125	255	0	255
	270	2011	SBL	70	85	0	85
	270		SBT	915	905	30	935
	270		SBR	760	1,090	20	1,110
	270	AM Peak Hour: 7:30 AM-8:30 AM	EBL	225	245	(30)	215
	270	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	390	610	30	640
	270		EBR	90	115	0	115
	270		WBL	105	185	0	185
	270	PHF:	WBT	330	840	0	840
	270	0.84	WBR	50	75	5	80
			TEV	**3715**	**5405**	**-50**	**5355**

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	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - AM Peak	2035 Build NCHRP 255-Link Unbalanced	Difference (Volume Balancing)	2035 Build NCHRP 255-Link Balanced
38	320	229th Avenue @ Evergreen Pkwy	NBL	105	270	0	270
	320	2 hr AM/PM Turning Movement Count	NBT	70	220	0	220
	320	Count Date: 10/19/2010	NBR	265	235	0	235
	320	2010	SBL	40	205	0	205
	320		SBT	25	150	0	150
	320		SBR	5	75	0	75
	320	AM Peak Hour: 7:15 AM-8:15 AM	EBL	15	80	0	80
	320	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	370	555	0	555
	320		EBR	85	150	0	150
	320		WBL	540	385	0	385
	320	PHF:	WBT	545	975	0	975
	320	0.89	WBR	200	440	0	440
			TEV	**2265**	**3740**	**0**	**3740**
31	330	Cornelius Pass Rd @ West Union Rd	NBL	50	30	0	30
	330	16 hr Turning Movement Count	NBT	360	540	0	540
	330	Count Date: 5/25/2011	NBR	190	215	0	215
	330	2011	SBL	10	55	0	55
	330		SBT	570	690	0	690
	330		SBR	35	105	0	105
	330	AM Peak Hour: 7:15 AM-8:15 AM	EBL	30	170	0	170
	330	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	55	235	0	235
	330		EBR	50	45	0	45
	330		WBL	520	940	0	940
	330	PHF:	WBT	155	705	0	705
	330	0.88	WBR	15	170	0	170
			TEV	**2040**	**3900**	**0**	**3900**
35	360	Cornelius Pass Rd @ US26 WB Ramps	NBL	70	80	0	80
	360	16 hr Turning Movement Count	NBT	750	735	10	745
	360	Count Date: 5/25/2011	NBR	0	0	0	0
	360	2011	SBL	0	0	0	0
	360		SBT	1065	1,075	0	1,075
	360		SBR	225	310	0	310
	360	AM Peak Hour: 7:00 AM-8:00 AM	EBL	0	0	0	0
	360	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	0	0	0	0
	360		EBR	1205	1,540	0	1,540
	360		WBL	0	0	0	0
	360	PHF:	WBT	0	0	0	0
	360	0.90	WBR	230	575	0	575
			TEV	**3545**	**4315**	**10**	**4325**
36	370	Cornelius Pass Rd @ US26 EB Ramps	NBL	0	0	0	0
	370	16 hr Turning Movement Count	NBT	665	660	0	660
	370	Count Date: 5/25/2011	NBR	490	540	0	540
	370	2011	SBL	0	0	0	0
	370		SBT	2025	2,275	(5)	2,270
	370		SBR	245	345	0	345
	370	AM Peak Hour: 7:00 AM-8:00 AM	EBL	155	165	0	165
	370	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	0	0	0	0
	370		EBR	185	215	0	215
	370		WBL	0	0	0	0
	370	PHF:	WBT	0	0	0	0
	370	0.88	WBR	0	0	0	0
			TEV	**3765**	**4200**	**-5**	**4195**

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	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - AM Peak	2035 Build NCHRP 255-Link Unbalanced	Difference (Volume Balancing)	2035 Build NCHRP 255-Link Balanced
37	380	Cornelius Pass Rd @ Evergreen Pkwy	NBL	155	275	0	275
	380	16 hr Turning Movement Count	NBT	775	835	0	835
	380	Count Date: 5/25/2011	NBR	45	75	0	75
	380	2011	SBL	250	220	0	220
	380		SBT	725	870	0	870
	380		SBR	300	285	0	285
	380	AM Peak Hour: 7:15 AM-8:15 AM	EBL	45	55	0	55
	380	AM Peak Hour Used: 7:30 AM-8:30 AM	EBT	250	480	0	480
	380		EBR	35	90	0	90
	380		WBL	30	75	0	75
	380	PHF:	WBT	505	1,030	0	1,030
	380	0.85	WBR	145	180	0	180
			TEV	**3260**	**4470**	**0**	**4470**

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Table 2: 2035 Link Volume Calculations for the AM Peak Period

Road	From	To	Direction	Volumes	Model	Interpolated Model	Model	2010-2035 Model Comparison			2035 Volume Estimates				Forecast Used	Method Used	Comments
				2011	2010	2011	2035	Annual Growth	Total Growth	Volume Growth	Volume Difference	Volume Growth	Absolute Difference	Average			
Helvetia Rd/Brookwood Pkwy	South of Evergreen	Evergreen	NB	780	1064	1085	1584	2.0%	46.9%	499	1279	1146	11%	1213	**1279**	Difference Method	Absolute difference >10% --> Used difference only
	Evergreen	South of Evergreen	SB	1110	1109	1113	1204	0.3%	8.2%	91	1201	1201	0%	1201	**1201**	Difference Method	To be consistent with method used for opposing direction
	Evergreen	Genentech	NB	870	1003	1017	1343	1.4%	32.5%	326	1196	1153	4%	1175	**1175**	Average of Difference and Growth	
	Genentech	Evergreen	SB	1745	1192	1204	1501	1.0%	24.9%	297	2042	2179	7%	2110	**2110**	Average of Difference and Growth	
	Genentech	Huffman St	NB	771	974	989	1343	1.5%	36.4%	354	1125	1051	7%	1088	**1088**	Average of Difference and Growth	
	Huffman St	Genentech	SB	1820	1223	1234	1501	0.9%	21.8%	267	2087	2217	6%	2152	**2152**	Average of Difference and Growth	
	Huffman St	Meek Rd	NB	780	976	986	1234	1.1%	25.4%	248	1028	978	5%	1003	**1003**	Average of Difference and Growth	
	Meek Rd	Huffman St	SB	1861	1437	1478	2450	2.8%	67.7%	972	2833	3120	10%	2977	**2977**	Average of Difference and Growth	
	Meek Rd	EB Ramp Terminal	NB	780	986	996	1234	1.0%	24.1%	238	1018	968	5%	993	**1018**	Difference Method	To be consistent with method used for opposing direction
	EB Ramp Terminal	Meek Rd	SB	1845	1414	1455	2450	2.9%	70.3%	995	2840	3143	10%	2991	**2840**	Difference Method	Absolute difference >10% --> Used difference only
	EB Ramp Terminal	WB Ramp Terminal	NB	375	533	541	727	1.5%	34.9%	186	561	506	10%	534	**561**	Difference Method	Absolute difference >10% --> Used difference only
	WB Ramp Terminal	EB Ramp Terminal	SB	1710	1281	1314	2094	2.5%	60.9%	780	2490	2752	10%	2621	**2490**	Difference Method	To be consistent with method used for opposing direction
	WB Ramp Terminal	Jacobson Rd	NB	360	403	420	817	4.1%	98.6%	397	757	715	6%	736	**736**	Average of Difference and Growth	
	Jacobson Rd	WB Ramp Terminal	SB	475	571	576	688	0.8%	19.7%	112	587	568	3%	578	**578**	Average of Difference and Growth	
	Jacobson Rd	Schaff Rd	NB	150	180	196	575	8.8%	210.7%	379	529	466	13%	498	**529**	Difference Method	Absolute difference >10% --> Used difference only
	Schaff Rd	Jacobson Rd	SB	315	339	350	623	3.4%	80.4%	273	588	568	3%	578	**588**	Difference Method	To be consistent with method used for opposing direction
Jackson School Rd	South of Evergreen	Evergreen	NB	10											**10**	**Manual**	Not in Models - Used existing volumes
	Evergreen	South of Evergreen	SB	5											**5**	**Manual**	Not in Models - Used existing volumes
	Evergreen	North of Evergreen	NB	470	258	260	314	0.9%	20.8%	54	524	568	8%	546	**546**	Average of Difference and Growth	
	North of Evergreen	Evergreen	SB	460	313	313	309	-0.1%	-1.2%	-4	456	454	0%	455	**455**	Average of Difference and Growth	
	Scotch Church Rd	EB Ramp Terminal	NB	630	468	472	567	0.8%	20.3%	95	725	758	4%	741	**741**	Average of Difference and Growth	
	EB Ramp Terminal	Scotch Church Rd	SB	505	502	515	837	2.7%	64.1%	322	827	829	0%	828	**828**	Average of Difference and Growth	
	EB Ramp Terminal	WB Ramp Terminal	NB	75	35	39	124	10.2%	244.1%	85	160	258	47%	209	**160**	Difference Method	Absolute difference >10% --> Used difference only
	WB Ramp Terminal	EB Ramp Terminal	SB	480	642	653	911	1.7%	40.2%	258	738	673	9%	706	**738**	Difference Method	To be consistent with method used for opposing direction
	WB Ramp Terminal	West Union	NB	55	151	155	261	2.9%	69.9%	106	161	93	53%	127	**161**	Difference Method	Absolute difference >10% --> Used difference only
	West Union	WB Ramp Terminal	SB	115	248	251	318	1.1%	27.1%	67	182	146	22%	164	**182**	Difference Method	Absolute difference >10% --> Used difference only
Cornelius Pass	South of Evergreen	Evergreen	NB	975	1144	1153	1378	0.8%	19.6%	225	1200	1166	3%	1183	**1183**	Average of Difference and Growth	
	Evergreen	South of Evergreen	SB	790	702	712	946	1.4%	33.4%	234	1024	1054	3%	1039	**1039**	Average of Difference and Growth	
	Evergreen	N of Evergreen	NB	965	1402	1407	1535	0.4%	9.1%	128	1093	1053	4%	1073	**1073**	Average of Difference and Growth	
	N of Evergreen	Evergreen	SB	1275	1131	1135	1228	0.3%	8.2%	93	1368	1380	1%	1374	**1374**	Average of Difference and Growth	
	South of EB Ramp	EB Ramp Terminal	NB	1155	1385	1387	1447	0.2%	4.3%	60	1215	1205	1%	1210	**1210**	Average of Difference and Growth	
	EB Ramp Terminal	South of EB Ramp	SB	2210	1622	1632	1868	0.6%	14.6%	236	2446	2532	3%	2489	**2489**	Average of Difference and Growth	
	EB Ramp Terminal	WB Ramp Terminal	NB	820	807	807	812	0.0%	0.6%	5	825	825	0%	825	**825**	Average of Difference and Growth	
	WB Ramp Terminal	EB Ramp Terminal	SB	2270	1769	1782	2086	0.7%	17.2%	304	2574	2661	3%	2617	**2617**	Average of Difference and Growth	
	WB Ramp Terminal	N of WB Ramp	NB	980	1152	1167	1522	1.3%	30.8%	355	1335	1282	4%	1309	**1309**	Average of Difference and Growth	
	N of WB Ramp	WB Ramp Terminal	SB	1290	1080	1085	1206	0.5%	11.2%	121	1411	1434	2%	1423	**1423**	Average of Difference and Growth	
	Jacobson Rd	West Union	NB	600	989	987	934	-0.2%	-5.3%	-53	547	568	4%	558	**558**	Average of Difference and Growth	
	West Union	Jacobson Rd	SB	1140	1046	1067	1582	2.0%	49.2%	515	1655	1701	3%	1678	**1678**	Average of Difference and Growth	
	West Union	N of West Union	NB	405	726	746	1227	2.8%	66.2%	481	886	673	27%	780	**886**	Difference Method	Absolute difference >10% --> Used difference only
	N of West Union	West Union	SB	615	658	658	660	0.0%	0.3%	2	617	617	0%	617	**617**	Difference Method	To be consistent with method used for opposing direction
West Union	E of Corn Pass	Corn Pass	WB	690	666	692	1315	3.9%	93.5%	623	1313	1335	2%	1324	**1313**	Difference Method	To be consistent with method used for opposing direction
	Corn Pass	E of Corn Pass	EB	255	524	534	785	2.0%	47.8%	251	506	377	29%	441	**506**	Difference Method	Absolute difference >10% --> Used difference only
	Corn Pass	W of Corn Pass	WB	240	270	295	895	9.3%	222.2%	600	840	773	8%	807	**840**	Difference Method	To be consistent with method used for opposing direction
	W of Corn Pass	Corn Pass	EB	135	253	261	446	3.1%	73.2%	185	320	234	31%	277	**320**	Difference Method	Absolute difference >10% --> Used difference only
Jacobson Road	E of Helvetia Rd	Helvetia Rd	WB	170	231	224	67	-2.8%	-68.2%	-157	13	54	125%	33	**13**	Difference Method	Absolute difference >10% --> Used difference only
	Helvetia Rd	E of Helvetia Rd	EB	220	223	224	245	0.4%	9.5%	21	241	241	0%	241	**241**	Difference Method	To be consistent with method used for opposing direction
	Helvatia Rd	W of Helvati Rd	WB	5											**5**	**Manual**	Not in Models - Used existing volumes
	W of Helvatia Rd	Helvatia Rd	EB	5											**5**	**Manual**	Not in Models - Used existing volumes
EB US 26 Ramps	W of Jackson School	Jackson School	EB	85	73	76	151	4.3%	102.6%	75	160	172	7%	166	**166**	Average of Difference and Growth	
	Jackson School	E of Jackson School	EB	615	647	648	667	0.1%	3.0%	19	634	633	0%	634	**634**	Average of Difference and Growth	
	W of Brookwood Pkwy	Brookwood Pkwy	EB	235	314	324	559	3.1%	74.9%	235	470	411	13%	441	**470**	Difference Method	Absolute difference >10% --> Used difference only
	Brookwood Pkwy	E of Brookwood Pkwy	EB	505	634	637	710	0.5%	11.5%	73	578	563	3%	571	**571**	Average of Difference and Growth	
	W of Corn Pass	Corn Pass	EB	340	241	242	275	0.6%	13.5%	33	373	386	4%	379	**379**	Average of Difference and Growth	
	Corn Pass SB	E of Corn Pass	EB	245	377	381	482	1.1%	26.7%	101	346	311	11%	328	**346**	Difference Method	Absolute difference >10% --> Used difference only
	Corn Pass NB	E of Corn Pass	EB	490	588	590	647	0.4%	9.6%	57	547	537	2%	542	**542**	Average of Difference and Growth	
WB US 26 Ramps	E of Corn Pass	Corn Pass NB	WB	230	344	359	711	4.3%	102.4%	352	582	466	22%	524	**582**	Difference Method	Absolute difference >10% --> Used difference only
	E of Corn Pass	Corn Pass SB	WB	1205	713	725	1005	1.6%	39.3%	280	1485	1679	12%	1582	**1582**	Average of Difference and Growth	
	Corn Pass	W of Corn Pass	WB	295	25	29	125	16.0%	384.0%	96	391	1428	114%	909	**391**	Difference Method	Absolute difference >10% --> Used difference only
	E of Helvatia	NB Helvetia	WB	40	23	33	269	42.8%	1026.8%	236	276	451	48%	363	**276**	Difference Method	Absolute difference >10% --> Used difference only
	E of Helvatia	SB Helvetia	WB	1260	796	822	1440	3.2%	77.7%	618	1878	2239	18%	2058	**1878**	Difference Method	Absolute difference >10% --> Used difference only
	Helvetia Rd	W of Helvatia	WB	80	238	237	212	-0.4%	-10.5%	-25	55	72	26%	63	**55**	Difference Method	Absolute difference >10% --> Used difference only
	E of Jackson School	Jackson School	WB	395	524	533	753	1.7%	42.0%	220	615	561	9%	588	**588**	Average of Difference and Growth	
	Jackson School	W of Jackson School	WB	35	14	14	24	2.9%	68.6%	10	45	59	28%	52	**45**	Difference Method	Absolute difference >10% --> Used difference only

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Table 2: 2035 Link Volume Calculations for the AM Peak Period

Road	From	To	Direction	Volumes	Model	Interpolated Model	Model	2010-2035 Model Comparison			2035 Volume Estimates				Forecast Used	Method Used	Comments
				2011	2010	2011	2035	Annual Growth	Total Growth	Volume Growth	Volume Difference	Volume Growth	Absolute Difference	Average			
Meek Road	Brookwood Pkwy	W of Brookwood Pkwy	WB	15	12	12	0	-4.0%	-96.0%	-12	3	1	141%	2	**3**	Difference Method	Absolute difference >10% --> Used difference only
	W of Brookwood Pkwy	Brookwood Pkwy	EB	40	45	43	0	-4.0%	-96.0%	-43	-3	2	600%	-1	**-3**	Difference Method	To be consistent with method used for opposing direction
Evergreen Road	E of Corn Pass	Corn Pass	WB	680	881	906	1514	2.9%	69.0%	608	1288	1149	11%	1218	**1288**	Difference Method	Absolute difference >10% --> Used difference only
	Corn Pass	E of Corn Pass	EB	545	561	571	800	1.7%	40.9%	229	774	768	1%	771	**774**	Difference Method	To be consistent with method used for opposing direction
	Corn Pass	W of Corn Pass	WB	960	1083	1109	1742	2.4%	58.4%	633	1593	1521	5%	1557	**1593**	Difference Method	To be consistent with method used for opposing direction
	W of Corn Pass	Corn Pass	EB	330	592	604	903	2.1%	50.4%	299	629	496	23%	562	**629**	Difference Method	Absolute difference >10% --> Used difference only
	E of 229th	229th	WB	1285	1158	1180	1698	1.9%	44.8%	518	1803	1860	3%	1832	**1832**	Average of Difference and Growth	
	229th	E of 229th	EB	675	863	878	1238	1.7%	41.7%	360	1035	957	8%	996	**996**	Average of Difference and Growth	
	229th	W of 229th	WB	655	1125	1153	1821	2.5%	59.4%	668	1323	1044	24%	1184	**1323**	Difference Method	Absolute difference >10% --> Used difference only
	W of 229th	229th	EB	470	862	876	1206	1.6%	38.3%	330	800	650	21%	725	**800**	Difference Method	To be consistent with method used for opposing direction
	E of Brookwood	Brookwood	WB	485	648	674	1305	4.1%	97.3%	631	1116	957	15%	1036	**1116**	Difference Method	Absolute difference >10% --> Used difference only
	Brookwood	E of Brookwood	EB	585	948	963	1328	1.6%	38.5%	365	950	810	16%	880	**950**	Difference Method	Absolute difference >10% --> Used difference only
	Brookwood	W of Brookwood	WB	1150	621	660	1584	6.2%	148.9%	924	2074	2862	32%	2468	**2074**	Difference Method	Absolute difference >10% --> Used difference only
	W of Brookwood	Brookwood	EB	705	775	787	1068	1.5%	36.3%	281	986	961	3%	974	**986**	Difference Method	To be consistent with method used for opposing direction
	273rd	25th Ave	WB	1080	632	638	777	0.9%	22.0%	139	1219	1318	8%	1269	**1269**	Average of Difference and Growth	
	25th Ave	273rd	EB	790	846	881	1709	4.1%	97.9%	828	1618	1564	3%	1591	**1591**	Average of Difference and Growth	
	25th Ave	15th	WB	600	273	278	404	1.9%	46.1%	126	726	876	19%	801	**726**	Difference Method	Absolute difference >10% --> Used difference only
	15th	25th Ave	EB	740	918	949	1695	3.4%	81.3%	746	1486	1341	10%	1414	**1486**	Difference Method	Absolute difference >10% --> Used difference only
	15th	W of 15th	WB	360	257	262	377	1.9%	44.8%	115	475	521	9%	498	**498**	Average of Difference and Growth	
	W of 15th	15th	EB	755	721	748	1387	3.7%	88.7%	639	1394	1425	2%	1409	**1409**	Average of Difference and Growth	
	E of Jackson School	Jackson School	WB	310	257	262	377	1.9%	44.8%	115	425	449	5%	437	**437**	Average of Difference and Growth	
	Jackson School	E of Jackson School	EB	755	721	748	1387	3.7%	88.7%	639	1394	1425	2%	1409	**1409**	Average of Difference and Growth	
	Jackson School	W of Jackson School	WB	515	372	378	517	1.6%	37.4%	139	654	708	8%	681	**681**	Average of Difference and Growth	
	W of Jackson School	Jackson School	EB	965	781	811	1531	3.8%	92.2%	720	1685	1855	10%	1770	**1770**	Average of Difference and Growth	
229th	S of Evergreen	Evergreen	NB	440	73	85	384	17.0%	409.0%	299	739	2240	101%	1489	**739**	Difference Method	Absolute difference >10% --> Used difference only
	Evergreen	S of Evergreen	SB	650	6	7	40	22.7%	544.0%	33	683	4186	144%	2434	**683**	Difference Method	Absolute difference >10% --> Used difference only
	Evergreen	N of Evergreen	NB	285	103	122	576	18.4%	440.9%	454	739	1541	70%	1140	**739**	Difference Method	Absolute difference >10% --> Used difference only
	N of Evergreen	Evergreen	SB	70	4	19	387	383.0%	9192.0%	368	438	6504	175%	3471	**438**	Difference Method	Absolute difference >10% --> Used difference only
25th Ave	S of Evergreen	Evergreen	NB	220	235	244	449	3.6%	87.4%	205	425	412	3%	419	**419**	Average of Difference and Growth	
	Evergreen	S of Evergreen	SB	650	665	671	807	0.9%	20.5%	136	786	783	0%	785	**785**	Average of Difference and Growth	
15th Ave	S of Evergreen	Evergreen	NB	285	249	252	330	1.3%	31.2%	78	363	374	3%	368	**363**	Difference Method	To be consistent with method used for opposing direction
	Evergreen	S of Evergreen	SB	540	68	67	49	-1.1%	-26.8%	-18	522	395	28%	458	**522**	Difference Method	Absolute difference >10% --> Used difference only
Genentech Access	E of Brookwood Pkwy	Brookwood Pkwy	WB	0											**0**	**Manual**	Not in Models - Used existing volumes
	Brookwood Pkwy	E of Brookwood Pkwy	EB	15											**15**	**Manual**	Not in Models - Used existing volumes
	Brookwood Pkwy	W of Brookwood Pkwy	WB	105											**105**	**Manual**	Not in Models - Used existing volumes
	W of Brookwood Pkwy	Brookwood Pkwy	EB	15											**15**	**Manual**	Not in Models - Used existing volumes
Huffman Street	E of Brookwood Pkwy	Brookwood Pkwy	WB	46	11	28	431	152.7%	3665.5%	403	449	1732	118%	1091	**449**	Difference Method	Absolute difference >10% --> Used difference only
	Brookwood Pkwy	E of Brookwood Pkwy	EB	151	223	223	235	0.2%	5.2%	12	163	159	2%	161	**163**	Difference Method	To be consistent with method used for opposing direction
	Brookwood Pkwy	W of Brookwood Pkwy	WB	3	1	49	1211	4840.0%	116160.0%	1162	1165	3488	100%	2326	**1165**	Difference Method	Absolute difference >10% --> Used difference only
	W of Brookwood Pkwy	Brookwood Pkwy	EB	3	1	11	255	1016.0%	24384.0%	244	247	735	99%	491	**247**	Difference Method	Absolute difference >10% --> Used difference only

Greater than 10% difference between difference and growth methods

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

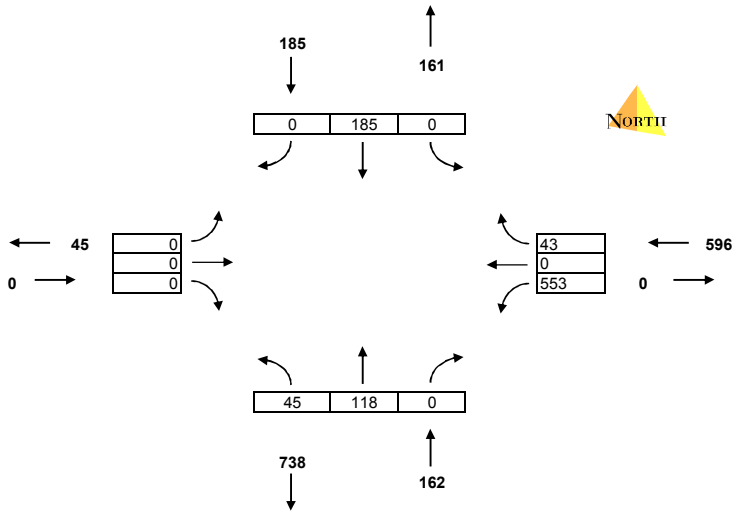
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Jackson School Rd @ US 26 WB Ramps
SCENARIO : 2035 Build
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: US 26 WB Ramps
NORTH-SOUTH ROAD: Jackson School Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	35	40	0	0	110	0	0	0	0	370	0	25
OUTPUT FUTURE	**45**	**118**	**0**	**0**	**185**	**0**	**0**	**0**	**0**	**553**	**0**	**43**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	75	480	110	65	0	35	395	0	580	580
OUTPUT FUTURE	**162**	**738**	**185**	**161**	**0**	**45**	**596**	**0**	943	943
INPUT FUTURE	160	738	182	161	0	45	588	0	930	943



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

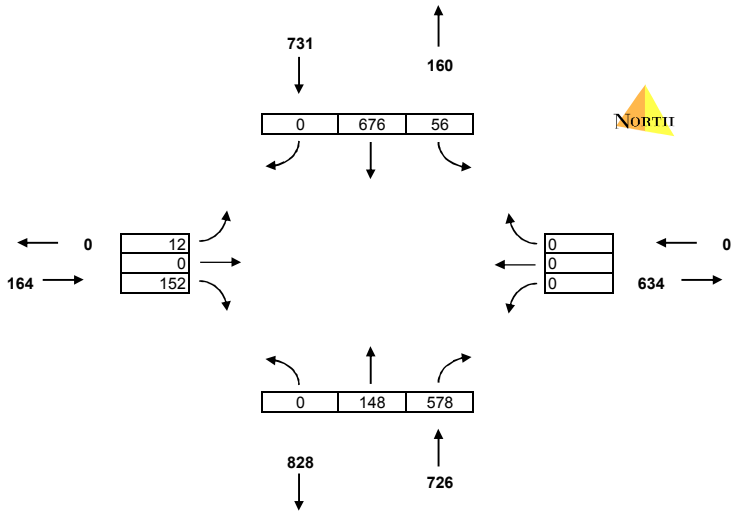
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Jackson School Rd @ US 26 EB Ramps
SCENARIO : 2035 Build
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: US 26 EB Ramps
NORTH-SOUTH ROAD: Jackson School Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	70	560	55	425	0	5	0	80	0	0	0
OUTPUT FUTURE	**0**	**148**	**578**	**56**	**676**	**0**	**12**	**0**	**152**	**0**	**0**	**0**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	630	505	480	75	85	0	0	615	1,195	1,195
OUTPUT FUTURE	**726**	**828**	**731**	**160**	**164**	**0**	**0**	**634**	1,622	1,622
INPUT FUTURE	741	828	738	160	166	0	0	634	1,646	1,622



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

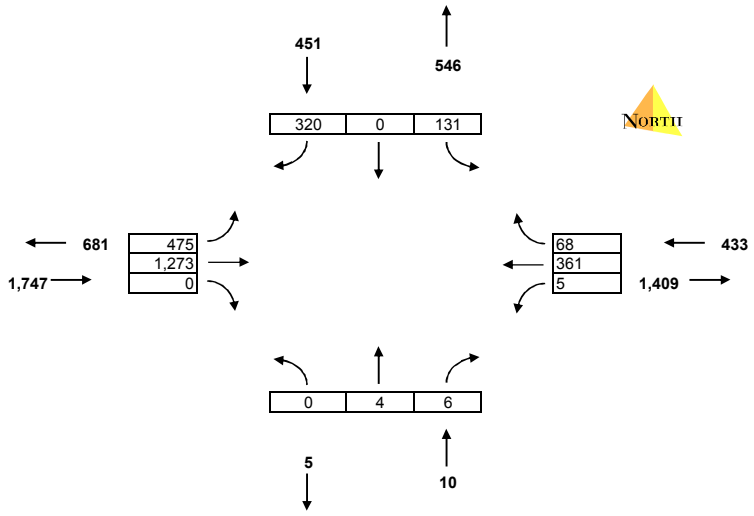
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Jackson School Rd @ Evergreen Rd
SCENARIO : 2035 Build
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Rd.
NORTH-SOUTH ROAD: Jackson School Rd.

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	5	5	160	0	300	375	590	0	5	215	90
OUTPUT FUTURE	**0**	**4**	**6**	**131**	**0**	**320**	**475**	**1,273**	**0**	**5**	**361**	**68**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	10	5	460	470	965	515	310	755	1,745	1,745
OUTPUT FUTURE	**10**	**5**	**451**	**546**	**1,747**	**681**	**433**	**1,409**	2,641	2,641
INPUT FUTURE	10	5	455	546	1,770	681	437	1,409	2,672	2,641



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

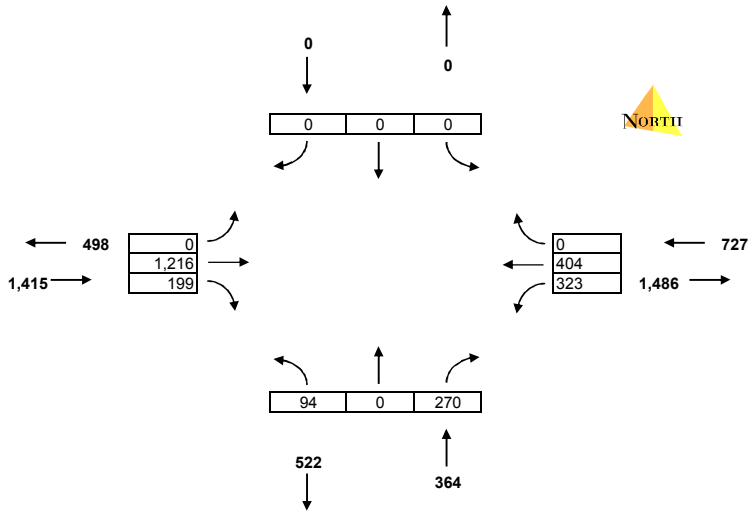
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : 15th Avenue @ Evergreen Rd
SCENARIO : 2035 Build
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Rd.
NORTH-SOUTH ROAD: 15th Avenue

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	95	0	190	0	0	0	0	550	205	335	265	0
OUTPUT FUTURE	**94**	**0**	**270**	**0**	**0**	**0**	**0**	**1,216**	**199**	**323**	**404**	**0**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	285	540	0	0	755	360	600	740	1,640	1,640
OUTPUT FUTURE	**364**	**522**	**0**	**0**	**1,415**	**498**	**727**	**1,486**	2,506	2,506
INPUT FUTURE	363	522	0	0	1,409	498	726	1,486	2,498	2,506



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

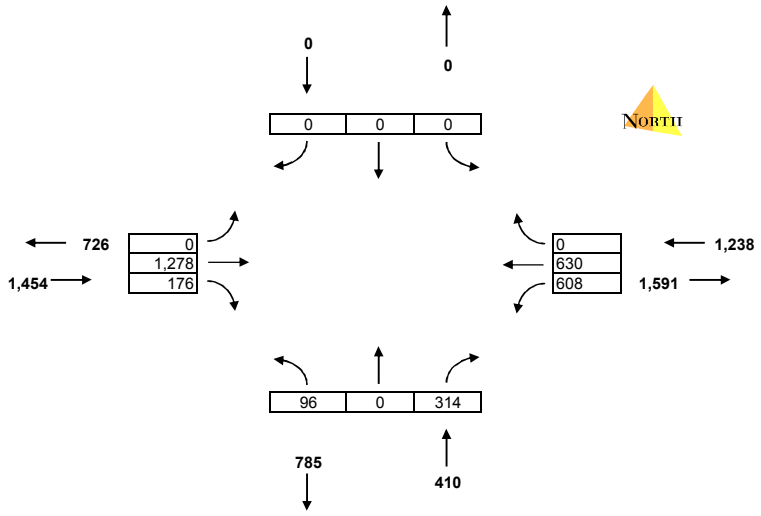
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : 25th Avenue @ Evergreen Rd
SCENARIO : 2035 Build
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Rd.
NORTH-SOUTH ROAD: 25th Avenue

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	60	0	160	0	0	0	0	630	110	540	540	0
OUTPUT FUTURE	**96**	**0**	**314**	**0**	**0**	**0**	**0**	**1,278**	**176**	**608**	**630**	**0**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	220	650	0	0	740	600	1,080	790	2,040	2,040
OUTPUT FUTURE	**410**	**785**	**0**	**0**	**1,454**	**726**	**1,238**	**1,591**	3,102	3,102
INPUT FUTURE	419	785	0	0	1,486	726	1,269	1,591	3,173	3,102



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

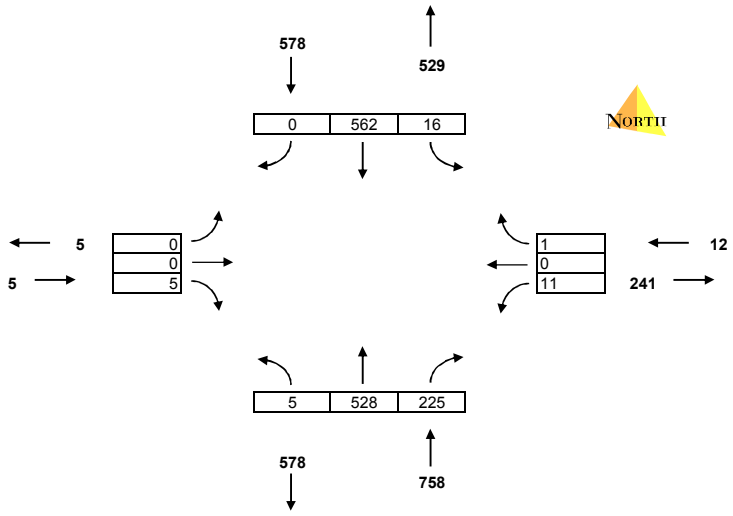
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Helvetia Rd @ Jacobson Rd
SCENARIO : 2035 Build
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Jacobson Rd.
NORTH-SOUTH ROAD: Helvetia Rd.

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	5	145	210	10	305	0	0	0	5	165	0	5
OUTPUT FUTURE	**5**	**528**	**225**	**16**	**562**	**0**	**0**	**0**	**5**	**11**	**0**	**1**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	360	475	315	150	5	5	170	220	850	850
OUTPUT FUTURE	**758**	**578**	**578**	**529**	**5**	**5**	**12**	**241**	1,353	1,353
INPUT FUTURE	736	578	588	529	5	5	13	241	1,341	1,353



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

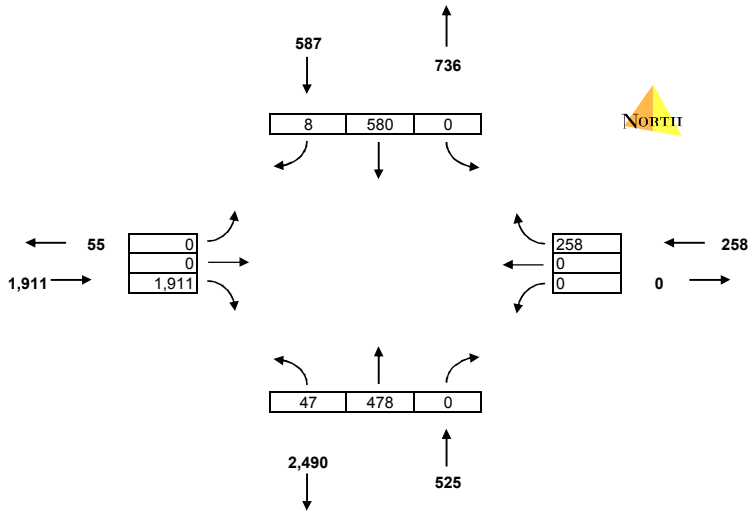
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Brookwood Pkwy @ US26 WB Ramps
SCENARIO : 2035 Build
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: US26 WB Ramps
NORTH-SOUTH ROAD: Brookwood Pkwy.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	55	320	0	0	450	25	0	0	1,260	0	0	40
OUTPUT FUTURE	**47**	**478**	**0**	**0**	**580**	**8**	**0**	**0**	**1,911**	**0**	**0**	**258**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	375	1,710	475	360	1,260	80	40	0	2,150	2,150
OUTPUT FUTURE	**525**	**2,490**	**587**	**736**	**1,911**	**55**	**258**	**0**	3,282	3,282
INPUT FUTURE	561	2,490	578	736	1,878	55	276	0	3,294	3,282



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

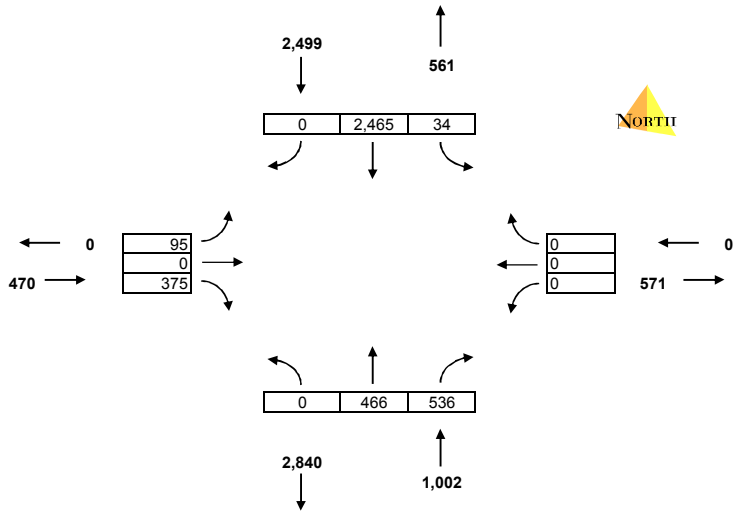
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Brookwood Pkwy @ US26 EB Ramps
SCENARIO : 2035 Build
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: US26 EB Ramps
NORTH-SOUTH ROAD: Brookwood Pkwy.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	315	465	40	1,670	0	60	0	175	0	0	0
OUTPUT FUTURE	**0**	**466**	**536**	**34**	**2,465**	**0**	**95**	**0**	**375**	**0**	**0**	**0**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	780	1,845	1,710	375	235	0	0	505	2,725	2,725
OUTPUT FUTURE	**1,002**	**2,840**	**2,499**	**561**	**470**	**0**	**0**	**571**	3,971	3,971
INPUT FUTURE	1,018	2,840	2,490	561	470	0	0	571	3,979	3,971



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

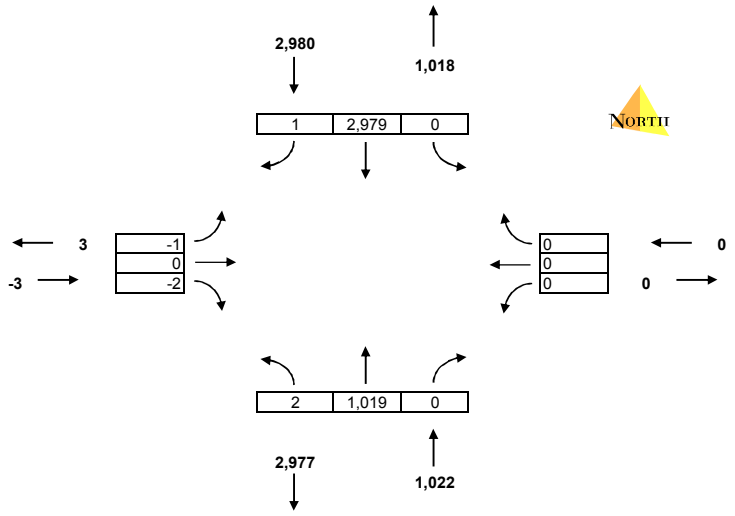
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Brookwood Pkwy @ Meek Rd
SCENARIO : 2035 Build
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Meek Rd.
NORTH-SOUTH ROAD: Brookwood Pkwy.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	10	765	5	0	1,840	5	15	5	20	0	0	0
OUTPUT FUTURE	**2**	**1,019**	**0**	**0**	**2,979**	**1**	**(1)**	**0**	**(2)**	**0**	**0**	**0**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	780	1,860	1,845	780	40	15	0	10	2,665	2,665
OUTPUT FUTURE	**1,022**	**2,977**	**2,980**	**1,018**	**-3**	**3**	**0**	**0**	3,999	3,999
INPUT FUTURE	1,003	2,977	2,840	1,018	(3)	3	0	0	3,839	3,999



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

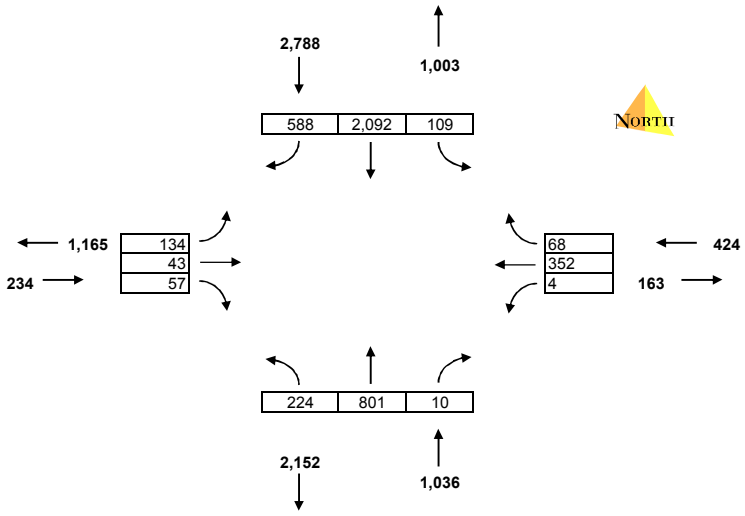
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Brookwood Pkwy @ Huffman St
SCENARIO : 2035 Build
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Huffman St.
NORTH-SOUTH ROAD: Brookwood Pkwy.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	1	740	30	120	1,740	1	1	1	1	5	1	40
OUTPUT FUTURE	**224**	**801**	**10**	**109**	**2,092**	**588**	**134**	**43**	**57**	**4**	**352**	**68**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	771	1,746	1,861	781	3	3	46	151	2,681	2,681
OUTPUT FUTURE	**1,036**	**2,152**	**2,788**	**1,003**	**234**	**1,165**	**424**	**163**	4,482	4,482
INPUT FUTURE	1,088	2,152	2,977	1,003	247	1,165	449	163	4,761	4,482



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

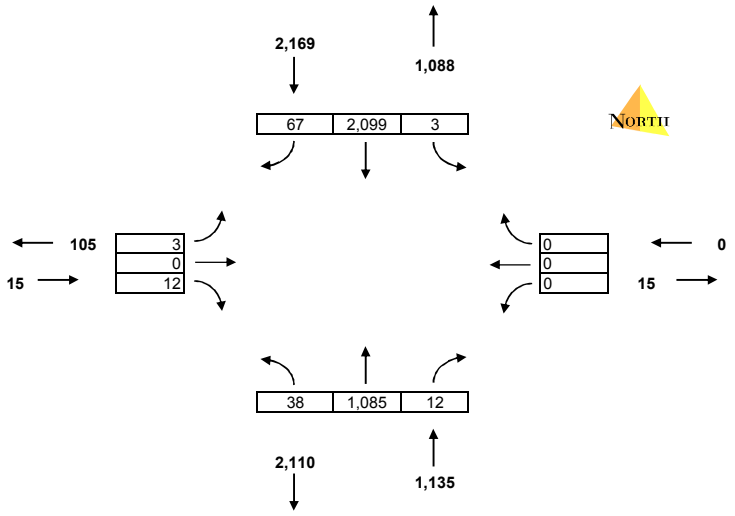
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Brookwood Pkwy @ Genetech Access
SCENARIO : 2035 Build
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Genetech Access
NORTH-SOUTH ROAD: Brookwood Pkwy.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	25	835	10	5	1,735	80	5	0	10	0	0	0
OUTPUT FUTURE	**38**	**1,085**	**12**	**3**	**2,099**	**67**	**3**	**0**	**12**	**0**	**0**	**0**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	870	1,745	1,820	840	15	105	0	15	2,705	2,705
OUTPUT FUTURE	**1,135**	**2,110**	**2,169**	**1,088**	**15**	**105**	**0**	**15**	3,319	3,319
INPUT FUTURE	1,175	2,110	2,152	1,088	15	105	0	15	3,342	3,319



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

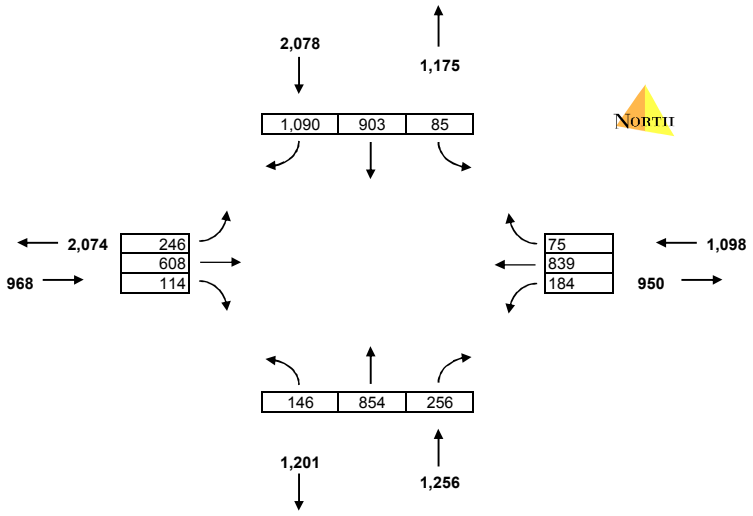
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Brookwood Pkwy @ Evergreen Rd
SCENARIO : 2035 Build
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Rd.
NORTH-SOUTH ROAD: Brookwood Pkwy.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	60	595	125	70	915	760	225	390	90	105	330	50
OUTPUT FUTURE	**146**	**854**	**256**	**85**	**903**	**1,090**	**246**	**608**	**114**	**184**	**839**	**75**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	780	1,110	1,745	870	705	1,150	485	585	3,715	3,715
OUTPUT FUTURE	**1,256**	**1,201**	**2,078**	**1,175**	**968**	**2,074**	**1,098**	**950**	5,400	5,400
INPUT FUTURE	1,279	1,201	2,110	1,175	986	2,074	1,116	950	5,492	5,400



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

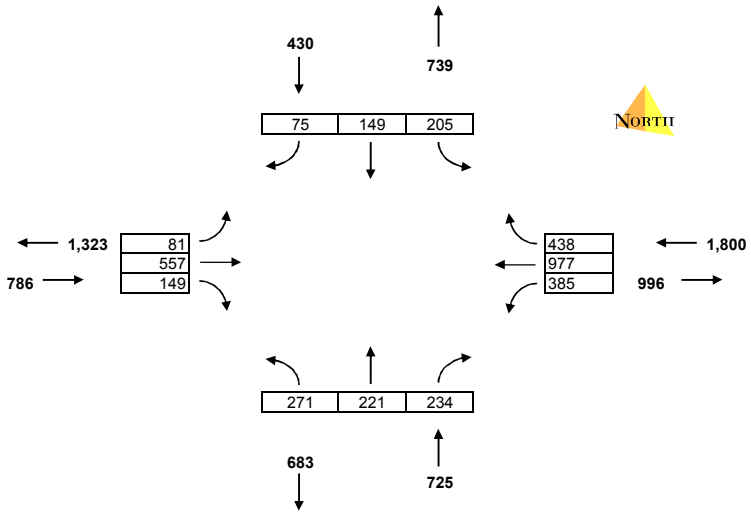
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : 229th Ave @ Evergreen Pkwy
SCENARIO : 2035 Build
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Pkwy.
NORTH-SOUTH ROAD: 229th Ave.

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	105	70	265	40	25	5	15	370	85	540	545	200
OUTPUT FUTURE	**271**	**221**	**234**	**205**	**149**	**75**	**81**	**557**	**149**	**385**	**977**	**438**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	440	650	70	285	470	655	1,285	675	2,265	2,265
OUTPUT FUTURE	**725**	**683**	**430**	**739**	**786**	**1,323**	**1,800**	**996**	3,741	3,741
INPUT FUTURE	739	683	438	739	800	1,323	1,832	996	3,808	3,741



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

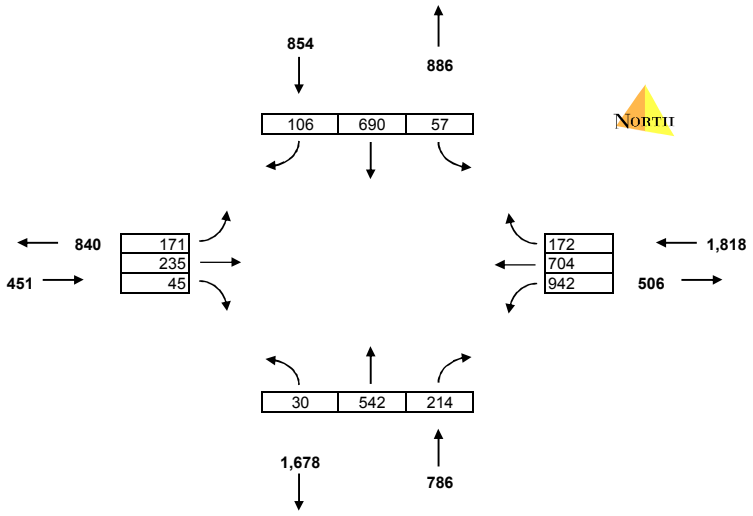
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Cornelius Pass Rd @ West Union Rd
SCENARIO : 2035 Build
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: West Union Rd.
NORTH-SOUTH ROAD: Cornelius Pass Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	50	360	190	10	570	35	30	55	50	520	155	15
OUTPUT FUTURE	**30**	**542**	**214**	**57**	**690**	**106**	**171**	**235**	**45**	**942**	**704**	**172**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	600	1,140	615	405	135	240	690	255	2,040	2,040
OUTPUT FUTURE	**786**	**1,678**	**854**	**886**	**451**	**840**	**1,818**	**506**	3,909	3,909
INPUT FUTURE	558	1,678	617	886	320	840	1,313	506	2,808	3,909



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

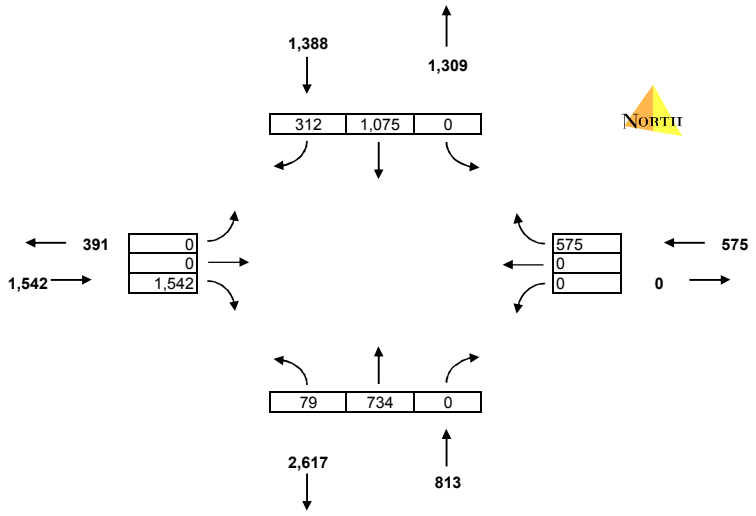
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Cornelius Pass Rd @ US 26 WB Ramps
SCENARIO : 2035 Build
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: US 26 WB Ramps
NORTH-SOUTH ROAD: Cornelius Pass Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	70	750	0	0	1,065	225	0	0	1,205	0	0	230
OUTPUT FUTURE	**79**	**734**	**0**	**0**	**1,075**	**312**	**0**	**0**	**1,542**	**0**	**0**	**575**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	820	2,270	1,290	980	1,205	295	230	0	3,545	3,545
OUTPUT FUTURE	**813**	**2,617**	**1,388**	**1,309**	**1,542**	**391**	**575**	**0**	4,317	4,317
INPUT FUTURE	825	2,617	1,423	1,309	1,582	391	582	0	4,412	4,317



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

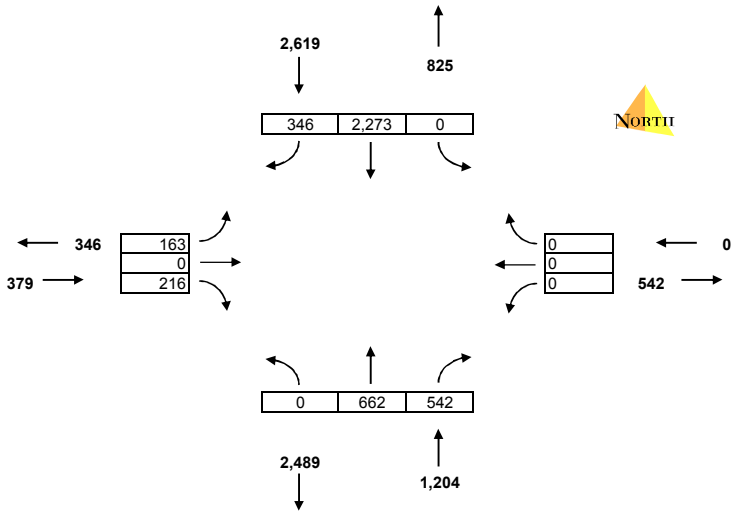
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Cornelius Pass Rd @ US 26 EB Ramps
SCENARIO : 2035 Build
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: US 26 EB Ramps
NORTH-SOUTH ROAD: Cornelius Pass Rd.

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	665	490	0	2,025	245	155	0	185	0	0	0
OUTPUT FUTURE	**0**	**662**	**542**	**0**	**2,273**	**346**	**163**	**0**	**216**	**0**	**0**	**0**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	1,155	2,210	2,270	820	340	245	0	490	3,765	3,765
OUTPUT FUTURE	**1,204**	**2,489**	**2,619**	**825**	**379**	**346**	**0**	**542**	4,202	4,202
INPUT FUTURE	1,210	2,489	2,617	825	379	346	0	542	4,206	4,202



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

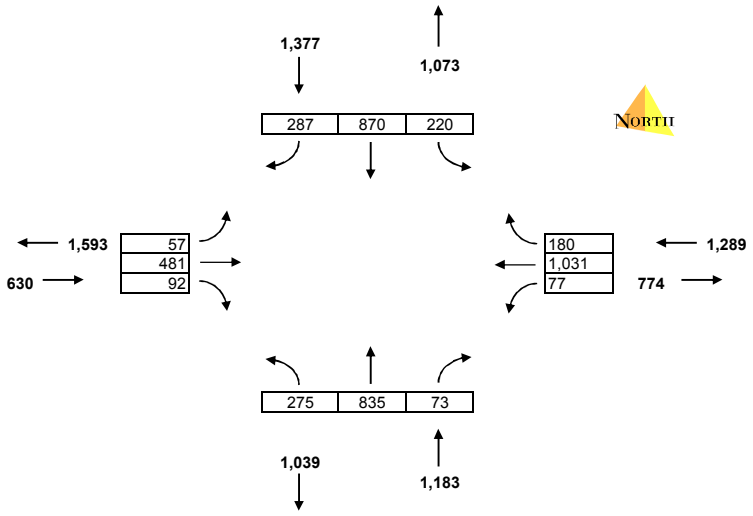
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Cornelius Pass Rd @ Evergreen Pkwy
SCENARIO : 2035 Build
PEAK HOUR : AM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Pkwy.
NORTH-SOUTH ROAD: Cornelius Pass Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	155	775	45	250	725	300	45	250	35	30	505	145
OUTPUT FUTURE	**275**	**835**	**73**	**220**	**870**	**287**	**57**	**481**	**92**	**77**	**1,031**	**180**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	975	790	1,275	965	330	960	680	545	3,260	3,260
OUTPUT FUTURE	**1,183**	**1,039**	**1,377**	**1,073**	**630**	**1,593**	**1,289**	**774**	4,479	4,479
INPUT FUTURE	1,183	1,039	1,374	1,073	629	1,593	1,288	774	4,473	4,479



* Turn Calculation Output from NCHRP 255

Project: Brookwood IAMP
Job #: ODOT0000-0701
Subject: ***PM Build Turning Movement Volumes***
Created: 6/8/2011
Rev. Date: 5/7/2012

Int No.	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - PM Peak	2035 Build NCHRP 255-Link Unbalanced	Difference (Volume Balancing)	2035 Build NCHRP 255-Link PM Balanced
21	10	Jackson Sch Rd @ West Union Rd	NBL	65	125	0	125
	10	16 hr Turning Movement Count	NBT	40	55	0	55
	10	Count Date: 5/25/2011	NBR	60	125	0	125
	10	2011	SBL	5	2	0	2
	10		SBT	30	2	8	10
	10		SBR	10	2	0	2
	10	PM Peak Hour: 4:45 PM-5:45 PM	EBL	10	20	0	20
	10	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	55	175	0	175
	10		EBR	40	55	0	55
	10		WBL	40	65	0	65
	10	PHF:	WBT	65	220	0	220
	10	0.94	WBR	10	25	0	25
			TEV	**430**	**871**	**8**	**879**
30	20	Jackson Quarry Rd @ West Union Rd	NBL	0	0	0	0
	20	3 hr PM Turning Movement Count	NBT	0	0	0	0
	20	Count Date: 5/25/2011	NBR	0	0	0	0
	20	2011	SBL	5	2	0	2
	20		SBT	0	0	0	0
	20		SBR	30	30	0	30
	20	PM Peak Hour: 10:00 AM-11:00 AM	EBL	30	35	0	35
	20	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	90	240	0	240
	20		EBR	0	0	0	0
	20		WBL	0	0	0	0
	20	PHF:	WBT	75	260	0	260
	20	0.94	WBR	10	5	0	5
			TEV	**240**	**572**	**0**	**572**
22	30	Jackson Sch Rd @ US26 WB Ramps	NBL	75	165	10	175
	30	16 hr Turning Movement Count	NBT	100	235	5	240
	30	Count Date: 5/25/2011	NBR	0	0	0	0
	30	2011	SBL	0	0	0	0
	30		SBT	105	120	10	130
	30		SBR	0	0	0	0
	30	PM Peak Hour: 5:00 PM-6:00 PM	EBL	0	0	0	0
	30	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	30		EBR	0	0	0	0
	30		WBL	500	560	0	560
	30	PHF:	WBT	0	0	0	0
	30	0.93	WBR	60	65	0	65
			TEV	**840**	**1145**	**25**	**1170**
23	40	Jackson Sch Rd @ US26 EB Ramps	NBL	0	0	0	0
	40	16 hr Turning Movement Count	NBT	170	395	15	410
	40	Count Date: 5/25/2011	NBR	565	720	20	740
	40	2011	SBL	45	35	5	40
	40		SBT	560	640	10	650
	40		SBR	0	0	0	0
	40	PM Peak Hour: 4:30 PM-5:30 PM	EBL	5	5	0	5
	40	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	40		EBR	25	20	0	20
	40		WBL	0	0	0	0
	40	PHF:	WBT	0	0	0	0
	40	0.93	WBR	0	0	0	0
			TEV	**1370**	**1815**	**50**	**1865**

Int No.	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - PM Peak	2035 Build NCHRP 255-Link Unbalanced	Difference (Volume Balancing)	2035 Build NCHRP 255-Link PM Balanced
24	50	Jackson Sch Rd @ Scotch Church Rd	NBL	25	165	5	170
	50	2 hr PM Turning Movement Count	NBT	620	1,075	(35)	1,040
	50	Count Date: 10/19/2010	NBR	0	0	0	0
	50	2010	SBL	0	0	0	0
	50		SBT	435	565	0	565
	50		SBR	140	120	(5)	115
	50	PM Peak Hour: 4:45 PM-5:45 PM	EBL	115	75	35	110
	50	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	50		EBR	20	75	(45)	30
	50		WBL	0	0	0	0
	50	PHF:	WBT	0	0	0	0
	50	0.88	WBR	0	0	0	0
			TEV	**1355**	**2075**	**-45**	**2030**
25	60	Jackson Sch Rd @ Meek Rd	NBL	0	0	0	0
	60	3 hr AM/2 hr PM Turning Movement Count	NBT	630	570	0	570
	60	Count Date: 5/25/2011	NBR	5	60	0	60
	60	2011	SBL	20	70	(10)	60
	60		SBT	435	625	(90)	535
	60		SBR	0	0	0	0
	60	PM Peak Hour: 4:45 PM-5:45 PM	EBL	0	0	0	0
	60	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	60		EBR	0	0	0	0
	60		WBL	0	0	0	0
	60	PHF:	WBT	0	0	0	0
	60	0.82	WBR	15	670	(30)	640
			TEV	**1105**	**1995**	**-130**	**1865**
26	70	Jackson Sch Rd @ Evergreen Rd	NBL	5	5	0	5
	70	16 hr Turning Movement Count	NBT	0	0	0	0
	70	Count Date: 5/25/2011	NBR	10	10	0	10
	70	2011	SBL	95	110	0	110
	70		SBT	5	5	0	5
	70		SBR	320	420	0	420
	70	PM Peak Hour: 5:00 PM-6:00 PM	EBL	315	290	0	290
	70	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	360	595	0	595
	70		EBR	0	0	0	0
	70		WBL	10	10	0	10
	70	PHF:	WBT	700	1,330	0	1,330
	70	0.91	WBR	320	290	40	330
			TEV	**2140**	**3065**	**40**	**3105**
27	80	15th Avenue @ Evergreen Rd	NBL	300	285	0	285
	80	2 hr AM/PM Turning Movement Count	NBT	0	0	0	0
	80	Count Date: 10/19/2010	NBR	415	355	0	355
	80	2010	SBL	0	0	0	0
	80		SBT	0	0	0	0
	80		SBR	0	0	0	0
	80	PM Peak Hour: 4:45 PM-5:45 PM	EBL	0	0	0	0
	80	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	345	610	0	610
	80		EBR	80	100	0	100
	80		WBL	235	290	0	290
	80	PHF:	WBT	725	1,405	(20)	1,385
	80	0.88	WBR	0	0	0	0
			TEV	**2100**	**3045**	**-20**	**3025**

Int No.	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - PM Peak	2035 Build NCHRP 255-Link Unbalanced	Difference (Volume Balancing)	2035 Build NCHRP 255-Link PM Balanced
28	90	25th Avenue @ Evergreen Rd	NBL	205	205	0	205
	90	2 hr AM/PM Turning Movement Count	NBT	0	0	0	0
	90	Count Date: 03/21/2007	NBR	730	735	0	735
	90	2007	SBL	0	0	0	0
	90		SBT	0	0	0	0
	90		SBR	0	0	0	0
	90	PM Peak Hour: 5:00 PM-6:00 PM	EBL	0	0	0	0
	90	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	675	875	(5)	870
	90		EBR	85	95	0	95
	90		WBL	145	250	0	250
	90	PHF:	WBT	755	1,470	0	1,470
	90	0.88	WBR	0	0	0	0
			TEV	**2595**	**3630**	**-5**	**3625**
29	100	Eggiman Rd @ Evergreen Rd	NBL	0	0	0	0
	100	3 hr PM Turning Movement Count	NBT	0	0	0	0
	100	Count Date: 5/25/2011	NBR	0	0	0	0
	100	2011	SBL	5	5	0	5
	100		SBT	0	0	0	0
	100		SBR	0	0	5	5
	100	PM Peak Hour: 5:00 PM-6:00 PM	EBL	0	0	0	0
	100	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	1405	1,610	(5)	1,605
	100		EBR	0	0	0	0
	100		WBL	0	0	0	0
	100	PHF:	WBT	900	1,710	5	1,715
	100	0.89	WBR	5	5	0	5
			TEV	**2315**	**3330**	**5**	**3335**
19	110	Groveland Rd @ West Union Rd	NBL	0	0	0	0
	110	3 hr PM Turning Movement Count	NBT	0	0	2	2
	110	Count Date: 5/25/2011	NBR	1	5	0	5
	110	2011	SBL	0	0	0	0
	110		SBT	0	0	0	0
	110		SBR	5	5	0	5
	110	PM Peak Hour: 4:15 PM-5:15 PM	EBL	5	5	0	5
	110	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	90	235	0	235
	110		EBR	1	2	0	2
	110		WBL	1	2	0	2
	110	PHF:	WBT	85	275	0	275
	110	0.95	WBR	5	5	0	5
			TEV	**190**	**534**	**2**	**536**
18	120	Groveland Rd @ Groveland Drive	NBL	0	0	0	0
	120	3 hr PM Turning Movement Count	NBT	0	0	0	0
	120	Count Date: 5/25/2011	NBR	0	0	0	0
	120	2011	SBL	1	2	0	2
	120		SBT	0	0	0	0
	120		SBR	1	2	0	2
	120	PM Peak Hour: 4:45 PM-5:45 PM	EBL	1	2	0	2
	120	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	10	10	0	10
	120		EBR	0	0	0	0
	120		WBL	0	0	0	0
	120	PHF:	WBT	10	10	0	10
	120	0.63	WBR	1	2	0	2
			TEV	**20**	**28**	**0**	**28**

Int No.	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - PM Peak	2035 Build NCHRP 255-Link Unbalanced	Difference (Volume Balancing)	2035 Build NCHRP 255-Link PM Balanced
16	130	Sewell Rd @ Meek Rd	NBL	10	140	0	140
	130	3 hr PM Turning Movement Count	NBT	0	0	0	0
	130	Count Date: 5/25/2011	NBR	5	25	0	25
	130	2011	SBL	0	0	0	0
	130		SBT	0	0	0	0
	130		SBR	0	0	0	0
	130	PM Peak Hour: 4:30 PM-5:30 PM	EBL	0	0	0	0
	130	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	10	40	0	40
	130		EBR	5	15	0	15
	130		WBL	5	30	0	30
	130	PHF:	WBT	25	520	0	520
	130	0.88	WBR	0	0	0	0
			TEV	**60**	**770**	**0**	**770**
13	140	Sewell Rd @ Evergreen Rd	NBL	0	0	0	0
	140	2 hr AM/PM Turning Movement Count	NBT	0	0	0	0
	140	Count Date: 03/21/2007	NBR	0	0	0	0
	140	2007	SBL	5	245	0	245
	140		SBT	0	0	0	0
	140		SBR	5	310	5	315
	140	PM Peak Hour: 5:00 PM-6:00 PM	EBL	10	40	0	40
	140	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	1395	1,595	(30)	1,565
	140		EBR	5	5	0	5
	140		WBL	5	5	0	5
	140	PHF:	WBT	900	1,405	0	1,405
	140	0.88	WBR	10	45	0	45
			TEV	**2335**	**3650**	**-25**	**3625**
14	150	Meier-Jurgen Rd @ Evergreen Rd	NBL	10	2	0	2
	150	3 hr PM Turning Movement Count	NBT	1	10	0	10
	150	Count Date: 5/25/2011	NBR	60	60	0	60
	150	2011	SBL	1	540	0	540
	150		SBT	1	50	0	50
	150		SBR	1	160	0	160
	150	PM Peak Hour: 5:00 PM-6:00 PM	EBL	1	15	0	15
	150	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	1360	1,840	0	1,840
	150		EBR	30	5	0	5
	150		WBL	45	20	0	20
	150	PHF:	WBT	890	1,210	0	1,210
	150	0.88	WBR	5	215	0	215
			TEV	**2400**	**4127**	**0**	**4127**
1	160	Helvetia Rd North @ West Union Rd	NBL	5	5	0	5
	160	3 hr AM/PM Turning Movement Count	NBT	135	395	(10)	385
	160	Count Date: 5/25/2011	NBR	0	0	0	0
	160	2011	SBL	0	0	0	0
	160		SBT	60	95	0	95
	160		SBR	5	5	0	5
	160	PM Peak Hour: 4:45 PM-5:45 PM	EBL	15	5	0	5
	160	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	160		EBR	0	0	0	0
	160		WBL	0	0	0	0
	160	PHF:	WBT	0	0	0	0
	160	0.82	WBR	0	0	0	0
			TEV	**220**	**505**	**-10**	**495**

Project: Brookwood IAMP
Job #: ODOT0000-0701
Subject: ***PM Build Turning Movement Volumes***
Created: 6/8/2011
Rev. Date: 5/7/2012

Int No.	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - PM Peak	2035 Build NCHRP 255-Link Unbalanced	Difference (Volume Balancing)	2035 Build NCHRP 255-Link PM Balanced
2	170	Helvetia Rd Middle @ West Union Rd	NBL	35	85	0	85
	170	16 hr Turning Movement Count	NBT	120	320	5	325
	170	Count Date: 5/25/2011	NBR	5	10	0	10
	170	2011	SBL	15	25	0	25
	170		SBT	45	70	0	70
	170		SBR	0	0	0	0
	170	PM Peak Hour: 4:45 PM-5:45 PM	EBL	0	0	0	0
	170	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	70	200	0	200
	170		EBR	15	40	0	40
	170		WBL	85	150	0	150
	170	PHF:	WBT	70	210	0	210
	170	0.92	WBR	20	65	0	65
			TEV	**480**	**1175**	**5**	**1180**
3	180	Helvetia Rd South @ West Union Rd	NBL	35	35	0	35
	180	3 hr AM/PM Turning Movement Count	NBT	160	415	5	420
	180	Count Date: 5/25/2011	NBR	270	375	0	375
	180	2011	SBL	0	0	0	0
	180		SBT	135	250	0	250
	180		SBR	10	10	0	10
	180	PM Peak Hour: 4:45 PM-5:45 PM	EBL	0	0	0	0
	180	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	180		EBR	10	10	0	10
	180		WBL	0	0	0	0
	180	PHF:	WBT	0	0	0	0
	180	0.92	WBR	0	0	0	0
			TEV	**620**	**1095**	**5**	**1100**
4	190	Helvetia Rd @ Pubols Rd	NBL	0	0	0	0
	190	3 hr PM Turning Movement Count	NBT	465	830	0	830
	190	Count Date: 5/25/2011	NBR	5	50	0	50
	190	2011	SBL	0	0	5	5
	190		SBT	145	250	5	255
	190		SBR	0	0	0	0
	190	PM Peak Hour: 10:00 AM-11:00 AM	EBL	0	0	0	0
	190	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	190		EBR	0	0	0	0
	190		WBL	5	15	0	15
	190	PHF:	WBT	0	0	0	0
	190	0.97	WBR	0	0	2	2
			TEV	**620**	**1145**	**12**	**1157**
5	200	Helvetia Rd @ Schaff Rd	NBL	0	0	0	0
	200	3 hr AM/PM Turning Movement Count	NBT	470	805	25	830
	200	Count Date: 5/25/2011	NBR	1	40	0	40
	200	2011	SBL	1	10	0	10
	200		SBT	150	270	(5)	265
	200		SBR	0	0	0	0
	200	PM Peak Hour: 4:30 PM-5:30 PM	EBL	0	0	0	0
	200	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	200		EBR	0	0	10	10
	200		WBL	1	115	0	115
	200	PHF:	WBT	0	0	0	0
	200	0.93	WBR	1	25	20	45
			TEV	**620**	**1265**	**50**	**1315**

Int No.	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - PM Peak	2035 Build NCHRP 255-Link Unbalanced	Difference (Volume Balancing)	2035 Build NCHRP 255-Link PM Balanced
6	210	Helvetia Rd @ Jacobson Rd	NBL	10	10	(10)	0
	210	3 hr AM/PM Turning Movement Count	NBT	460	855	0	855
	210	Count Date: 5/25/2011	NBR	500	620	(25)	595
	210	2011	SBL	5	10	0	10
	210		SBT	145	380	0	380
	210		SBR	0	0	0	0
	210	PM Peak Hour: 4:30 PM-5:30 PM	EBL	0	0	0	0
	210	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	210		EBR	10	10	(10)	0
	210		WBL	175	170	0	170
	210	PHF:	WBT	0	0	0	0
	210	0.91	WBR	10	15	0	15
			TEV	**1315**	**2070**	**-45**	**2025**
7	220	Brookwood Pkwy @ US26 WB Ramps	NBL	215	330	0	330
	220	16 hr Turning Movement Count	NBT	885	1,320	130	1,450
	220	Count Date: 5/25/2011	NBR	0	0	0	0
	220	2011	SBL	0	0	0	0
	220		SBT	265	410	0	410
	220		SBR	65	135	5	140
	220	PM Peak Hour: 4:30 PM-5:30 PM	EBL	0	0	0	0
	220	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	220		EBR	0	815	0	815
	220		WBL	640	0	0	0
	220	PHF:	WBT	0	0	0	0
	220	0.93	WBR	85	130	0	130
			TEV	**2155**	**3140**	**135**	**3275**
8	230	Brookwood Pkwy @ US26 EB Ramps	NBL	0	0	0	0
	230	16 hr Turning Movement Count	NBT	1030	1,605	(10)	1,595
	230	Count Date: 5/25/2011	NBR	780	975	0	975
	230	2011	SBL	20	15	0	15
	230		SBT	885	1,220	(10)	1,210
	230		SBR	0	0	0	0
	230	PM Peak Hour: 5:00 PM-6:00 PM	EBL	70	55	0	55
	230	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	230		EBR	60	75	0	75
	230		WBL	0	0	0	0
	230	PHF:	WBT	0	0	0	0
	230	0.96	WBR	0	0	0	0
			TEV	**2845**	**3945**	**-20**	**3925**
9	240	Brookwood Pkwy @ Meek Rd	NBL	25	15	(15)	0
	240	3 hr AM/PM Turning Movement Count	NBT	1805	2,665	(2,665)	0
	240	Count Date: 5/25/2011	NBR	0	0	0	0
	240	2011	SBL	0	0	0	0
	240		SBT	930	1,295	(1,295)	0
	240		SBR	15	5	(5)	0
	240	PM Peak Hour: 4:30 PM-5:30 PM	EBL	5	2	(2)	0
	240	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	240		EBR	15	5	(5)	0
	240		WBL	0	0	0	0
	240	PHF:	WBT	0	0	0	0
	240	0.94	WBR	0	0	0	0
			TEV	**2795**	**3987**	**-3987**	**0**

Project: Brookwood IAMP
Job #: ODOT0000-0701
Subject: ***PM Build Turning Movement Volumes***
Created: 6/8/2011
Rev. Date: 5/7/2012

Int No.	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - PM Peak	2035 Build NCHRP 255-Link Unbalanced	Difference (Volume Balancing)	2035 Build NCHRP 255-Link PM Balanced
10	250	Brookwood Pkwy @ Huffman Street	NBL	1	100	0	100
	250	3 hr AM/PM Turning Movement Count	NBT	1700	1,890	(160)	1,730
	250	Count Date: 5/25/2011	NBR	15	10	5	15
	250	2011	SBL	30	45	0	45
	250		SBT	915	1,035	45	1,080
	250		SBR	1	230	(70)	160
	250	PM Peak Hour: 4:30 PM-5:30 PM	EBL	1	720	35	755
	250	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	1	415	0	415
	250		EBR	1	320	0	320
	250		WBL	10	2	0	2
	250	PHF:	WBT	1	60	0	60
	250	0.94	WBR	130	85	0	85
			TEV	**2800**	**4912**	**-145**	**4767**
11	260	Brookwood Pkwy @ Genentech Access	NBL	5	5	0	5
	260	3 hr AM/PM Turning Movement Count	NBT	1640	1,900	(70)	1,830
	260	Count Date: 5/25/2011	NBR	0	0	0	0
	260	2011	SBL	0	0	0	0
	260		SBT	925	1,335	0	1,335
	260		SBR	0	0	70	70
	260	PM Peak Hour: 4:30 PM-5:30 PM	EBL	65	65	(65)	0
	260	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	260		EBR	35	35	0	35
	260		WBL	5	5	(5)	0
	260	PHF:	WBT	0	0	0	0
	260	0.73	WBR	10	10	5	15
			TEV	**2685**	**3355**	**-65**	**3290**
12	270	Brookwood Pkwy @ Evergreen Rd	NBL	100	105	0	105
	270	16 hr Turning Movement Count	NBT	930	1,035	(50)	985
	270	Count Date: 5/25/2011	NBR	95	160	0	160
	270	2011	SBL	65	155	0	155
	270		SBT	670	885	(5)	880
	270		SBR	230	345	0	345
	270	PM Peak Hour: 5:00 PM-6:00 PM	EBL	600	710	(50)	660
	270	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	590	1,055	0	1,055
	270		EBR	110	110	0	110
	270		WBL	170	230	0	230
	270	PHF:	WBT	490	765	0	765
	270	0.89	WBR	115	190	0	190
			TEV	**4165**	**5745**	**-105**	**5640**
20	280	Century Blvd @ West Union Rd	NBL	10	120	0	120
	280	3 hr PM Turning Movement Count	NBT	0	0	0	0
	280	Count Date: 5/25/2011	NBR	10	460	0	460
	280	2011	SBL	15	25	0	25
	280		SBT	0	0	0	0
	280		SBR	5	2	0	2
	280	PM Peak Hour: 4:30 PM-5:30 PM	EBL	5	2	0	2
	280	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	350	625	0	625
	280		EBR	5	5	0	5
	280		WBL	5	25	0	25
	280	PHF:	WBT	155	300	0	300
	280	0.93	WBR	10	20	0	20
			TEV	**570**	**1584**	**0**	**1584**

Int No.	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - PM Peak	2035 Build NCHRP 255-Link Unbalanced	Difference (Volume Balancing)	2035 Build NCHRP 255-Link PM Balanced
17	290	Century Blvd @ Jacobson Rd	NBL	40	130	0	130
	290	3 hr AM/PM Turning Movement Count	NBT	1	395	0	395
	290	Count Date: 5/25/2011	NBR	15	130	0	130
	290	2011	SBL	1	2	0	2
	290		SBT	1	10	0	10
	290		SBR	1	0	0	0
	290	PM Peak Hour: 4:30 PM-5:30 PM	EBL	1	65	0	65
	290	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	470	660	0	660
	290		EBR	30	205	0	205
	290		WBL	10	60	0	60
	290	PHF:	WBT	100	45	0	45
	290	0.89	WBR	1	60	0	60
			TEV	**665**	**1762**	**0**	**1762**
39	300	Croeni Rd @ Jacobson Rd	NBL	30	20	0	20
	300	3 hr AM/PM Turning Movement Count	NBT	5	10	0	10
	300	Count Date: 5/25/2011	NBR	20	165	50	215
	300	2011	SBL	40	70	0	70
	300		SBT	15	10	0	10
	300		SBR	5	0	0	0
	300	PM Peak Hour: 4:30 PM-5:30 PM	EBL	5	2	0	2
	300	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	450	775	0	775
	300		EBR	40	20	0	20
	300		WBL	5	40	0	40
	300	PHF:	WBT	80	150	0	150
	300	0.91	WBR	5	35	0	35
			TEV	**700**	**1297**	**50**	**1347**
15	310	235th Avenue @ Evergreen Pkwy	NBL	25	15	0	15
	310	3 hr PM Turning Movement Count	NBT	5	10	0	10
	310	Count Date: 5/25/2011	NBR	40	25	0	25
	310	2011	SBL	35	165	0	165
	310		SBT	0	0	5	5
	310		SBR	60	270	0	270
	310	PM Peak Hour: 5:00 PM-6:00 PM	EBL	15	75	0	75
	310	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	875	1,350	0	1,350
	310		EBR	5	100	0	100
	310		WBL	5	85	0	85
	310	PHF:	WBT	755	970	0	970
	310	0.86	WBR	10	45	0	45
			TEV	**1830**	**3110**	**5**	**3115**
38	320	229th Avenue @ Evergreen Pkwy	NBL	85	155	0	155
	320	2 hr AM/PM Turning Movement Count	NBT	40	165	0	165
	320	Count Date: 10/19/2010	NBR	630	485	0	485
	320	2010	SBL	170	505	0	505
	320		SBT	55	245	0	245
	320		SBR	10	70	0	70
	320	PM Peak Hour: 5:15 PM-6:15 PM	EBL	10	80	0	80
	320	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	790	1,220	0	1,220
	320		EBR	110	255	0	255
	320		WBL	220	200	0	200
	320	PHF:	WBT	555	810	0	810
	320	0.94	WBR	70	225	0	225
			TEV	**2745**	**4415**	**0**	**4415**

Int No.	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - PM Peak	2035 Build NCHRP 255-Link Unbalanced	Difference (Volume Balancing)	2035 Build NCHRP 255-Link PM Balanced
31	330	Cornelius Pass Rd @ West Union Rd	NBL	60	90	0	90
	330	16 hr Turning Movement Count	NBT	850	1,030	(20)	1,010
	330	Count Date: 5/25/2011	NBR	680	980	0	980
	330	2011	SBL	25	70	0	70
	330		SBT	395	420	0	420
	330		SBR	30	85	0	85
	330	PM Peak Hour: 4:45 PM-5:45 PM	EBL	115	330	0	330
	330	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	195	665	0	665
	330		EBR	95	125	0	125
	330		WBL	225	190	70	260
	330	PHF:	WBT	75	165	(70)	95
	330	0.97	WBR	20	35	0	35
			TEV	**2765**	**4185**	**-20**	**4165**
32	340	Cornelius Pass Rd @ Jacobson Rd	NBL	40	100	0	100
	340	3 hr PM Turning Movement Count	NBT	1250	1,380	20	1,400
	340	Count Date: 5/25/2011	NBR	60	50	0	50
	340	2011	SBL	10	5	0	5
	340		SBT	650	605	65	670
	340		SBR	55	130	0	130
	340	PM Peak Hour: 4:45 PM-5:45 PM	EBL	335	675	0	675
	340	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	30	45	0	45
	340		EBR	180	330	100	430
	340		WBL	30	25	0	25
	340	PHF:	WBT	5	10	0	10
	340	0.92	WBR	5	5	0	5
			TEV	**2650**	**3360**	**185**	**3545**
33	350	Cornelius Pass Rd @ Rock Creek Blvd	NBL	0	0	0	0
	350	3 hr PM Turning Movement Count	NBT	1325	1,490	30	1,520
	350	Count Date: 5/25/2011	NBR	345	555	(10)	545
	350	2011	SBL	60	105	0	105
	350		SBT	810	835	185	1,020
	350		SBR	0	0	0	0
	350	PM Peak Hour: 4:45 PM-5:45 PM	EBL	0	0	0	0
	350	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	350		EBR	0	0	0	0
	350		WBL	145	140	0	140
	350	PHF:	WBT	0	0	0	0
	350	0.91	WBR	25	30	0	30
			TEV	**2710**	**3155**	**205**	**3360**
35	360	Cornelius Pass Rd @ US26 WB Ramps	NBL	270	270	0	270
	360	16 hr Turning Movement Count	NBT	1550	1,725	50	1,775
	360	Count Date: 5/25/2011	NBR	0	0	0	0
	360	2011	SBL	0	0	0	0
	360		SBT	995	1,465	80	1,545
	360		SBR	180	205	0	205
	360	PM Peak Hour: 4:30 PM-5:30 PM	EBL	0	0	0	0
	360	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	360		EBR	700	750	0	750
	360		WBL	0	0	0	0
	360	PHF:	WBT	0	0	0	0
	360	0.97	WBR	300	345	0	345
			TEV	**3995**	**4760**	**130**	**4890**

Int No.	Synchro ID	Intersection	Movement	2011 Final Balanced Volumes for Synchro - PM Peak	2035 Build NCHRP 255-Link Unbalanced	Difference (Volume Balancing)	2035 Build NCHRP 255-Link PM Balanced
36	370	Cornelius Pass Rd @ US26 EB Ramps	NBL	0	0	0	0
	370	16 hr Turning Movement Count	NBT	1655	1,825	40	1,865
	370	Count Date: 5/25/2011	NBR	920	1,065	0	1,065
	370	2011	SBL	0	0	0	0
	370		SBT	1395	1,465	90	1,555
	370		SBR	300	740	0	740
	370	PM Peak Hour: 4:30 PM-5:30 PM	EBL	165	180	0	180
	370	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	370		EBR	125	115	0	115
	370		WBL	0	0	0	0
	370	PHF:	WBT	0	0	0	0
	370	0.97	WBR	0	0	0	0
			TEV	**4560**	**5390**	**130**	**5520**
37	380	Cornelius Pass Rd @ Evergreen Pkwy	NBL	55	130	0	130
	380	16 hr Turning Movement Count	NBT	1070	1,240	0	1,240
	380	Count Date: 5/25/2011	NBR	80	150	0	150
	380	2011	SBL	230	275	0	275
	380		SBT	985	1,165	0	1,165
	380		SBR	25	40	0	40
	380	PM Peak Hour: 4:45 PM-5:45 PM	EBL	380	390	0	390
	380	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	860	1,445	0	1,445
	380		EBR	160	265	0	265
	380		WBL	80	120	0	120
	380	PHF:	WBT	355	695	0	695
	380	0.96	WBR	410	390	0	390
			TEV	**4690**	**6305**	**0**	**6305**
34	390	Cornelius Pass Rd @ Wagon Way	NBL	205	295	0	295
	390	3 hr AM/PM Turning Movement Count	NBT	1640	1,825	(5)	1,820
	390	Count Date: 5/25/2011	NBR	5	5	0	5
	390	2011	SBL	0	0	2	2
	390		SBT	925	880	185	1,065
	390		SBR	30	95	0	95
	390	PM Peak Hour: 4:30 PM-5:30 PM	EBL	30	245	0	245
	390	PM Peak Hour Used: 4:45 PM-5:45 PM	EBT	0	0	0	0
	390		EBR	245	780	(100)	680
	390		WBL	5	5	0	5
	390	PHF:	WBT	0	0	0	0
	390	0.95	WBR	0	0	0	0
			TEV	**3085**	**4130**	**82**	**4212**

Project: Brookwood IAMP
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Table 2: 2035 Link Volume Calculations for the PM Peak Period

Road	From	To	Direction	Volumes	Model	Interpolated Model	Model	2010-2035 Model Comparison			2035 Volume Estimates				Forecast Used	Method Used	Comments
				2011	2010	2011	2035	Annual Growth	Total Growth	Volume Growth	Volume Difference	Volume Growth	Absolute Difference	Average			
Helvetia Rd/Brookwood Pkwy	South of Evergreen	Evergreen	NB	1125	1093	1100	1259	0.6%	14.6%	159	1284	1289	0%	1287	**1287**	Average of Difference and Growth	
	Evergreen	South of Evergreen	SB	950	1029	1041	1328	1.2%	27.9%	287	1237	1215	2%	1226	**1226**	Average of Difference and Growth	
	Evergreen	Genentech	NB	1645	1177	1187	1424	0.8%	20.1%	237	1882	1976	5%	1929	**1929**	Average of Difference and Growth	
	Genentech	Evergreen	SB	965	934	951	1355	1.8%	43.3%	404	1369	1383	1%	1376	**1376**	Average of Difference and Growth	
	Genentech	Huffman St	NB	1716	1203	1212	1424	0.7%	17.6%	212	1928	2019	5%	1973	**1973**	Average of Difference and Growth	
	Huffman St	Genentech	SB	925	907	925	1355	2.0%	47.4%	430	1355	1364	1%	1359	**1359**	Average of Difference and Growth	
	Huffman St	Meek Rd	NB	1830	1445	1477	2235	2.2%	52.5%	758	2588	2790	8%	2689	**2689**	Average of Difference and Growth	
	Meek Rd	Huffman St	SB	946	912	926	1272	1.6%	37.9%	346	1292	1304	1%	1298	**1298**	Average of Difference and Growth	
	Meek Rd	EB Ramp Terminal	NB	1810	1443	1475	2235	2.2%	52.7%	760	2570	2764	7%	2667	**2667**	Average of Difference and Growth	
	EB Ramp Terminal	Meek Rd	SB	945	916	930	1272	1.6%	37.3%	342	1287	1298	1%	1292	**1292**	Average of Difference and Growth	
	EB Ramp Terminal	WB Ramp Terminal	NB	1100	795	818	1379	2.9%	70.5%	561	1661	1876	12%	1768	**1661**	Difference Method	Absolute difference >10% --> Used difference only
	WB Ramp Terminal	EB Ramp Terminal	SB	905	833	846	1165	1.6%	38.3%	319	1224	1251	2%	1237	**1224**	Difference Method	To be consistent with method used for opposing direction
	WB Ramp Terminal	Jacobson Rd	NB	970	545	565	1044	3.7%	87.9%	479	1449	1823	23%	1636	**1449**	Difference Method	Absolute difference >10% --> Used difference only
	Jacobson Rd	WB Ramp Terminal	SB	330	374	383	609	2.5%	60.3%	226	556	529	5%	542	**556**	Difference Method	To be consistent with method used for opposing direction
	Jacobson Rd	Schaff Rd	NB	471	303	320	717	5.5%	131.2%	397	868	1089	23%	979	**868**	Difference Method	Absolute difference >10% --> Used difference only
	Schaff Rd	Jacobson Rd	SB	150	146	156	390	6.7%	160.4%	234	384	391	2%	387	**384**	Difference Method	To be consistent with method used for opposing direction
	Schaff Rd	Pubols	NB	470	251	266	629	6.0%	144.6%	363	833	1149	32%	991	**833**	Difference Method	Absolute difference >10% --> Used difference only
	Pubols	Schaff Rd	SB	151	134	139	254	3.6%	86.0%	115	266	281	5%	274	**266**	Difference Method	To be consistent with method used for opposing direction
2	Pubols	West Union South	NB	465	251	266	629	6.0%	144.6%	363	828	1137	31%	983	**828**	Difference Method	Absolute difference >10% --> Used difference only
1	West Union South	Pubols	SB	145	134	139	254	3.6%	86.0%	115	260	270	4%	265	**260**	Difference Method	To be consistent with method used for opposing direction
4	West Union South	West Union Center	NB	160	81	92	349	13.2%	317.6%	257	417	668	46%	543	**417**	Difference Method	Absolute difference >10% --> Used difference only
3	West Union Center	West Union South	SB	145	133	138	254	3.6%	87.3%	116	261	272	4%	266	**261**	Difference Method	To be consistent with method used for opposing direction
6	West Union Center	West Union North	NB	140	94	104	349	10.9%	260.4%	245	385	505	27%	445	**385**	Difference Method	Absolute difference >10% --> Used difference only
5	West Union North	West Union Center	SB	60	39	40	75	3.7%	88.6%	35	95	113	18%	104	**95**	Difference Method	Absolute difference >10% --> Used difference only
8	West Union North	North of West Union	NB	150	97	107	354	10.6%	254.4%	247	397	532	29%	464	**397**	Difference Method	Absolute difference >10% --> Used difference only
7	North of West Union	West Union North	SB	65	42	44	84	4.0%	96.0%	40	105	127	19%	116	**105**	Difference Method	Absolute difference >10% --> Used difference only
Jackson School Rd	South of Evergreen	Evergreen	NB	15	15	15	**15**	0.0%	0.0%	0	15	15	0%	15	**15**	Manual	Not in Models - Used existing volumes
	Evergreen	South of Evergreen	SB	15	15	15	**15**	0.0%	0.0%	0	15	15	0%	15	**15**	Manual	Not in Models - Used existing volumes
	Evergreen	North of Evergreen	NB	635	435	433	380	-0.5%	-12.1%	-53	582	558	4%	570	**582**	Difference Method	To be consistent with method used for opposing direction
	North of Evergreen	Evergreen	SB	420	251	256	369	1.9%	45.1%	113	533	610	13%	571	**533**	Difference Method	Absolute difference >10% --> Used difference only
	South of Meek	Meek Rd	NB	635	434	435	455	0.2%	4.6%	20	655	664	1%	660	**655**	Difference Method	To be consistent with method used for opposing direction
	Meek Rd	South of Meek	SB	435	246	254	442	3.2%	76.5%	188	623	768	21%	695	**623**	Difference Method	Absolute difference >10% --> Used difference only
	Meek Rd	Scotch Church Rd	NB	645	438	463	1055	5.6%	135.2%	592	1237	1517	20%	1377	**1237**	Difference Method	Absolute difference >10% --> Used difference only
	Scotch Church Rd	Meek Rd	SB	455	246	254	439	3.1%	75.3%	185	640	798	22%	719	**640**	Difference Method	Absolute difference >10% --> Used difference only
	Scotch Church Rd	EB Ramp Terminal	NB	735	581	596	963	2.6%	63.1%	367	1102	1199	8%	1150	**1150**	Average of Difference and Growth	
	EB Ramp Terminal	Scotch Church Rd	SB	585	479	482	551	0.6%	14.4%	69	654	669	2%	662	**662**	Average of Difference and Growth	
	EB Ramp Terminal	WB Ramp Terminal	NB	175	118	127	354	8.0%	192.0%	227	402	511	24%	456	**402**	Difference Method	Absolute difference >10% --> Used difference only
	WB Ramp Terminal	EB Ramp Terminal	SB	605	545	548	625	0.6%	14.1%	77	682	690	1%	686	**682**	Difference Method	To be consistent with method used for opposing direction
	WB Ramp Terminal	West Union	NB	165	200	206	352	3.0%	73.0%	146	311	285	9%	298	**298**	Average of Difference and Growth	
	West Union	WB Ramp Terminal	SB	110	149	150	164	0.4%	9.7%	14	124	121	3%	123	**123**	Average of Difference and Growth	
	West Union	North of West Union	NB	60	213	215	252	0.7%	17.6%	37	97	71	32%	84	**97**	Difference Method	Absolute difference >10% --> Used difference only
	North of West Union	West Union	SB	45	150	148	109	-1.1%	-26.2%	-39	6	33	142%	19	**6**	Difference Method	Absolute difference >10% --> Used difference only
Cornelius Pass	South of Evergreen	Evergreen	NB	1205	957	968	1240	1.2%	28.4%	272	1477	1547	5%	1512	**1512**	Average of Difference and Growth	
	Evergreen	South of Evergreen	SB	1225	1103	1116	1428	1.2%	28.3%	312	1537	1572	2%	1554	**1554**	Average of Difference and Growth	
	Evergreen	N of Evergreen	NB	1860	1336	1342	1477	0.4%	10.1%	135	1995	2048	3%	2022	**2022**	Average of Difference and Growth	
	N of Evergreen	Evergreen	SB	1240	1160	1169	1389	0.8%	19.0%	220	1460	1475	1%	1467	**1467**	Average of Difference and Growth	
	South of EB Ramp	EB Ramp Terminal	NB	2575	1685	1696	1956	0.6%	15.4%	260	2835	2973	5%	2904	**2904**	Average of Difference and Growth	
	EB Ramp Terminal	South of EB Ramp	SB	1520	1231	1233	1285	0.2%	4.2%	52	1572	1584	1%	1578	**1578**	Average of Difference and Growth	
	EB Ramp Terminal	WB Ramp Terminal	NB	1820	1054	1060	1196	0.5%	12.9%	136	1956	2055	5%	2006	**2006**	Average of Difference and Growth	
	WB Ramp Terminal	EB Ramp Terminal	SB	1695	1427	1447	1922	1.4%	33.3%	475	2170	2259	4%	2215	**2215**	Average of Difference and Growth	
	WB Ramp Terminal	N of WB Ramp	NB	1850	1357	1365	1550	0.6%	13.7%	185	2035	2103	3%	2069	**2069**	Average of Difference and Growth	
	N of WB Ramp	WB Ramp Terminal	SB	1175	977	996	1442	1.9%	45.7%	446	1621	1712	5%	1667	**1667**	Average of Difference and Growth	
	South of Wagon	Wagon	NB	1850	1357	1365	1550	0.6%	13.7%	185	2035	2103	3%	2069	**2069**	Average of Difference and Growth	
	Wagon	South of Wagon	SB	1175	977	996	1442	1.9%	45.7%	446	1621	1712	5%	1667	**1667**	Average of Difference and Growth	
	Wagon	North of Wagon	NB	1670	1258	1272	1613	1.1%	27.1%	341	2011	2122	5%	2067	**2067**	Average of Difference and Growth	
	North of Wagon	Wagon	SB	955	690	691	704	0.1%	1.9%	13	968	974	1%	971	**971**	Average of Difference and Growth	
	S of Rock Creek	Rock Creek	NB	1670	1258	1272	1613	1.1%	27.1%	341	2011	2122	5%	2067	**2067**	Average of Difference and Growth	
	Rock Creek	S of Rock Creek	SB	955	690	691	704	0.1%	1.9%	13	968	974	1%	971	**971**	Average of Difference and Growth	
	Rock Creek	Jacobson Rd	NB	1350	990	996	1138	0.6%	14.4%	142	1492	1544	3%	1518	**1518**	Average of Difference and Growth	
	Jacobson Rd	Rock Creek	SB	870	591	594	667	0.5%	12.3%	73	943	977	4%	960	**960**	Average of Difference and Growth	
	Jacobson Rd	West Union	NB	1590	1250	1267	1681	1.4%	33.1%	414	2004	2116	5%	2060	**2060**	Average of Difference and Growth	
	West Union	Jacobson Rd	SB	715	740	741	763	0.1%	3.0%	22	737	736	0%	737	**737**	Average of Difference and Growth	
	West Union	N of West Union	NB	985	850	866	1246	1.9%	44.7%	380	1365	1426	4%	1395	**1395**	Average of Difference and Growth	
	N of West Union	West Union	SB	450	532	537	657	0.9%	22.6%	120	570	552	3%	561	**561**	Average of Difference and Growth	

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Table 2: 2035 Link Volume Calculations for the PM Peak Period

Road	From	To	Direction	Volumes	Model	Interpolated Model	Model	2010-2035 Model Comparison			2035 Volume Estimates				Forecast Used	Method Used	Comments
				2011	2010	2011	2035	Annual Growth	Total Growth	Volume Growth	Volume Difference	Volume Growth	Absolute Difference	Average			
West Union	E of Corn Pass	Corn Pass	WB	320	401	404	479	0.8%	18.7%	75	395	380	4%	387	**387**	Average of Difference and Growth	
	Corn Pass	E of Corn Pass	EB	900	730	760	1490	4.2%	99.9%	730	1630	1800	10%	1715	**1715**	Average of Difference and Growth	
	Corn Pass	W of Corn Pass	WB	165	200	207	381	3.6%	86.9%	174	339	308	9%	324	**339**	Difference Method	To be consistent with method used for opposing direction
	W of Corn Pass	Corn Pass	EB	405	338	367	1063	8.6%	205.9%	696	1101	1239	12%	1170	**1101**	Difference Method	Absolute difference >10% --> Used difference only
	E of Dick Rd	Dick Rd	WB	170	200	207	381	3.6%	86.9%	174	344	318	8%	331	**331**	Average of Difference and Growth	
	Dick Rd	E of Dick Rd	EB	375	338	367	1063	8.6%	205.9%	696	1071	1147	7%	1109	**1109**	Average of Difference and Growth	
	Dick Rd	W of Dick Rd	WB	170	205	215	466	5.1%	122.2%	251	421	378	11%	399	**421**	Difference Method	Absolute difference >10% --> Used difference only
	W of Dick Rd	Dick Rd	EB	360	340	350	600	3.1%	73.4%	250	610	624	2%	617	**610**	Difference Method	To be consistent with method used for opposing direction
	E of Helvetia Rd	Helvetia Rd	WB	175	205	215	466	5.1%	122.2%	251	426	389	9%	407	**426**	Difference Method	To be consistent with method used for opposing direction
	Helvetia Rd	E of Helvetia Rd	EB	90	170	176	320	3.5%	84.7%	144	234	166	34%	200	**234**	Difference Method	Absolute difference >10% --> Used difference only
	Helvatia Rd	W of Helvati Rd	WB	110	82	90	276	9.5%	227.1%	186	296	360	19%	328	**296**	Difference Method	Absolute difference >10% --> Used difference only
	W of Helvatia Rd	Helvatia Rd	EB	100	155	161	309	4.0%	95.4%	148	248	195	24%	222	**248**	Difference Method	Absolute difference >10% --> Used difference only
	E of Groveland	Groveland	WB	91	85	93	284	9.4%	224.8%	191	282	296	5%	289	**282**	Difference Method	To be consistent with method used for opposing direction
	Groveland	E of Groveland	EB	91	158	164	313	3.9%	94.2%	149	240	177	30%	208	**240**	Difference Method	Absolute difference >10% --> Used difference only
	Groveland	W of Groveland	WB	90	81	89	278	9.7%	233.5%	189	279	300	7%	290	**279**	Difference Method	To be consistent with method used for opposing direction
	W of Groveland	Groveland	EB	96	149	155	300	4.1%	97.3%	145	241	189	24%	215	**241**	Difference Method	Absolute difference >10% --> Used difference only
	E of Jackson Quarry	Jackson Quarry	WB	85	81	89	278	9.7%	233.5%	189	274	283	3%	279	**274**	Difference Method	To be consistent with method used for opposing direction
	Jackson Quarry	E of Jackson Quarry	EB	95	149	155	300	4.1%	97.3%	145	240	187	25%	214	**240**	Difference Method	Absolute difference >10% --> Used difference only
	Jackson Quarry	W of Jackson Quarry	WB	105	81	89	278	9.7%	233.5%	189	294	350	17%	322	**294**	Difference Method	Absolute difference >10% --> Used difference only
	W of Jackson Quarry	Jackson Quarry	EB	120	149	156	335	5.0%	119.8%	179	299	264	12%	281	**299**	Difference Method	Absolute difference >10% --> Used difference only
	E of Jackson School	Jackson School	WB	115	81	89	278	9.7%	233.5%	189	304	384	23%	344	**304**	Difference Method	Absolute difference >10% --> Used difference only
	Jackson School	E of Jackson School	EB	120	149	156	335	5.0%	119.8%	179	299	264	12%	281	**299**	Difference Method	Absolute difference >10% --> Used difference only
	Jackson School	W of Jackson School	WB	140	88	97	302	9.7%	233.5%	205	345	467	30%	406	**345**	Difference Method	Absolute difference >10% --> Used difference only
	W of Jackson School	Jackson School	EB	105	168	174	314	3.5%	83.4%	140	245	193	24%	219	**245**	Difference Method	Absolute difference >10% --> Used difference only
West Union South	Helvetia Rd	E of Helvetia Rd	EB	270	170	174	280	2.6%	62.1%	106	376	438	15%	407	**376**	Difference Method	Absolute difference >10% --> Used difference only
West Union North	Helvatia Rd	W of Helvati Rd	WB	10	3	3	9	8.0%	192.0%	6	16	29	60%	22	**9**	Difference Method	Absolute difference >10% --> Used difference only
	W of Helvati Rd	Helvatia Rd	EB	15	4	4	4	0.0%	0.0%	0	15	15	0%	15	**4**	Difference Method	Absolute difference >10% --> Used difference only
Jacobson Road	E of Corn Pass	Corn Pass	WB	40											**40**	Manual	
	Corn Pass	E of Corn Pass	EB	100											**100**	Manual	
	Corn Pass	W of Corn Pass	WB	100	163	169	308	3.6%	85.4%	139	239	185	25%	212	**239**	Difference Method	Absolute difference >10% --> Used difference only
	W of Corn Pass	Corn Pass	EB	545	274	295	795	7.6%	182.5%	500	1045	1540	38%	1293	**1045**	Difference Method	Absolute difference >10% --> Used difference only
	E of Croeni	Croeni	WB	90	163	169	308	3.6%	85.4%	139	229	167	31%	198	**229**	Difference Method	Absolute difference >10% --> Used difference only
	Croeni	E of Croeni	EB	510	274	295	795	7.6%	182.5%	500	1010	1441	35%	1226	**1010**	Difference Method	Absolute difference >10% --> Used difference only
	Croeni	Century	WB	111	239	241	297	1.0%	23.3%	56	167	137	20%	152	**167**	Difference Method	Absolute difference >10% --> Used difference only
	Century	Croeni	EB	486	262	275	579	4.8%	116.2%	304	790	1051	28%	920	**790**	Difference Method	Absolute difference >10% --> Used difference only
	Century	W of Century	WB	141	239	240	276	0.6%	14.9%	36	177	162	9%	169	**177**	Difference Method	Absolute difference >10% --> Used difference only
	W of Century	Century	EB	501	262	280	708	6.8%	163.4%	428	929	1320	35%	1124	**929**	Difference Method	Absolute difference >10% --> Used difference only
	E of Helvetia Rd	Helvetia Rd	WB	185	228	228	220	-0.1%	-3.4%	-8	177	179	1%	178	**178**	Average of Difference and Growth	
	Helvetia Rd	E of Helvetia Rd	EB	505	242	245	327	1.4%	33.7%	82	587	675	14%	631	**631**	Average of Difference and Growth	
	Helvatia Rd	W of Helvati Rd	WB	10											**10**	Manual	
	W of Helvatia Rd	Helvatia Rd	EB	10											**10**	Manual	
EB US 26 Ramps	W of Jackson School	Jackson School	EB	30	50	50	44	-0.5%	-11.5%	-6	24	27	9%	25	**25**	Average of Difference and Growth	
	Jackson School	E of Jackson School	EB	610	579	585	726	1.0%	24.4%	141	751	759	1%	755	**755**	Average of Difference and Growth	
	W of Brookwood Pkwy	Brookwood Pkwy	EB	130	141	141	142	0.0%	0.7%	1	131	131	0%	131	**131**	Average of Difference and Growth	
	Brookwood Pkwy	E of Brookwood Pkwy	EB	800	707	714	891	1.0%	25.0%	177	977	1000	2%	988	**988**	Average of Difference and Growth	
	W of Corn Pass	Corn Pass	EB	290	189	189	194	0.1%	2.5%	5	295	297	1%	296	**296**	Average of Difference and Growth	
	Corn Pass SB	E of Corn Pass	EB	300	363	381	819	5.0%	120.6%	438	738	662	11%	700	**738**	Difference Method	Absolute difference >10% --> Used difference only
	Corn Pass NB	E of Corn Pass	EB	920	645	650	771	0.8%	18.8%	121	1041	1093	5%	1067	**1067**	Average of Difference and Growth	
WB US 26 Ramps	E of Corn Pass	Corn Pass NB	WB	300	304	306	354	0.7%	15.8%	48	348	347	0%	348	**348**	Average of Difference and Growth	
	E of Corn Pass	Corn Pass SB	WB	700	602	604	647	0.3%	7.2%	43	743	750	1%	747	**747**	Average of Difference and Growth	
	Corn Pass	W of Corn Pass	WB	450	153	154	167	0.4%	8.8%	13	463	490	5%	476	**476**	Average of Difference and Growth	
	E of Helvatia	NB Helvetia	WB	85	55	57	104	3.6%	85.5%	47	132	158	18%	145	**132**	Difference Method	Absolute difference >10% --> Used difference only
	E of Helvatia	SB Helvetia	WB	640	507	514	686	1.4%	33.9%	172	812	857	5%	834	**834**	Average of Difference and Growth	
	Helvetia Rd	W of Helvatia	WB	280	353	362	570	2.5%	59.0%	208	488	445	9%	467	**467**	Average of Difference and Growth	
	E of Jackson School	Jackson School	WB	560	548	551	617	0.5%	12.1%	66	626	628	0%	627	**627**	Average of Difference and Growth	
	Jackson School	W of Jackson School	WB	75	71	75	160	5.0%	120.3%	85	160	165	3%	163	**163**	Average of Difference and Growth	
Meek Road	Brookwood Pkwy	W of Brookwood Pkwy	WB	40	22	21	0	-4.0%	-96.0%	-21	19	2	169%	10	**19**	Difference Method	Absolute difference >10% --> Used difference only
	W of Brookwood Pkwy	Brookwood Pkwy	EB	20	16	15	0	-4.0%	-96.0%	-15	5	1	141%	3	**5**	Difference Method	Absolute difference >10% --> Used difference only
	E of Sewell	Sewell	WB	30	14	36	554	154.3%	3702.9%	518	548	1141	70%	845	**548**	Difference Method	Absolute difference >10% --> Used difference only
	Sewell	E of Sewell	EB	15	12	14	61	16.3%	392.0%	47	62	74	17%	68	**62**	Difference Method	Absolute difference >10% --> Used difference only
	Sewell	W of Swell	WB	35	15	41	662	172.5%	4140.8%	621	656	1484	77%	1070	**656**	Difference Method	Absolute difference >10% --> Used difference only
	W of Swell	Sewell	EB	15	6	8	48	28.0%	672.0%	40	55	116	71%	86	**55**	Difference Method	Absolute difference >10% --> Used difference only
	E of Jackson School	Jackson School	WB	15	15	44	728	190.1%	4563.2%	684	699	699	0%	699	**699**	Difference Method	To be consistent with method used for opposing direction
	Jackson School	E of Jackson School	EB	25	11	16	124	41.1%	986.2%	108	133	272	68%	203	**133**	Difference Method	Absolute difference >10% --> Used difference only

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Table 2: 2035 Link Volume Calculations for the PM Peak Period

Road	From	To	Direction	Volumes 2011	Model 2010	Interpolated Model 2011	Model 2035	2010-2035 Model Comparison: Annual Growth	Total Growth	Volume Growth	2035 Volume Estimates: Volume Difference	Volume Growth	Absolute Difference	Average	Forecast Used	Method Used	Comments
Evergreen Road	E of Corn Pass	Corn Pass	WB	845	693	706	1022	1.9%	45.6%	316	1161	1230	6%	1195	**1195**	Average of Difference and Growth	
	Corn Pass	E of Corn Pass	EB	1170	909	935	1549	2.8%	67.6%	614	1784	1961	9%	1873	**1873**	Average of Difference and Growth	
	Corn Pass	W of Corn Pass	WB	435	567	585	1013	3.1%	75.5%	428	863	763	12%	813	**863**	Difference Method	Absolute difference >10% --> Used difference only
	W of Corn Pass	Corn Pass	EB	1400	1104	1132	1816	2.6%	61.9%	684	2084	2267	8%	2175	**2084**	Difference Method	To be consistent with method used for opposing direction
	E of 229th	229th	WB	845	952	968	1356	1.7%	40.7%	388	1233	1189	4%	1211	**1233**	Difference Method	To be consistent with method used for opposing direction
	229th	E of 229th	EB	1590	1161	1187	1806	2.2%	53.3%	619	2209	2438	10%	2324	**2209**	Difference Method	Absolute difference >10% --> Used difference only
	229th	W of 229th	WB	650	894	910	1298	1.8%	43.4%	388	1038	932	11%	985	**1038**	Difference Method	To be consistent with method used for opposing direction
	W of 229th	229th	EB	910	1152	1179	1826	2.3%	56.2%	647	1557	1421	9%	1489	**1557**	Difference Method	Absolute difference >10% --> Used difference only
	E of 235th	235th	WB	770	894	910	1298	1.8%	43.4%	388	1158	1104	5%	1131	**1131**	Average of Difference and Growth	
	235th	E of 235th	EB	950	1152	1179	1826	2.3%	56.2%	647	1597	1484	7%	1540	**1540**	Average of Difference and Growth	
	235th	W of 235th	WB	840	913	931	1364	2.0%	47.4%	433	1273	1238	3%	1256	**1256**	Average of Difference and Growth	
	W of 235th	235th	EB	895	772	798	1426	3.4%	81.3%	628	1523	1623	6%	1573	**1573**	Average of Difference and Growth	
	E of Brookwood	Brookwood	WB	775	913	931	1364	2.0%	47.4%	433	1208	1143	6%	1175	**1175**	Average of Difference and Growth	
	Brookwood	E of Brookwood	EB	750	772	798	1426	3.4%	81.3%	628	1378	1360	1%	1369	**1369**	Average of Difference and Growth	
	Brookwood	W of Brookwood	WB	820	751	768	1165	2.2%	52.9%	397	1217	1254	3%	1236	**1217**	Difference Method	To be consistent with method used for opposing direction
	W of Brookwood	Brookwood	EB	1300	789	812	1364	2.9%	70.0%	552	1852	2210	18%	2031	**1852**	Difference Method	Absolute difference >10% --> Used difference only
	E of 253rd	253rd	WB	940	848	870	1410	2.7%	63.6%	540	1480	1538	4%	1509	**1480**	Difference Method	To be consistent with method used for opposing direction
	253rd	E of 253rd	EB	1421	842	884	1900	5.0%	120.6%	1016	2437	3135	25%	2786	**2437**	Difference Method	Absolute difference >10% --> Used difference only
	253rd	W of 253rd	WB	901	848	867	1335	2.3%	55.1%	468	1369	1398	2%	1383	**1369**	Difference Method	To be consistent with method used for opposing direction
	W of 253rd	253rd	EB	1391	842	860	1296	2.2%	51.8%	436	1827	2111	14%	1969	**1827**	Difference Method	Absolute difference >10% --> Used difference only
	E of Sewell	Sewell	WB	915	847	867	1355	2.4%	57.6%	488	1403	1442	3%	1422	**1422**	Average of Difference and Growth	
	Sewell	E of Sewell	EB	1400	826	840	1165	1.6%	39.4%	325	1725	1952	12%	1839	**1839**	Average of Difference and Growth	
	Sewell	273rd	WB	905	843	876	1659	3.9%	92.9%	783	1688	1746	3%	1717	**1717**	Average of Difference and Growth	
	273rd	Sewell	EB	1410	825	831	982	0.8%	18.3%	151	1561	1668	7%	1614	**1614**	Average of Difference and Growth	
	273rd	25th Ave	WB	900	843	876	1659	3.9%	92.9%	783	1683	1736	3%	1710	**1710**	Average of Difference and Growth	
	25th Ave	273rd	EB	1405	825	831	982	0.8%	18.3%	151	1556	1662	7%	1609	**1609**	Average of Difference and Growth	
	25th Ave	15th	WB	960	1014	1044	1759	2.9%	70.5%	715	1675	1637	2%	1656	**1675**	Difference Method	To be consistent with method used for opposing direction
	15th	25th Ave	EB	760	473	481	685	1.8%	43.0%	204	964	1087	12%	1025	**964**	Difference Method	Absolute difference >10% --> Used difference only
	15th	W of 15th	WB	1025	841	866	1468	3.0%	71.6%	602	1627	1759	8%	1693	**1693**	Average of Difference and Growth	
	W of 15th	15th	EB	425	354	364	613	2.9%	70.2%	249	674	724	7%	699	**699**	Average of Difference and Growth	
	E of Jackson School	Jackson School	WB	1030	841	866	1468	3.0%	71.6%	602	1632	1767	8%	1700	**1632**	Difference Method	To be consistent with method used for opposing direction
	Jackson School	E of Jackson School	EB	465	354	364	613	2.9%	70.2%	249	714	792	10%	753	**714**	Difference Method	Absolute difference >10% --> Used difference only
	Jackson School	W of Jackson School	WB	1025	803	834	1566	3.8%	91.2%	732	1757	1960	11%	1859	**1757**	Difference Method	Absolute difference >10% --> Used difference only
	W of Jackson School	Jackson School	EB	675	500	509	722	1.8%	42.6%	213	888	963	8%	925	**888**	Difference Method	To be consistent with method used for opposing direction
229th	S of Evergreen	Evergreen	NB	755	83	85	137	2.6%	62.5%	52	807	1227	41%	1017	**807**	Difference Method	Absolute difference >10% --> Used difference only
	Evergreen	S of Evergreen	SB	385	94	107	417	13.7%	329.9%	310	695	1655	82%	1175	**695**	Difference Method	Absolute difference >10% --> Used difference only
	Evergreen	N of Evergreen	NB	120	87	102	454	16.9%	405.0%	352	472	606	25%	539	**472**	Difference Method	Absolute difference >10% --> Used difference only
	N of Evergreen	Evergreen	SB	235	48	72	655	50.6%	1214.0%	583	818	3088	116%	1953	**818**	Difference Method	Absolute difference >10% --> Used difference only
235th	S of Evergreen	Evergreen	NB	70	828	827	810	-0.1%	-2.1%	-17	53	69	26%	61	**53**	Difference Method	Absolute difference >10% --> Used difference only
	Evergreen	S of Evergreen	SB	10	262	269	444	2.8%	66.7%	175	185	17	167%	101	**185**	Difference Method	Absolute difference >10% --> Used difference only
	Evergreen	N of Evergreen	NB	30	267	271	369	1.5%	36.7%	98	128	41	103%	84	**128**	Difference Method	Absolute difference >10% --> Used difference only
	N of Evergreen	Evergreen	SB	95	101	116	469	14.6%	349.8%	353	448	427	5%	438	**448**	Difference Method	To be consistent with method used for opposing direction
253rd	S of Evergreen	Evergreen	NB	71											**71**	Manual	
	Evergreen	S of Evergreen	SB	76											**76**	Manual	
	Evergreen	N of Evergreen	NB	7	1	11	243	968.0%	23232.0%	232	239	1633	149%	936	**239**	Difference Method	Absolute difference >10% --> Used difference only
	N of Evergreen	Evergreen	SB	3	1	32	772	3084.0%	74016.0%	740	743	2223	100%	1483	**743**	Difference Method	Absolute difference >10% --> Used difference only
Sewell Rd	S of Evergreen	Evergreen	NB	0											**0**	Manual	
	Evergreen	S of Evergreen	SB	10											**10**	Manual	
	Evergreen	N of Evergreen	NB	20	25	28	92	10.7%	257.3%	64	84	71	17%	78	**84**	Difference Method	Absolute difference >10% --> Used difference only
	N of Evergreen	Evergreen	SB	10	21	43	580	106.5%	2555.4%	537	547	266	69%	406	**547**	Difference Method	Absolute difference >10% --> Used difference only
	S of Meek	Meek Rd	NB	15	8	14	160	76.0%	1824.0%	146	161	289	57%	225	**161**	Difference Method	Absolute difference >10% --> Used difference only
	Meek Rd	S of Meek	SB	10	1	2	38	148.0%	3552.0%	36	46	365	156%	205	**46**	Difference Method	Absolute difference >10% --> Used difference only
273rd	N of Evergreen	Evergreen	SB	5											**5**	Manual	
	Evergreen	N of Evergreen	NB	5											**5**	Manual	
25th Ave	S of Evergreen	Evergreen	NB	935	766	766	764	0.0%	-0.3%	-2	933	933	0%	933	933	Average of Difference and Growth	
	Evergreen	S of Evergreen	SB	230	242	247	368	2.1%	50.0%	121	351	345	2%	348	348	Average of Difference and Growth	
15th Ave	S of Evergreen	Evergreen	NB	715	207	204	121	-1.7%	-39.9%	-83	632	430	38%	531	632	Difference Method	Absolute difference >10% --> Used difference only
	Evergreen	S of Evergreen	SB	315	261	264	339	1.2%	28.7%	75	390	405	4%	398	390	Difference Method	To be consistent with method used for opposing direction
Genentech Access	E of Brookwood Pkwy	Brookwood Pkwy	WB	15											**15**	Manual	
	Brookwood Pkwy	E of Brookwood Pkwy	EB	0											**0**	Manual	
	Brookwood Pkwy	W of Brookwood Pkwy	WB	5											**5**	Manual	
	W of Brookwood Pkwy	Brookwood Pkwy	EB	100											**100**	Manual	

Project: Brookwood IAMP
Job #: ODOT0000-0701
Subject: **PM Build Link Volumes**

Table 2: 2035 Link Volume Calculations for the PM Peak Period

Road	From	To	Direction	Volumes	Model	Interpolated Model	Model	2010-2035 Model Comparison			2035 Volume Estimates				Forecast Used	Method Used	Comments
				2011	2010	2011	2035	Annual Growth	Total Growth	Volume Growth	Volume Difference	Volume Growth	Absolute Difference	Average			
Huffman Street	E of Brookwood Pkwy	Brookwood Pkwy	WB	141	247	247	249	0.0%	0.8%	2	143	142	1%	143	**143**	Difference Method	To be consistent with method used for opposing direction
	Brookwood Pkwy	E of Brookwood Pkwy	EB	46	10	28	448	175.2%	4204.8%	420	466	1980	124%	1223	**466**	Difference Method	Absolute difference >10% --> Used difference only
	Brookwood Pkwy	W of Brookwood Pkwy	WB	3	1	17	404	1612.0%	38688.0%	387	390	1164	100%	777	**390**	Difference Method	Not in Base Model - Used Difference
	W of Brookwood Pkwy	Brookwood Pkwy	EB	3	1	61	1496	5980.0%	143520.0%	1435	1438	4309	100%	2873	**1438**	Difference Method	Not in Base Model - Used Difference
Rock Creek	E of Corn Pass	Corn Pass	WB	170	138	138	138	0.0%	0.0%	0	170	170	0%	170	170	Difference Method	To be consistent with method used for opposing direction
	Corn Pass	E of Corn Pass	EB	405	308	319	576	3.5%	83.5%	257	662	743	12%	703	662	Difference Method	Absolute difference >10% --> Used difference only
Croeni	S of Jacobson	Jacobson Rd	NB	55	166	172	310	3.5%	83.3%	138	193	101	63%	147	**193**	Difference Method	Absolute difference >10% --> Used difference only
	Jacobson Rd	S of Jacobson	SB	60	76	76	84	0.4%	10.1%	8	68	66	2%	67	**68**	Difference Method	To be consistent with method used for opposing direction
	Jacobson Rd	N of Jacobson	NB	15	5	7	43	30.4%	729.6%	36	51	124	83%	88	**51**	Difference Method	Absolute difference >10% --> Used difference only
	N of Jacobson	Jacobson Rd	SB	60	3	4	23	26.7%	640.0%	19	79	444	139%	262	**79**	Difference Method	Absolute difference >10% --> Used difference only
Century	S of Jacobson	Jacobson Rd	NB	56	1	26	623	2488.0%	59712.0%	597	653	33495	192%	17074	**653**	Difference Method	
	Jacobson Rd	S of Jacobson	SB	41	1	11	246	980.0%	23520.0%	235	276	9684	189%	4980	**276**	Difference Method	
	Jacobson Rd	N of Jacobson	NB	3	1	22	538	2148.0%	51552.0%	516	519	1550	100%	1034	**519**	Difference Method	
	N of Jacobson	Jacobson Rd	SB	3	1	1	11	40.0%	960.0%	10	13	32	86%	22	**13**	Difference Method	
Groveland	N of Groveland	Groveland	SB	2											**5**	Manual	
	Groveland	N of Groveland	NB	2											**5**	Manual	
	E of Groveland	Groveland	WB	11											**10**	Manual	
	Groveland	E of Groveland	EB	11											**10**	Manual	
	Groveland	W of Groveland	WB	11											**10**	Manual	
	W of Groveland	Groveland	EB	11											**10**	Manual	
	S of West Union	West Union	NB	1											**5**	Manual	
	West Union	S of West Union	SB	2											**5**	Manual	
	West Union	N of West Union	NB	10											**10**	Manual	
	N of West Union	West Union	SB	5											**5**	Manual	
Schaff Road	E of Helvetia Rd	Helvetia Rd	WB	2	13	19	154	43.4%	1041.2%	135	137	23	143%	80	**137**	Difference Method	Absolute difference >10% --> Used difference only
	Helvetia Rd	E of Helvetia Rd	EB	2	53	55	105	3.9%	94.2%	50	52	4	172%	28	**52**	Difference Method	Absolute difference >10% --> Used difference only
Pubols Road	E of Helvetia Rd	Helvetia Rd	WB	5											15	Manual	
	Helvetia Rd	E of Helvetia Rd	EB	5											50	Manual	
Dick Road	S of West Union	West Union	NB	20	5	28	571	452.8%	10867.2%	543	563	2193	118%	1378	**563**	Difference Method	Absolute difference >10% --> Used difference only
	West Union	S of West Union	SB	10	3	4	23	26.7%	640.0%	19	29	74	87%	52	**29**	Difference Method	Absolute difference >10% --> Used difference only
	West Union	N of West Union	NB	15											**20**	Manual	
	N of West Union	West Union	SB	20											**25**	Manual	
Jackson Quarry	West Union	N of West Union	EB	40											40	Manual	
	N of West Union	West Union	WB	35											35	Manual	
Wagon Way	W of Corn Pass	Corn Pass	EB	275	314	345	1085	9.8%	235.7%	740	1015	923	9%	969	**1015**	Difference Method	To be consistent with method used for opposing direction
	Corn Pass	W of Corn Pass	WB	235	125	131	283	5.1%	121.3%	152	387	520	29%	453	**387**	Difference Method	Absolute difference >10% --> Used difference only
	Corn Pass	E of Corn Pass	EB	5											**5**	Manual	
	E of Corn Pass	Corn Pass	WB	5											**5**	Manual	
Scott Church Road	Jackson School	W of Jackson School	WB	165	241	246	368	2.1%	50.6%	122	287	248	14%	268	287	Difference Method	Absolute difference >10% --> Used difference only
	W of Jackson School	Jackson School	EB	135	152	152	164	0.3%	7.6%	12	147	145	1%	146	147	Difference Method	To be consistent with method used for opposing direction

Greater than 10% difference between difference and growth methods

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

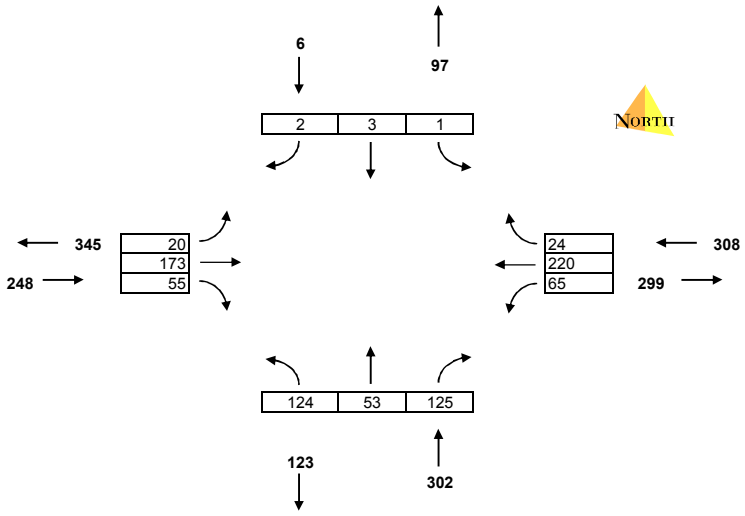
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Jackson School Rd @ West Union Rd
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: West Union Rd
NORTH-SOUTH ROAD: Jackson School Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	65	40	60	5	30	10	10	55	40	40	65	10
OUTPUT FUTURE	**124**	**53**	**125**	**1**	**3**	**2**	**20**	**173**	**55**	**65**	**220**	**24**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	165	110	45	60	105	140	115	120	430	430
OUTPUT FUTURE	**302**	**123**	**6**	**97**	**248**	**345**	**308**	**299**	864	864
INPUT FUTURE	298	123	6	97	245	345	304	299	853	864



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

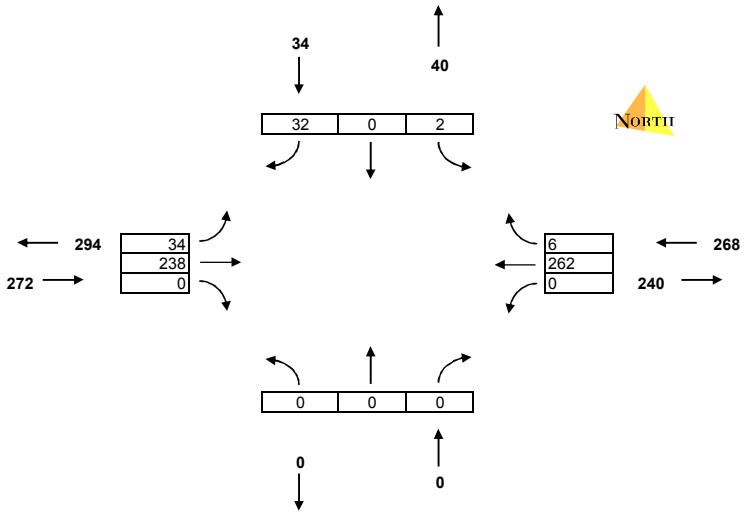
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Jackson Quarry Rd @ West Union Rd
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: West Union Rd
NORTH-SOUTH ROAD: Jackson Quarry Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	0	0	5	0	30	30	90	0	0	75	10
OUTPUT FUTURE	**0**	**0**	**0**	**2**	**0**	**32**	**34**	**238**	**0**	**0**	**262**	**6**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	0	0	35	40	120	105	85	95	240	240
OUTPUT FUTURE	**0**	**0**	**34**	**40**	**272**	**294**	**268**	**240**	574	574
INPUT FUTURE	0	0	35	40	299	294	274	240	608	574



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

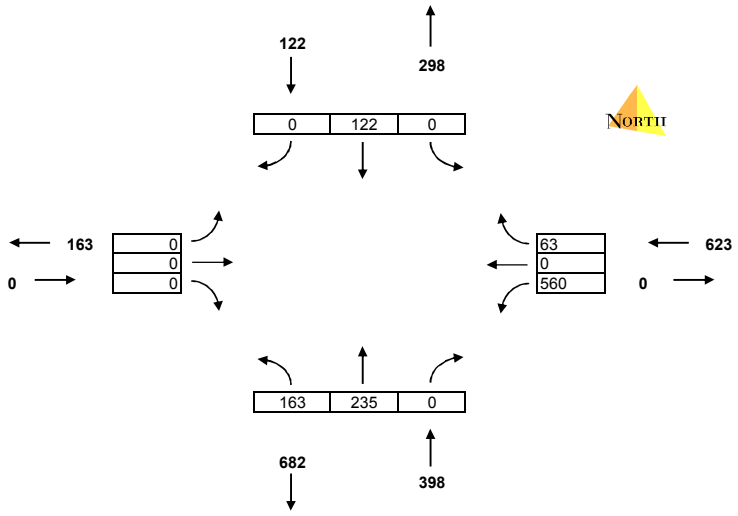
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Jackson School Rd @ US 26 WB Ramps
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: US 26 WB Ramps
NORTH-SOUTH ROAD: Jackson School Rd.

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	75	100	0	0	105	0	0	0	0	500	0	60
OUTPUT FUTURE	**163**	**235**	**0**	**0**	**122**	**0**	**0**	**0**	**0**	**560**	**0**	**63**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	175	605	105	160	0	75	560	0	840	840
OUTPUT FUTURE	**398**	**682**	**122**	**298**	**0**	**163**	**623**	**0**	1,143	1,143
INPUT FUTURE	402	682	123	298	0	163	627	0	1,151	1,143



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

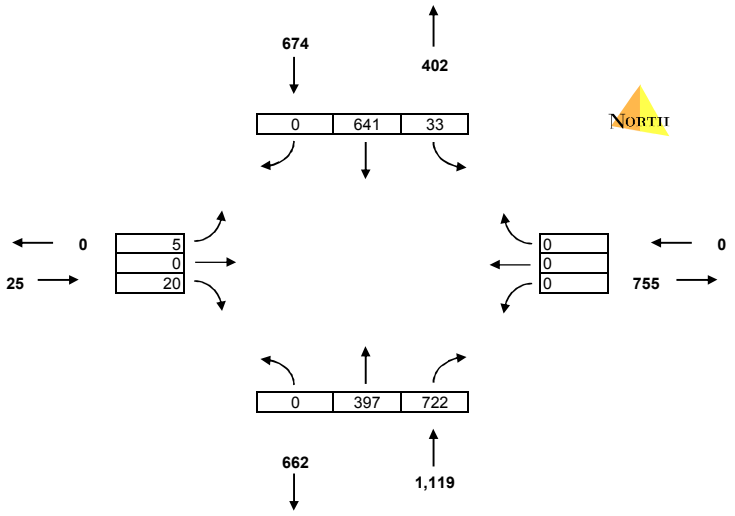
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Jackson School Rd @ US 26 EB Ramps
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: US 26 EB Ramps
NORTH-SOUTH ROAD: Jackson School Rd.

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	170	565	45	560	0	5	0	25	0	0	0
OUTPUT FUTURE	**0**	**397**	**722**	**33**	**641**	**0**	**5**	**0**	**20**	**0**	**0**	**0**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	735	585	605	175	30	0	0	610	1,370	1,370
OUTPUT FUTURE	**1,119**	**662**	**674**	**402**	**25**	**0**	**0**	**755**	1,818	1,818
INPUT FUTURE	1,150	662	682	402	25	0	0	755	1,858	1,818



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

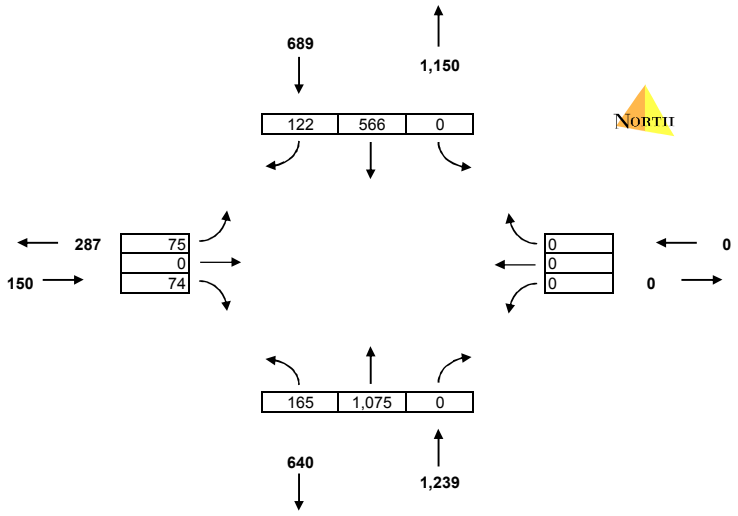
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Jackson School Rd @ Scott Church Rd
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Scott Church Rd
NORTH-SOUTH ROAD: Jackson School Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	25	620	0	0	435	140	115	0	20	0	0	0
OUTPUT FUTURE	**165**	**1,075**	**0**	**0**	**566**	**122**	**75**	**0**	**74**	**0**	**0**	**0**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	645	455	575	735	135	165	0	0	1,355	1,355
OUTPUT FUTURE	**1,239**	**640**	**689**	**1,150**	**150**	**287**	**0**	**0**	2,078	2,078
INPUT FUTURE	1,237	640	662	1,150	147	287	0	0	2,046	2,078



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

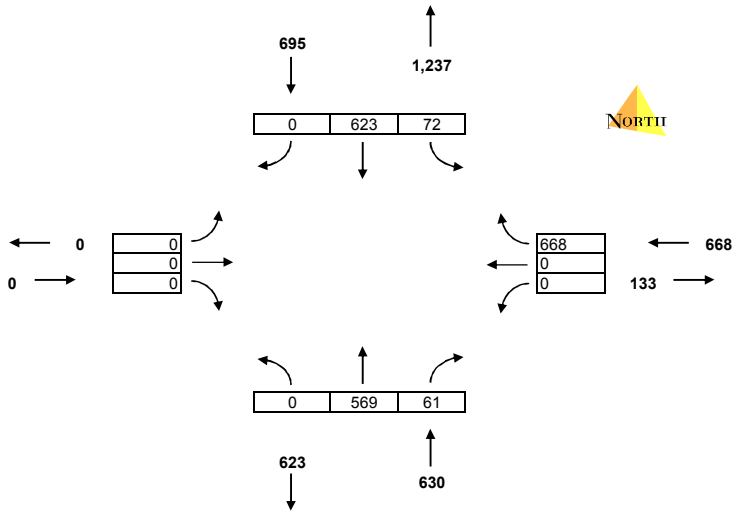
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Jackson School Rd @ Meek Rd
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Meek Rd.
NORTH-SOUTH ROAD: Jackson School Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	630	5	20	435	0	0	0	0	0	0	15
OUTPUT FUTURE	**0**	**569**	**61**	**72**	**623**	**0**	**0**	**0**	**0**	**0**	**0**	**668**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	635	435	455	645	0	0	15	25	1,105	1,105
OUTPUT FUTURE	**630**	**623**	**695**	**1,237**	**0**	**0**	**668**	**133**	1,994	1,994
INPUT FUTURE	655	623	640	1,237	0	0	699	133	1,995	1,994



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

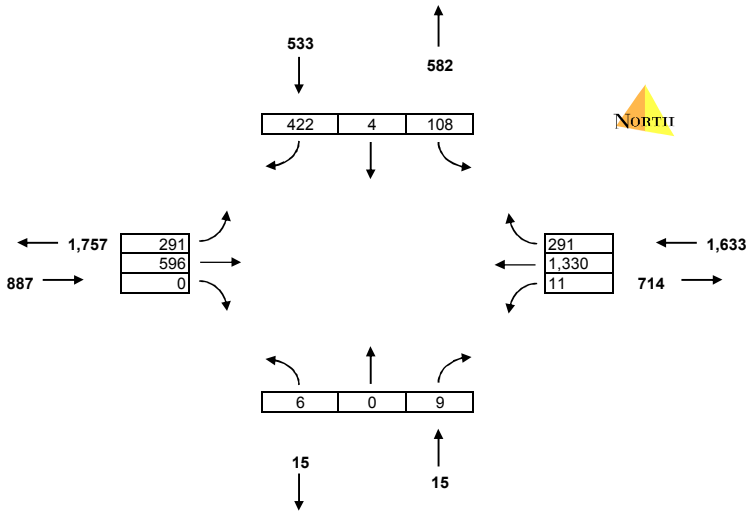
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Jackson School Rd @ Evergreen Rd
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Rd.
NORTH-SOUTH ROAD: Jackson School Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	5	0	10	95	5	320	315	360	0	10	700	320
OUTPUT FUTURE	**6**	**0**	**9**	**108**	**4**	**422**	**291**	**596**	**0**	**11**	**1,330**	**291**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	15	15	420	635	675	1,025	1,030	465	2,140	2,140
OUTPUT FUTURE	**15**	**15**	**533**	**582**	**887**	**1,757**	**1,633**	**714**	3,068	3,068
INPUT FUTURE	15	15	533	582	888	1,757	1,632	714	3,068	3,068



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

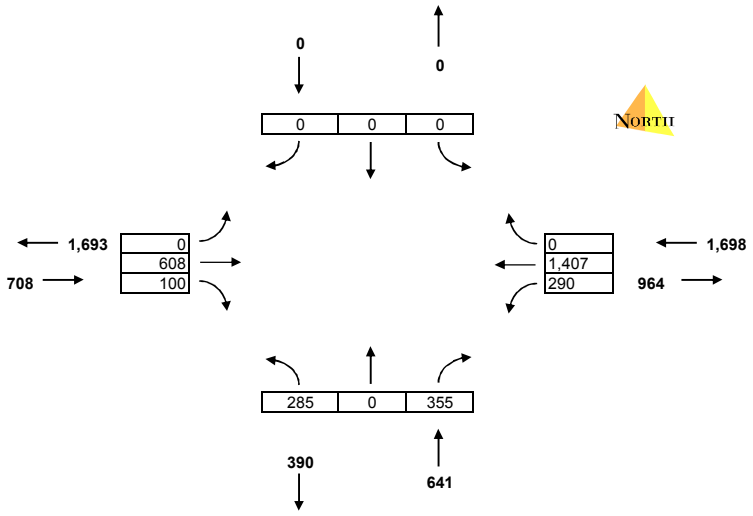
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : 15th Avenue @ Evergreen Rd
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Rd.
NORTH-SOUTH ROAD: 15th Avenue

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	300	0	415	0	0	0	0	345	80	235	725	0
OUTPUT FUTURE	**285**	**0**	**355**	**0**	**0**	**0**	**0**	**608**	**100**	**290**	**1,407**	**0**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	715	315	0	0	425	1,025	960	760	2,100	2,100
OUTPUT FUTURE	**641**	**390**	**0**	**0**	**708**	**1,693**	**1,698**	**964**	3,046	3,046
INPUT FUTURE	632	390	0	0	699	1,693	1,675	964	3,006	3,046



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

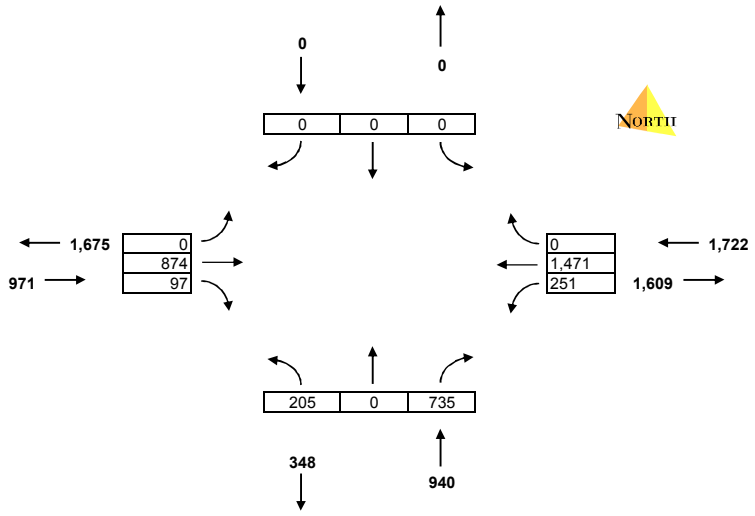
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : 25th Avenue @ Evergreen Rd
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Rd.
NORTH-SOUTH ROAD: 25th Avenue

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	205	0	730	0	0	0	0	675	85	145	755	0
OUTPUT FUTURE	**205**	**0**	**735**	**0**	**0**	**0**	**0**	**874**	**97**	**251**	**1,471**	**0**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	935	230	0	0	760	960	900	1,405	2,595	2,595
OUTPUT FUTURE	**940**	**348**	**0**	**0**	**971**	**1,675**	**1,722**	**1,609**	3,632	3,632
INPUT FUTURE	933	348	0	0	964	1,675	1,710	1,609	3,606	3,632



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

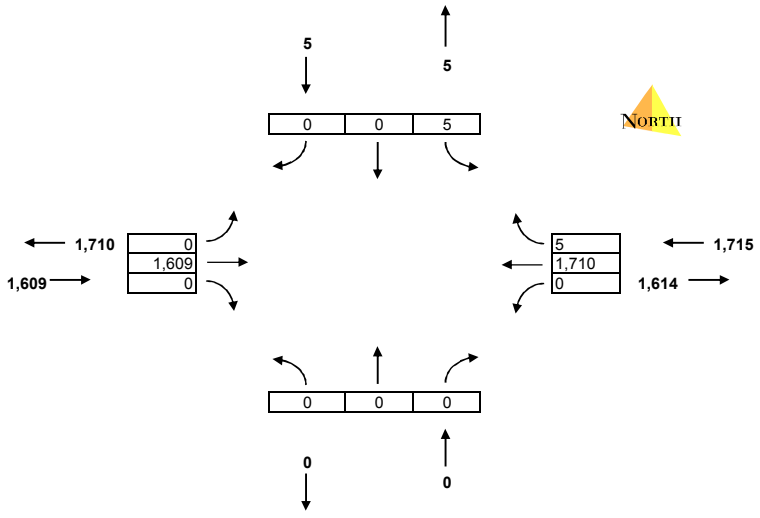
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Eggiman Rd @ Evergreen Rd
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Rd.
NORTH-SOUTH ROAD: Eggiman Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	0	0	5	0	0	0	1,405	0	0	900	5
OUTPUT FUTURE	**0**	**0**	**0**	**5**	**0**	**0**	**0**	**1,609**	**0**	**0**	**1,710**	**5**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	0	0	5	5	1,405	900	905	1,410	2,315	2,315
OUTPUT FUTURE	**0**	**0**	**5**	**5**	**1,609**	**1,710**	**1,715**	**1,614**	3,329	3,329
INPUT FUTURE	0	0	5	5	1,609	1,710	1,717	1,614	3,331	3,329



* Turn Calculation Output from NCHRP 255

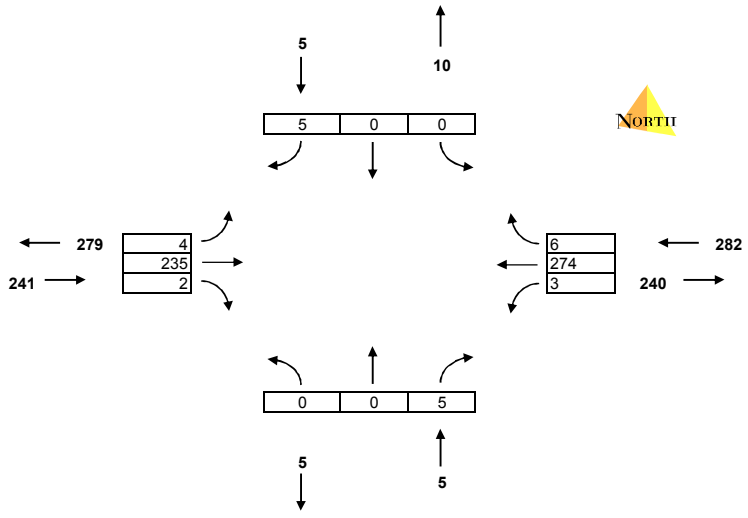
Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION :	Groveland Rd @ West Union Rd.		
SCENARIO :	2035 Build		
PEAK HOUR :	PM		
BASE YEAR :	2011	EAST-WEST ROAD:	West Union Rd.
FUTURE YEAR :	2035	NORTH-SOUTH ROAD:	Groveland Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	0	1	0	0	5	5	90	1	1	85	5
OUTPUT FUTURE	**0**	**0**	**5**	**0**	**0**	**5**	**4**	**235**	**2**	**3**	**274**	**6**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	1	2	5	10	96	90	91	91	193	193
OUTPUT FUTURE	**5**	**5**	**5**	**10**	**241**	**279**	**282**	**240**	534	534
INPUT FUTURE	5	5	5	10	241	279	282	240	533	534



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

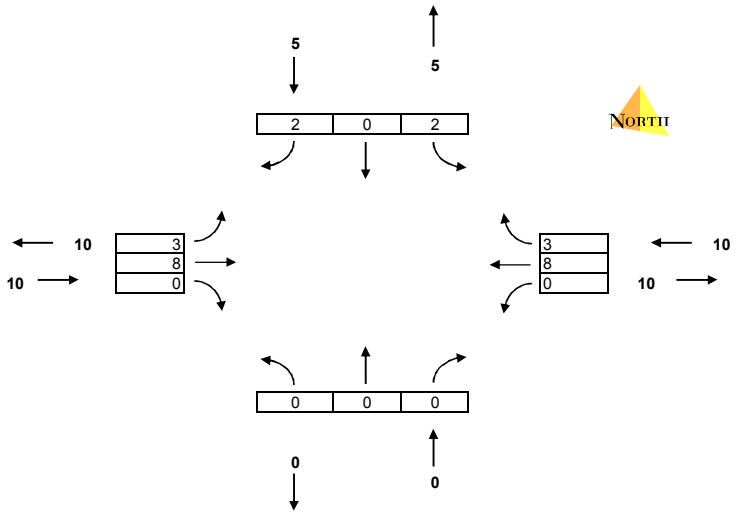
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Groveland Rd @ Groveland Dr
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Groveland Dr.
NORTH-SOUTH ROAD: Groveland Rd.

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	0	0	1	0	1	1	10	0	0	10	1
OUTPUT FUTURE	**0**	**0**	**0**	**2**	**0**	**2**	**3**	**8**	**0**	**0**	**8**	**3**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	0	0	2	2	11	11	11	11	24	24
OUTPUT FUTURE	**0**	**0**	**5**	**5**	**10**	**10**	**10**	**10**	25	25
INPUT FUTURE	0	0	5	5	10	10	10	10	25	25



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

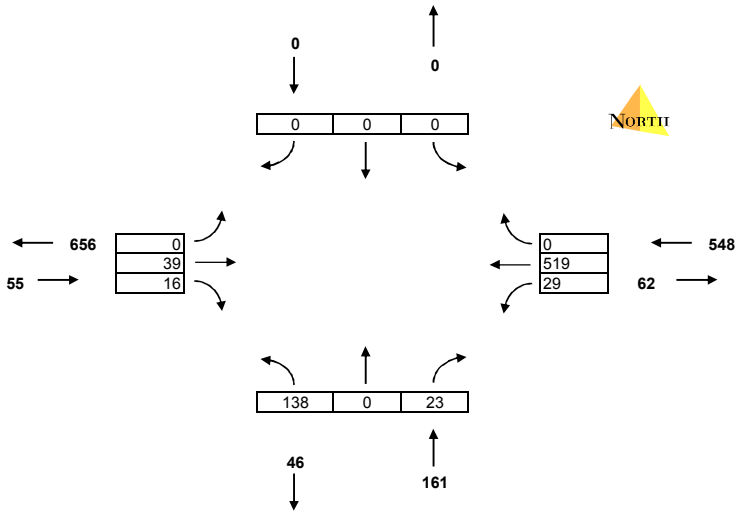
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Sewell Rd @ Meek Rd
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Meek Rd.
NORTH-SOUTH ROAD: Sewell Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	10	0	5	0	0	0	0	10	5	5	25	0
OUTPUT FUTURE	**138**	**0**	**23**	**0**	**0**	**0**	**0**	**39**	**16**	**29**	**519**	**0**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	15	10	0	0	15	35	30	15	60	60
OUTPUT FUTURE	**161**	**46**	**0**	**0**	**55**	**656**	**548**	**62**	764	764
INPUT FUTURE	161	46	0	0	55	656	548	62	765	764



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

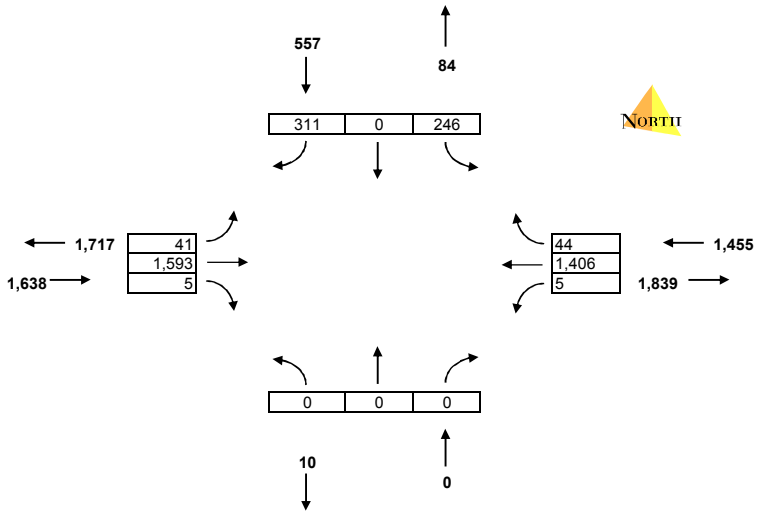
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Sewell Rd @ Evergreen Rd
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Rd.
NORTH-SOUTH ROAD: Sewell Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	0	0	5	0	5	10	1,395	5	5	900	10
OUTPUT FUTURE	**0**	**0**	**0**	**246**	**0**	**311**	**41**	**1,593**	**5**	**5**	**1,406**	**44**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	0	10	10	20	1,410	905	915	1,400	2,335	2,335
OUTPUT FUTURE	**0**	**10**	**557**	**84**	**1,638**	**1,717**	**1,455**	**1,839**	3,650	3,650
INPUT FUTURE	0	10	547	84	1,614	1,717	1,422	1,839	3,583	3,650



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

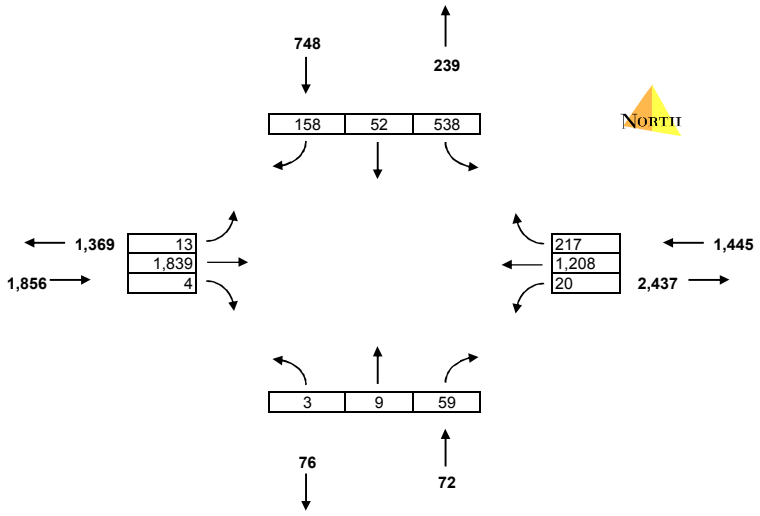
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Meier-Jurgen Rd @ Evergreen Rd
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Rd.
NORTH-SOUTH ROAD: Meier-Jurgen Rd.

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	10	1	60	1	1	1	1	1,360	30	45	890	5
OUTPUT FUTURE	**3**	**9**	**59**	**538**	**52**	**158**	**13**	**1,839**	**4**	**20**	**1,208**	**217**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	71	76	3	7	1,391	901	940	1,421	2,405	2,405
OUTPUT FUTURE	**72**	**76**	**748**	**239**	**1,856**	**1,369**	**1,445**	**2,437**	4,121	4,121
INPUT FUTURE	71	76	743	239	1,827	1,369	1,480	2,437	4,121	4,121



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

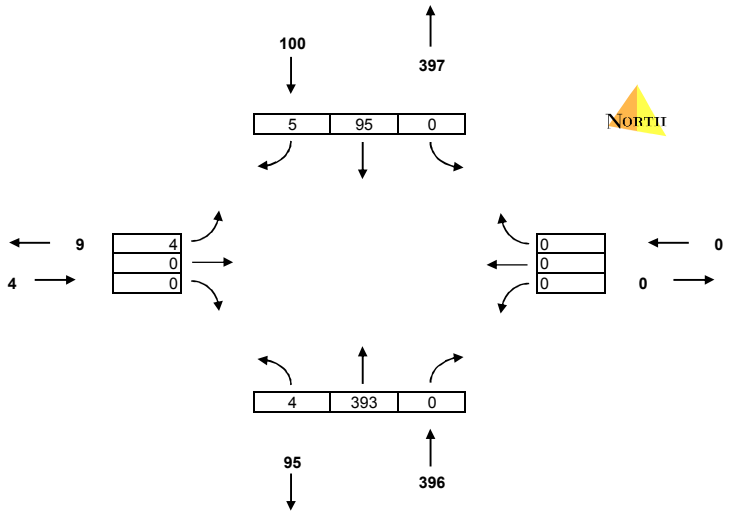
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Helvetia Rd North @ West Union Rd
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: West Union Rd.
NORTH-SOUTH ROAD: Helvetia Rd. North

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	5	135	0	0	60	5	15	0	0	0	0	0
OUTPUT FUTURE	**4**	**393**	**0**	**0**	**95**	**5**	**4**	**0**	**0**	**0**	**0**	**0**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	140	60	65	150	15	10	0	0	220	220
OUTPUT FUTURE	**396**	**95**	**100**	**397**	**4**	**9**	**0**	**0**	500	500
INPUT FUTURE	385	95	105	397	4	9	0	0	494	500



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

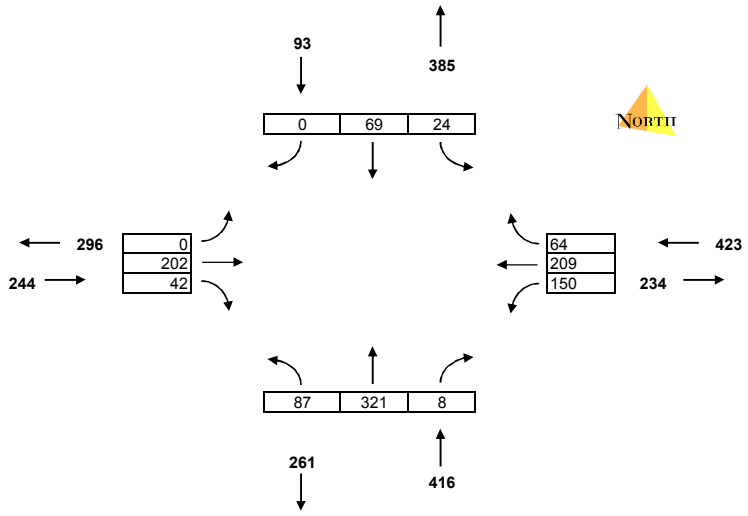
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Helvetia Rd Middle @ West Union Rd
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: West Union Rd.
NORTH-SOUTH ROAD: Helvetia Rd. Middle

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	35	120	5	15	45	0	0	70	15	85	70	20
OUTPUT FUTURE	**87**	**321**	**8**	**24**	**69**	**0**	**0**	**202**	**42**	**150**	**209**	**64**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	160	145	60	140	85	105	175	90	480	480
OUTPUT FUTURE	**416**	**261**	**93**	**385**	**244**	**296**	**423**	**234**	1,176	1,176
INPUT FUTURE	417	261	95	385	248	296	426	234	1,185	1,176



* Turn Calculation Output from NCHRP 255

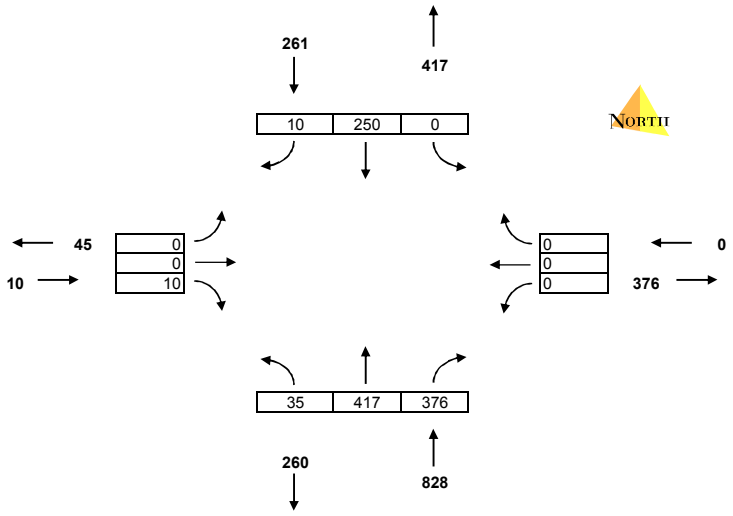
Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION :	Helvetia Rd South @ West Union Rd		
SCENARIO :	2035 Build		
PEAK HOUR :	PM		
BASE YEAR :	2011	EAST-WEST ROAD:	West Union Rd.
FUTURE YEAR :	2035	NORTH-SOUTH ROAD:	Helvetia Rd. South

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	35	160	270	0	135	10	0	0	10	0	0	0
OUTPUT FUTURE	**35**	**417**	**376**	**0**	**250**	**10**	**0**	**0**	**10**	**0**	**0**	**0**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	465	145	145	160	10	45	0	270	620	620
OUTPUT FUTURE	**828**	**260**	**261**	**417**	**10**	**45**	**0**	**376**	1,098	1,098
INPUT FUTURE	828	260	261	417	10	45	0	376	1,099	1,098



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

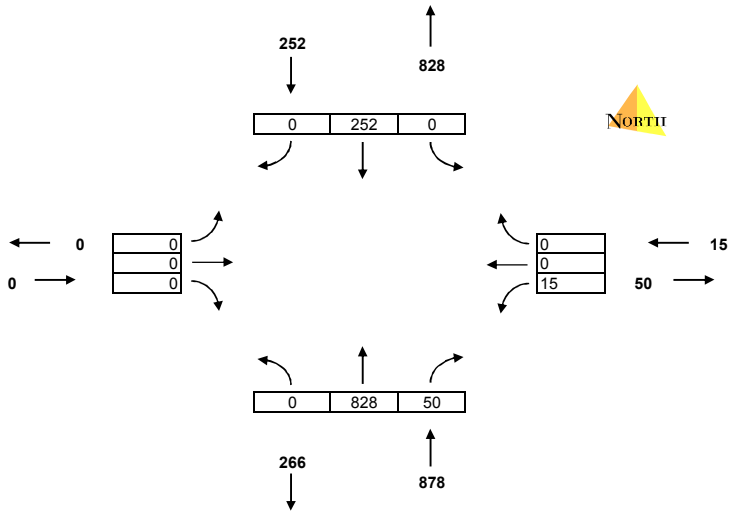
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Helvetia Rd @ Pubols Rd
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Pubols Rd.
NORTH-SOUTH ROAD: Helvetia Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	465	5	0	145	0	0	0	0	5	0	0
OUTPUT FUTURE	**0**	**828**	**50**	**0**	**252**	**0**	**0**	**0**	**0**	**15**	**0**	**0**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	470	150	145	465	0	0	5	5	620	620
OUTPUT FUTURE	**878**	**266**	**252**	**828**	**0**	**0**	**15**	**50**	1,144	1,144
INPUT FUTURE	833	266	260	828	0	0	15	50	1,108	1,144



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

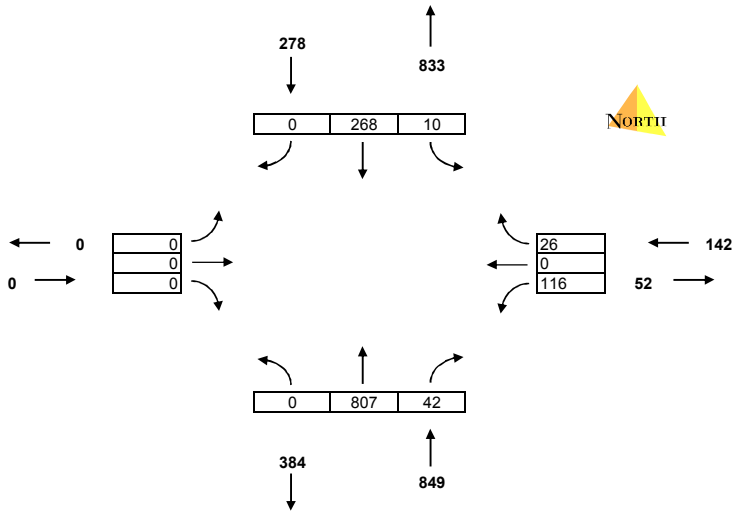
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Helvetia Rd @ Schaff Rd
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Schaff Rd.
NORTH-SOUTH ROAD: Helvetia Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	470	1	1	150	0	0	0	0	1	0	1
OUTPUT FUTURE	**0**	**807**	**42**	**10**	**268**	**0**	**0**	**0**	**0**	**116**	**0**	**26**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	471	151	151	471	0	0	2	2	624	624
OUTPUT FUTURE	**849**	**384**	**278**	**833**	**0**	**0**	**142**	**52**	1,269	1,269
INPUT FUTURE	868	384	266	833	0	0	137	52	1,272	1,269



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

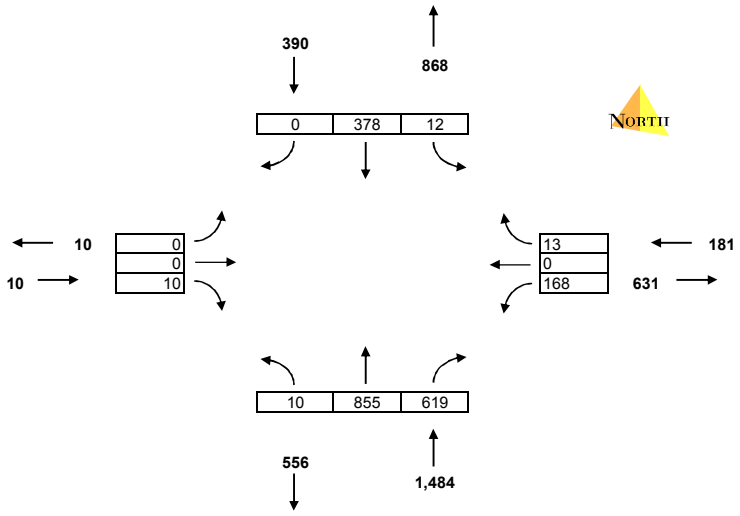
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Helvetia Rd @ Jacobson Rd
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Jacobson Rd.
NORTH-SOUTH ROAD: Helvetia Rd.

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	10	460	500	5	145	0	0	0	10	175	0	10
OUTPUT FUTURE	**10**	**855**	**619**	**12**	**378**	**0**	**0**	**0**	**10**	**168**	**0**	**13**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	970	330	150	470	10	10	185	505	1,315	1,315
OUTPUT FUTURE	**1,484**	**556**	**390**	**868**	**10**	**10**	**181**	**631**	2,065	2,065
INPUT FUTURE	1,449	556	384	868	10	10	178	631	2,021	2,065



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

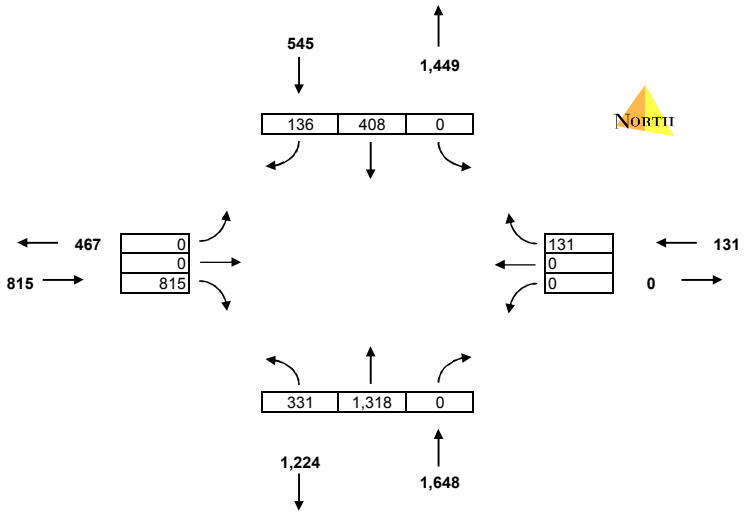
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Brookwood Pkwy @ US26 WB Ramps
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: US26 WB Ramps
NORTH-SOUTH ROAD: Brookwood Pkwy.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	215	885	0	0	265	65	0	0	640	0	0	85
OUTPUT FUTURE	**331**	**1,318**	**0**	**0**	**408**	**136**	**0**	**0**	**815**	**0**	**0**	**131**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	1,100	905	330	970	640	280	85	0	2,155	2,155
OUTPUT FUTURE	**1,648**	**1,224**	**545**	**1,449**	**815**	**467**	**131**	**0**	3,140	3,140
INPUT FUTURE	1,661	1,224	556	1,449	834	467	132	0	3,183	3,140



* Turn Calculation Output from NCHRP 255

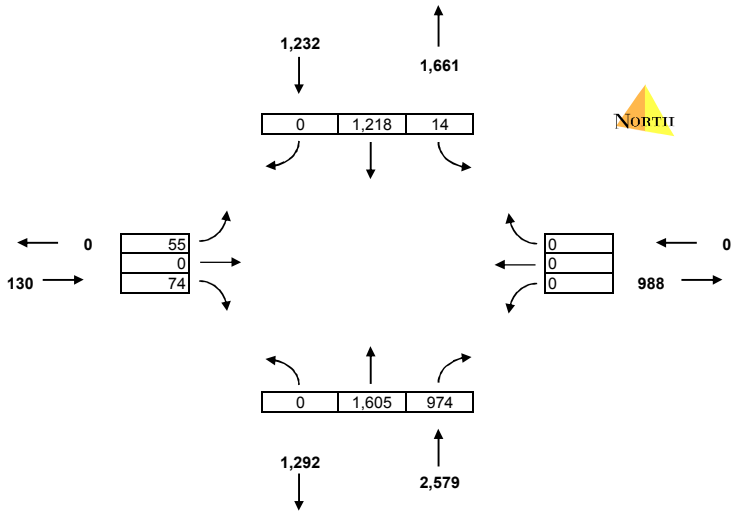
Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION :	Brookwood Pkwy @ US26 EB Ramps		
SCENARIO :	2035 Build		
PEAK HOUR :	PM		
BASE YEAR :	2011	EAST-WEST ROAD:	US26 EB Ramps
FUTURE YEAR :	2035	NORTH-SOUTH ROAD:	Brookwood Pkwy.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	1,030	780	20	885	0	70	0	60	0	0	0
OUTPUT FUTURE	**0**	**1,605**	**974**	**14**	**1,218**	**0**	**55**	**0**	**74**	**0**	**0**	**0**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	1,810	945	905	1,100	130	0	0	800	2,845	2,845
OUTPUT FUTURE	**2,579**	**1,292**	**1,232**	**1,661**	**130**	**0**	**0**	**988**	3,941	3,941
INPUT FUTURE	2,667	1,292	1,224	1,661	131	0	0	988	4,022	3,941



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

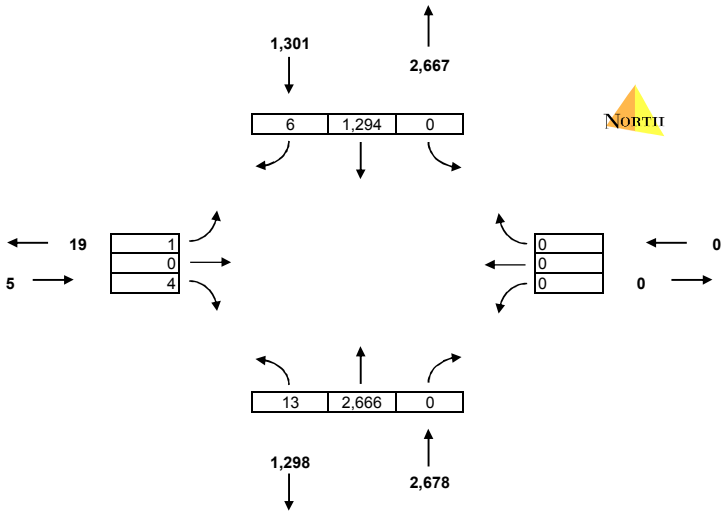
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Brookwood Pkwy @ Meek Rd
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Meek Rd.
NORTH-SOUTH ROAD: Brookwood Pkwy.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	25	1,805	0	0	930	15	5	0	15	0	0	0
OUTPUT FUTURE	**13**	**2,666**	**0**	**0**	**1,294**	**6**	**1**	**0**	**4**	**0**	**0**	**0**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	1,830	945	945	1,810	20	40	0	0	2,795	2,795
OUTPUT FUTURE	**2,678**	**1,298**	**1,301**	**2,667**	**5**	**19**	**0**	**0**	3,984	3,984
INPUT FUTURE	2,689	1,298	1,292	2,667	5	19	0	0	3,986	3,984



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

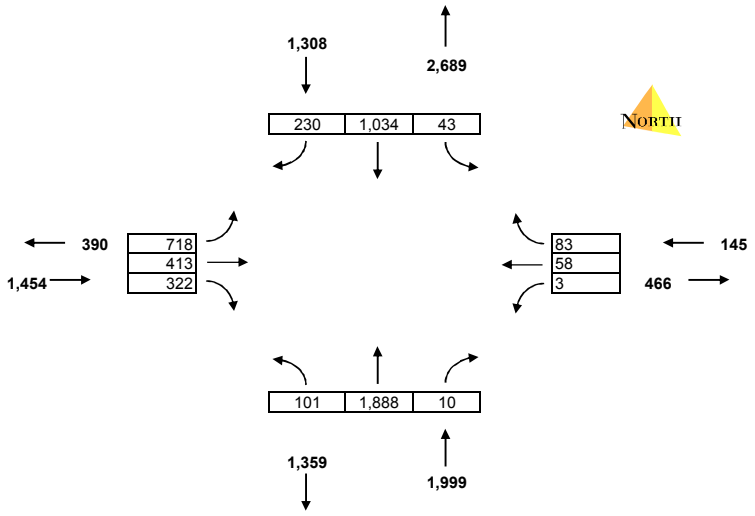
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Brookwood Pkwy @ Huffman St
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Huffman St.
NORTH-SOUTH ROAD: Brookwood Pkwy.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	1	1,700	15	30	915	1	1	1	1	10	1	130
OUTPUT FUTURE	**101**	**1,888**	**10**	**43**	**1,034**	**230**	**718**	**413**	**322**	**3**	**58**	**83**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	1,716	926	946	1,831	3	3	141	46	2,806	2,806
OUTPUT FUTURE	**1,999**	**1,359**	**1,308**	**2,689**	**1,454**	**390**	**145**	**466**	4,905	4,905
INPUT FUTURE	1,973	1,359	1,298	2,689	1,438	390	143	466	4,853	4,905



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

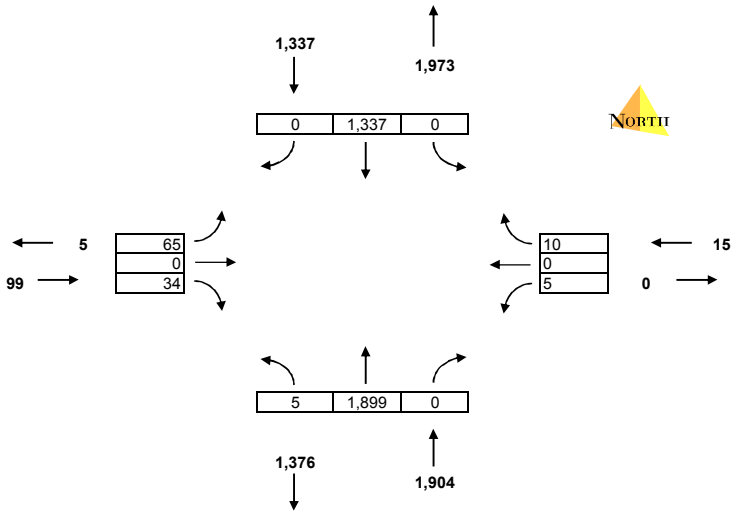
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Brookwood Pkwy @ Genetech Access
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Genetech Access
NORTH-SOUTH ROAD: Brookwood Pkwy.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	5	1,640	0	0	925	0	65	0	35	5	0	10
OUTPUT FUTURE	**5**	**1,899**	**0**	**0**	**1,337**	**0**	**65**	**0**	**34**	**5**	**0**	**10**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	1,645	965	925	1,715	100	5	15	0	2,685	2,685
OUTPUT FUTURE	**1,904**	**1,376**	**1,337**	**1,973**	**99**	**5**	**15**	**0**	3,354	3,354
INPUT FUTURE	1,929	1,376	1,359	1,973	100	5	15	0	3,404	3,354



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

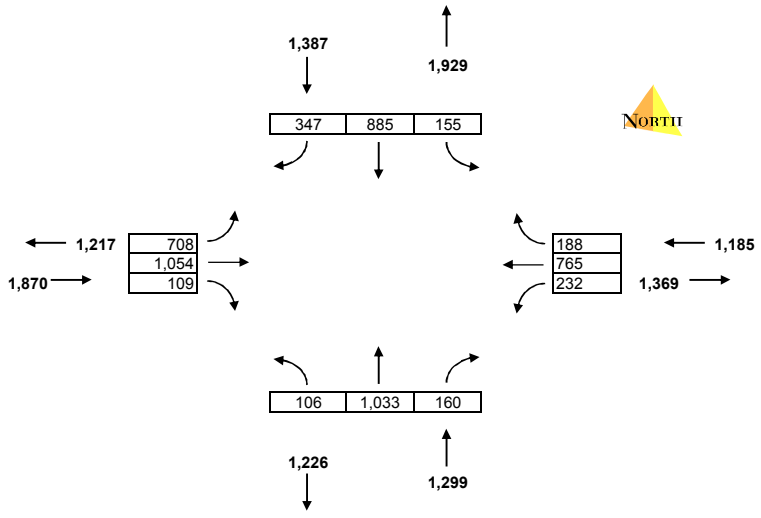
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Brookwood Pkwy @ Evergreen Rd
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Rd.
NORTH-SOUTH ROAD: Brookwood Pkwy.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	100	930	95	65	670	230	600	590	110	170	490	115
OUTPUT FUTURE	**106**	**1,033**	**160**	**155**	**885**	**347**	**708**	**1,054**	**109**	**232**	**765**	**188**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	1,125	950	965	1,645	1,300	820	775	750	4,165	4,165
OUTPUT FUTURE	**1,299**	**1,226**	**1,387**	**1,929**	**1,870**	**1,217**	**1,185**	**1,369**	5,742	5,742
INPUT FUTURE	1,287	1,226	1,376	1,929	1,852	1,217	1,175	1,369	5,690	5,742



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

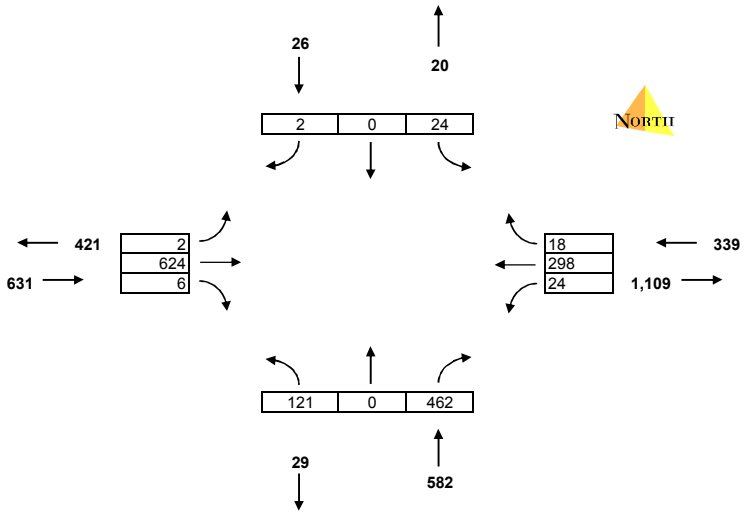
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Century Blvd @ West Union Rd
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: West Union Rd.
NORTH-SOUTH ROAD: Century Blvd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	10	0	10	15	0	5	5	350	5	5	155	10
OUTPUT FUTURE	**121**	**0**	**462**	**24**	**0**	**2**	**2**	**624**	**6**	**24**	**298**	**18**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	20	10	20	15	360	170	170	375	570	570
OUTPUT FUTURE	**582**	**29**	**26**	**20**	**631**	**421**	**339**	**1,109**	1,579	1,579
INPUT FUTURE	563	29	25	20	610	421	331	1,109	1,529	1,579



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

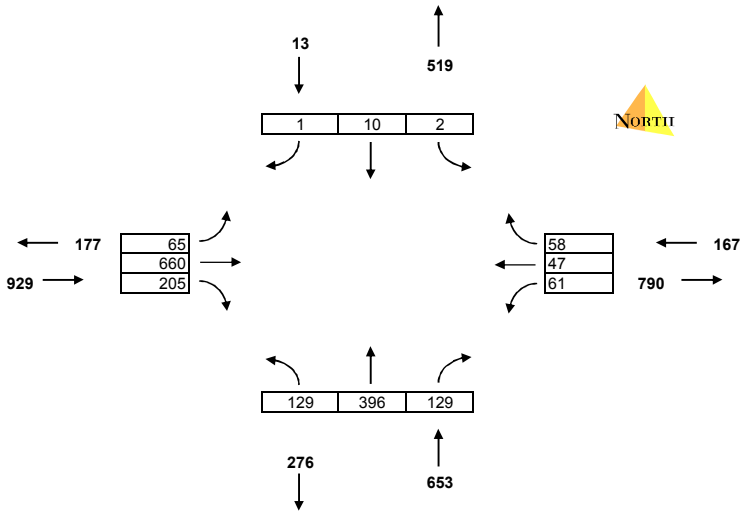
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Century Blvd @ Jacobson Rd
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Jacobson Rd.
NORTH-SOUTH ROAD: Century Blvd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	40	1	15	1	1	1	1	470	30	10	100	1
OUTPUT FUTURE	**129**	**396**	**129**	**2**	**10**	**1**	**65**	**660**	**205**	**61**	**47**	**58**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	56	41	3	3	501	141	111	486	671	671
OUTPUT FUTURE	**653**	**276**	**13**	**519**	**929**	**177**	**167**	**790**	1,762	1,762
INPUT FUTURE	653	276	13	519	929	177	167	790	1,762	1,762



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

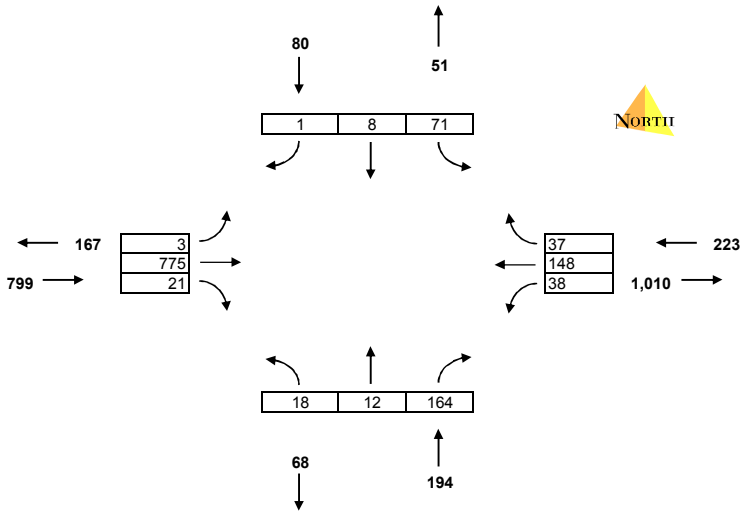
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Croeni Rd @ Jacobson Rd
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Jacobson Rd.
NORTH-SOUTH ROAD: Croeni Rd.

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	30	5	20	40	15	5	5	450	40	5	80	5
OUTPUT FUTURE	**18**	**12**	**164**	**71**	**8**	**1**	**3**	**775**	**21**	**38**	**148**	**37**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	55	60	60	15	495	115	90	510	700	700
OUTPUT FUTURE	**194**	**68**	**80**	**51**	**799**	**167**	**223**	**1,010**	1,296	1,296
INPUT FUTURE	193	68	79	51	790	167	229	1,010	1,292	1,296



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

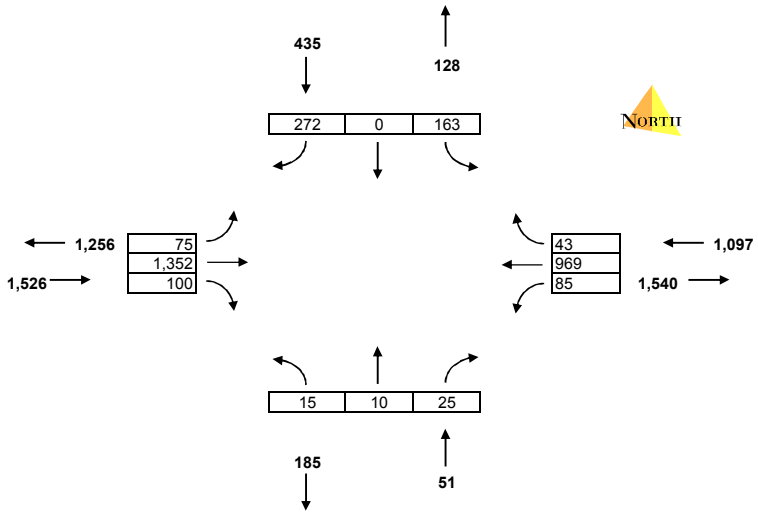
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : 235th Ave @ Evergreen Pkwy
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Pkwy.
NORTH-SOUTH ROAD: 235th Ave.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	25	5	40	35	0	60	15	875	5	5	755	10
OUTPUT FUTURE	**15**	**10**	**25**	**163**	**0**	**272**	**75**	**1,352**	**100**	**85**	**969**	**43**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	70	10	95	30	895	840	770	950	1,830	1,830
OUTPUT FUTURE	**51**	**185**	**435**	**128**	**1,526**	**1,256**	**1,097**	**1,540**	3,109	3,109
INPUT FUTURE	53	185	448	128	1,573	1,256	1,131	1,540	3,205	3,109



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

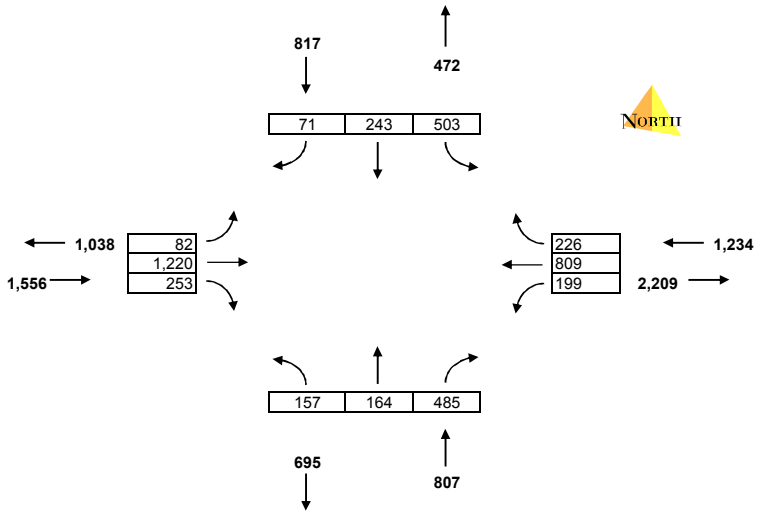
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : 229th Ave @ Evergreen Pkwy
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Pkwy.
NORTH-SOUTH ROAD: 229th Ave.

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	85	40	630	170	55	10	10	790	110	220	555	70
OUTPUT FUTURE	**157**	**164**	**485**	**503**	**243**	**71**	**82**	**1,220**	**253**	**199**	**809**	**226**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	755	385	235	120	910	650	845	1,590	2,745	2,745
OUTPUT FUTURE	**807**	**695**	**817**	**472**	**1,556**	**1,038**	**1,234**	**2,209**	4,414	4,414
INPUT FUTURE	807	695	818	472	1,557	1,038	1,233	2,209	4,414	4,414



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

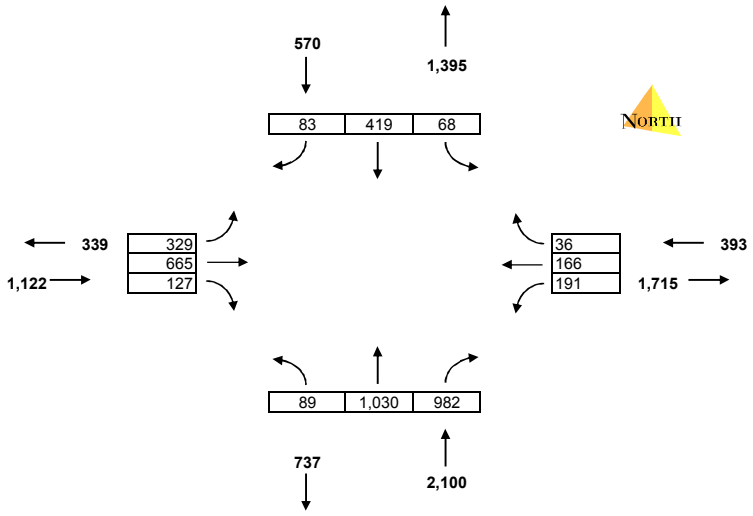
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Cornelius Pass Rd @ West Union Rd
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: West Union Rd.
NORTH-SOUTH ROAD: Cornelius Pass Rd.

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	60	850	680	25	395	30	115	195	95	225	75	20
OUTPUT FUTURE	**89**	**1,030**	**982**	**68**	**419**	**83**	**329**	**665**	**127**	**191**	**166**	**36**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	1,590	715	450	985	405	165	320	900	2,765	2,765
OUTPUT FUTURE	**2,100**	**737**	**570**	**1,395**	**1,122**	**339**	**393**	**1,715**	4,185	4,185
INPUT FUTURE	2,060	737	561	1,395	1,101	339	387	1,715	4,109	4,185



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

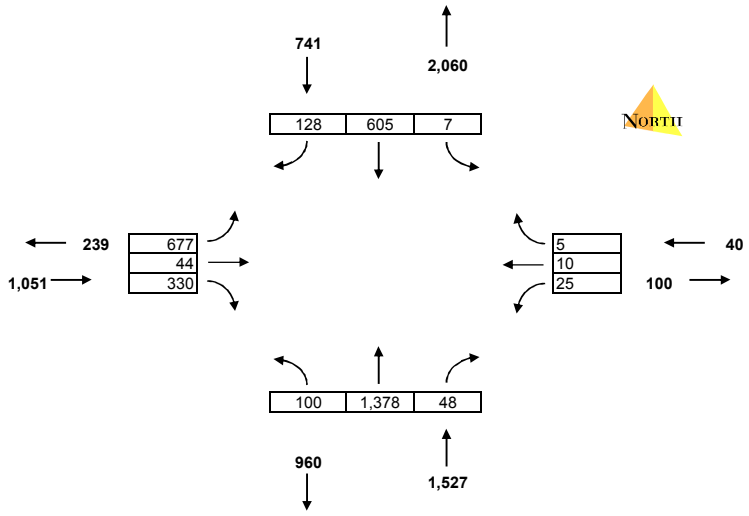
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Cornelius Pass Rd @ Jacobson Rd
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Jacobson Rd.
NORTH-SOUTH ROAD: Cornelius Pass Rd.

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	40	1,250	60	10	650	55	335	30	180	30	5	5
OUTPUT FUTURE	**100**	**1,378**	**48**	**7**	**605**	**128**	**677**	**44**	**330**	**25**	**10**	**5**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	1,350	860	715	1,590	545	100	40	100	2,650	2,650
OUTPUT FUTURE	**1,527**	**960**	**741**	**2,060**	**1,051**	**239**	**40**	**100**	3,359	3,359
INPUT FUTURE	1,518	960	737	2,060	1,045	239	40	100	3,340	3,359



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

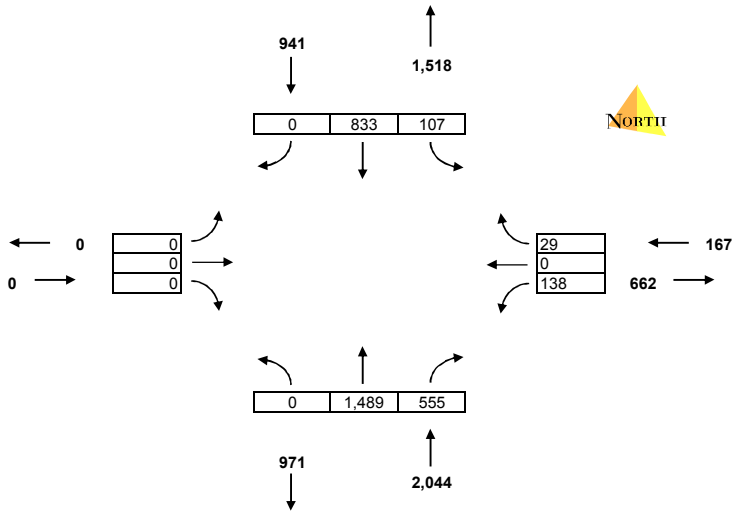
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Cornelius Pass Rd @ Rock Creek Blvd
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Rock Creek Blvd.
NORTH-SOUTH ROAD: Cornelius Pass Rd.

YEAR	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	1,325	345	60	810	0	0	0	0	145	0	25
OUTPUT FUTURE	**0**	**1,489**	**555**	**107**	**833**	**0**	**0**	**0**	**0**	**138**	**0**	**29**

YEAR	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	1,670	955	870	1,350	0	0	170	405	2,710	2,710
OUTPUT FUTURE	**2,044**	**971**	**941**	**1,518**	**0**	**0**	**167**	**662**	3,151	3,151
INPUT FUTURE	2,067	971	960	1,518	0	0	170	662	3,197	3,151



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

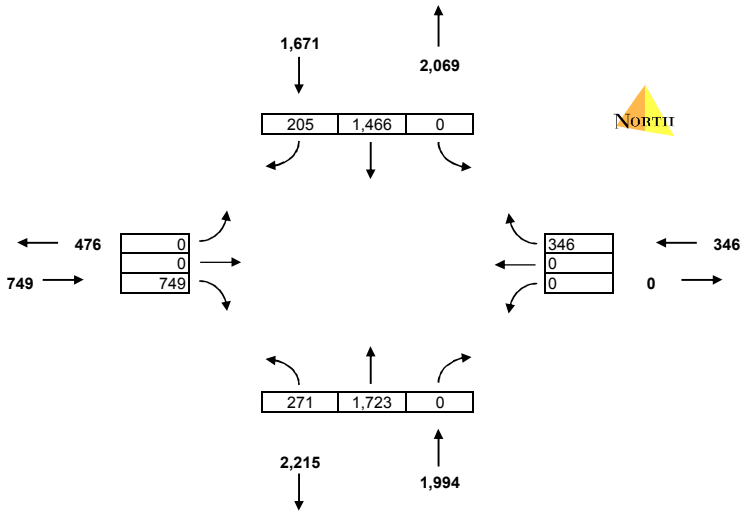
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Cornelius Pass Rd @ US 26 WB Ramps
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: US 26 WB Ramps
NORTH-SOUTH ROAD: Cornelius Pass Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	270	1,550	0	0	995	180	0	0	700	0	0	300
OUTPUT FUTURE	**271**	**1,723**	**0**	**0**	**1,466**	**205**	**0**	**0**	**749**	**0**	**0**	**346**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	1,820	1,695	1,175	1,850	700	450	300	0	3,995	3,995
OUTPUT FUTURE	**1,994**	**2,215**	**1,671**	**2,069**	**749**	**476**	**346**	**0**	4,760	4,760
INPUT FUTURE	2,006	2,215	1,667	2,069	747	476	348	0	4,767	4,760



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

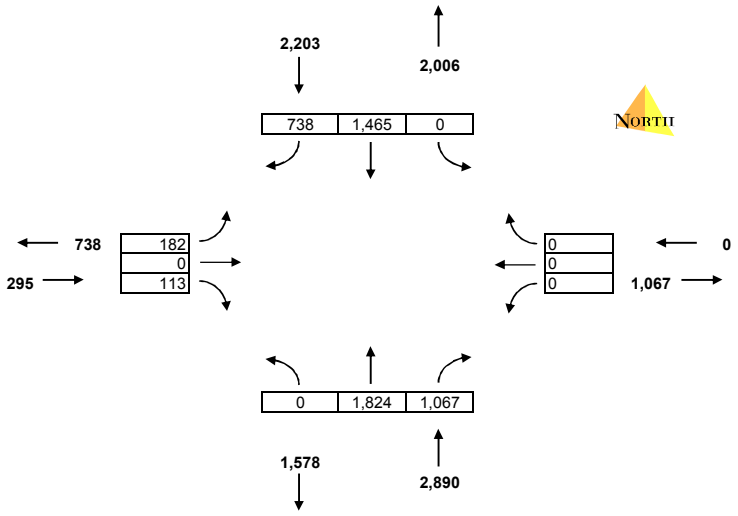
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Cornelius Pass Rd @ US 26 EB Ramps
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: US 26 EB Ramps
NORTH-SOUTH ROAD: Cornelius Pass Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	0	1,655	920	0	1,395	300	165	0	125	0	0	0
OUTPUT FUTURE	**0**	**1,824**	**1,067**	**0**	**1,465**	**738**	**182**	**0**	**113**	**0**	**0**	**0**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	2,575	1,520	1,695	1,820	290	300	0	920	4,560	4,560
OUTPUT FUTURE	**2,890**	**1,578**	**2,203**	**2,006**	**295**	**738**	**0**	**1,067**	5,388	5,388
INPUT FUTURE	2,904	1,578	2,215	2,006	296	738	0	1,067	5,415	5,388



* Turn Calculation Output from NCHRP 255

Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

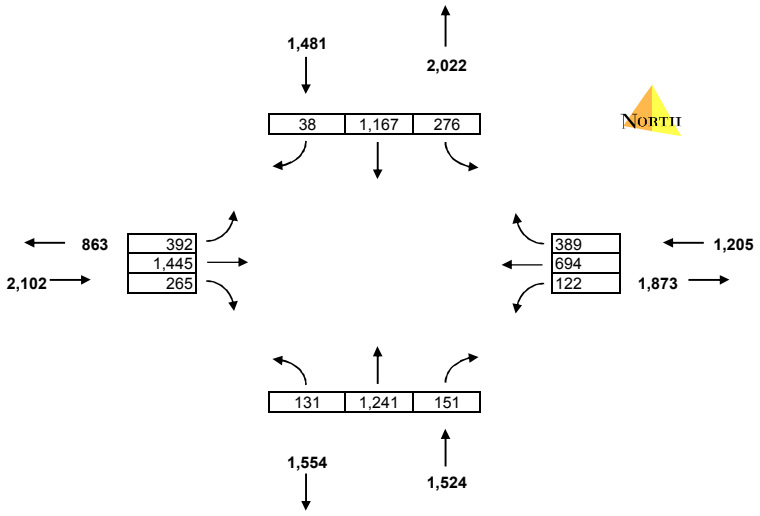
OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION : Cornelius Pass Rd @ Evergreen Pkwy
SCENARIO : 2035 Build
PEAK HOUR : PM
BASE YEAR : 2011
FUTURE YEAR : 2035

EAST-WEST ROAD: Evergreen Pkwy.
NORTH-SOUTH ROAD: Cornelius Pass Rd.

	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	55	1,070	80	230	985	25	380	860	160	80	355	410
OUTPUT FUTURE	**131**	**1,241**	**151**	**276**	**1,167**	**38**	**392**	**1,445**	**265**	**122**	**694**	**389**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	1,205	1,225	1,240	1,860	1,400	435	845	1,170	4,690	4,690
OUTPUT FUTURE	**1,524**	**1,554**	**1,481**	**2,022**	**2,102**	**863**	**1,205**	**1,873**	6,312	6,312
INPUT FUTURE	1,512	1,554	1,467	2,022	2,084	863	1,195	1,873	6,258	6,312



* Turn Calculation Output from NCHRP 255

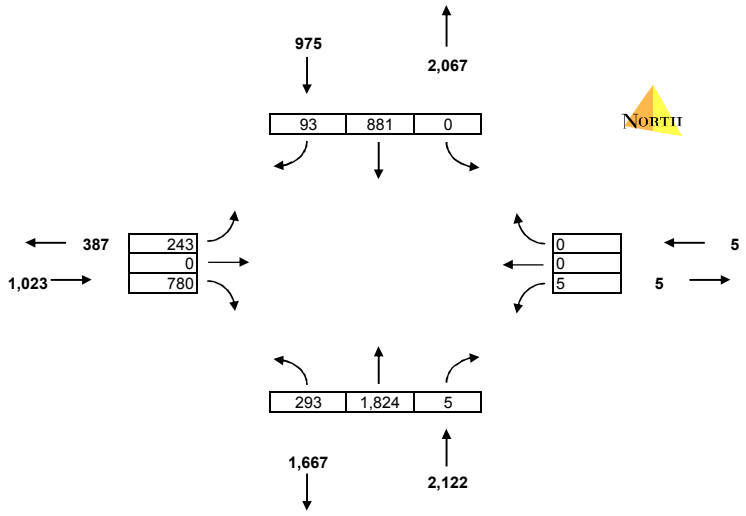
Insert data into cells with blue font : HEADER INFO, BASE YEAR TURN MOVEMENTS, FUTURE YEAR LINK VOLUMES

OUTPUT DATA IS IN BOLD PRINT.

INTERSECTION :	Cornelius Pass Rd @ Wagon Way		
SCENARIO :	2035 Build		
PEAK HOUR :	PM		
BASE YEAR :	2011	EAST-WEST ROAD:	Wagon Way
FUTURE YEAR :	2035	NORTH-SOUTH ROAD:	Cornelius Pass Rd.

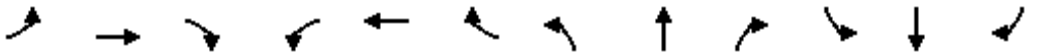
	PEAK HOUR TURNING MOVEMENTS											
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
YEAR	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
BASE YEAR	205	1,640	5	0	925	30	30	0	245	5	0	0
OUTPUT FUTURE	**293**	**1,824**	**5**	**0**	**881**	**93**	**243**	**0**	**780**	**5**	**0**	**0**

	PEAK HOUR DIRECTIONAL LINK VOLUMES									
	SOUTHLEG		NORTHLEG		WESTLEG		EASTLEG		ALL LEGS	
YEAR	In	Out	In	Out	In	Out	In	Out	In	Out
BASE YEAR	1,850	1,175	955	1,670	275	235	5	5	3,085	3,085
OUTPUT FUTURE	**2,122**	**1,667**	**975**	**2,067**	**1,023**	**387**	**5**	**5**	4,125	4,125
INPUT FUTURE	2,069	1,667	971	2,067	1,015	387	5	5	4,060	4,125



* Turn Calculation Output from NCHRP 255

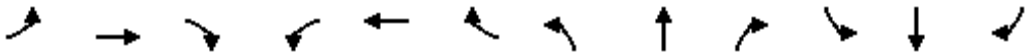
Appendix B. Intersection Operations Analysis



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	555	0	45	45	115	0	0	185	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	0	584	0	47	47	121	0	0	195	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						23						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	411	411	195	411	411	121	195			121		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	411	411	195	411	411	121	195			121		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.3	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.4	2.3			2.2		
p0 queue free %	100	100	100	0	100	95	97			100		
cM capacity (veh/h)	512	515	852	532	515	912	1355			1479		

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	632	47	121	195	0
Volume Left	584	47	0	0	0
Volume Right	47	0	0	0	0
cSH	575	1355	1700	1700	1700
Volume to Capacity	1.10	0.03	0.07	0.11	0.00
Queue Length 95th (ft)	484	3	0	0	0
Control Delay (s)	89.5	7.8	0.0	0.0	0.0
Lane LOS	F	A			
Approach Delay (s)	89.5	2.2		0.0	
Approach LOS	F				

Intersection Summary				
Average Delay	57.2			
Intersection Capacity Utilization	86.4%	ICU Level of Service		E
Analysis Period (min)	15			



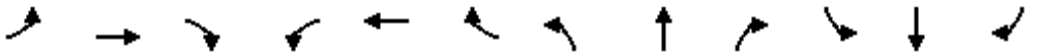
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	10	0	150	0	0	0	0	150	580	55	685	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	11	0	158	0	0	0	0	158	611	58	721	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			11									
Median type								TWLTL			None	
Median storage veh)								2				
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	995	995	721	995	995	158	721			158		
vC1, stage 1 conf vol	837	837		158	158							
vC2, stage 2 conf vol	158	158		837	837							
vCu, unblocked vol	995	995	721	995	995	158	721			158		
tC, single (s)	7.4	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)	6.4	5.5		6.1	5.5							
tF (s)	3.8	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	96	100	63	100	100	100	100			96		
cM capacity (veh/h)	295	353	426	213	354	893	890			1374		

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	168	158	611	58	721
Volume Left	11	0	0	58	0
Volume Right	158	0	611	0	0
cSH	454	1700	1700	1374	1700
Volume to Capacity	0.37	0.09	0.36	0.04	0.42
Queue Length 95th (ft)	42	0	0	3	0
Control Delay (s)	18.3	0.0	0.0	7.7	0.0
Lane LOS	C			A	
Approach Delay (s)	18.3	0.0		0.6	
Approach LOS	C				

Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	86.4%	ICU Level of Service	E	
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	635	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3374					
Flt Permitted	1.00					
Satd. Flow (perm)	3374					
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	738	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	738	0	0	0	0	0
Heavy Vehicles (%)	7%	0%	0%	0%	0%	0%
Turn Type						
Protected Phases	4					
Permitted Phases						
Actuated Green, G (s)	20.0					
Effective Green, g (s)	20.0					
Actuated g/C Ratio	1.00					
Clearance Time (s)	4.0					
Lane Grp Cap (vph)	3374					
v/s Ratio Prot	c0.22					
v/s Ratio Perm						
v/c Ratio	0.22					
Uniform Delay, d1	0.0					
Progression Factor	1.00					
Incremental Delay, d2	0.1					
Delay (s)	0.1					
Level of Service	A					
Approach Delay (s)	0.1			0.0	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM Average Control Delay	0.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	20.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	20.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	475	1275	2	5	395	70	2	5	5	130	2	320
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1	4.7		4.8	4.7	4.7		5.2			5.6	5.6
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.94			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.95	1.00
Satd. Flow (prot)	1752	1809		1805	1743	1583		1777			1759	1599
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.96			0.72	1.00
Satd. Flow (perm)	1752	1809		1805	1743	1583		1712			1327	1599
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	528	1417	2	6	439	78	2	6	6	144	2	356
RTOR Reduction (vph)	0	0	0	0	0	35	0	5	0	0	0	308
Lane Group Flow (vph)	528	1419	0	6	439	43	0	9	0	0	146	48
Heavy Vehicles (%)	3%	5%	0%	0%	9%	2%	0%	0%	0%	3%	0%	1%
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases						6	8			4		4
Actuated Green, G (s)	35.5	80.1		0.9	45.2	45.2		14.4			14.0	14.0
Effective Green, g (s)	36.9	81.5		2.3	46.6	46.6		15.8			15.4	15.4
Actuated g/C Ratio	0.32	0.71		0.02	0.41	0.41		0.14			0.13	0.13
Clearance Time (s)	6.5	6.1		6.2	6.1	6.1		6.6			7.0	7.0
Vehicle Extension (s)	2.6	3.2		2.7	3.2	3.2		1.8			1.8	1.8
Lane Grp Cap (vph)	566	1290		36	711	645		237			179	215
v/s Ratio Prot	c0.30	c0.78		0.00	0.25							
v/s Ratio Perm						0.03		0.01			c0.11	0.03
v/c Ratio	0.93	1.10		0.17	0.62	0.07		0.04			0.82	0.22
Uniform Delay, d1	37.5	16.4		55.1	26.8	20.6		42.7			48.1	44.1
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	22.5	57.1		1.8	1.6	0.0		0.0			22.9	0.2
Delay (s)	60.0	73.5		56.9	28.4	20.7		42.7			71.0	44.3
Level of Service	E	E		E	C	C		D			E	D
Approach Delay (s)		69.8			27.6			42.7			52.1	
Approach LOS		E			C			D			D	

Intersection Summary			
HCM Average Control Delay	59.3	HCM Level of Service	E
HCM Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	114.3	Sum of lost time (s)	15.4
Intersection Capacity Utilization	98.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1210	200	325	405	95	270
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.8		5.3	4.8	6.1	6.1
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3411		1787	3312	1719	1599
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3411		1787	3312	1719	1599
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1274	211	342	426	100	284
RTOR Reduction (vph)	12	0	0	0	0	252
Lane Group Flow (vph)	1473	0	342	426	100	32
Heavy Vehicles (%)	4%	1%	1%	9%	5%	1%
Turn Type			Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	42.1		18.6	67.4	9.7	9.7
Effective Green, g (s)	43.5		20.0	68.8	10.2	10.2
Actuated g/C Ratio	0.48		0.22	0.77	0.11	0.11
Clearance Time (s)	6.2		6.7	6.2	6.6	6.6
Vehicle Extension (s)	3.2		2.6	3.2	2.0	2.0
Lane Grp Cap (vph)	1650		398	2535	195	181
v/s Ratio Prot	c0.43		c0.19	0.13	c0.06	
v/s Ratio Perm						0.02
v/c Ratio	0.89		0.86	0.17	0.51	0.18
Uniform Delay, d1	21.1		33.6	2.8	37.5	36.1
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	6.6		16.5	0.0	0.9	0.2
Delay (s)	27.7		50.1	2.9	38.5	36.2
Level of Service	C		D	A	D	D
Approach Delay (s)	27.7			23.9	36.8	
Approach LOS	C			C	D	

Intersection Summary			
HCM Average Control Delay	27.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	89.9	Sum of lost time (s)	16.2
Intersection Capacity Utilization	76.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1280	175	610	630	95	315
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1		6.0	5.1	5.9	6.0
Lane Util. Factor	0.95		0.97	0.95	1.00	0.88
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3480		3400	3505	1656	2682
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3480		3400	3505	1656	2682
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1347	184	642	663	100	332
RTOR Reduction (vph)	10	0	0	0	0	20
Lane Group Flow (vph)	1521	0	642	663	100	312
Heavy Vehicles (%)	2%	1%	3%	3%	9%	6%
Turn Type			Prot			custom
Protected Phases	2		1	6	3	
Permitted Phases						1 8
Actuated Green, G (s)	42.8		18.2	68.4	10.7	36.2
Effective Green, g (s)	44.2		19.6	69.8	12.1	32.5
Actuated g/C Ratio	0.48		0.21	0.75	0.13	0.35
Clearance Time (s)	6.5		7.4	6.5	7.3	
Vehicle Extension (s)	3.2		2.3	3.2	2.3	
Lane Grp Cap (vph)	1656		717	2633	216	938
v/s Ratio Prot	c0.44		c0.19	0.19	c0.06	
v/s Ratio Perm						0.12
v/c Ratio	0.92		0.90	0.25	0.46	0.33
Uniform Delay, d1	22.7		35.7	3.5	37.4	22.2
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	8.6		13.6	0.1	0.9	0.1
Delay (s)	31.2		49.2	3.6	38.3	22.3
Level of Service	C		D	A	D	C
Approach Delay (s)	31.2			26.0	26.0	
Approach LOS	C			C	C	

Intersection Summary			
HCM Average Control Delay	28.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	92.9	Sum of lost time (s)	17.0
Intersection Capacity Utilization	77.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	30	2	530	210	15	560
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	33	2	589	233	17	622
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			942			
pX, platoon unblocked						
vC, conflicting volume	1244	589			822	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1244	589			822	
tC, single (s)	6.4	6.5			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.6			2.2	
p0 queue free %	82	100			98	
cM capacity (veh/h)	189	455			816	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	33	2	589	233	639
Volume Left	33	0	0	0	17
Volume Right	0	2	0	233	0
cSH	189	455	1700	1700	816
Volume to Capacity	0.18	0.00	0.35	0.14	0.02
Queue Length 95th (ft)	16	0	0	0	2
Control Delay (s)	28.1	13.0	0.0	0.0	0.5
Lane LOS	D	B			A
Approach Delay (s)	27.1		0.0		0.5
Approach LOS	D				

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	51.5%	ICU Level of Service	A
Analysis Period (min)	15		

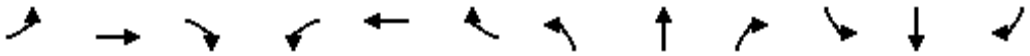
Movement	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Lane Configurations									
Volume (vph)	0	1910	45	740	580	0	10	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.0	2.0	2.0	3.0				
Lane Util. Factor		*0.95	1.00	0.95	0.95				
Frt		0.85	1.00	1.00	1.00				
Flt Protected		1.00	0.95	1.00	1.00				
Satd. Flow (prot)		2771	1630	3260	3251				
Flt Permitted		1.00	0.95	1.00	1.00				
Satd. Flow (perm)		2771	1630	3260	3251				
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	2011	47	779	611	0	11	0	0
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	2011	47	779	621	0	0	0	0
Turn Type		custom	Prot						
Protected Phases		8	3	3 6	2				
Permitted Phases									
Actuated Green, G (s)		88.0	89.0	120.0	22.0				
Effective Green, g (s)		90.0	91.0	117.0	24.0				
Actuated g/C Ratio		0.75	0.76	0.98	0.20				
Clearance Time (s)		5.0	4.0		5.0				
Vehicle Extension (s)		5.2	2.3		5.2				
Lane Grp Cap (vph)		2078	1236	3179	650				
v/s Ratio Prot		c0.73	0.03	0.24	c0.19				
v/s Ratio Perm									
v/c Ratio		0.97	0.04	0.25	0.96				
Uniform Delay, d1		13.7	3.6	0.0	47.5				
Progression Factor		1.00	0.86	1.00	1.00				
Incremental Delay, d2		13.5	0.0	0.0	25.2				
Delay (s)		27.2	3.1	0.1	72.7				
Level of Service		C	A	A	E				
Approach Delay (s)	27.2			0.2	72.7			0.0	
Approach LOS	C			A	E			A	

Intersection Summary			
HCM Average Control Delay	28.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	97.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	260	525	0	0	2490
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	274	553	0	0	2621
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		1				
Median type			None			None
Median storage veh)						
Upstream signal (ft)			707			290
pX, platoon unblocked	0.85					
vC, conflicting volume	1426	184			553	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	877	184			553	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	67			100	
cM capacity (veh/h)	244	833			1028	

Direction, Lane #	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	184	184	184	874	874	874
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0
cSH	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.11	0.11	0.11	0.51	0.51	0.51
Queue Length 95th (ft)	0	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS						
Approach Delay (s)	0.0			0.0		
Approach LOS						

Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	95	0	375	0	0	0	0	430	535	35	2455	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.0	3.0					3.0	3.0	2.0	3.0	
Lane Util. Factor		0.95	0.95					0.95	1.00	1.00	0.91	
Frt		0.91	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.98	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1382	1262					3107	1430	1662	4730	
Flt Permitted		0.98	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1382	1262					3107	1430	1662	4730	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	100	0	395	0	0	0	0	453	563	37	2584	0
RTOR Reduction (vph)	0	4	4	0	0	0	0	0	235	0	0	0
Lane Group Flow (vph)	0	250	237	0	0	0	0	453	328	37	2584	0
Heavy Vehicles (%)	0%	0%	12%	0%	0%	0%	0%	7%	4%	0%	1%	0%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		8						6		5	2	
Permitted Phases	8		8						6			
Actuated Green, G (s)		25.6	25.6					68.0	68.0	12.4	84.4	
Effective Green, g (s)		27.6	27.6					70.0	70.0	14.4	86.4	
Actuated g/C Ratio		0.23	0.23					0.58	0.58	0.12	0.72	
Clearance Time (s)		5.0	5.0					5.0	5.0	4.0	5.0	
Vehicle Extension (s)		2.3	2.3					4.7	4.7	2.3	4.7	
Lane Grp Cap (vph)		318	290					1812	834	199	3406	
v/s Ratio Prot								0.15		0.02	c0.55	
v/s Ratio Perm		0.18	c0.19						0.23			
v/c Ratio		0.79	0.82					0.25	0.39	0.19	0.76	
Uniform Delay, d1		43.4	43.8					12.2	13.5	47.5	10.4	
Progression Factor		1.00	1.00					1.00	1.00	1.02	0.95	
Incremental Delay, d2		11.5	15.7					0.3	1.4	0.6	0.5	
Delay (s)		54.9	59.5					12.5	14.9	49.0	10.3	
Level of Service		D	E					B	B	D	B	
Approach Delay (s)		57.1			0.0			13.9			10.9	
Approach LOS		E			A			B			B	

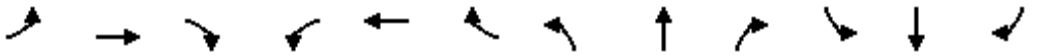
Intersection Summary			
HCM Average Control Delay	17.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	570	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3539					
Flt Permitted	1.00					
Satd. Flow (perm)	3539					
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	620	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	620	0	0	0	0	0
Turn Type						
Protected Phases	4					
Permitted Phases						
Actuated Green, G (s)	2.2					
Effective Green, g (s)	2.2					
Actuated g/C Ratio	0.09					
Clearance Time (s)	5.8					
Lane Grp Cap (vph)	311					
v/s Ratio Prot	c0.18					
v/s Ratio Perm						
v/c Ratio	1.99					
Uniform Delay, d1	11.4					
Progression Factor	1.00					
Incremental Delay, d2	458.4					
Delay (s)	469.8					
Level of Service	F					
Approach Delay (s)	469.8			0.0	0.0	
Approach LOS	F			A	A	

Intersection Summary			
HCM Average Control Delay	469.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.99		
Actuated Cycle Length (s)	25.0	Sum of lost time (s)	22.8
Intersection Capacity Utilization	20.6%	ICU Level of Service	A
Analysis Period (min)	15		

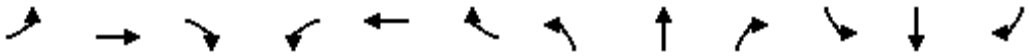
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	140	45	55	5	350	70	350	755	10	115	2335	315
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.0	4.5	4.0	4.5	4.0		4.0	4.0	4.5
Lane Util. Factor	0.97	1.00		1.00	1.00	1.00	0.97	0.91		1.00	0.91	1.00
Frt	1.00	0.92		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1708		1805	1863	1615	3433	4978		1787	5085	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1708		1805	1863	1615	3433	4978		1787	5085	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	147	47	58	5	368	74	368	795	11	121	2458	332
RTOR Reduction (vph)	0	35	0	0	0	58	0	1	0	0	0	80
Lane Group Flow (vph)	147	70	0	5	368	16	368	805	0	121	2458	252
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	2%	4%	3%	1%	2%	2%
Turn Type	Prot			Prot		Perm	Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						6
Actuated Green, G (s)	6.0	31.4		0.8	26.2	26.2	10.0	62.8		12.2	65.0	65.0
Effective Green, g (s)	5.5	30.9		0.8	25.7	26.2	9.5	62.8		12.2	65.0	64.5
Actuated g/C Ratio	0.04	0.25		0.01	0.21	0.21	0.08	0.51		0.10	0.53	0.52
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	153	428		12	389	343	265	2537		177	2683	829
v/s Ratio Prot	c0.04	0.04		0.00	c0.20		c0.11	0.16		0.07	c0.48	
v/s Ratio Perm						0.01						0.16
v/c Ratio	0.96	0.16		0.42	0.95	0.05	1.39	0.32		0.68	0.92	0.30
Uniform Delay, d1	58.7	36.0		61.0	48.1	38.6	56.9	17.7		53.6	26.6	16.6
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	60.7	0.1		16.1	31.8	0.0	196.5	0.1		9.6	5.5	0.2
Delay (s)	119.5	36.2		77.1	79.8	38.6	253.4	17.7		63.2	32.1	16.8
Level of Service	F	D		E	E	D	F	B		E	C	B
Approach Delay (s)		84.8			73.0			91.6			31.6	
Approach LOS		F			E			F			C	

Intersection Summary			
HCM Average Control Delay	53.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	123.2	Sum of lost time (s)	13.5
Intersection Capacity Utilization	92.1%	ICU Level of Service	F
Analysis Period (min)	15		

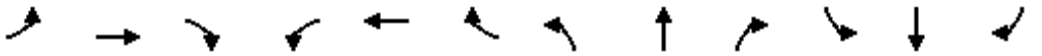
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	10	0	0	0	0	1115	15	0	2120	285
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	11	0	0	0	0	1174	16	0	2232	300
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1086			1190	
pX, platoon unblocked	0.58	0.58	0.53	0.58	0.58	0.90	0.53			0.90		
vC, conflicting volume	2773	3571	894	1936	3713	399	2532			1189		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	359	1743	0	0	1989	0	770			830		
tC, single (s)	7.5	6.5	7.1	7.5	6.5	6.9	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	98	100	100	100	100			100		
cM capacity (veh/h)	333	51	557	582	36	984	436			731		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	11	0	469	469	251	893	893	746
Volume Left	0	0	0	0	0	0	0	0
Volume Right	11	0	0	0	16	0	0	300
cSH	557	1700	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.02	0.00	0.28	0.28	0.15	0.53	0.53	0.44
Queue Length 95th (ft)	1	0	0	0	0	0	0	0
Control Delay (s)	11.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	B	A						
Approach Delay (s)	11.6	0.0	0.0			0.0		
Approach LOS	B	A						

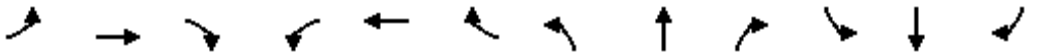
Intersection Summary				
Average Delay	0.0			
Intersection Capacity Utilization	57.3%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	215	640	115	185	840	80	185	835	255	85	935	1110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.6	4.1		2.6	4.1	4.1	2.0	3.5	3.5	2.0	3.5	3.5
Lane Util. Factor	0.97	0.95		0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.88
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3482		3072	3610	1568	1719	3312	1495	1719	3312	2450
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3482		3072	3610	1568	1719	3312	1495	1719	3312	2450
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	226	674	121	195	884	84	195	879	268	89	984	1168
RTOR Reduction (vph)	0	16	0	0	0	59	0	0	157	0	0	40
Lane Group Flow (vph)	226	779	0	195	884	25	195	879	111	89	984	1128
Heavy Vehicles (%)	2%	1%	3%	14%	0%	3%	5%	9%	8%	5%	9%	16%
Turn Type	Prot			Prot		Perm	Prot		custom	Prot		custom
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases						4			2			2 3
Actuated Green, G (s)	6.0	27.0		7.0	28.0	28.0	9.0	37.7	35.0	6.3	35.0	46.5
Effective Green, g (s)	7.4	28.4		8.4	29.4	29.4	11.0	39.7	37.0	8.3	37.0	48.5
Actuated g/C Ratio	0.08	0.29		0.09	0.30	0.30	0.11	0.41	0.38	0.09	0.38	0.50
Clearance Time (s)	4.0	5.5		4.0	5.5	5.5	4.0	5.5	5.5	4.0	5.5	
Vehicle Extension (s)	2.3	3.1		2.3	3.1	3.1	2.4	3.1	3.1	2.4	3.1	
Lane Grp Cap (vph)	262	1019		266	1094	475	195	1356	570	147	1263	1225
v/s Ratio Prot	0.07	0.22		0.06	c0.24		c0.11	0.27		0.05	0.30	
v/s Ratio Perm						0.02			0.07			c0.46
v/c Ratio	0.86	0.76		0.73	0.81	0.05	1.00	0.65	0.19	0.61	0.78	0.92
Uniform Delay, d1	44.3	31.3		43.2	31.2	23.9	43.0	23.0	20.0	42.8	26.4	22.5
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	23.7	3.5		9.1	4.5	0.0	64.5	1.1	0.2	5.6	3.1	11.3
Delay (s)	68.0	34.8		52.3	35.7	24.0	107.5	24.1	20.2	48.4	29.5	33.8
Level of Service	E	C		D	D	C	F	C	C	D	C	C
Approach Delay (s)		42.1			37.6			35.5			32.5	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM Average Control Delay	35.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	97.0	Sum of lost time (s)	5.5
Intersection Capacity Utilization	82.4%	ICU Level of Service	E
Analysis Period (min)	15		

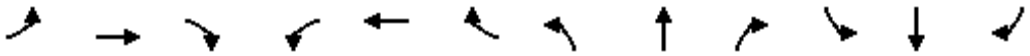
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	80	555	150	385	975	440	270	220	235	205	150	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	4.7	4.7	5.8	4.6		6.4	5.5	6.4	6.4	5.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	3406	1599	1787	3329		1736	1881	1583	1626	1758	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1805	3406	1599	1787	3329		1736	1881	1583	1626	1758	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	84	584	158	405	1026	463	284	232	247	216	158	79
RTOR Reduction (vph)	0	0	115	0	42	0	0	0	33	0	17	0
Lane Group Flow (vph)	84	584	43	405	1447	0	284	232	214	216	220	0
Heavy Vehicles (%)	0%	6%	1%	1%	4%	2%	4%	1%	2%	11%	4%	0%
Turn Type	Prot		Perm	Prot			Prot		custom	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						1 8			
Actuated Green, G (s)	5.0	26.7	26.7	18.9	40.7		13.9	18.9	44.1	11.8	16.8	
Effective Green, g (s)	6.4	28.1	28.1	20.3	42.1		14.7	19.7	39.4	12.6	17.6	
Actuated g/C Ratio	0.06	0.27	0.27	0.20	0.41		0.14	0.19	0.38	0.12	0.17	
Clearance Time (s)	7.2	6.1	6.1	7.2	6.0		7.2	6.3		7.2	6.3	
Vehicle Extension (s)	2.4	3.1	3.1	2.4	3.1		2.4	3.6		2.4	3.6	
Lane Grp Cap (vph)	112	928	436	352	1359		248	359	605	199	300	
v/s Ratio Prot	0.05	0.17		c0.23	c0.43		c0.16	0.12		0.13	c0.12	
v/s Ratio Perm			0.03						0.13			
v/c Ratio	0.75	0.63	0.10	1.15	1.06		1.15	0.65	0.35	1.09	0.73	
Uniform Delay, d1	47.6	32.9	28.0	41.4	30.5		44.2	38.5	22.7	45.2	40.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	22.9	1.4	0.1	95.5	43.7		102.0	4.2	0.2	88.4	9.2	
Delay (s)	70.5	34.3	28.1	136.9	74.2		146.2	42.7	23.0	133.7	49.7	
Level of Service	E	C	C	F	E		F	D	C	F	D	
Approach Delay (s)		36.8			87.6			74.8			89.8	
Approach LOS		D			F			E			F	

Intersection Summary			
HCM Average Control Delay	74.7	HCM Level of Service	E
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	103.1	Sum of lost time (s)	17.7
Intersection Capacity Utilization	90.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	170	235	45	940	705	170	30	540	215	55	690	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5	4.0	4.0	5.5		4.0	5.5	5.5	4.0	5.5	
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00		1.00	1.00	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1456	1827	1302	3502	1759		1703	1610	1568	1597	3258	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1456	1827	1302	3502	1759		1703	1610	1568	1597	3258	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	179	247	47	989	742	179	32	568	226	58	726	111
RTOR Reduction (vph)	0	0	26	0	10	0	0	0	104	0	13	0
Lane Group Flow (vph)	179	247	21	989	911	0	32	568	122	58	824	0
Heavy Vehicles (%)	24%	4%	24%	0%	1%	21%	6%	18%	3%	13%	9%	6%
Turn Type	Prot		custom	Prot			Prot		custom	Prot		
Protected Phases	3			7	4		1	6		5	2	
Permitted Phases		8	1 8						6 7			
Actuated Green, G (s)	5.0	18.4	22.4	20.6	34.0		4.0	28.0	48.6	4.0	28.0	
Effective Green, g (s)	5.0	18.4	22.4	20.6	34.0		4.0	28.0	48.6	4.0	28.0	
Actuated g/C Ratio	0.06	0.20	0.25	0.23	0.38		0.04	0.31	0.54	0.04	0.31	
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	5.5		4.0	5.5	
Vehicle Extension (s)	2.4	3.2		2.5	3.2		2.3	3.2		2.2	3.2	
Lane Grp Cap (vph)	81	374	324	802	665		76	501	847	71	1014	
v/s Ratio Prot	c0.12			0.28	c0.52		0.02	c0.35		c0.04	0.25	
v/s Ratio Perm		0.14	0.02						0.08			
v/c Ratio	2.21	0.66	0.07	1.23	1.37		0.42	1.13	0.14	0.82	0.81	
Uniform Delay, d1	42.5	32.9	25.8	34.7	28.0		41.9	31.0	10.3	42.6	28.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	582.4	4.4	0.1	115.7	176.0		2.2	82.4	0.1	47.7	7.1	
Delay (s)	624.9	37.3	25.9	150.4	204.0		44.1	113.4	10.4	90.3	35.7	
Level of Service	F	D	C	F	F		D	F	B	F	D	
Approach Delay (s)		258.5			176.2			82.5			39.2	
Approach LOS		F			F			F			D	

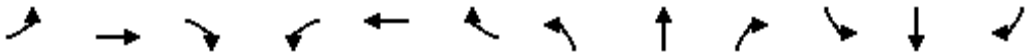
Intersection Summary			
HCM Average Control Delay	137.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.31		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	105.3%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBR	WBR2	NBL	NBT	SBT
Lane Configurations					
Volume (vph)	1540	575	80	745	1075
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	5.0	5.0
Lane Util. Factor	1.00	0.88	1.00	0.95	0.95
Frt	0.86	0.85	1.00	1.00	1.00
Flt Protected	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1596	2656	1656	3312	3438
Flt Permitted	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1596	2656	1656	3312	3438
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1621	605	84	784	1132
RTOR Reduction (vph)	68	36	0	0	0
Lane Group Flow (vph)	1553	569	84	784	1132
Heavy Vehicles (%)	3%	7%	9%	9%	5%
Turn Type	custom	custom	Prot		
Protected Phases			1	6	2
Permitted Phases	4	4			
Actuated Green, G (s)	54.0	54.0	4.0	32.0	24.0
Effective Green, g (s)	54.0	54.0	4.0	32.0	24.0
Actuated g/C Ratio	0.57	0.57	0.04	0.34	0.25
Clearance Time (s)	4.0	4.0	4.0	5.0	5.0
Vehicle Extension (s)	2.3	2.3	2.3	4.5	4.5
Lane Grp Cap (vph)	907	1510	70	1116	869
v/s Ratio Prot			c0.05	0.24	c0.33
v/s Ratio Perm	c0.97	0.21			
v/c Ratio	1.71	0.38	1.20	0.70	1.30
Uniform Delay, d1	20.5	11.3	45.5	27.4	35.5
Progression Factor	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	325.1	0.1	171.1	2.3	144.6
Delay (s)	345.6	11.3	216.6	29.7	180.1
Level of Service	F	B	F	C	F
Approach Delay (s)				47.8	180.1
Approach LOS				D	F

Intersection Summary			
HCM Average Control Delay	192.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.57		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	Err%	ICU Level of Service	H
Analysis Period (min)	15		

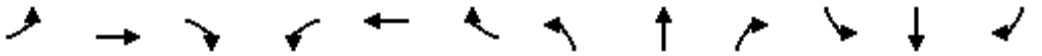
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	165	0	215	0	0	0	0	660	540	0	2270	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					5.0	5.0		5.0	
Lane Util. Factor		1.00	1.00					0.91	0.91		0.91	
Frt		1.00	0.85					0.97	0.85		1.00	
Flt Protected		0.95	1.00					1.00	1.00		1.00	
Satd. Flow (prot)		1467	1583					3143	1400		5036	
Flt Permitted		0.95	1.00					1.00	1.00		1.00	
Satd. Flow (perm)		1467	1583					3143	1400		5036	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	174	0	226	0	0	0	0	695	568	0	2389	0
RTOR Reduction (vph)	0	0	1	0	0	0	0	27	154	0	0	0
Lane Group Flow (vph)	0	174	225	0	0	0	0	850	232	0	2389	0
Heavy Vehicles (%)	23%	0%	2%	0%	0%	0%	0%	7%	5%	0%	3%	0%
Turn Type	Perm		Perm						Perm			
Protected Phases		8						6			2	
Permitted Phases	8		8						6			
Actuated Green, G (s)		13.0	13.0					33.3	33.3		33.3	
Effective Green, g (s)		13.0	13.0					33.3	33.3		33.3	
Actuated g/C Ratio		0.24	0.24					0.60	0.60		0.60	
Clearance Time (s)		4.0	4.0					5.0	5.0		5.0	
Vehicle Extension (s)		2.3	2.3					4.5	4.5		4.5	
Lane Grp Cap (vph)		345	372					1893	843		3033	
v/s Ratio Prot								0.27			c0.47	
v/s Ratio Perm		0.12	c0.14						0.17			
v/c Ratio		0.50	0.61					0.45	0.28		0.79	
Uniform Delay, d1		18.4	18.9					6.0	5.2		8.3	
Progression Factor		1.00	1.00					1.00	1.00		1.00	
Incremental Delay, d2		0.7	2.2					0.3	0.3		1.6	
Delay (s)		19.0	21.0					6.3	5.6		9.9	
Level of Service		B	C					A	A		A	
Approach Delay (s)		20.2			0.0			6.1			9.9	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM Average Control Delay	9.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	55.3	Sum of lost time (s)	9.0
Intersection Capacity Utilization	64.7%	ICU Level of Service	C
Analysis Period (min)	15		

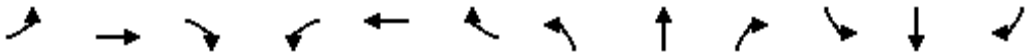
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	55	480	90	75	1030	180	275	835	75	220	870	285
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.6	4.1		2.6	4.1		2.6	4.1		2.6	4.1	2.6
Lane Util. Factor	0.97	0.95		1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.98		1.00	0.98		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	2918	3225		1805	3465		1703	3374		1805	3438	1538
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	2918	3225		1805	3465		1703	3374		1805	3438	1538
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	58	505	95	79	1084	189	289	879	79	232	916	300
RTOR Reduction (vph)	0	15	0	0	14	0	0	7	0	0	0	85
Lane Group Flow (vph)	58	585	0	79	1259	0	289	951	0	232	916	215
Heavy Vehicles (%)	20%	5%	32%	0%	2%	1%	6%	6%	2%	0%	5%	5%
Turn Type	Prot			Prot			Prot			Prot		custom
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												5 6
Actuated Green, G (s)	3.9	30.6		5.4	32.1		14.1	30.5		12.1	28.5	46.6
Effective Green, g (s)	5.3	32.0		6.8	33.5		15.5	31.9		13.5	29.9	48.0
Actuated g/C Ratio	0.05	0.33		0.07	0.34		0.16	0.33		0.14	0.31	0.49
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	5.5		4.0	5.5	
Vehicle Extension (s)	2.3	3.1		2.4	3.1		2.4	3.1		2.4	3.1	
Lane Grp Cap (vph)	158	1057		126	1189		270	1103		250	1053	756
v/s Ratio Prot	0.02	0.18		c0.04	c0.36		c0.17	c0.28		0.13	0.27	
v/s Ratio Perm												c0.14
v/c Ratio	0.37	0.55		0.63	1.06		1.07	0.86		0.93	0.87	0.28
Uniform Delay, d1	44.5	26.9		44.2	32.0		41.0	30.8		41.6	32.0	14.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.8	0.6		7.9	43.3		74.7	7.2		37.4	7.9	0.1
Delay (s)	45.4	27.6		52.1	75.3		115.7	37.9		79.0	39.9	14.8
Level of Service	D	C		D	E		F	D		E	D	B
Approach Delay (s)		29.1			73.9			56.0			40.9	
Approach LOS		C			E			E			D	

Intersection Summary			
HCM Average Control Delay	52.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	97.6	Sum of lost time (s)	5.2
Intersection Capacity Utilization	91.2%	ICU Level of Service	F
Analysis Period (min)	15		

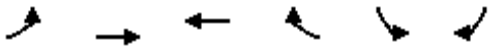
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	20	175	55	65	220	25	125	55	125	2	10	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	21	186	59	69	234	27	133	59	133	2	11	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	261			245			651	657	215	673	673	247
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	261			245			651	657	215	673	673	247
tC, single (s)	4.1			4.2			7.2	6.5	6.2	7.1	6.5	6.4
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.6	4.0	3.3	3.5	4.0	3.5
p0 queue free %	98			95			61	84	84	99	97	100
cM capacity (veh/h)	1316			1298			341	361	830	259	353	745

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	266	330	324	15
Volume Left	21	69	133	2
Volume Right	59	27	133	2
cSH	1316	1298	456	362
Volume to Capacity	0.02	0.05	0.71	0.04
Queue Length 95th (ft)	1	4	139	3
Control Delay (s)	0.8	2.1	30.2	15.4
Lane LOS	A	A	D	C
Approach Delay (s)	0.8	2.1	30.2	15.4
Approach LOS			D	C

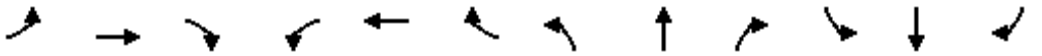
Intersection Summary			
Average Delay	11.7		
Intersection Capacity Utilization	63.0%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	35	240	260	5	2	30
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	37	253	274	5	2	32
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	279				603	276
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	279				603	276
tC, single (s)	4.1				6.4	6.3
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.4
p0 queue free %	97				100	96
cM capacity (veh/h)	1295				452	751

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	289	279	34
Volume Left	37	0	2
Volume Right	0	5	32
cSH	1295	1700	721
Volume to Capacity	0.03	0.16	0.05
Queue Length 95th (ft)	2	0	4
Control Delay (s)	1.2	0.0	10.2
Lane LOS	A		B
Approach Delay (s)	1.2	0.0	10.2
Approach LOS			B

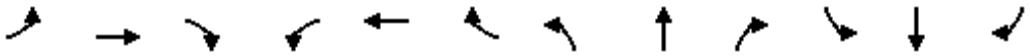
Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	41.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	560	0	65	175	240	0	0	130	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	0	0	602	0	70	188	258	0	0	140	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						23						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	774	774	140	774	774	258	140			258		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	774	774	140	774	774	258	140			258		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	100	100	100	0	100	91	87			100		
cM capacity (veh/h)	260	289	914	284	289	762	1456			1318		

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	672	188	258	140	0
Volume Left	602	188	0	0	0
Volume Right	70	0	0	0	0
cSH	307	1456	1700	1700	1700
Volume to Capacity	2.19	0.13	0.15	0.08	0.00
Queue Length 95th (ft)	1264	11	0	0	0
Control Delay (s)	571.4	7.8	0.0	0.0	0.0
Lane LOS	F	A			
Approach Delay (s)	571.4	3.3		0.0	
Approach LOS	F				

Intersection Summary				
Average Delay	306.4			
Intersection Capacity Utilization	93.7%	ICU Level of Service	F	
Analysis Period (min)	15			



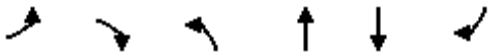
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	0	20	0	0	0	0	410	740	40	650	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	5	0	22	0	0	0	0	441	796	43	699	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			11									
Median type								TWLTL			None	
Median storage veh)								2				
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1226	1226	699	1226	1226	441	699			441		
vC1, stage 1 conf vol	785	785		441	441							
vC2, stage 2 conf vol	441	441		785	785							
vCu, unblocked vol	1226	1226	699	1226	1226	441	699			441		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	95	100	100	100	100			96		
cM capacity (veh/h)	330	343	443	321	348	621	907			1130		

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	27	441	796	43	699
Volume Left	5	0	0	43	0
Volume Right	22	0	796	0	0
cSH	554	1700	1700	1130	1700
Volume to Capacity	0.05	0.26	0.47	0.04	0.41
Queue Length 95th (ft)	4	0	0	3	0
Control Delay (s)	14.0	0.0	0.0	8.3	0.0
Lane LOS	B			A	
Approach Delay (s)	14.0	0.0		0.5	
Approach LOS	B				

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	93.7%	ICU Level of Service	F	
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	780	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3574					
Flt Permitted	1.00					
Satd. Flow (perm)	3574					
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	907	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	907	0	0	0	0	0
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%
Turn Type						
Protected Phases	4					
Permitted Phases						
Actuated Green, G (s)	20.0					
Effective Green, g (s)	20.0					
Actuated g/C Ratio	1.00					
Clearance Time (s)	4.0					
Lane Grp Cap (vph)	3574					
v/s Ratio Prot	c0.25					
v/s Ratio Perm						
v/c Ratio	0.25					
Uniform Delay, d1	0.0					
Progression Factor	1.00					
Incremental Delay, d2	0.2					
Delay (s)	0.2					
Level of Service	A					
Approach Delay (s)	0.2			0.0	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM Average Control Delay	0.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	20.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	24.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	110	30	170	1040	565	115
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	122	33	189	1156	628	128
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2225	692	756			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2225	692	756			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	92	78			
cM capacity (veh/h)	38	439	864			

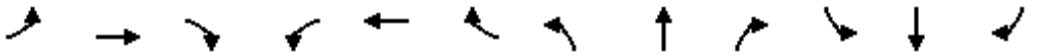
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	156	1344	756
Volume Left	122	189	0
Volume Right	33	0	128
cSH	47	864	1700
Volume to Capacity	3.33	0.22	0.44
Queue Length 95th (ft)	Err	21	0
Control Delay (s)	Err	7.5	0.0
Lane LOS	F	A	
Approach Delay (s)	Err	7.5	0.0
Approach LOS	F		

Intersection Summary			
Average Delay	694.1		
Intersection Capacity Utilization	118.8%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	640	570	60	60	535
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	711	633	67	67	594
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1394	667			700	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1394	667			700	
tC, single (s)	6.4	6.2			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.3	
p0 queue free %	100	0			92	
cM capacity (veh/h)	145	463			870	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	711	700	661
Volume Left	0	0	67
Volume Right	711	67	0
cSH	463	1700	870
Volume to Capacity	1.54	0.41	0.08
Queue Length 95th (ft)	952	0	6
Control Delay (s)	275.2	0.0	2.0
Lane LOS	F		A
Approach Delay (s)	275.2	0.0	2.0
Approach LOS	F		

Intersection Summary			
Average Delay	95.1		
Intersection Capacity Utilization	114.7%	ICU Level of Service	H
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	290	595	0	10	1330	330	5	0	10	110	5	420
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1	4.7		4.8	4.7	4.7		5.2			5.6	5.6
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.91			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.98			0.95	1.00
Satd. Flow (prot)	1787	1845		1805	1881	1599		1697			1779	1568
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.91			0.72	1.00
Satd. Flow (perm)	1787	1845		1805	1881	1599		1572			1349	1568
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	305	626	0	11	1400	347	5	0	11	116	5	442
RTOR Reduction (vph)	0	0	0	0	0	50	0	9	0	0	0	134
Lane Group Flow (vph)	305	626	0	11	1400	297	0	7	0	0	121	308
Heavy Vehicles (%)	1%	3%	0%	0%	1%	1%	0%	0%	0%	2%	0%	3%
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases						6	8			4		4
Actuated Green, G (s)	14.5	88.1		1.0	74.3	74.3		17.0			16.6	16.6
Effective Green, g (s)	15.9	89.5		2.4	75.7	75.7		18.4			18.0	18.0
Actuated g/C Ratio	0.13	0.72		0.02	0.61	0.61		0.15			0.14	0.14
Clearance Time (s)	6.5	6.1		6.2	6.1	6.1		6.6			7.0	7.0
Vehicle Extension (s)	2.6	3.2		2.7	3.2	3.2		1.8			1.8	1.8
Lane Grp Cap (vph)	227	1321		35	1139	968		231			194	226
v/s Ratio Prot	c0.17	0.34		0.01	c0.74							
v/s Ratio Perm						0.19		0.00			0.09	c0.20
v/c Ratio	1.34	0.47		0.31	1.23	0.31		0.03			0.62	1.36
Uniform Delay, d1	54.5	7.6		60.5	24.6	11.9		45.6			50.3	53.5
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	181.1	0.3		4.3	111.0	0.2		0.0			4.4	188.4
Delay (s)	235.6	7.9		64.8	135.6	12.1		45.7			54.8	241.9
Level of Service	F	A		E	F	B		D			D	F
Approach Delay (s)		82.5			110.8			45.7			201.7	
Approach LOS		F			F			D			F	

Intersection Summary			
HCM Average Control Delay	118.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.27		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	15.4
Intersection Capacity Utilization	113.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	610	100	290	1385	285	355
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.8		5.3	4.8	6.1	6.1
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3499		1787	3574	1787	1615
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3499		1787	3574	1787	1615
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	678	111	322	1539	317	394
RTOR Reduction (vph)	19	0	0	0	0	298
Lane Group Flow (vph)	770	0	322	1539	317	96
Heavy Vehicles (%)	1%	1%	1%	1%	1%	0%
Turn Type			Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	16.5		12.4	35.6	15.0	15.0
Effective Green, g (s)	17.9		13.8	37.0	15.5	15.5
Actuated g/C Ratio	0.28		0.22	0.58	0.24	0.24
Clearance Time (s)	6.2		6.7	6.2	6.6	6.6
Vehicle Extension (s)	3.2		2.6	3.2	2.0	2.0
Lane Grp Cap (vph)	988		389	2086	437	395
v/s Ratio Prot	0.22		0.18	c0.43	c0.18	
v/s Ratio Perm						0.06
v/c Ratio	0.78		0.83	0.74	0.73	0.24
Uniform Delay, d1	20.9		23.7	9.7	22.0	19.2
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	4.0		13.3	1.4	5.0	0.1
Delay (s)	24.9		36.9	11.1	27.0	19.4
Level of Service	C		D	B	C	B
Approach Delay (s)	24.9			15.5	22.8	
Approach LOS	C			B	C	

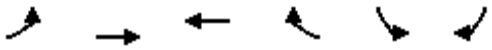
Intersection Summary			
HCM Average Control Delay	19.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	63.4	Sum of lost time (s)	10.9
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	870	95	250	1470	205	735
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1		6.0	5.1	5.9	6.0
Lane Util. Factor	0.95		0.97	0.95	1.00	0.88
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3515		3367	3574	1787	2814
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3515		3367	3574	1787	2814
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	916	100	263	1547	216	774
RTOR Reduction (vph)	12	0	0	0	0	41
Lane Group Flow (vph)	1004	0	263	1547	216	733
Heavy Vehicles (%)	1%	3%	4%	1%	1%	1%
Turn Type			Prot			custom
Protected Phases	2		1	6	3	
Permitted Phases						1 8
Actuated Green, G (s)	21.2		6.7	35.3	15.1	29.1
Effective Green, g (s)	22.6		8.1	36.7	16.5	25.4
Actuated g/C Ratio	0.35		0.13	0.57	0.26	0.40
Clearance Time (s)	6.5		7.4	6.5	7.3	
Vehicle Extension (s)	3.2		2.3	3.2	2.3	
Lane Grp Cap (vph)	1237		425	2043	459	1113
v/s Ratio Prot	0.29		0.08	c0.43	0.12	
v/s Ratio Perm						c0.26
v/c Ratio	0.81		0.62	0.76	0.47	0.66
Uniform Delay, d1	18.9		26.6	10.4	20.2	15.9
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	4.2		2.1	1.7	0.4	1.2
Delay (s)	23.1		28.7	12.1	20.6	17.0
Level of Service	C		C	B	C	B
Approach Delay (s)	23.1			14.5	17.8	
Approach LOS	C			B	B	

Intersection Summary			
HCM Average Control Delay	17.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	64.2	Sum of lost time (s)	11.1
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		

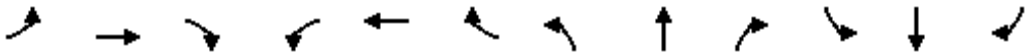
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	1605	1715	5	5	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	1689	1805	5	5	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1811				2653	905
vC1, stage 1 conf vol					1808	
vC2, stage 2 conf vol					845	
vCu, unblocked vol	1811				2653	905
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				95	98
cM capacity (veh/h)	344				111	283

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	0	845	845	1204	607	11
Volume Left	0	0	0	0	0	5
Volume Right	0	0	0	0	5	5
cSH	1700	1700	1700	1700	1700	159
Volume to Capacity	0.00	0.50	0.50	0.71	0.36	0.07
Queue Length 95th (ft)	0	0	0	0	0	5
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	29.2
Lane LOS						D
Approach Delay (s)	0.0			0.0		29.2
Approach LOS						D

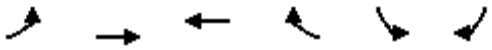
Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	57.6%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	235	2	2	275	5	0	2	5	0	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	5	247	2	2	289	5	0	2	5	0	0	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	295			249			561	558	248	562	556	292
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	295			249			561	558	248	562	556	292
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	99	100	100	99
cM capacity (veh/h)	1278			1328			437	438	795	435	439	752

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	255	297	7	5
Volume Left	5	2	0	0
Volume Right	2	5	5	5
cSH	1278	1328	645	752
Volume to Capacity	0.00	0.00	0.01	0.01
Queue Length 95th (ft)	0	0	1	1
Control Delay (s)	0.2	0.1	10.6	9.8
Lane LOS	A	A	B	A
Approach Delay (s)	0.2	0.1	10.6	9.8
Approach LOS			B	A

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	25.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	2	10	10	2	2	2
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	2	12	12	2	2	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	14				29	13
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	14				29	13
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1617				989	1073

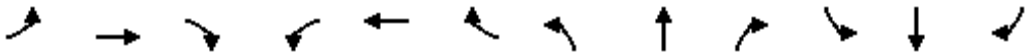
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	14	14	5
Volume Left	2	0	2
Volume Right	0	2	2
cSH	1617	1700	1029
Volume to Capacity	0.00	0.01	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	1.2	0.0	8.5
Lane LOS	A		A
Approach Delay (s)	1.2	0.0	8.5
Approach LOS			A

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	40	15	30	520	140	25
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	44	17	33	578	156	28
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			61		697	53
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			61		697	53
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			98		60	97
cM capacity (veh/h)			1555		385	1020

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	61	611	183
Volume Left	0	33	156
Volume Right	17	0	28
cSH	1700	1555	425
Volume to Capacity	0.04	0.02	0.43
Queue Length 95th (ft)	0	2	53
Control Delay (s)	0.0	0.6	19.7
Lane LOS		A	C
Approach Delay (s)	0.0	0.6	19.7
Approach LOS			C

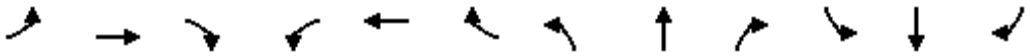
Intersection Summary			
Average Delay	4.7		
Intersection Capacity Utilization	51.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	40	1565	5	5	1405	45	0	0	0	245	0	315
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	42	1647	5	5	1479	47	0	0	0	258	0	332
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1526			1653			2816	3271	826	2421	3250	763
vC1, stage 1 conf vol							1734	1734		1513	1513	
vC2, stage 2 conf vol							1082	1537		908	1737	
vCu, unblocked vol	1526			1653			2816	3271	826	2421	3250	763
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	90			99			100	100	100	0	100	6
cM capacity (veh/h)	442			396			0	89	319	110	97	351

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1	SB 2
Volume Total	42	1098	554	5	986	540	0	258	332
Volume Left	42	0	0	5	0	0	0	258	0
Volume Right	0	0	5	0	0	47	0	0	332
cSH	442	1700	1700	396	1700	1700	1700	110	351
Volume to Capacity	0.10	0.65	0.33	0.01	0.58	0.32	0.00	2.34	0.94
Queue Length 95th (ft)	8	0	0	1	0	0	0	567	250
Control Delay (s)	14.0	0.0	0.0	14.2	0.0	0.0	0.0	691.3	69.8
Lane LOS	B			B			A	F	F
Approach Delay (s)	0.3			0.0			0.0	341.7	
Approach LOS							A	F	

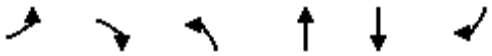
Intersection Summary				
Average Delay	53.0			
Intersection Capacity Utilization	69.6%	ICU Level of Service		C
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	15	1840	5	20	1210	215	2	10	60	540	50	160
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	16	1937	5	21	1274	226	2	11	63	568	53	168
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1500			1942			2845	3513	971	2497	3403	750
vC1, stage 1 conf vol							1971	1971		1429	1429	
vC2, stage 2 conf vol							874	1542		1068	1974	
vCu, unblocked vol	1500			1942			2845	3513	971	2497	3403	750
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			93			96	87	75	0	28	53
cM capacity (veh/h)	453			298			50	81	252	91	74	358

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1	SB 2
Volume Total	16	1291	651	21	849	651	76	568	221
Volume Left	16	0	0	21	0	0	2	568	0
Volume Right	0	0	5	0	0	226	63	0	168
cSH	453	1700	1700	298	1700	1700	180	91	186
Volume to Capacity	0.03	0.76	0.38	0.07	0.50	0.38	0.42	6.26	1.19
Queue Length 95th (ft)	3	0	0	6	0	0	48	Err	288
Control Delay (s)	13.2	0.0	0.0	18.0	0.0	0.0	38.9	Err	175.9
Lane LOS	B			C			E	F	F
Approach Delay (s)	0.1			0.2			38.9	7248.5	
Approach LOS							E	F	

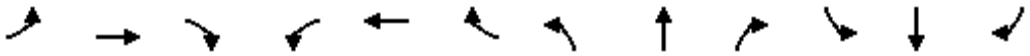
Intersection Summary				
Average Delay	1318.1			
Intersection Capacity Utilization	94.3%	ICU Level of Service		F
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	5	0	5	385	95	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	0	6	428	106	6
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	547	108	111			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	547	108	111			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	100	100			
cM capacity (veh/h)	499	951	1491			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	6	433	111
Volume Left	6	6	0
Volume Right	0	0	6
cSH	499	1491	1700
Volume to Capacity	0.01	0.00	0.07
Queue Length 95th (ft)	1	0	0
Control Delay (s)	12.3	0.1	0.0
Lane LOS	B	A	
Approach Delay (s)	12.3	0.1	0.0
Approach LOS	B		

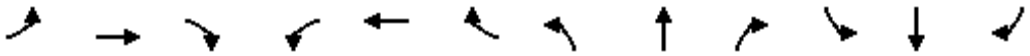
Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	34.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	200	40	150	210	65	85	325	10	25	70	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	217	43	163	228	71	92	353	11	27	76	0

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	261	462	92	364	27	76
Volume Left (vph)	0	163	92	0	27	0
Volume Right (vph)	43	71	0	11	0	0
Hadj (s)	-0.10	0.00	0.50	-0.02	0.50	0.00
Departure Headway (s)	6.6	6.3	7.6	7.1	8.5	8.0
Degree Utilization, x	0.48	0.81	0.20	0.72	0.06	0.17
Capacity (veh/h)	502	549	454	487	384	406
Control Delay (s)	15.6	30.2	11.3	24.7	10.9	11.4
Approach Delay (s)	15.6	30.2	22.0		11.3	
Approach LOS	C	D	C		B	

Intersection Summary				
Delay	22.8			
HCM Level of Service	C			
Intersection Capacity Utilization	67.0%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	10	0	0	0	35	420	375	0	250	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	11	0	0	0	38	457	408	0	272	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			None	
Median storage veh)								2				
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	810	1217	277	1024	1019	660	283			864		
vC1, stage 1 conf vol	277	277		736	736							
vC2, stage 2 conf vol	533	940		288	283							
vCu, unblocked vol	810	1217	277	1024	1019	660	283			864		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	100	100	100	97			100		
cM capacity (veh/h)	474	316	766	371	384	466	1291			787		

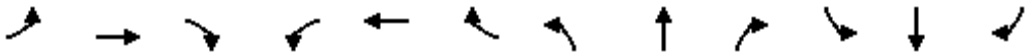
Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	11	38	864	283
Volume Left	0	38	0	0
Volume Right	11	0	408	11
cSH	766	1291	1700	787
Volume to Capacity	0.01	0.03	0.51	0.00
Queue Length 95th (ft)	1	2	0	0
Control Delay (s)	9.8	7.9	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	9.8	0.3		0.0
Approach LOS	A			

Intersection Summary				
Average Delay	0.3			
Intersection Capacity Utilization	55.0%	ICU Level of Service	B	
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	15	2	830	50	5	255
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	15	2	856	52	5	263
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1155	881			907	
vC1, stage 1 conf vol	881					
vC2, stage 2 conf vol	273					
vCu, unblocked vol	1155	881			907	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	99			99	
cM capacity (veh/h)	384	349			759	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	18	907	5	263
Volume Left	15	0	5	0
Volume Right	2	52	0	0
cSH	379	1700	759	1700
Volume to Capacity	0.05	0.53	0.01	0.15
Queue Length 95th (ft)	4	0	1	0
Control Delay (s)	15.0	0.0	9.8	0.0
Lane LOS	B		A	
Approach Delay (s)	15.0	0.0	0.2	
Approach LOS	B			

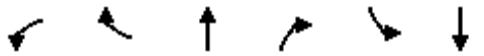
Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	56.7%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	10	115	0	45	0	830	40	10	265	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	11	121	0	47	0	874	42	11	279	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			TWLTL	
Median storage veh)											2	
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1242	1216	279	1205	1195	895	279			916		
vC1, stage 1 conf vol	300	300		895	895							
vC2, stage 2 conf vol	942	916		311	300							
vCu, unblocked vol	1242	1216	279	1205	1195	895	279			916		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	62	100	86	100			99		
cM capacity (veh/h)	250	320	760	316	335	342	1284			753		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	11	168	916	11	279
Volume Left	0	121	0	11	0
Volume Right	11	47	42	0	0
cSH	760	323	1284	753	1700
Volume to Capacity	0.01	0.52	0.00	0.01	0.16
Queue Length 95th (ft)	1	71	0	1	0
Control Delay (s)	9.8	27.7	0.0	9.8	0.0
Lane LOS	A	D		A	
Approach Delay (s)	9.8	27.7	0.0	0.4	
Approach LOS	A	D			

Intersection Summary				
Average Delay	3.5			
Intersection Capacity Utilization	69.0%	ICU Level of Service	C	
Analysis Period (min)	15			



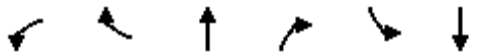
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	170	15	855	595	10	380
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	179	16	900	626	11	400
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			949			
pX, platoon unblocked						
vC, conflicting volume	1321	900			1526	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1321	900			1526	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	95			98	
cM capacity (veh/h)	169	340			442	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	179	16	900	626	411
Volume Left	179	0	0	0	11
Volume Right	0	16	0	626	0
cSH	169	340	1700	1700	442
Volume to Capacity	1.06	0.05	0.53	0.37	0.02
Queue Length 95th (ft)	220	4	0	0	2
Control Delay (s)	140.1	16.1	0.0	0.0	0.7
Lane LOS	F	C			A
Approach Delay (s)	130.0		0.0		0.7
Approach LOS	F				

Intersection Summary			
Average Delay	12.0		
Intersection Capacity Utilization	64.1%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Lane Configurations									
Volume (vph)	0	815	330	1450	410	0	140	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.0	2.0	2.0	3.0				
Lane Util. Factor		0.88	1.00	0.95	0.95				
Frt		0.85	1.00	1.00	0.96				
Flt Protected		1.00	0.95	1.00	1.00				
Satd. Flow (prot)		2567	1630	3260	3136				
Flt Permitted		1.00	0.95	1.00	1.00				
Satd. Flow (perm)		2567	1630	3260	3136				
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	858	347	1526	432	0	147	0	0
RTOR Reduction (vph)	0	0	0	0	56	0	0	0	0
Lane Group Flow (vph)	0	858	347	1526	523	0	0	0	0
Turn Type		custom	Prot						
Protected Phases		8	3	3 6	2				
Permitted Phases									
Actuated Green, G (s)		28.0	29.0	60.0	22.0				
Effective Green, g (s)		30.0	31.0	57.0	24.0				
Actuated g/C Ratio		0.50	0.52	0.95	0.40				
Clearance Time (s)		5.0	4.0		5.0				
Vehicle Extension (s)		5.2	2.3		5.2				
Lane Grp Cap (vph)		1284	842	3097	1254				
v/s Ratio Prot		c0.33	0.21	c0.47	0.17				
v/s Ratio Perm									
v/c Ratio		0.67	0.41	0.49	0.42				
Uniform Delay, d1		11.3	8.9	0.1	13.0				
Progression Factor		1.00	0.98	1.00	1.00				
Incremental Delay, d2		2.8	0.2	0.1	0.5				
Delay (s)		14.0	8.9	0.2	13.5				
Level of Service		B	A	A	B				
Approach Delay (s)	14.0			1.8	13.5			0.0	
Approach LOS	B			A	B			A	

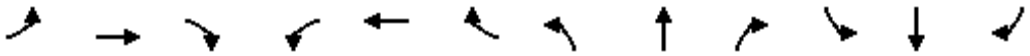
Intersection Summary			
HCM Average Control Delay	7.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	3.0
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	130	1650	0	0	1225
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	140	1774	0	0	1317
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		1				
Median type			None			None
Median storage veh)						
Upstream signal (ft)			704			285
pX, platoon unblocked	0.87	0.87			0.87	
vC, conflicting volume	2213	591			1774	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1861	0			1354	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	85			100	
cM capacity (veh/h)	57	945			446	

Direction, Lane #	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	591	591	591	439	439	439
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0
cSH	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.35	0.35	0.35	0.26	0.26	0.26
Queue Length 95th (ft)	0	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS						
Approach Delay (s)	0.0			0.0		
Approach LOS						

Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	83.8%	ICU Level of Service	E
Analysis Period (min)	15		



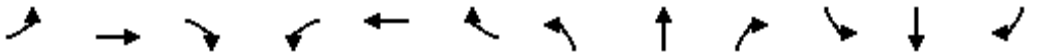
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	55	0	75	0	0	0	0	1595	975	15	1210	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.0	3.0					3.0	3.0	2.0	3.0	
Lane Util. Factor		0.95	0.95					0.95	1.00	1.00	0.91	
Frt		0.97	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.96	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1553	1413					3292	1473	1662	4778	
Flt Permitted		0.96	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1553	1413					3292	1473	1662	4778	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	57	0	78	0	0	0	0	1661	1016	16	1260	0
RTOR Reduction (vph)	0	7	59	0	0	0	0	0	196	0	0	0
Lane Group Flow (vph)	0	63	6	0	0	0	0	1661	820	16	1260	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		8						6		5	2	
Permitted Phases	8		8						6			
Actuated Green, G (s)		9.1	9.1					94.8	94.8	2.1	100.9	
Effective Green, g (s)		11.1	11.1					96.8	96.8	4.1	102.9	
Actuated g/C Ratio		0.09	0.09					0.81	0.81	0.03	0.86	
Clearance Time (s)		5.0	5.0					5.0	5.0	4.0	5.0	
Vehicle Extension (s)		2.3	2.3					4.7	4.7	2.3	4.7	
Lane Grp Cap (vph)		144	131					2656	1188	57	4097	
v/s Ratio Prot								0.50		0.01	c0.26	
v/s Ratio Perm		0.04	0.00						c0.56			
v/c Ratio		0.44	0.05					0.63	0.69	0.28	0.31	
Uniform Delay, d1		51.5	49.6					4.5	5.1	56.5	1.7	
Progression Factor		1.00	1.00					1.00	1.00	0.97	1.50	
Incremental Delay, d2		1.2	0.1					1.1	3.3	1.3	0.2	
Delay (s)		52.7	49.7					5.6	8.3	56.0	2.6	
Level of Service		D	D					A	A	E	A	
Approach Delay (s)		51.3			0.0			6.7			3.3	
Approach LOS		D			A			A			A	

Intersection Summary			
HCM Average Control Delay	7.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	83.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	990	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3610					
Flt Permitted	1.00					
Satd. Flow (perm)	3610					
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1076	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1076	0	0	0	0	0
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%
Turn Type						
Protected Phases	4					
Permitted Phases						
Actuated Green, G (s)	2.5					
Effective Green, g (s)	2.5					
Actuated g/C Ratio	0.14					
Clearance Time (s)	4.5					
Lane Grp Cap (vph)	501					
v/s Ratio Prot	c0.30					
v/s Ratio Perm						
v/c Ratio	2.15					
Uniform Delay, d1	7.8					
Progression Factor	1.00					
Incremental Delay, d2	523.1					
Delay (s)	530.9					
Level of Service	F					
Approach Delay (s)	530.9			0.0	0.0	
Approach LOS	F			A	A	

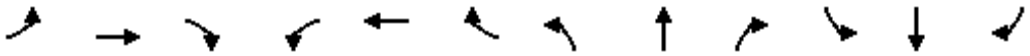
Intersection Summary			
HCM Average Control Delay	530.9	HCM Level of Service	F
HCM Volume to Capacity ratio	2.15		
Actuated Cycle Length (s)	18.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	31.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	755	415	320	2	60	85	100	1730	15	45	1080	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.0	4.5	4.0	4.5	4.0		4.0	4.0	4.5
Lane Util. Factor	0.97	1.00		1.00	1.00	1.00	0.97	0.91		1.00	0.91	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1741		1805	1863	1568	3433	5129		1805	5187	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1741		1805	1863	1568	3433	5129		1805	5187	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	795	437	337	2	63	89	105	1821	16	47	1137	168
RTOR Reduction (vph)	0	21	0	0	0	66	0	1	0	0	0	107
Lane Group Flow (vph)	795	753	0	2	63	23	105	1836	0	47	1137	61
Heavy Vehicles (%)	2%	2%	2%	0%	2%	3%	2%	1%	0%	0%	0%	2%
Turn Type	Prot			Prot		Perm	Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						6
Actuated Green, G (s)	33.3	44.1		1.0	11.8	11.8	6.0	42.3		3.1	39.4	39.4
Effective Green, g (s)	32.8	43.6		1.0	11.3	11.8	5.5	42.3		3.1	39.4	38.9
Actuated g/C Ratio	0.31	0.41		0.01	0.11	0.11	0.05	0.40		0.03	0.37	0.37
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	1057	713		17	198	174	177	2037		53	1919	578
v/s Ratio Prot	c0.23	c0.43		0.00	0.03		0.03	c0.36		c0.03	0.22	
v/s Ratio Perm						0.01						0.04
v/c Ratio	0.75	1.06		0.12	0.32	0.13	0.59	0.90		0.89	0.59	0.11
Uniform Delay, d1	33.2	31.4		52.3	44.0	42.7	49.4	30.1		51.5	27.1	22.3
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.9	49.6		2.2	0.7	0.3	4.4	6.0		82.0	0.4	0.1
Delay (s)	36.1	81.1		54.6	44.7	43.0	53.8	36.1		133.5	27.5	22.4
Level of Service	D	F		D	D	D	D	D		F	C	C
Approach Delay (s)		58.3			43.8			37.1			30.5	
Approach LOS		E			D			D			C	

Intersection Summary			
HCM Average Control Delay	42.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	106.5	Sum of lost time (s)	17.0
Intersection Capacity Utilization	88.9%	ICU Level of Service	E
Analysis Period (min)	15		

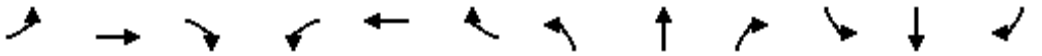
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	35	0	0	15	5	1830	0	0	1335	70
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	0	39	0	0	17	6	2033	0	0	1483	78
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1086			1190	
pX, platoon unblocked	0.87	0.87	0.83	0.87	0.87	0.79	0.83			0.79		
vC, conflicting volume	2228	3567	533	2578	3606	678	1561			2033		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	579	2113	0	980	2158	0	958			1368		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	96	100	100	98	99			100		
cM capacity (veh/h)	342	45	905	172	42	859	603			400		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	39	17	514	1017	508	593	593	374
Volume Left	0	0	6	0	0	0	0	0
Volume Right	39	17	0	0	0	0	0	78
cSH	905	859	603	1700	1700	1700	1700	1700
Volume to Capacity	0.04	0.02	0.01	0.60	0.30	0.35	0.35	0.22
Queue Length 95th (ft)	3	1	1	0	0	0	0	0
Control Delay (s)	9.2	9.3	0.3	0.0	0.0	0.0	0.0	0.0
Lane LOS	A	A	A					
Approach Delay (s)	9.2	9.3	0.1			0.0		
Approach LOS	A	A						

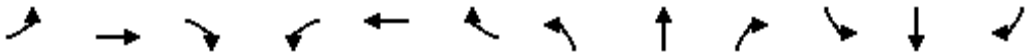
Intersection Summary				
Average Delay	0.2			
Intersection Capacity Utilization	45.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	660	1055	110	230	765	190	105	985	160	155	880	345
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.6	4.1		2.6	4.1	4.1	2.0	3.5	3.5	2.0	3.5	3.5
Lane Util. Factor	0.97	0.95		0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.88
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3303	3549		3502	3610	1615	1787	3574	1599	1805	3610	2842
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3303	3549		3502	3610	1615	1787	3574	1599	1805	3610	2842
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	695	1111	116	242	805	200	111	1037	168	163	926	363
RTOR Reduction (vph)	0	7	0	0	0	107	0	0	116	0	0	45
Lane Group Flow (vph)	695	1220	0	242	805	93	111	1037	52	163	926	318
Heavy Vehicles (%)	6%	0%	3%	0%	0%	0%	1%	1%	1%	0%	0%	0%
Turn Type	Prot			Prot		Perm	Prot		custom	Prot		custom
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases						4			2			2 3
Actuated Green, G (s)	21.0	41.7		8.0	28.7	28.7	7.0	30.1	31.1	8.0	31.1	57.6
Effective Green, g (s)	22.4	43.1		9.4	30.1	30.1	9.0	32.1	33.1	10.0	33.1	59.6
Actuated g/C Ratio	0.21	0.40		0.09	0.28	0.28	0.08	0.30	0.31	0.09	0.31	0.56
Clearance Time (s)	4.0	5.5		4.0	5.5	5.5	4.0	5.5	5.5	4.0	5.5	
Vehicle Extension (s)	2.3	3.1		2.3	3.1	3.1	2.4	3.1	3.1	2.4	3.1	
Lane Grp Cap (vph)	693	1432		308	1017	455	151	1074	496	169	1119	1586
v/s Ratio Prot	c0.21	c0.34		0.07	0.22		0.06	c0.29		c0.09	0.26	
v/s Ratio Perm						0.06			0.03			0.11
v/c Ratio	1.00	0.85		0.79	0.79	0.20	0.74	0.97	0.10	0.96	0.83	0.20
Uniform Delay, d1	42.2	28.9		47.7	35.4	29.2	47.7	36.8	26.3	48.2	34.2	11.7
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	34.9	5.1		11.8	4.3	0.2	15.7	19.5	0.1	58.2	5.2	0.1
Delay (s)	77.1	34.1		59.5	39.8	29.5	63.5	56.3	26.4	106.4	39.4	11.8
Level of Service	E	C		E	D	C	E	E	C	F	D	B
Approach Delay (s)		49.6			41.9			53.1			40.0	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM Average Control Delay	46.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	106.8	Sum of lost time (s)	8.1
Intersection Capacity Utilization	89.2%	ICU Level of Service	E
Analysis Period (min)	15		

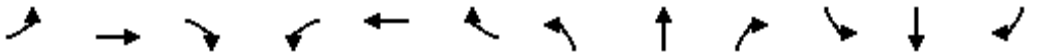
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	625	5	25	300	20	120	0	460	25	0	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	2	672	5	27	323	22	129	0	495	27	0	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	344			677			1058	1077	675	1558	1069	333
vC1, stage 1 conf vol							679	679		387	387	
vC2, stage 2 conf vol							378	398		1171	682	
vCu, unblocked vol	344			677			1058	1077	675	1558	1069	333
tC, single (s)	4.4			4.3			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.5			2.4			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			67	100	0	0	100	100
cM capacity (veh/h)	1061			816			391	395	458	0	381	713

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	2	677	27	344	129	495	29
Volume Left	2	0	27	0	129	0	27
Volume Right	0	5	0	22	0	495	2
cSH	1061	1700	816	1700	391	458	0
Volume to Capacity	0.00	0.40	0.03	0.20	0.33	1.08	Err
Queue Length 95th (ft)	0	0	3	0	35	403	Err
Control Delay (s)	8.4	0.0	9.6	0.0	18.7	95.5	Err
Lane LOS	A		A		C	F	F
Approach Delay (s)	0.0		0.7		79.6		Err
Approach LOS					F		F

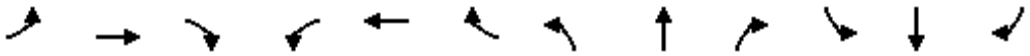
Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	68.3%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	65	660	205	60	45	60	130	395	130	2	10	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.0	4.0	4.0	4.0		4.0	4.5	4.0	4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.91		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1863	1455	1203	1696		1752	1863	1495	1770	1863	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	1863	1455	1203	1696		1752	1863	1495	1770	1863	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	72	733	228	67	50	67	144	439	144	2	11	0
RTOR Reduction (vph)	0	0	114	0	38	0	0	0	62	0	0	0
Lane Group Flow (vph)	72	733	114	67	79	0	144	439	82	2	11	0
Heavy Vehicles (%)	2%	2%	11%	50%	3%	2%	3%	2%	8%	2%	2%	2%
Turn Type	Prot		Perm	Prot			Prot		pt+ov	Prot		
Protected Phases	1	6		5	2		7	4	4 5	3	8	
Permitted Phases			6									
Actuated Green, G (s)	6.2	34.6	34.6	6.2	34.6		9.5	22.0	32.2	0.7	13.2	
Effective Green, g (s)	5.7	34.6	34.6	6.2	34.6		9.5	21.5	32.2	0.2	12.7	
Actuated g/C Ratio	0.07	0.44	0.44	0.08	0.44		0.12	0.27	0.41	0.00	0.16	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	127	811	633	94	738		209	504	606	4	298	
v/s Ratio Prot	0.04	c0.39		c0.06	0.05		c0.08	c0.24	0.05	0.00	0.01	
v/s Ratio Perm			0.08									
v/c Ratio	0.57	0.90	0.18	0.71	0.11		0.69	0.87	0.13	0.50	0.04	
Uniform Delay, d1	35.7	20.9	13.8	35.8	13.3		33.6	27.7	14.9	39.6	28.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	4.6	13.4	0.1	21.1	0.0		8.4	15.1	0.1	57.4	0.0	
Delay (s)	40.3	34.3	13.9	56.9	13.3		41.9	42.7	15.0	97.0	28.3	
Level of Service	D	C	B	E	B		D	D	B	F	C	
Approach Delay (s)		30.2			29.2			37.1			38.8	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM Average Control Delay	32.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	79.5	Sum of lost time (s)	16.5
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		

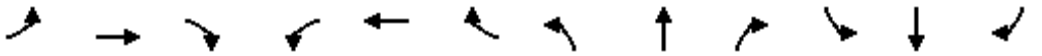
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	775	20	40	150	35	20	10	215	70	10	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	2	852	22	44	165	38	22	11	236	77	11	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	203			874			1125	1158	863	1370	1150	184
vC1, stage 1 conf vol							867	867		272	272	
vC2, stage 2 conf vol							258	291		1098	878	
vCu, unblocked vol	203			874			1125	1158	863	1370	1150	184
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.5
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.6
p0 queue free %	100			94			93	97	34	0	96	100
cM capacity (veh/h)	1380			781			327	344	357	39	308	794

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	2	874	44	203	22	247	77	11
Volume Left	2	0	44	0	22	0	77	0
Volume Right	0	22	0	38	0	236	0	0
cSH	1380	1700	781	1700	327	357	39	308
Volume to Capacity	0.00	0.51	0.06	0.12	0.07	0.69	1.95	0.04
Queue Length 95th (ft)	0	0	4	0	5	124	205	3
Control Delay (s)	7.6	0.0	9.9	0.0	16.8	35.0	665.2	17.1
Lane LOS	A		A		C	E	F	C
Approach Delay (s)	0.0		1.8		33.5		584.2	
Approach LOS					D		F	

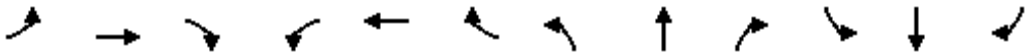
Intersection Summary				
Average Delay	41.1			
Intersection Capacity Utilization	69.7%	ICU Level of Service		C
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	75	1350	100	85	970	45	15	10	25	165	5	270
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	5.2	5.2	7.3	5.2		6.7	6.7	6.7	6.7	6.7	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.99	1.00	0.95	1.00	
Satd. Flow (prot)	1687	3574	1615	1805	3519		1466	1723	1568	1703	1620	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.41	0.89	1.00	0.75	1.00	
Satd. Flow (perm)	1687	3574	1615	1805	3519		639	1552	1568	1341	1620	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	79	1421	105	89	1021	47	16	11	26	174	5	284
RTOR Reduction (vph)	0	0	53	0	4	0	0	0	21	0	145	0
Lane Group Flow (vph)	79	1421	53	89	1064	0	13	14	5	174	144	0
Heavy Vehicles (%)	7%	1%	0%	0%	2%	0%	17%	0%	3%	6%	0%	0%
Turn Type	Prot		Perm	Prot			Perm		Perm	Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2				8		8	4		
Actuated Green, G (s)	4.8	29.9	29.9	3.6	29.5		11.7	11.7	11.7	11.7	11.7	
Effective Green, g (s)	4.8	29.9	29.9	3.6	29.5		11.7	11.7	11.7	11.7	11.7	
Actuated g/C Ratio	0.07	0.46	0.46	0.06	0.46		0.18	0.18	0.18	0.18	0.18	
Clearance Time (s)	6.5	5.2	5.2	7.3	5.2		6.7	6.7	6.7	6.7	6.7	
Vehicle Extension (s)	2.6	3.1	3.1	2.3	3.1		2.4	2.4	2.4	2.4	2.4	
Lane Grp Cap (vph)	126	1659	750	101	1612		116	282	285	244	294	
v/s Ratio Prot	0.05	c0.40		c0.05	0.30						0.09	
v/s Ratio Perm			0.03				0.02	0.01	0.00	c0.13		
v/c Ratio	0.63	0.86	0.07	0.88	0.66		0.11	0.05	0.02	0.71	0.49	
Uniform Delay, d1	28.9	15.3	9.6	30.2	13.6		22.0	21.8	21.6	24.8	23.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	8.4	4.6	0.0	52.9	1.0		0.3	0.0	0.0	8.7	0.8	
Delay (s)	37.3	20.0	9.6	83.1	14.6		22.3	21.8	21.6	33.4	24.5	
Level of Service	D	B	A	F	B		C	C	C	C	C	
Approach Delay (s)		20.1			19.9			21.8			27.9	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM Average Control Delay	21.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	64.4	Sum of lost time (s)	14.0
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		

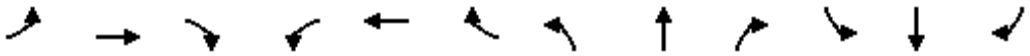
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	80	1220	255	200	810	225	155	165	485	505	245	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	4.7	4.7	5.8	4.6		6.4	5.5	6.4	6.4	5.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	3574	1615	1787	3428		1805	1792	1599	1736	1836	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1805	3574	1615	1787	3428		1805	1792	1599	1736	1836	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	84	1284	268	211	853	237	163	174	511	532	258	74
RTOR Reduction (vph)	0	0	188	0	22	0	0	0	3	0	9	0
Lane Group Flow (vph)	84	1284	80	211	1068	0	163	174	508	532	323	0
Heavy Vehicles (%)	0%	1%	0%	1%	1%	5%	0%	6%	1%	4%	0%	0%
Turn Type	Prot		Perm	Prot			Prot		custom	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						1 8			
Actuated Green, G (s)	5.4	32.6	32.6	7.8	35.1		12.8	29.1	43.2	17.8	34.1	
Effective Green, g (s)	6.8	34.0	34.0	9.2	36.5		13.6	29.9	38.5	18.6	34.9	
Actuated g/C Ratio	0.06	0.30	0.30	0.08	0.32		0.12	0.26	0.34	0.16	0.31	
Clearance Time (s)	7.2	6.1	6.1	7.2	6.0		7.2	6.3		7.2	6.3	
Vehicle Extension (s)	2.4	3.1	3.1	2.4	3.1		2.4	3.6		2.4	3.6	
Lane Grp Cap (vph)	108	1065	481	144	1097		215	470	540	283	562	
v/s Ratio Prot	0.05	c0.36		c0.12	0.31		0.09	0.10		c0.31	c0.18	
v/s Ratio Perm			0.05						c0.32			
v/c Ratio	0.78	1.21	0.17	1.47	0.97		0.76	0.37	0.94	1.88	0.57	
Uniform Delay, d1	52.9	40.0	29.6	52.4	38.3		48.7	34.4	36.7	47.8	33.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	27.7	101.6	0.2	243.3	20.9		13.4	0.6	24.7	409.1	1.6	
Delay (s)	80.6	141.6	29.7	295.7	59.3		62.0	35.0	61.3	456.8	34.9	
Level of Service	F	F	C	F	E		E	D	E	F	C	
Approach Delay (s)		120.2			97.6			56.1			294.7	
Approach LOS		F			F			E			F	

Intersection Summary			
HCM Average Control Delay	134.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.37		
Actuated Cycle Length (s)	114.1	Sum of lost time (s)	28.8
Intersection Capacity Utilization	105.6%	ICU Level of Service	G
Analysis Period (min)	15		

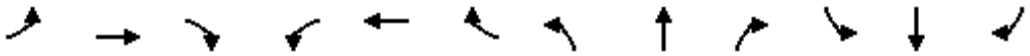
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	330	665	125	260	95	35	90	1010	980	70	420	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5	4.0	4.0	5.5		4.0	5.5	5.5	4.0	5.5	
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00		1.00	1.00	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1752	1900	1568	3433	1697		1597	1827	1615	1671	3325	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1752	1900	1568	3433	1697		1597	1827	1615	1671	3325	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	340	686	129	268	98	36	93	1041	1010	72	433	88
RTOR Reduction (vph)	0	0	49	0	13	0	0	0	42	0	17	0
Lane Group Flow (vph)	340	686	80	268	121	0	93	1041	968	72	504	0
Heavy Vehicles (%)	3%	0%	3%	2%	8%	6%	13%	4%	0%	8%	7%	0%
Turn Type	Prot		custom	Prot			Prot		custom	Prot		
Protected Phases	3			7	4		1	6		5	2	
Permitted Phases		8	1 8						6 7			
Actuated Green, G (s)	10.0	31.5	40.0	6.0	27.5		8.5	38.5	44.5	5.0	35.0	
Effective Green, g (s)	10.0	31.5	40.0	6.0	27.5		8.5	38.5	44.5	5.0	35.0	
Actuated g/C Ratio	0.10	0.32	0.40	0.06	0.28		0.08	0.38	0.44	0.05	0.35	
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	5.5		4.0	5.5	
Vehicle Extension (s)	2.4	3.2		2.5	3.2		2.3	3.2		2.2	3.2	
Lane Grp Cap (vph)	175	599	627	206	467		136	703	719	84	1164	
v/s Ratio Prot	c0.19			0.08	0.07		c0.06	c0.57		0.04	0.15	
v/s Ratio Perm		c0.36	0.05						c0.60			
v/c Ratio	1.94	1.15	0.13	1.30	0.26		0.68	1.48	1.35	0.86	0.43	
Uniform Delay, d1	45.0	34.2	19.0	47.0	28.3		44.4	30.8	27.8	47.1	24.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.11	0.75	0.68	1.00	1.00	
Incremental Delay, d2	444.5	83.8	0.1	166.2	0.3		1.1	217.1	156.6	52.3	1.2	
Delay (s)	489.5	118.1	19.0	213.2	28.6		50.5	240.0	175.4	99.5	26.1	
Level of Service	F	F	B	F	C		D	F	F	F	C	
Approach Delay (s)		216.4			151.7			201.4			35.0	
Approach LOS		F			F			F			C	

Intersection Summary			
HCM Average Control Delay	177.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.38		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	115.6%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	675	45	430	25	10	5	100	1400	50	5	670	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	5.5		4.0	5.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.86		1.00	0.95		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1613		1805	1811		1641	3523		1805	3376	
Flt Permitted	0.75	1.00		0.28	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1392	1613		532	1811		1641	3523		1805	3376	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	711	47	453	26	11	5	105	1474	53	5	705	137
RTOR Reduction (vph)	0	115	0	0	3	0	0	2	0	0	16	0
Lane Group Flow (vph)	711	385	0	26	13	0	105	1525	0	5	826	0
Heavy Vehicles (%)	2%	0%	2%	0%	0%	0%	10%	2%	0%	0%	4%	6%
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8								
Actuated Green, G (s)	43.0	43.0		43.0	43.0		8.6	42.5		1.0	34.9	
Effective Green, g (s)	43.0	43.0		43.0	43.0		8.6	42.5		1.0	34.9	
Actuated g/C Ratio	0.43	0.43		0.43	0.43		0.09	0.42		0.01	0.35	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	5.5		4.0	5.5	
Vehicle Extension (s)	1.6	1.6		1.6	1.6		2.6	3.1		2.6	3.1	
Lane Grp Cap (vph)	599	694		229	779		141	1497		18	1178	
v/s Ratio Prot		0.24			0.01		c0.06	c0.43		0.00	0.24	
v/s Ratio Perm	c0.51			0.05								
v/c Ratio	1.19	0.56		0.11	0.02		0.74	1.02		0.28	0.70	
Uniform Delay, d1	28.5	21.3		17.1	16.4		44.6	28.8		49.1	28.1	
Progression Factor	1.00	1.00		1.00	1.00		0.82	1.06		1.48	0.48	
Incremental Delay, d2	100.2	0.5		0.1	0.0		13.5	24.4		4.8	2.6	
Delay (s)	128.7	21.9		17.2	16.4		49.8	54.8		77.4	16.1	
Level of Service	F	C		B	B		D	D		E	B	
Approach Delay (s)		84.6			16.9			54.4			16.5	
Approach LOS		F			B			D			B	

Intersection Summary			
HCM Average Control Delay	55.2	HCM Level of Service	E
HCM Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	99.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	140	30	1520	545	105	1020
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		5.0	4.0	4.0	5.5
Lane Util. Factor	0.97		0.95	1.00	1.00	0.95
Frt	0.97		1.00	0.85	1.00	1.00
Flt Protected	0.96		1.00	1.00	0.95	1.00
Satd. Flow (prot)	3313		3505	1599	1805	3438
Flt Permitted	0.96		1.00	1.00	0.95	1.00
Satd. Flow (perm)	3313		3505	1599	1805	3438
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	147	32	1600	574	111	1074
RTOR Reduction (vph)	22	0	0	60	0	0
Lane Group Flow (vph)	157	0	1600	514	111	1074
Heavy Vehicles (%)	4%	4%	3%	1%	0%	5%
Turn Type				custom	Prot	
Protected Phases	4		6		5	2
Permitted Phases				4 6		
Actuated Green, G (s)	12.0		64.9	81.9	10.1	78.5
Effective Green, g (s)	12.0		64.9	76.9	10.1	78.5
Actuated g/C Ratio	0.12		0.65	0.77	0.10	0.78
Clearance Time (s)	4.0		5.0		4.0	5.5
Vehicle Extension (s)	2.2		2.4		2.6	2.4
Lane Grp Cap (vph)	398		2275	1230	182	2699
v/s Ratio Prot	0.05		c0.46		c0.06	0.31
v/s Ratio Perm				c0.32		
v/c Ratio	0.39		0.70	0.42	0.61	0.40
Uniform Delay, d1	40.6		11.3	3.9	43.1	3.4
Progression Factor	1.00		0.22	0.03	1.20	0.39
Incremental Delay, d2	0.3		0.7	0.0	3.8	0.3
Delay (s)	41.0		3.3	0.1	55.5	1.6
Level of Service	D		A	A	E	A
Approach Delay (s)	41.0		2.4			6.7
Approach LOS	D		A			A

Intersection Summary			
HCM Average Control Delay	5.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	63.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBR	WBR2	NBL	NBT	SBT
Lane Configurations					
Volume (vph)	750	345	270	1775	1545
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	5.0	5.0
Lane Util. Factor	1.00	0.88	1.00	0.95	0.95
Frt	0.86	0.85	1.00	1.00	1.00
Flt Protected	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1611	2707	1770	3539	3505
Flt Permitted	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1611	2707	1770	3539	3505
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	773	356	278	1830	1593
RTOR Reduction (vph)	229	29	0	0	0
Lane Group Flow (vph)	544	327	278	1830	1593
Heavy Vehicles (%)	2%	5%	2%	2%	3%
Turn Type	custom	custom	Prot		
Protected Phases			1	6	2
Permitted Phases	4	4			
Actuated Green, G (s)	25.0	25.0	16.0	61.0	41.0
Effective Green, g (s)	25.0	25.0	16.0	61.0	41.0
Actuated g/C Ratio	0.26	0.26	0.17	0.64	0.43
Clearance Time (s)	4.0	4.0	4.0	5.0	5.0
Vehicle Extension (s)	2.3	2.3	2.3	4.5	4.5
Lane Grp Cap (vph)	424	712	298	2272	1513
v/s Ratio Prot			c0.16	0.52	c0.45
v/s Ratio Perm	c0.34	0.12			
v/c Ratio	1.28	0.46	0.93	0.81	1.05
Uniform Delay, d1	35.0	29.3	39.0	12.6	27.0
Progression Factor	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	144.2	0.3	34.6	2.4	38.5
Delay (s)	179.2	29.6	73.5	15.0	65.5
Level of Service	F	C	E	B	E
Approach Delay (s)				22.7	65.5
Approach LOS				C	E

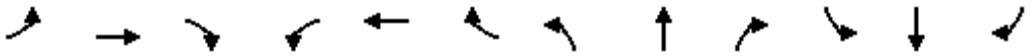
Intersection Summary			
HCM Average Control Delay	62.4	HCM Level of Service	E
HCM Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	Err%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Volume (veh/h)	0	2120	1545	205	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.97	0.97	0.90	0.90
Hourly flow rate (vph)	0	2356	1593	211	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		258	829			
pX, platoon unblocked	0.75				0.72	0.75
vC, conflicting volume	1804				2771	796
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1400				1092	52
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	369				152	756

Direction, Lane #	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	1178	1178	796	796	211
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	211
cSH	1700	1700	1700	1700	1700
Volume to Capacity	0.69	0.69	0.47	0.47	0.12
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS					
Approach Delay (s)	0.0		0.0		
Approach LOS					

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	61.9%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	180	0	115	0	0	0	0	1865	1065	0	1555	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					5.0	5.0		5.0	
Lane Util. Factor		1.00	1.00					0.91	0.91		0.91	
Frt		1.00	0.85					0.99	0.85		1.00	
Flt Protected		0.95	1.00					1.00	1.00		1.00	
Satd. Flow (prot)		1719	1553					3345	1441		5085	
Flt Permitted		0.95	1.00					1.00	1.00		1.00	
Satd. Flow (perm)		1719	1553					3345	1441		5085	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	186	0	119	0	0	0	0	1923	1098	0	1603	0
RTOR Reduction (vph)	0	0	11	0	0	0	0	8	340	0	0	0
Lane Group Flow (vph)	0	186	108	0	0	0	0	2102	571	0	1603	0
Heavy Vehicles (%)	5%	0%	4%	0%	0%	0%	0%	2%	2%	0%	2%	0%
Turn Type	Perm		Perm						Perm			
Protected Phases		8						6			2	
Permitted Phases	8		8						6			
Actuated Green, G (s)		11.7	11.7					34.8	34.8		34.8	
Effective Green, g (s)		11.7	11.7					34.8	34.8		34.8	
Actuated g/C Ratio		0.21	0.21					0.63	0.63		0.63	
Clearance Time (s)		4.0	4.0					5.0	5.0		5.0	
Vehicle Extension (s)		2.3	2.3					4.5	4.5		4.5	
Lane Grp Cap (vph)		362	327					2097	904		3188	
v/s Ratio Prot								c0.63			0.32	
v/s Ratio Perm		0.11	0.07						0.40			
v/c Ratio		0.51	0.33					1.00	0.63		0.50	
Uniform Delay, d1		19.4	18.6					10.4	6.4		5.6	
Progression Factor		1.00	1.00					1.00	1.00		1.00	
Incremental Delay, d2		0.8	0.3					20.2	1.8		0.2	
Delay (s)		20.1	18.9					30.6	8.2		5.9	
Level of Service		C	B					C	A		A	
Approach Delay (s)		19.7			0.0			23.8			5.9	
Approach LOS		B			A			C			A	

Intersection Summary			
HCM Average Control Delay	17.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	55.5	Sum of lost time (s)	9.0
Intersection Capacity Utilization	80.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

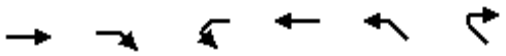
Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Volume (veh/h)	0	2045	1555	740	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	0	2324	1767	841	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		227	826			
pX, platoon unblocked	0.66				0.56	0.66
vC, conflicting volume	2608				3349	1009
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1614				0	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	268				579	715

Direction, Lane #	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	1162	1162	707	707	1194
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	841
cSH	1700	1700	1700	1700	1700
Volume to Capacity	0.68	0.68	0.42	0.42	0.70
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS					
Approach Delay (s)	0.0		0.0		
Approach LOS					

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	80.3%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1065	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3539					
Flt Permitted	1.00					
Satd. Flow (perm)	3539					
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	1098	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1098	0	0	0	0	0
Heavy Vehicles (%)	2%	0%	0%	0%	0%	0%
Turn Type						
Protected Phases	4					
Permitted Phases						
Actuated Green, G (s)	20.0					
Effective Green, g (s)	20.0					
Actuated g/C Ratio	1.00					
Clearance Time (s)	4.0					
Lane Grp Cap (vph)	3539					
v/s Ratio Prot	c0.31					
v/s Ratio Perm						
v/c Ratio	0.31					
Uniform Delay, d1	0.0					
Progression Factor	1.00					
Incremental Delay, d2	0.2					
Delay (s)	0.2					
Level of Service	A					
Approach Delay (s)	0.2			0.0	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM Average Control Delay	0.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	20.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	32.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Volume (veh/h)	0	295	0	740	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	0	304	0	763	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			304		763	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			304		763	0
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1268		375	1091

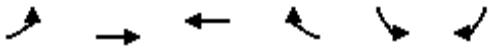
Direction, Lane #	EB 1	WB 1
Volume Total	304	763
Volume Left	0	0
Volume Right	304	0
cSH	1700	1700
Volume to Capacity	0.18	0.45
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	0.0
Lane LOS		
Approach Delay (s)	0.0	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	42.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBR	WBR2	SBL	SBR	SEL
Lane Configurations					
Volume (veh/h)	0	740	0	0	295
Sign Control	Free		Stop		Free
Grade	0%		0%		0%
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	0	763	0	0	304
Pedestrians					
Lane Width (ft)					
Walking Speed (ft/s)					
Percent Blockage					
Right turn flare (veh)					
Median type	None				None
Median storage veh)					
Upstream signal (ft)					
pX, platoon unblocked					
vC, conflicting volume			304	0	
vC1, stage 1 conf vol					
vC2, stage 2 conf vol					
vCu, unblocked vol			304	0	
tC, single (s)			6.4	6.2	
tC, 2 stage (s)					
tF (s)			3.5	3.3	
p0 queue free %			100	100	
cM capacity (veh/h)			692	1091	

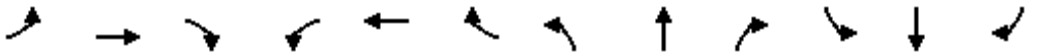
Direction, Lane #	WB 1	WB 2	SE 1
Volume Total	381	381	304
Volume Left	0	0	0
Volume Right	381	381	0
cSH	1700	1700	1700
Volume to Capacity	0.22	0.22	0.18
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			
Approach Delay (s)	0.0		0.0
Approach LOS			

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	Err%	ICU Level of Service	H
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑				
Volume (vph)	0	740	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0				
Lane Util. Factor		0.95				
Frt		1.00				
Flt Protected		1.00				
Satd. Flow (prot)		3438				
Flt Permitted		1.00				
Satd. Flow (perm)		3438				
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	763	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	763	0	0	0	0
Heavy Vehicles (%)	0%	5%	0%	0%	0%	0%
Turn Type						
Protected Phases						
Permitted Phases		2				
Actuated Green, G (s)		20.0				
Effective Green, g (s)		20.0				
Actuated g/C Ratio		1.00				
Clearance Time (s)		4.0				
Lane Grp Cap (vph)		3438				
v/s Ratio Prot						
v/s Ratio Perm		c0.22				
v/c Ratio		0.22				
Uniform Delay, d1		0.0				
Progression Factor		1.00				
Incremental Delay, d2		0.1				
Delay (s)		0.1				
Level of Service		A				
Approach Delay (s)		0.1	0.0		0.0	
Approach LOS		A	A		A	

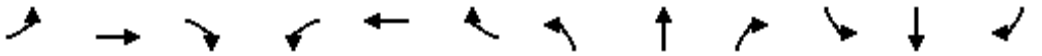
Intersection Summary			
HCM Average Control Delay	0.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	20.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	23.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	390	1445	265	120	695	390	130	1240	150	275	1165	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5		4.0	5.5		4.0	5.5	4.0
Lane Util. Factor	0.97	0.95		1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.98		1.00	0.95		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3467	3515		1787	3370		1770	3489		1752	3539	1538
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3467	3515		1787	3370		1770	3489		1752	3539	1538
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	406	1505	276	125	724	406	135	1292	156	286	1214	42
RTOR Reduction (vph)	0	13	0	0	64	0	0	8	0	0	0	23
Lane Group Flow (vph)	406	1768	0	125	1066	0	135	1440	0	286	1214	19
Heavy Vehicles (%)	1%	0%	2%	1%	1%	2%	2%	2%	0%	3%	2%	5%
Turn Type	Prot			Prot			Prot			Prot		custom
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												5 6
Actuated Green, G (s)	12.0	43.5		8.0	39.5		8.0	36.5		13.0	41.5	53.5
Effective Green, g (s)	12.0	43.5		8.0	39.5		8.0	36.5		13.0	41.5	53.5
Actuated g/C Ratio	0.10	0.36		0.07	0.33		0.07	0.30		0.11	0.35	0.45
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	5.5		4.0	5.5	
Vehicle Extension (s)	2.3	3.1		2.4	3.1		2.4	3.1		2.4	3.1	
Lane Grp Cap (vph)	347	1274		119	1109		118	1061		190	1224	686
v/s Ratio Prot	c0.12	c0.50		0.07	0.32		0.08	c0.41		c0.16	0.34	
v/s Ratio Perm												0.01
v/c Ratio	1.17	1.39		1.05	0.96		1.14	1.36		1.51	0.99	0.03
Uniform Delay, d1	54.0	38.2		56.0	39.5		56.0	41.8		53.5	39.1	18.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	103.0	179.5		96.7	18.3		126.8	167.1		252.8	23.6	0.0
Delay (s)	157.0	217.7		152.7	57.8		182.8	208.8		306.3	62.7	18.7
Level of Service	F	F		F	E		F	F		F	E	B
Approach Delay (s)		206.5			67.3			206.6			106.7	
Approach LOS		F			E			F			F	

Intersection Summary			
HCM Average Control Delay	156.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.39		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	125.2%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	245	0	680	5	0	0	295	1820	5	2	1065	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.0		4.0	5.5		4.0	5.5	5.5
Lane Util. Factor		1.00	1.00		1.00		0.97	0.95		1.00	0.95	1.00
Frt		1.00	0.85		1.00		1.00	1.00		1.00	1.00	0.85
Flt Protected		0.95	1.00		0.95		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1805	1553		1543		3433	3536		1805	3471	1568
Flt Permitted		0.75	1.00		0.47		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1434	1553		762		3433	3536		1805	3471	1568
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	258	0	716	5	0	0	311	1916	5	2	1121	100
RTOR Reduction (vph)	0	0	136	0	0	0	0	0	0	0	0	37
Lane Group Flow (vph)	0	258	580	0	5	0	311	1921	0	2	1121	63
Heavy Vehicles (%)	0%	0%	4%	17%	0%	0%	2%	2%	25%	0%	4%	3%
Turn Type	Perm		Perm	Perm			Prot			Prot		Perm
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8		8	4								2
Actuated Green, G (s)		31.5	31.5		32.0		11.6	53.5		1.0	42.9	42.9
Effective Green, g (s)		31.5	31.5		32.0		11.6	53.5		1.0	42.9	42.9
Actuated g/C Ratio		0.32	0.32		0.32		0.12	0.54		0.01	0.43	0.43
Clearance Time (s)		4.5	4.5		4.0		4.0	5.5		4.0	5.5	5.5
Vehicle Extension (s)		1.4	1.4		2.3		2.3	2.4		2.6	2.4	2.4
Lane Grp Cap (vph)		452	489		244		398	1892		18	1489	673
v/s Ratio Prot							c0.09	c0.54		0.00	0.32	
v/s Ratio Perm		0.18	c0.37		0.01							0.04
v/c Ratio		0.57	1.19		0.02		0.78	1.02		0.11	0.75	0.09
Uniform Delay, d1		28.6	34.2		23.3		43.0	23.2		49.1	24.1	17.0
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.25	0.73	0.41
Incremental Delay, d2		1.1	102.6		0.0		9.1	24.6		2.0	3.4	0.3
Delay (s)		29.7	136.8		23.3		52.1	47.8		63.2	21.0	7.3
Level of Service		C	F		C		D	D		E	C	A
Approach Delay (s)		108.5			23.3			48.4			20.0	
Approach LOS		F			C			D			B	

Intersection Summary			
HCM Average Control Delay	53.7	HCM Level of Service	D
HCM Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	88.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Appendix C. Intersection Queuing Analysis

Intersection: 30: US-26 WB JS Rd On-ramp & Jackson School Rd

Movement	WB	WB	B33	NB
Directions Served	LT	R	T	L
Maximum Queue (ft)	1203	599	265	45
Average Queue (ft)	725	231	45	9
95th Queue (ft)	1565	711	227	34
Link Distance (ft)	1366		940	
Upstream Blk Time (%)	11			
Queuing Penalty (veh)	0			
Storage Bay Dist (ft)		575		375
Storage Blk Time (%)	30	0		
Queuing Penalty (veh)	13	2		

Intersection: 40: US-26 EB JS Rd Off-ramp & Jackson School Rd

Movement	EB	EB	SB
Directions Served	LT	R	L
Maximum Queue (ft)	64	200	39
Average Queue (ft)	11	66	8
95th Queue (ft)	43	166	31
Link Distance (ft)	1666		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		275	375
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 41: US-26 EB JS Rd On-ramp &

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	310	341
Average Queue (ft)	137	157
95th Queue (ft)	310	323
Link Distance (ft)	1044	1044
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 200: Schaaf Rd & Helvetia Rd

Movement	EB	WB	NB	SB	SB
Directions Served	LTR	LTR	LTR	L	TR
Maximum Queue (ft)	32	79	18	30	64
Average Queue (ft)	6	28	1	9	1
95th Queue (ft)	25	59	12	27	24
Link Distance (ft)	2030	1678	389		1117
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)				250	
Storage Blk Time (%)					0
Queuing Penalty (veh)					0

Intersection: 210: Jacobson Rd & Helvetia Rd

Movement	WB	WB	NB	SB
Directions Served	L	R	R	LT
Maximum Queue (ft)	86	37	12	182
Average Queue (ft)	21	3	0	23
95th Queue (ft)	56	22	6	124
Link Distance (ft)		2271	892	389
Upstream Blk Time (%)				0
Queuing Penalty (veh)				3
Storage Bay Dist (ft)	250			
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 220: Loop Ramp #1 & Helvetia Rd

Movement	EB	EB	B6	NB	NB	NB	SB	SB
Directions Served	R	R	T	L	T	T	T	T>
Maximum Queue (ft)	644	682	8	126	310	318	721	733
Average Queue (ft)	353	403	0	28	184	168	522	533
95th Queue (ft)	555	618	5	80	375	370	837	844
Link Distance (ft)	767	767	573	244	244	244	892	892
Upstream Blk Time (%)		0			12	9	1	1
Queuing Penalty (veh)		0			32	23	3	3
Storage Bay Dist (ft)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 221: US-26 WB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy

Movement	WB	NB	NB	B8	B8	SB	SB	SB
Directions Served	R	T	T	T	T	T	T	T
Maximum Queue (ft)	324	203	150	16	12	47	59	62
Average Queue (ft)	83	27	16	1	0	8	9	12
95th Queue (ft)	201	112	80	11	9	72	84	106
Link Distance (ft)	582	276	276	315	315	244	244	244
Upstream Blk Time (%)	0	0				0	0	1
Queuing Penalty (veh)	0	0				0	1	6
Storage Bay Dist (ft)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy #1

Movement	EB	EB	NB	NB	SB	SB	SB	SB	B8	B8	B8
Directions Served	LR	R	T	T	L	T	T	T	T	T	T
Maximum Queue (ft)	342	309	137	180	141	300	348	378	99	125	176
Average Queue (ft)	208	198	61	88	31	170	220	263	18	22	31
95th Queue (ft)	311	292	138	183	89	323	360	415	137	151	169
Link Distance (ft)	1097		2117	2117		315	315	315	276	276	276
Upstream Blk Time (%)						2	3	5	1	1	2
Queuing Penalty (veh)						17	26	44	7	11	14
Storage Bay Dist (ft)		300			175						
Storage Blk Time (%)	1	0				6					
Queuing Penalty (veh)	2	1				2					

Intersection: 231: US-26 EB Helvetia On-ramp &

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	403	426
Average Queue (ft)	207	225
95th Queue (ft)	384	401
Link Distance (ft)	980	980
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 250: Huffman St & Brookwood Pkwy

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB	SB
Directions Served	L	L	TR	L	T	R	L	L	T	T	TR	L
Maximum Queue (ft)	168	191	171	241	2391	375	822	844	810	706	360	125
Average Queue (ft)	80	107	77	13	1459	145	559	577	253	185	130	102
95th Queue (ft)	160	184	146	119	2513	408	902	922	736	500	274	152
Link Distance (ft)			3925		3634				1120	1120	1120	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	1000	1000		350		350	1000	1000				100
Storage Blk Time (%)					74	0	0	0	0			28
Queuing Penalty (veh)					56	1	0	0	0			217

Intersection: 250: Huffman St & Brookwood Pkwy

Movement	SB	SB	SB	SB
Directions Served	T	T	T	R
Maximum Queue (ft)	1928	1998	2021	325
Average Queue (ft)	1471	1578	1617	191
95th Queue (ft)	2299	2334	2366	381
Link Distance (ft)	2117	2117	2117	
Upstream Blk Time (%)	1	2	2	
Queuing Penalty (veh)	12	16	23	
Storage Bay Dist (ft)				300
Storage Blk Time (%)	30		35	1
Queuing Penalty (veh)	34		110	10

Intersection: 260: Genentech & Brookwood Pkwy

Movement	EB	SB	SB	SB
Directions Served	R	T	T	TR
Maximum Queue (ft)	53	87	231	270
Average Queue (ft)	9	4	32	46
95th Queue (ft)	36	43	151	178
Link Distance (ft)		1120	1120	1120
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 261: Genentech &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 270: Evergreen Pkwy & Brookwood Pkwy

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	L	T	TR	L	L	T	T	L	T	T	R
Maximum Queue (ft)	420	433	536	482	227	266	410	425	225	1386	1404	400
Average Queue (ft)	273	278	250	262	112	119	236	264	220	1242	1167	111
95th Queue (ft)	493	514	547	488	212	225	362	387	246	1679	1667	371
Link Distance (ft)			1748	1748			4274	4274		1294	1294	
Upstream Blk Time (%)										54	22	
Queuing Penalty (veh)										0	0	
Storage Bay Dist (ft)	475	475			250	250			175			350
Storage Blk Time (%)	6	8	0		2	1	6	1	79	15	14	0
Queuing Penalty (veh)	19	24	0		9	6	11	0	327	27	35	0

Intersection: 270: Evergreen Pkwy & Brookwood Pkwy

Movement	B271	B271	SB	SB	SB	SB	SB
Directions Served	T	T	L	T	T	R	R
Maximum Queue (ft)	1404	1431	177	826	1075	1032	500
Average Queue (ft)	513	507	83	318	525	755	485
95th Queue (ft)	1315	1324	166	605	1013	1083	531
Link Distance (ft)	1921	1921		1003	1003	1003	
Upstream Blk Time (%)				0	1	2	
Queuing Penalty (veh)				0	9	16	
Storage Bay Dist (ft)			475				350
Storage Blk Time (%)				0		38	38
Queuing Penalty (veh)				0		209	209

Intersection: 360: US-26 WB NB Corn Pass Off-ramp & Cornelius Pass Rd

Movement	B365	WB	WB	NB	NB	NB	SB	SB
Directions Served	T	>	>	L	T	T	T	T
Maximum Queue (ft)	88	198	182	116	140	164	278	283
Average Queue (ft)	7	86	84	30	40	54	153	179
95th Queue (ft)	88	149	136	85	98	116	281	297
Link Distance (ft)	859	1542	1542		725	725	141	141
Upstream Blk Time (%)							7	11
Queuing Penalty (veh)							40	59
Storage Bay Dist (ft)				325				
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 361: Cornelius Pass Rd &

Movement	NB	SB	SB	SB
Directions Served	T	T	T	R
Maximum Queue (ft)	7	161	171	39
Average Queue (ft)	0	17	20	3
95th Queue (ft)	5	98	98	39
Link Distance (ft)	141	740	740	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				75
Storage Blk Time (%)			1	
Queuing Penalty (veh)			3	

Intersection: 363: US-26 WB Corn Pass On-ramp &

Movement	NW
Directions Served	L
Maximum Queue (ft)	85
Average Queue (ft)	24
95th Queue (ft)	67
Link Distance (ft)	152
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 370: US-26 EB Corn Pass Off-ramp & Cornelius Pass Rd

Movement	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	T	TR	R	T	T	T
Maximum Queue (ft)	214	145	146	180	93	214	218	218
Average Queue (ft)	93	67	50	73	38	98	129	135
95th Queue (ft)	168	121	110	137	67	193	210	213
Link Distance (ft)		304	1073	1073	1073	116	116	116
Upstream Blk Time (%)						3	5	6
Queuing Penalty (veh)						23	40	48
Storage Bay Dist (ft)	200							
Storage Blk Time (%)	0							
Queuing Penalty (veh)	1							

Intersection: 371: Cornelius Pass Rd &

Movement	NB	SB	SB	SB
Directions Served	T	T	T	TR
Maximum Queue (ft)	12	73	371	151
Average Queue (ft)	0	5	20	18
95th Queue (ft)	8	43	179	90
Link Distance (ft)	116	725	725	725
Upstream Blk Time (%)			0	
Queuing Penalty (veh)			0	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 373: Int

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	114	138
Average Queue (ft)	56	75
95th Queue (ft)	92	113
Link Distance (ft)	889	889
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 376: US-26 EB Corn Pass Off-ramp &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 377: US-26 WB Corn Pass Off-ramp &

Movement	WB
Directions Served	>
Maximum Queue (ft)	30
Average Queue (ft)	1
95th Queue (ft)	15
Link Distance (ft)	365
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 379: Int

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	149	158
Average Queue (ft)	73	90
95th Queue (ft)	123	137
Link Distance (ft)	254	254
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 390: Wagon Way & Cornelius Pass Rd

Movement	EB	EB	WB	NB	NB	NB	NB	SB	SB	SB	B350	B350
Directions Served	LT	R	LR	L	L	T	TR	T	T	R	T	T
Maximum Queue (ft)	122	226	64	316	290	83	162	808	820	225	189	251
Average Queue (ft)	51	73	6	189	94	20	39	426	496	130	12	19
95th Queue (ft)	103	148	33	289	242	59	103	772	824	276	102	132
Link Distance (ft)		322	338			740	740	749	749		2324	2324
Upstream Blk Time (%)								1	2			
Queuing Penalty (veh)								0	0			
Storage Bay Dist (ft)	100			300	300					125		
Storage Blk Time (%)	3	3		1	0			34	37	0		
Queuing Penalty (veh)	3	2		5	1			0	93	2		

Network Summary

Network wide Queuing Penalty: 1912

Intersection: 30: US-26 WB JS Rd On-ramp & Jackson School Rd

Movement	WB	WB	B33	NB	NB
Directions Served	LT	R	T	L	T
Maximum Queue (ft)	1964	600	348	48	4
Average Queue (ft)	1734	508	248	16	0
95th Queue (ft)	2370	862	563	43	3
Link Distance (ft)	1895		387		631
Upstream Blk Time (%)	46		41		
Queuing Penalty (veh)	0		0		
Storage Bay Dist (ft)		575		375	
Storage Blk Time (%)	73	0			
Queuing Penalty (veh)	47	2			

Intersection: 40: US-26 EB JS Rd Off-ramp & Jackson School Rd

Movement	EB	NB	NB	B43	SB
Directions Served	LT	T	R	T	L
Maximum Queue (ft)	24	656	425	1508	40
Average Queue (ft)	3	511	360	920	12
95th Queue (ft)	15	942	597	1998	35
Link Distance (ft)	1666	577		1484	
Upstream Blk Time (%)		32		21	
Queuing Penalty (veh)		0		0	
Storage Bay Dist (ft)			400		375
Storage Blk Time (%)		0	43		
Queuing Penalty (veh)		1	171		

Intersection: 41: US-26 EB JS Rd On-ramp &

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	979	1144
Average Queue (ft)	931	1084
95th Queue (ft)	1038	1269
Link Distance (ft)	1044	1044
Upstream Blk Time (%)		65
Queuing Penalty (veh)		252
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 200: Groveland Dr & Helvetia Rd

Movement	EB	WB	SB
Directions Served	LR	LR	L
Maximum Queue (ft)	24	296	19
Average Queue (ft)	8	106	3
95th Queue (ft)	26	225	15
Link Distance (ft)	1104	1678	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			250
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 210: Jacobson Rd & Helvetia Rd

Movement	WB	WB	NB	SB
Directions Served	L	R	R	LT
Maximum Queue (ft)	272	255	18	210
Average Queue (ft)	141	60	1	27
95th Queue (ft)	283	258	9	123
Link Distance (ft)		2263	896	376
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	250			
Storage Blk Time (%)	13	0		
Queuing Penalty (veh)	2	0		

Intersection: 220: Loop Ramp #1 & Helvetia Rd

Movement	EB	EB	NB	NB	NB	SB	SB
Directions Served	R	R	L	T	T	T	T>
Maximum Queue (ft)	173	193	275	304	299	150	191
Average Queue (ft)	84	101	105	95	80	78	102
95th Queue (ft)	146	166	216	294	254	129	165
Link Distance (ft)	792	792	243	243	243	896	896
Upstream Blk Time (%)			1	3	1		
Queuing Penalty (veh)			4	16	7		
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 225: US-26 WB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy

Movement	WB	NB	NB	NB	B8
Directions Served	R	T	T	T	T
Maximum Queue (ft)	201	32	142	83	31
Average Queue (ft)	66	1	13	5	2
95th Queue (ft)	142	15	72	43	14
Link Distance (ft)	607	240	240	240	349
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy #1

Movement	EB	EB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LR	R	T	T	R	L	T	T	T
Maximum Queue (ft)	280	126	2204	2219	2154	62	118	127	130
Average Queue (ft)	116	33	1132	1299	1341	16	17	22	26
95th Queue (ft)	240	97	2653	2810	2748	44	66	77	89
Link Distance (ft)	1098		2117	2117	2117		349	349	349
Upstream Blk Time (%)			2	5	11				
Queuing Penalty (veh)			15	38	91				
Storage Bay Dist (ft)		300				175			
Storage Blk Time (%)	1								
Queuing Penalty (veh)	1								

Intersection: 231: US-26 EB Helvetia On-ramp &

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	912	1081
Average Queue (ft)	848	990
95th Queue (ft)	1034	1259
Link Distance (ft)	980	980
Upstream Blk Time (%)		56
Queuing Penalty (veh)		275
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 250: Huffman St & Brookwood Pkwy

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB	SB
Directions Served	L	L	TR	L	T	R	L	L	T	T	TR	L
Maximum Queue (ft)	678	872	915	23	151	124	387	802	998	1019	1024	125
Average Queue (ft)	283	368	490	1	49	44	51	200	453	490	475	49
95th Queue (ft)	534	725	815	10	105	90	252	766	1000	1021	1025	105
Link Distance (ft)			3919		3634				1120	1120	1120	
Upstream Blk Time (%)									7	8	9	
Queuing Penalty (veh)									44	50	50	
Storage Bay Dist (ft)	1000	1000		350		350	1000	1000				100
Storage Blk Time (%)		0	0					0	9			3
Queuing Penalty (veh)		2	3					0	9			9

Intersection: 250: Huffman St & Brookwood Pkwy

Movement	SB	SB	SB	SB
Directions Served	T	T	T	R
Maximum Queue (ft)	268	280	246	63
Average Queue (ft)	162	185	149	33
95th Queue (ft)	253	278	238	57
Link Distance (ft)	2117	2117	2117	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				300
Storage Blk Time (%)	22			
Queuing Penalty (veh)	10			

Intersection: 260: Genentech & Brookwood Pkwy

Movement	EB	WB	NB	NB	NB
Directions Served	R	R	LT	T	TR
Maximum Queue (ft)	50	47	531	535	491
Average Queue (ft)	22	11	66	66	64
95th Queue (ft)	48	37	378	385	380
Link Distance (ft)		316	1003	1003	1003
Upstream Blk Time (%)			0	0	0
Queuing Penalty (veh)			2	2	1
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 261: Genentech &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 270: Evergreen Pkwy & Brookwood Pkwy

Movement	EB	EB	EB	EB	B1	B1	WB	WB	WB	WB	WB	B310
Directions Served	L	L	T	TR	T	T	L	L	T	T	R	T
Maximum Queue (ft)	521	560	2571	2422	608	612	201	204	338	366	56	378
Average Queue (ft)	474	518	1714	1345	58	53	95	107	215	236	6	13
95th Queue (ft)	623	685	3843	3273	445	437	169	182	315	334	36	271
Link Distance (ft)			4215	4215	1951	1951			4278	4278		1880
Upstream Blk Time (%)			5	2		0						0
Queuing Penalty (veh)			0	0		0						0
Storage Bay Dist (ft)	475	475					250	250			375	
Storage Blk Time (%)	32	46	0				0	0	3	0		
Queuing Penalty (veh)	167	243	3				0	0	8	0		

Intersection: 270: Evergreen Pkwy & Brookwood Pkwy

Movement	B310	NB	NB	NB	NB	B271	B271	SB	SB	SB	SB	SB
Directions Served	T	L	T	T	R	T	T	L	T	T	R	R
Maximum Queue (ft)	378	224	1372	1370	400	1308	1325	574	800	817	417	162
Average Queue (ft)	13	113	1316	1320	174	669	686	409	464	468	48	50
95th Queue (ft)	271	226	1532	1531	481	1479	1507	636	750	739	224	132
Link Distance (ft)	1880		1294	1294		1921	1921		1003	1003	1003	
Upstream Blk Time (%)	0		46	50								
Queuing Penalty (veh)	0		0	0								
Storage Bay Dist (ft)		175			350			475				350
Storage Blk Time (%)		1	68	65				26	7			
Queuing Penalty (veh)		3	71	104				112	11			

Intersection: 360: US-26 WB NB Corn Pass Off-ramp & Cornelius Pass Rd

Movement	EB	B365	WB	WB	NB	NB	NB	SB	SB
Directions Served	R	T	>	>	L	T	T	T	T
Maximum Queue (ft)	311	4	163	183	350	785	754	272	291
Average Queue (ft)	24	0	82	96	241	283	273	240	262
95th Queue (ft)	169	3	136	154	415	801	732	306	278
Link Distance (ft)	412	859	1542	1542		725	725	141	141
Upstream Blk Time (%)	0					6	1	19	50
Queuing Penalty (veh)	0					61	13	146	385
Storage Bay Dist (ft)					325				
Storage Blk Time (%)					21	0			
Queuing Penalty (veh)					183	1			

Intersection: 361: Cornelius Pass Rd &

Movement	NB	NB	SB	SB	SB
Directions Served	T	T	T	T	R
Maximum Queue (ft)	42	49	789	782	200
Average Queue (ft)	3	3	302	422	77
95th Queue (ft)	31	42	729	827	236
Link Distance (ft)	141	141	740	740	
Upstream Blk Time (%)	0	0	1	4	
Queuing Penalty (veh)	1	1	5	36	
Storage Bay Dist (ft)					75
Storage Blk Time (%)				38	
Queuing Penalty (veh)				78	

Intersection: 363: US-26 WB Corn Pass On-ramp &

Movement	NW
Directions Served	L
Maximum Queue (ft)	135
Average Queue (ft)	58
95th Queue (ft)	127
Link Distance (ft)	152
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 370: US-26 EB Corn Pass Off-ramp & Cornelius Pass Rd

Movement	EB	EB	NB	NB	NB	B382	B382	B382	SB	SB	SB
Directions Served	LT	R	T	TR	R	T	T	T	T	T	T
Maximum Queue (ft)	166	17	452	495	449	762	9	762	153	136	193
Average Queue (ft)	82	1	195	239	119	26	0	26	60	59	65
95th Queue (ft)	140	8	402	446	302	547	7	547	124	110	132
Link Distance (ft)		287	1071	1071	1071	3799	3799	3799	116	116	116
Upstream Blk Time (%)						0		0	1	0	0
Queuing Penalty (veh)						0		0	3	1	1
Storage Bay Dist (ft)	200										
Storage Blk Time (%)	0										
Queuing Penalty (veh)	0										

Intersection: 371: Cornelius Pass Rd &

Movement	NB	NB	SB	SB	SB
Directions Served	T	T	T	T	TR
Maximum Queue (ft)	132	116	485	811	851
Average Queue (ft)	28	20	75	327	259
95th Queue (ft)	132	101	384	905	765
Link Distance (ft)	116	116	725	725	725
Upstream Blk Time (%)	2	1		3	3
Queuing Penalty (veh)	24	8		20	20
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 373: Int

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	302	320
Average Queue (ft)	135	156
95th Queue (ft)	255	275
Link Distance (ft)	880	880
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 376: US-26 EB Corn Pass Off-ramp &

Movement	WB
Directions Served	T
Maximum Queue (ft)	379
Average Queue (ft)	222
95th Queue (ft)	491
Link Distance (ft)	255
Upstream Blk Time (%)	33
Queuing Penalty (veh)	234
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 377: US-26 WB Corn Pass Off-ramp &

Movement	WB	WB
Directions Served	>	>
Maximum Queue (ft)	452	442
Average Queue (ft)	345	346
95th Queue (ft)	573	559
Link Distance (ft)	365	365
Upstream Blk Time (%)	36	34
Queuing Penalty (veh)	131	124
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 379: Int

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	354	347
Average Queue (ft)	327	319
95th Queue (ft)	363	345
Link Distance (ft)	254	254
Upstream Blk Time (%)	84	88
Queuing Penalty (veh)	310	324
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 382: Bend

Movement	SB
Directions Served	T
Maximum Queue (ft)	460
Average Queue (ft)	24
95th Queue (ft)	292
Link Distance (ft)	1071
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 390: Wagon Way & Cornelius Pass Rd

Movement	EB	EB	B393	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	T	LR	L	L	T	TR	L	T	T	R
Maximum Queue (ft)	125	415	841	37	170	318	620	689	27	541	581	225
Average Queue (ft)	108	394	817	4	91	116	336	382	1	263	315	78
95th Queue (ft)	156	404	827	19	147	243	606	677	10	455	514	220
Link Distance (ft)		322	801	320			740	740		755	755	
Upstream Blk Time (%)		54	57				0	1			0	
Queuing Penalty (veh)		0	0				5	9			0	
Storage Bay Dist (ft)	100				300	300			100			125
Storage Blk Time (%)	22	51					7			33	37	
Queuing Penalty (veh)	149	124					20			1	36	

Network Summary

Network wide Queuing Penalty: 4283

Appendix D. Freeway Operations Analysis

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Eastbound
Agency or Company	David Evans & Associates, Inc.	Junction	Cornelius Pass Rd Interchange
Date Performed	4-2-12	Jurisdiction	ODOT
Analysis Time Period	AM Peak	Analysis Year	2035 Build

Project Description Eastbound Off-ramp to Cornelius Pass Rd

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☐ Yes ☐ On		☐ Yes ☐ On
☑ No ☐ Off		☑ No ☐ Off
L_{up} = ft	S_{FF} = 60.0 mph S_{FR} = 35.0 mph	L_{down} = ft
V_u = veh/h	Sketch (show lanes, L_A, L_D,V_R,V_f)	V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2790	0.95	Level	4	0	0.980	1.00	2996
Ramp	380	0.95	Level	4	0	0.980	1.00	408
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = using Equation (Exhibit 25-5)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 using Equation (Exhibit 25-12)

V_{12} = 2996 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2996	Exhibit 25-14	4600	No
$V_{FO} = V_F - V_R$	2588	Exhibit 25-14	4600	No
V_R	408	Exhibit 25-3	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2996	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 16.5 (pc/mi/ln)

LOS = B (Exhibit 25-4)

Speed Determination

D_s = 0.465 (Exhibit 25-19)

S_R= 51.6 mph (Exhibit 25-19)

S_0= N/A mph (Exhibit 25-19)

S = 51.6 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Eastbound
Agency or Company	David Evans & Associates, Inc.	Junction	Cornelius Pass Rd Interchange
Date Performed	4-2-12	Jurisdiction	ODOT
Analysis Time Period	AM Peak Period	Analysis Year	2035 Mitigated

Project Description: Eastbound On-ramp from Southbound Cornelius Pass Rd

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2410	0.95	Level	4	0	0.980	1.00	2588
Ramp	345	0.95	Level	4	0	0.980	1.00	370
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.585 using Equation (Exhibit 25-5)

V_{12} = 1513 pc/h

V_3 or V_{av34} 1075 pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2958	Exhibit 25-7		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1883	Exhibit 25-7	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 18.4 (pc/mi/ln)

LOS = B (Exhibit 25-4)

Speed Determination

M_S = 0.329 (Exibit 25-19)

S_R = 54.1 mph (Exhibit 25-19)

S_0 = 57.9 mph (Exhibit 25-19)

S = 55.4 mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-12)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 25-14		
$V_{FO} = V_F - V_R$		Exhibit 25-14		
V_R		Exhibit 25-3		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 25-14		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

D_s = (Exhibit 25-19)

S_R = mph (Exhibit 25-19)

S_0 = mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Eastbound
Agency or Company	David Evans & Associates, Inc.	Junction	Cornelius Pass Rd Interchange
Date Performed	4-2-12	Jurisdiction	ODOT
Analysis Time Period	AM Peak Period	Analysis Year	

Project Description: Eastbound On-ramp from Northbound Cornelius Pass Rd

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2755	0.95	Level	4	0	0.980	1.00	2958
Ramp	540	0.95	Level	4	0	0.980	1.00	580
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.591 using Equation (Exhibit 25-5)

V_{12} = 1750 pc/h

V_3 or V_{av34} 1208 pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3538	Exhibit 25-7		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2330	Exhibit 25-7	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 20.2 (pc/mi/ln)

LOS = C (Exhibit 25-4)

Speed Determination

M_S = 0.326 (Exibit 25-19)

S_R = 54.1 mph (Exhibit 25-19)

S_0 = 57.5 mph (Exhibit 25-19)

S = 55.2 mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-12)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 25-14		
$V_{FO} = V_F - V_R$		Exhibit 25-14		
V_R		Exhibit 25-3		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 25-14		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

D_s = (Exhibit 25-19)

S_R = mph (Exhibit 25-19)

S_0 = mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Cornelius Pass Rd Interchange
Date Performed	4-2-12	Jurisdiction	ODOT
Analysis Time Period	AM Peak	Analysis Year	2035 Build

Project Description Westbound Off-ramp to Northbound Cornelius Pass Rd

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	5820	0.95	Level	4	0	0.980	1.00	6249
Ramp	575	0.95	Level	4	0	0.980	1.00	617
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)
P_{FM} = using Equation (Exhibit 25-5)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)
LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)
S_R = mph (Exhibit 25-19)
S_0 = mph (Exhibit 25-19)
S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = 0.575 using Equation (Exhibit 25-12)
V_{12} = 3858 pc/h
V_3 or V_{av34} 2391 pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	6249	Exhibit 25-14	6900	No
$V_{FO} = V_F - V_R$	5632	Exhibit 25-14	6900	No
V_R	617	Exhibit 25-3	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3858	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 23.9 (pc/mi/ln)
LOS = C (Exhibit 25-4)

Speed Determination

D_s = 0.484 (Exhibit 25-19)
S_R = 51.3 mph (Exhibit 25-19)
S_0 = 60.4 mph (Exhibit 25-19)
S = 54.4 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Cornelius Pass Rd Interchange
Date Performed	4-2-12	Jurisdiction	ODOT
Analysis Time Period	AM Peak	Analysis Year	2035 Build

Project Description: Westbound LOOP Off-ramp to Southbound Cornelius Pass Rd

Inputs

Upstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	5245	0.95	Level	4	0	0.980	1.00	5631
Ramp	1540	0.95	Level	4	0	0.980	1.00	1653
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = using Equation (Exhibit 25-5)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)

S_R = mph (Exhibit 25-19)

S_0 = mph (Exhibit 25-19)

S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.543 using Equation (Exhibit 25-12)

V_{12} = 3814 pc/h

V_3 or V_{av34} 1817 pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	5631	Exhibit 25-14	6900	No
$V_{FO} = V_F - V_R$	3978	Exhibit 25-14	6900	No
V_R	1653	Exhibit 25-3	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3814	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 23.6 (pc/mi/ln)

LOS = C (Exhibit 25-4)

Speed Determination

D_s = 0.577 (Exhibit 25-19)

S_R = 49.6 mph (Exhibit 25-19)

S_0 = 62.6 mph (Exhibit 25-19)

S = 53.2 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Cornelius Pass Rd Interchange
Date Performed	4-2-12	Jurisdiction	ODOT
Analysis Time Period	AM Peak Period	Analysis Year	2035 Build

Project Description Westbound On-ramp from Cornelius Pass Rd

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3705	0.95	Level	2	0	0.990	1.00	3939
Ramp	390	0.95	Level	4	0	0.980	1.00	419
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 using Equation (Exhibit 25-5)

V_{12} = 3939 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4358	Exhibit 25-7		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4358	Exhibit 25-7	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 36.5 (pc/mi/ln)

LOS = E (Exhibit 25-4)

Speed Determination

M_S = 0.594 (Exibit 25-19)

S_R = 49.3 mph (Exhibit 25-19)

S_0 = N/A mph (Exhibit 25-19)

S = 49.3 mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-12)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 25-14		
$V_{FO} = V_F - V_R$		Exhibit 25-14		
V_R		Exhibit 25-3		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 25-14		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

D_s = (Exhibit 25-19)

S_R = mph (Exhibit 25-19)

S_0 = mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Eastbound
Agency or Company	David Evans & Associates, Inc.	Junction	Brookwood Interchange
Date Performed	4-2-12	Jurisdiction	ODOT
Analysis Time Period	AM Peak	Analysis Year	2035 Build

Project Description Eastbound Off-ramp to Brookwood

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2690	0.95	Level	4	0	0.980	1.00	2888
Ramp	470	0.95	Level	4	0	0.980	1.00	505
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)
P_{FM} = using Equation (Exhibit 25-5)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)
LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)
S_R = mph (Exhibit 25-19)
S_0 = mph (Exhibit 25-19)
S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = 1.000 using Equation (Exhibit 25-12)
V_{12} = 2888 pc/h
V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2888	Exhibit 25-14	4600	No
$V_{FO} = V_F - V_R$	2383	Exhibit 25-14	4600	No
V_R	505	Exhibit 25-3	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2888	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 15.6 (pc/mi/ln)
LOS = B (Exhibit 25-4)

Speed Determination

D_s = 0.473 (Exhibit 25-19)
S_R = 51.5 mph (Exhibit 25-19)
S_0 = N/A mph (Exhibit 25-19)
S = 51.5 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Eastbound
Agency or Company	David Evans & Associates, Inc.	Junction	Brookwood Interchange
Date Performed	4-2-12	Jurisdiction	ODOT
Analysis Time Period	AM Peak Period	Analysis Year	2035 Build

Project Description: Eastbound On-ramp from Brookwood

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2220	0.95	Level	4	0	0.980	1.00	2384
Ramp	570	0.95	Level	4	0	0.980	1.00	612
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 using Equation (Exhibit 25-5)

V_{12} = 2384 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2996	Exhibit 25-7		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2996	Exhibit 25-7	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 26.0 (pc/mi/ln)

LOS = C (Exhibit 25-4)

Speed Determination

M_S = 0.370 (Exibit 25-19)

S_R = 53.3 mph (Exhibit 25-19)

S_0 = N/A mph (Exhibit 25-19)

S = 53.3 mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-12)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 25-14		
$V_{FO} = V_F - V_R$		Exhibit 25-14		
V_R		Exhibit 25-3		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 25-14		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

D_s = (Exhibit 25-19)

S_R = mph (Exhibit 25-19)

S_0 = mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Brookwood Interchange
Date Performed	4-2-12	Jurisdiction	ODOT
Analysis Time Period	AM Peak	Analysis Year	2035 Build

Project Description Westbound 1-lane off-ramp to Northbound Helvetia

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	4095	0.95	Level	4	0	0.980	1.00	4397
Ramp	260	0.95	Level	4	0	0.980	1.00	279
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)
P_{FM} = using Equation (Exhibit 25-5)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)
LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)
S_R = mph (Exhibit 25-19)
S_0 = mph (Exhibit 25-19)
S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = 1.000 using Equation (Exhibit 25-12)
V_{12} = 4397 pc/h
V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4397	Exhibit 25-14	4600	No
$V_{FO} = V_F - V_R$	4118	Exhibit 25-14	4600	No
V_R	279	Exhibit 25-3	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4397	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 28.6 (pc/mi/ln)
LOS = D (Exhibit 25-4)

Speed Determination

D_s = 0.453 (Exhibit 25-19)
S_R = 51.8 mph (Exhibit 25-19)
S_0 = N/A mph (Exhibit 25-19)
S = 51.8 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Brookwood Interchange
Date Performed	4-2-12	Jurisdiction	ODOT
Analysis Time Period	AM Peak	Analysis Year	2035 Build

Project Description: Westbound 2-lane Off-ramp to Southbound Brookwood

Inputs

Upstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3835	0.95	Level	4	0	0.980	1.00	4118
Ramp	1910	0.95	Level	4	0	0.980	1.00	2051
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = using Equation (Exhibit 25-5)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)

S_R = mph (Exhibit 25-19)

S_0 = mph (Exhibit 25-19)

S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 using Equation (Exhibit 25-12)

V_{12} = 4118 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4118	Exhibit 25-14	4600	No
$V_{FO} = V_F - V_R$	2067	Exhibit 25-14	4600	No
V_R	2051	Exhibit 25-3	3800	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4118	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 12.7 (pc/mi/ln)

LOS = B (Exhibit 25-4)

Speed Determination

D_s = 0.613 (Exhibit 25-19)

S_R = 49.0 mph (Exhibit 25-19)

S_0 = N/A mph (Exhibit 25-19)

S = 49.0 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Brookwood Interchange
Date Performed	4-2-12	Jurisdiction	ODOT
Analysis Time Period	AM Peak Period	Analysis Year	2035 Build

Project Description Westbound On-ramp from Brookwood

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1925	0.95	Level	4	0	0.980	1.00	2067
Ramp	55	0.95	Level	4	0	0.980	1.00	59
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)
P_{FM} = 1.000 using Equation (Exhibit 25-5)
V_{12} = 2067 pc/h
V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2126	Exhibit 25-7		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2126	Exhibit 25-7	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 19.5 (pc/mi/ln)
LOS = B (Exhibit 25-4)

Speed Determination

M_S = 0.325 (Exibit 25-19)
S_R = 54.2 mph (Exhibit 25-19)
S_0 = N/A mph (Exhibit 25-19)
S = 54.2 mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = using Equation (Exhibit 25-12)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 25-14		
$V_{FO} = V_F - V_R$		Exhibit 25-14		
V_R		Exhibit 25-3		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 25-14		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)
LOS = (Exhibit 25-4)

Speed Determination

D_s = (Exhibit 25-19)
S_R = mph (Exhibit 25-19)
S_0 = mph (Exhibit 25-19)
S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Eastbound
Agency or Company	David Evans & Associates, Inc.	Junction	Jackson School Interchange
Date Performed	4-2-12	Jurisdiction	ODOT
Analysis Time Period	AM Peak	Analysis Year	2035 Build

Project Description Eastbound Off-ramp to Jackson School Rd

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2215	0.95	Level	4	0	0.980	1.00	2378
Ramp	160	0.95	Level	4	0	0.980	1.00	172
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)
P_{FM} = using Equation (Exhibit 25-5)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)
LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)
S_R = mph (Exhibit 25-19)
S_0 = mph (Exhibit 25-19)
S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = 1.000 using Equation (Exhibit 25-12)
V_{12} = 2378 pc/h
V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2378	Exhibit 25-14	4600	No
$V_{FO} = V_F - V_R$	2206	Exhibit 25-14	4600	No
V_R	172	Exhibit 25-3	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2378	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 11.2 (pc/mi/ln)
LOS = B (Exhibit 25-4)

Speed Determination

D_s = 0.443 (Exhibit 25-19)
S_R = 52.0 mph (Exhibit 25-19)
S_0 = N/A mph (Exhibit 25-19)
S = 52.0 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Eastbound
Agency or Company	David Evans & Associates, Inc.	Junction	Jackson School Rd Interchange
Date Performed	4-2-12	Jurisdiction	ODOT
Analysis Time Period	AM Peak Period	Analysis Year	2035 Build

Project Description: Eastbound On-ramp from Jackson School Rd

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2055	0.95	Level	4	0	0.980	1.00	2206
Ramp	635	0.95	Level	4	0	0.980	1.00	682
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 using Equation (Exhibit 25-5)

V_{12} = 2206 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2888	Exhibit 25-7		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2888	Exhibit 25-7	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 24.6 (pc/mi/ln)

LOS = C (Exhibit 25-4)

Speed Determination

M_S = 0.356 (Exibit 25-19)

S_R = 53.6 mph (Exhibit 25-19)

S_0 = N/A mph (Exhibit 25-19)

S = 53.6 mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-12)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 25-14		
$V_{FO} = V_F - V_R$		Exhibit 25-14		
V_R		Exhibit 25-3		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 25-14		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

D_s = (Exhibit 25-19)

S_R = mph (Exhibit 25-19)

S_0 = mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Jackson School Rd Interchange
Date Performed	4-2-12	Jurisdiction	ODOT
Analysis Time Period	AM Peak	Analysis Year	2035 Build

Project Description Westbound Off-ramp to Jackson School Rd

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1980	0.95	Level	4	0	0.980	1.00	2126
Ramp	600	0.95	Level	4	0	0.980	1.00	644
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)
P_{FM} = using Equation (Exhibit 25-5)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)
LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)
S_R = mph (Exhibit 25-19)
S_0 = mph (Exhibit 25-19)
S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = 1.000 using Equation (Exhibit 25-12)
V_{12} = 2126 pc/h
V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2126	Exhibit 25-14	4600	No
$V_{FO} = V_F - V_R$	1482	Exhibit 25-14	4600	No
V_R	644	Exhibit 25-3	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2126	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 9.0 (pc/mi/ln)
LOS = A (Exhibit 25-4)

Speed Determination

D_s = 0.486 (Exhibit 25-19)
S_R = 51.3 mph (Exhibit 25-19)
S_0 = N/A mph (Exhibit 25-19)
S = 51.3 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Jackson School Rd Interchange
Date Performed	4-2-12	Jurisdiction	ODOT
Analysis Time Period	AM Peak Period	Analysis Year	2035 Build

Project Description: Westbound On-ramp from Jackson School Rd

Inputs

Upstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1380	0.95	Level	4	0	0.980	1.00	1482
Ramp	45	0.95	Level	4	0	0.980	1.00	48
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 using Equation (Exhibit 25-5)

V_{12} = 1482 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	1530	Exhibit 25-7		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1530	Exhibit 25-7	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 14.3 (pc/mi/ln)

LOS = B (Exhibit 25-4)

Speed Determination

M_S = 0.304 (Exibit 25-19)

S_R = 54.5 mph (Exhibit 25-19)

S_0 = N/A mph (Exhibit 25-19)

S = 54.5 mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-12)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 25-14		
$V_{FO} = V_F - V_R$		Exhibit 25-14		
V_R		Exhibit 25-3		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 25-14		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

D_s = (Exhibit 25-19)

S_R = mph (Exhibit 25-19)

S_0 = mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Eastbound
Agency or Company	David Evans & Associates, Inc.	Junction	Cornelius Pass Rd Interchange
Date Performed	4-2-12	Jurisdiction	ODOT
Analysis Time Period	PM Peak	Analysis Year	2035 Build

Project Description Eastbound Off-ramp to Cornelius Pass Rd

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3820	0.95	Level	1	0	0.995	1.00	4041
Ramp	295	0.96	Level	1	0	0.995	1.00	309
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)
P_{FM} = using Equation (Exhibit 25-5)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)
LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)
S_R = mph (Exhibit 25-19)
S_0 = mph (Exhibit 25-19)
S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = 1.000 using Equation (Exhibit 25-12)
V_{12} = 4041 pc/h
V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4041	Exhibit 25-14	4600	No
$V_{FO} = V_F - V_R$	3732	Exhibit 25-14	4600	No
V_R	309	Exhibit 25-3	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4041	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 25.5 (pc/mi/ln)
LOS = C (Exhibit 25-4)

Speed Determination

D_s = 0.456 (Exhibit 25-19)
S_R = 51.8 mph (Exhibit 25-19)
S_0 = N/A mph (Exhibit 25-19)
S = 51.8 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Eastbound
Agency or Company	David Evans & Associates, Inc.	Junction	Cornelius Pass Rd Interchange
Date Performed	4-2-12	Jurisdiction	ODOT
Analysis Time Period	PM Peak Period	Analysis Year	2035 Build

Project Description: Eastbound On-Ramp from Northbound Cornelius Pass Rd

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4265	0.95	Level	1	0	0.995	1.00	4512
Ramp	1065	0.96	Level	1	0	0.995	1.00	1115
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)
P_{FM} = 0.591 using Equation (Exhibit 25-5)
V_{12} = 2669 pc/h
V_3 or V_{av34} 1843 pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	5627	Exhibit 25-7		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3784	Exhibit 25-7	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 31.3 (pc/mi/ln)
LOS = D (Exhibit 25-4)

Speed Determination

M_S = 0.458 (Exibit 25-19)
S_R = 51.8 mph (Exhibit 25-19)
S_0 = 55.2 mph (Exhibit 25-19)
S = 52.8 mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = using Equation (Exhibit 25-12)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 25-14		
$V_{FO} = V_F - V_R$		Exhibit 25-14		
V_R		Exhibit 25-3		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 25-14		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)
LOS = (Exhibit 25-4)

Speed Determination

D_s = (Exhibit 25-19)
S_R = mph (Exhibit 25-19)
S_0 = mph (Exhibit 25-19)
S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Eastbound
Agency or Company	David Evans & Associates, Inc.	Junction	Cornelius Pass Rd Interchange
Date Performed	4-2-12	Jurisdiction	ODOT
Analysis Time Period	PM Peak Period	Analysis Year	2035 Build

Project Description: Eastbound On-Ramp from Southbound Cornelius Pass Rd

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3525	0.95	Level	1	0	0.995	1.00	3729
Ramp	740	0.96	Level	1	0	0.995	1.00	775
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.591 using Equation (Exhibit 25-5)

V_{12} = 2206 pc/h

V_3 or V_{av34} 1523 pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4504	Exhibit 25-7		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2981	Exhibit 25-7	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 25.2 (pc/mi/ln)

LOS = C (Exhibit 25-4)

Speed Determination

M_S = 0.363 (Exibit 25-19)

S_R = 53.5 mph (Exhibit 25-19)

S_0 = 56.3 mph (Exhibit 25-19)

S = 54.4 mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-12)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 25-14		
$V_{FO} = V_F - V_R$		Exhibit 25-14		
V_R		Exhibit 25-3		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 25-14		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

D_s = (Exhibit 25-19)

S_R = mph (Exhibit 25-19)

S_0 = mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Cornelius Pass Rd Interchange
Date Performed	4-2-12	Jurisdiction	ODOT
Analysis Time Period	PM Peak	Analysis Year	2035 Build

Project Description Westbound Off-ramp to Northbound Cornelius Pass Rd

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	4355	0.95	Level	1	0	0.995	1.00	4607
Ramp	345	0.95	Level	3	0	0.985	1.00	369
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)
P_{FM} = using Equation (Exhibit 25-5)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)
LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)
S_R = mph (Exhibit 25-19)
S_0 = mph (Exhibit 25-19)
S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = 0.628 using Equation (Exhibit 25-12)
V_{12} = 3030 pc/h
V_3 or V_{av34} 1577 pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4607	Exhibit 25-14	6900	No
$V_{FO} = V_F - V_R$	4238	Exhibit 25-14	6900	No
V_R	369	Exhibit 25-3	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3030	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 16.8 (pc/mi/ln)
LOS = B (Exhibit 25-4)

Speed Determination

D_s = 0.461 (Exhibit 25-19)
S_R = 51.7 mph (Exhibit 25-19)
S_0 = 63.6 mph (Exhibit 25-19)
S = 55.2 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Cornelius Pass Rd Interchange
Date Performed	4-2-12	Jurisdiction	ODOT
Analysis Time Period	PM Peak	Analysis Year	

Project Description: Westbound LOOP Off-ramp to Southbound Cornelius Pass Rd

Inputs

Upstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	4010	0.95	Level	1	0	0.995	1.00	4242
Ramp	750	0.95	Level	3	0	0.985	1.00	801
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = using Equation (Exhibit 25-5)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)

S_R = mph (Exhibit 25-19)

S_0 = mph (Exhibit 25-19)

S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.617 using Equation (Exhibit 25-12)

V_{12} = 2924 pc/h

V_3 or V_{av34} 1318 pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4242	Exhibit 25-14	6900	No
$V_{FO} = V_F - V_R$	3441	Exhibit 25-14	6900	No
V_R	801	Exhibit 25-3	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2924	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 15.9 (pc/mi/ln)

LOS = B (Exhibit 25-4)

Speed Determination

D_s = 0.500 (Exhibit 25-19)

S_R = 51.0 mph (Exhibit 25-19)

S_0 = 64.6 mph (Exhibit 25-19)

S = 54.6 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Cornelius Pass Rd Interchange
Date Performed	4-2-12	Jurisdiction	ODOT
Analysis Time Period	PM Peak Period	Analysis Year	2035 Build

Project Description Westbound On-ramp from Cornelius Pass Rd

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3260	0.95	Level	1	0	0.995	1.00	3449
Ramp	475	0.95	Level	3	0	0.985	1.00	508
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)
P_{FM} = 1.000 using Equation (Exhibit 25-5)
V_{12} = 3449 pc/h
V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3957	Exhibit 25-7		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3957	Exhibit 25-7	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 33.0 (pc/mi/ln)
LOS = D (Exhibit 25-4)

Speed Determination

M_S = 0.490 (Exibit 25-19)
S_R = 51.2 mph (Exhibit 25-19)
S_0 = N/A mph (Exhibit 25-19)
S = 51.2 mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = using Equation (Exhibit 25-12)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 25-14		
$V_{FO} = V_F - V_R$		Exhibit 25-14		
V_R		Exhibit 25-3		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 25-14		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)
LOS = (Exhibit 25-4)

Speed Determination

D_s = (Exhibit 25-19)
S_R = mph (Exhibit 25-19)
S_0 = mph (Exhibit 25-19)
S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Eastbound
Agency or Company	David Evans & Associates, Inc.	Junction	Brookwood Interchange
Date Performed	Orenco Station Area results	Jurisdiction	ODOT
Analysis Time Period	PM Peak	Analysis Year	2035 Build

Project Description: Eastbound - Off-ramp to Brookwood

Inputs

Upstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2960	0.95	Level	1	0	0.995	1.00	3131
Ramp	130	0.95	Level	1	0	0.995	1.00	138
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = using Equation (Exhibit 25-5)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)

S_R = mph (Exhibit 25-19)

S_0 = mph (Exhibit 25-19)

S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 using Equation (Exhibit 25-12)

V_{12} = 3131 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3131	Exhibit 25-14	4600	No
$V_{FO} = V_F - V_R$	2993	Exhibit 25-14	4600	No
V_R	138	Exhibit 25-3	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3131	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 17.7 (pc/mi/ln)

LOS = B (Exhibit 25-4)

Speed Determination

D_s = 0.440 (Exhibit 25-19)

S_R = 52.1 mph (Exhibit 25-19)

S_0 = N/A mph (Exhibit 25-19)

S = 52.1 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Eastbound
Agency or Company	David Evans & Associates, Inc.	Junction	Brookwood Interchange
Date Performed	4-2-12	Jurisdiction	ODOT
Analysis Time Period	PM Peak Period	Analysis Year	

Project Description: Eastbound On-ramp from Brookwood

Inputs

Upstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2830	0.95	Level	1	0	0.995	1.00	2994
Ramp	800	0.95	Level	1	0	0.995	1.00	846
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 using Equation (Exhibit 25-5)

V_{12} = 2994 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3840	Exhibit 25-7		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3840	Exhibit 25-7	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 32.5 (pc/mi/ln)

LOS = D (Exhibit 25-4)

Speed Determination

M_S = 0.474 (Exibit 25-19)

S_R = 51.5 mph (Exhibit 25-19)

S_0 = N/A mph (Exhibit 25-19)

S = 51.5 mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-12)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 25-14		
$V_{FO} = V_F - V_R$		Exhibit 25-14		
V_R		Exhibit 25-3		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 25-14		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

D_s = (Exhibit 25-19)

S_R = mph (Exhibit 25-19)

S_0 = mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Brookwood Interchange
Date Performed	4-2-12	Jurisdiction	ODOT
Analysis Time Period	PM Peak	Analysis Year	2035 Build

Project Description Westbound 1-lane Off-ramp to Northbound Helvetia

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3735	0.95	Level	1	0	0.995	1.00	3951
Ramp	130	0.95	Level	3	0	0.985	1.00	139
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)
P_{FM} = using Equation (Exhibit 25-5)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes,V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)
LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)
S_R= mph (Exhibit 25-19)
S_0= mph (Exhibit 25-19)
S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = 1.000 using Equation (Exhibit 25-12)
V_{12} = 3951 pc/h
V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes,V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3951	Exhibit 25-14	4600	No
$V_{FO} = V_F - V_R$	3812	Exhibit 25-14	4600	No
V_R	139	Exhibit 25-3	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3951	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 24.7 (pc/mi/ln)
LOS = C (Exhibit 25-4)

Speed Determination

D_s = 0.441 (Exhibit 25-19)
S_R= 52.1 mph (Exhibit 25-19)
S_0= N/A mph (Exhibit 25-19)
S = 52.1 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Brookwood Interchange
Date Performed	4-2-12	Jurisdiction	ODOT
Analysis Time Period	PM Peak	Analysis Year	2035 Build

Project Description: Westbound 2-lane Off-ramp to Southbound Brookwood

Inputs

Upstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3605	0.95	Level	1	0	0.995	1.00	3814
Ramp	815	0.95	Level	3	0	0.985	1.00	871
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = using Equation (Exhibit 25-5)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)

S_R = mph (Exhibit 25-19)

S_0 = mph (Exhibit 25-19)

S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 using Equation (Exhibit 25-12)

V_{12} = 3814 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3814	Exhibit 25-14	4600	No
$V_{FO} = V_F - V_R$	2943	Exhibit 25-14	4600	No
V_R	871	Exhibit 25-3	3800	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3814	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 10.1 (pc/mi/ln)

LOS = B (Exhibit 25-4)

Speed Determination

D_s = 0.506 (Exhibit 25-19)

S_R = 50.9 mph (Exhibit 25-19)

S_0 = N/A mph (Exhibit 25-19)

S = 50.9 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Brookwood Interchange
Date Performed	4-2-12	Jurisdiction	ODOT
Analysis Time Period	PM Peak Period	Analysis Year	2035 Build

Project Description: Westbound On-ramp from Brookwood

Inputs

Upstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2790	0.95	Level	1	0	0.995	1.00	2952
Ramp	470	0.95	Level	3	0	0.985	1.00	502
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 using Equation (Exhibit 25-5)

V_{12} = 2952 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3454	Exhibit 25-7		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3454	Exhibit 25-7	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 29.6 (pc/mi/ln)

LOS = D (Exhibit 25-4)

Speed Determination

M_S = 0.416 (Exibit 25-19)

S_R = 52.5 mph (Exhibit 25-19)

S_0 = N/A mph (Exhibit 25-19)

S = 52.5 mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-12)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 25-14		
$V_{FO} = V_F - V_R$		Exhibit 25-14		
V_R		Exhibit 25-3		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 25-14		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

D_s = (Exhibit 25-19)

S_R = mph (Exhibit 25-19)

S_0 = mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Eastbound
Agency or Company	David Evans & Associates, Inc.	Junction	Jackson School Rd Interchange
Date Performed	4-2-12	Jurisdiction	ODOT
Analysis Time Period	PM Peak	Analysis Year	2035 Build

Project Description Eastbound Off-ramp to Jackson School Rd

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2205	0.95	Level	1	0	0.995	1.00	2333
Ramp	25	0.96	Level	1	0	0.995	1.00	26
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)
P_{FM} = using Equation (Exhibit 25-5)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)
LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)
S_R = mph (Exhibit 25-19)
S_0 = mph (Exhibit 25-19)
S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = 1.000 using Equation (Exhibit 25-12)
V_{12} = 2333 pc/h
V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2333	Exhibit 25-14	4600	No
$V_{FO} = V_F - V_R$	2307	Exhibit 25-14	4600	No
V_R	26	Exhibit 25-3	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2333	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 10.8 (pc/mi/ln)
LOS = B (Exhibit 25-4)

Speed Determination

D_s = 0.430 (Exhibit 25-19)
S_R = 52.3 mph (Exhibit 25-19)
S_0 = N/A mph (Exhibit 25-19)
S = 52.3 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Eastbound
Agency or Company	David Evans & Associates, Inc.	Junction	Jackson School Rd Interchange
Date Performed	4-2-12	Jurisdiction	ODOT
Analysis Time Period	PM Peak Period	Analysis Year	2035 Build

Project Description: Eastbound On-Ramp from Jackson School Rd

Inputs

Upstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2180	0.95	Level	1	0	0.995	1.00	2306
Ramp	780	0.96	Level	1	0	0.995	1.00	817
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 using Equation (Exhibit 25-5)

V_{12} = 2306 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3123	Exhibit 25-7		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3123	Exhibit 25-7	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 26.3 (pc/mi/ln)

LOS = C (Exhibit 25-4)

Speed Determination

M_S = 0.375 (Exibit 25-19)

S_R = 53.3 mph (Exhibit 25-19)

S_0 = N/A mph (Exhibit 25-19)

S = 53.3 mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-12)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 25-14		
$V_{FO} = V_F - V_R$		Exhibit 25-14		
V_R		Exhibit 25-3		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 25-14		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

D_s = (Exhibit 25-19)

S_R = mph (Exhibit 25-19)

S_0 = mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Jackson School Rd Interchange
Date Performed	4-2-12	Jurisdiction	ODOT
Analysis Time Period	PM Peak	Analysis Year	2035 Build

Project Description Westbound Off-ramp to Jackson School Rd

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3260	0.95	Level	1	0	0.995	1.00	3449
Ramp	625	0.95	Level	3	0	0.985	1.00	668
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)
P_{FM} = using Equation (Exhibit 25-5)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 25-7		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 25-7		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)
LOS = (Exhibit 25-4)

Speed Determination

M_S = (Exibit 25-19)
S_R = mph (Exhibit 25-19)
S_0 = mph (Exhibit 25-19)
S = mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = 1.000 using Equation (Exhibit 25-12)
V_{12} = 3449 pc/h
V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3449	Exhibit 25-14	4600	No
$V_{FO} = V_F - V_R$	2781	Exhibit 25-14	4600	No
V_R	668	Exhibit 25-3	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3449	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 20.4 (pc/mi/ln)
LOS = C (Exhibit 25-4)

Speed Determination

D_s = 0.488 (Exhibit 25-19)
S_R = 51.2 mph (Exhibit 25-19)
S_0 = N/A mph (Exhibit 25-19)
S = 51.2 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Josh Anderson	Freeway/Dir of Travel	US 26 Westbound
Agency or Company	David Evans & Associates, Inc.	Junction	Jackson School Rd Interchange
Date Performed	4-2-12	Jurisdiction	ODOT
Analysis Time Period	PM Peak Period	Analysis Year	2035 Build

Project Description: Westbound On-ramp from Jackson School Rd

Inputs

Upstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 60.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2635	0.95	Level	1	0	0.995	1.00	2788
Ramp	175	0.95	Level	3	0	0.985	1.00	187
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 using Equation (Exhibit 25-5)

V_{12} = 2788 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 25-8)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2975	Exhibit 25-7		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2975	Exhibit 25-7	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 25.5 (pc/mi/ln)

LOS = C (Exhibit 25-4)

Speed Determination

M_S = 0.362 (Exibit 25-19)

S_R = 53.5 mph (Exhibit 25-19)

S_0 = N/A mph (Exhibit 25-19)

S = 53.5 mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-12)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 25-14		
$V_{FO} = V_F - V_R$		Exhibit 25-14		
V_R		Exhibit 25-3		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 25-14		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 25-4)

Speed Determination

D_s = (Exhibit 25-19)

S_R = mph (Exhibit 25-19)

S_0 = mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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Appendix E:
JTA Traffic Analysis

US 26/Brookwood Parkway/Helvetia Road Interchange Project

JTA US 26/Brookwood/Helvetia Interchange Analysis Key # 16842
Final Technical Memorandum

Prepared for:

Oregon Department of Transportation
123 NW Flanders
Portland, OR 97209

Prepared by:

David Evans and Associates, Inc.
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Portland, Oregon 97201

January 2012

INTRODUCTION

In 2009, the Oregon Legislature provided funds for the planning, design, and construction of the Brookwood/Helvetia interchange with US 26 as part of House Bill 2001, the Oregon Jobs and Transportation Act (JTA). The project will improve the interchange by reducing congestion and increasing safety. The JTA provides $45 million of the $70 million total cost of the interchange, which includes the following elements:

- Constructing a new westbound US 26 to southbound Brookwood Parkway exit loop ramp
- Reconstructing the westbound entrance ramp
- Widen the structure of the overcrossing to allow for up to six travel lane and the associated shoulders, bicycle, and pedestrian needs on Brookwood Parkway
- Extending the northbound right-turn lane from Brookwood Parkway to the eastbound US 26 on-ramp
- Provide for at least two north and southbound through lanes on Brookwood Parkway through the interchange

This technical memorandum provides the data, analysis, and conclusions of the traffic-related impacts of the proposed ultimate design within the JTA study area, as well as potential phases of the project from phase 1 through the ultimate design.

The JTA study area is focused on the US 26/Brookwood/Helvetia interchange. As shown in **Figure 1**, the JTA study area includes US 26 operations at the interchange and operations on Brookwood/Helvetia from Schaff Road on the north to just north of Huffman Road on the south.

PHASING ALTERNATIVES

As shown in **Figure 2**, there are three potential phases, in addition to a no-build alternative, that are being studied as potential phases leading up to an ultimate design. The three initial phases are described below. Note that two designs for phase two were studied, with the intention of identifying the one that best meets the needs of the transportation system as a whole. The phases were analyzed for opening day (2015), interim year, and ultimate design year (2035).

No-Build:

There are currently no planned transportation improvement projects within the JTA study area; therefore, the no-build alternative lane configurations were identical to the existing lane configurations. While the shoulders on both sides of the Brookwood/Helvetia overcrossing are wide enough to accommodate pedestrians and/or bicyclists, there are no designated pedestrian or bicycle facilities within the JTA study area. Brookwood to the south has a posted speed limit of 55 miles per hour while Helvetia to the north is not posted and is governed by the basic rule. **Figure 3** graphically depicts the lane configurations for existing and no-build.

Phase 1, New Loop Ramp:

This alternative includes the addition of a loop ramp from a new westbound US 26 off-ramp to southbound Brookwood Parkway. The one-lane off-ramp would widen to two lanes once the single exit lane clears the Brookwood/Helvetia overpass structure and begins to curve as it approaches Brookwood/Helvetia. The loop ramp would provide for two right-turn lanes through

the signalized interchange ramp terminal. The loop ramp would connect to Brookwood/Helvetia in the location of the current Jacobson intersection. The westbound on-ramp would be shifted north to the location of the current Jacobson intersection. The Jacobson Road connection, in turn, would be shifted about 700 feet to the north. The section of Helvetia between the new Jacobson Road connection and the new westbound off ramp will be widened to accommodate a four lane cross section. The current westbound off-ramp would remain in its current location, but the allowable movements would be limited to right turns off of the freeway only. The lane geometry of the west approach to the eastbound ramp terminal would be slightly modified; the current left turn lane would become a shared left, through, right turn lane. Additionally, a roughly 900 foot northbound right-turn lane from Brookwood to the eastbound US 26 on-ramp would be provided to accommodate queuing emanating from the ramp-meter. **Figure 4** graphically depicts the lane configurations for Phase 1.

Phase 2, Increase Westbound-to-Southbound Capacity:

As land use served by the Brookwood/Helvetia interchange develops, traffic volumes at the interchange will increase, eventually exceeding the operational capacity of the Phase 1 improvements. Phase 2 provides additional capacity at the interchange primarily to serve westbound-to-southbound traffic flow. Two options have been developed for this phase: Option A and Option B. Which option is needed first will depend on where traffic volumes increase over time. The two Phase 2 options are described below, along with an indication of which particular movements benefit from additional capacity provided in the phase.

Phase 2, Option A, Widen Southbound Brookwood/Helvetia:

This alternative builds upon the capacity enhancements of Phase 1 by widening southbound Brookwood/Helvetia to three lanes from the loop ramp south to either Huffman Street or Evergreen Parkway, which are south of the JTA study area. This option provides additional capacity southbound on Brookwood/Helvetia to help accommodate growth in the total traffic moving through the westbound and eastbound ramp terminal intersections, including traffic from the loop ramp, southbound traffic on Helvetia, and traffic on the US 26 westbound off-ramp. It does not provide additional capacity on US 26. **Figure 5** graphically depicts the lane configurations for Phase 2, Option A.

Phase 2, Option B, Two-Lane Loop Ramp Exit:

This alternative builds upon the capacity enhancements of Phase 1 by widening the one-lane loop ramp to two lanes. This widening results in one dedicated and one choice lane off of US 26 to the loop ramp. This option provides additional capacity on westbound US 26 to help accommodate growth in traffic on the loop ramp. It does not provide additional capacity on Brookwood/Helvetia. **Figure 6** graphically depicts the lane configurations for Phase 2, Option B.

Phase 3, Ultimate Design:

This alternative combines the improvements of Phase 1, Phase 2A, and Phase 2B and results in a two-lane off-ramp from westbound US 26, a two-lane loop ramp, two right-turn lanes from the loop ramp to southbound Brookwood Parkway and three southbound through lanes on Brookwood to south of the JTA study area. Phase 3 would also include the relocation of Jacobson roughly 700 feet north on Helvetia, an additional right-turn lane from eastbound US26

to southbound Brookwood, and an additional 900 feet of storage length for the northbound right-turn from Brookwood to US 26 eastbound. **Figure 7** graphically depicts the lane configurations for Phase 3.

EXISTING TRAFFIC VOLUME DEVELOPMENT

Oregon Department of Transportation's (ODOT) Transportation Planning Analysis Unit (TPAU) has developed procedures for calculating current year traffic volumes from traffic count data. The procedure is outlined in the Analysis Procedure Manual (APM) and is used to determine the 30th highest hour volumes for existing analysis.

Initial raw count data was collected on Wednesday, May 25, 2011 at the following locations:

- Helvetia Road and Schaff Road
- Helvetia Road and Jacobson Road
- Brookwood Parkway and US 26 Westbound Ramp Terminal
- Brookwood Parkway and US 26 Eastbound Ramp Terminal
- Brookwood Parkway and Meek Road
- Brookwood Parkway and Huffman Street

Traffic data for all of the above locations were collected for a three-hour AM peak period (6 to 9 AM) and three-hour PM peak period (4 to 7 PM), with the exception of the two ramp terminals. Both ramp terminals were counted for a 16-hour period from 5 AM to 9 PM.

The raw data was processed, and the peak hours for the AM and PM periods were identified. A common peak hour was chosen based upon a majority of intersection counts with the same peak hour. The common peak hour chosen was 7:30 to 8:30 for the AM peak period and 4:30 to 5:30 for the PM peak period. The existing traffic count information is summarized in **Appendix A.**

The 30th highest hour traffic volumes are calculated by applying a seasonal factor to the peak hour volumes. Automatic Traffic Recorder (ATR) Characteristic Tables were used for calculating seasonal adjustment factors, because representative ATRs were easily identified. The ATR closest to the JTA study area with similar traffic flows, area type, and lane configurations was used. For locations on US 26, the ATRs with similar characteristics are:

- 09-007 (US 97; MP 135.95; The Dalles-California Highway; 0.49 mile south of Empire Avenue
- 20-011 (OR 569; MP 12.00; Beltline Highway; 0.76 mile west of I-5

A seasonal factor of 1.04 was determined for ATR 09-007. This seasonal factor was calculated by comparing five years'worth of ATR data (from 2005 to 2009) averaged for the count month (May) and June. The average for both months was used in accordance with APM procedures that suggest that when counts are near the end of a month, they should be averaged with data from the following month. The average ATR data from May/June was compared with the peak month at the ATR (generally August for most of the five years). The lowest percent and highest percent of overall Average Daily Traffic (ADT) were removed from the data set, and the remaining three years of count month data (May/June) were compared to the peak month data, yielding a seasonal adjustment factor of 1.04.

A similar procedure was completed for ATR 20-011, with the resultant seasonal factor calculated to be 1.05. Taking the average of the two seasonal factors calculated from the ATRs results in a seasonal factor of 1.05. This factor is then applied to all of the raw count turning-movement volumes from the data collection effort. The seasonally adjusted volumes were input into Synchro and balanced accordingly. To err on the side of caution, it is preferable to add traffic to the system instead of removing it, and that approach was taken whenever possible. A spreadsheet detailing the calculations used in developing the seasonal adjustment factors are found in **Appendix B.**

After the application of the annual and seasonal factors, traffic volumes were balanced across the JTA study area to account for the lack of traffic sources or sinks along Brookwood Parkway/Helvetia Road between Schaff Road and Huffman Street. The majority of the differences in traffic volumes were small, on the order of 5 to 20 vehicles; however, there was a difference of 190 vehicles in the southbound direction between the westbound and eastbound ramp terminals.

To validate the May ramp terminal counts, additional data was collected on Wednesday, July 20, 2011, at both the eastbound and westbound ramp terminals, as well as one location on US 26 between the Cornelius Pass and Brookwood/Helvetia interchanges. The existing traffic counts for both May and July are in **Appendix A.**

The July counts resulted in no imbalance of volumes between the eastbound and westbound ramp terminals and were deemed more accurate than the original May counts. The July ramp terminal counts were used, with the exception of a few isolated turning-movement volumes to/from US 26. At specific turn locations, the higher May counts were used. Volume was then added to the northbound and southbound through movements to balance the corridor.

The resultant volumes are balanced between the ramp terminals and use the highest volumes collected for the individual ramp terminal movements, which is a conservative approach in determining operations for the ramp terminals. **Figure 8** depicts existing year 2011 30th highest hour turning movement volumes. All volumes shown are in vehicles (NOT Passenger Car Equivalents).

Pedestrian and bicycle counts were conducted at the same time as the vehicular volume counts. The non vehicular count volumes were very low, indicative of a rural high vehicular speed interchange with no dedicated pedestrian or bicycle facilities. The JTA study area intersections served, at maximum, one pedestrian and three bicycles per hour.

2035 VOLUME DEVELOPMENT

For volume development, the ODOT APM methods were used. To convert model volumes to design hour volumes the link-based method, was followed, as instructed by the APM. The two most commonly used link based methods are the growth method and the difference method.

Both methods were compared in a spreadsheet. When the difference between the growth and difference methods were large, the difference method was used. When the difference between the two methods was small, the average of the growth and difference methods was used. This technique is consistent with the preferred method in National Cooperative Highway Research

Program (NCHRP) Report 255. The forecasted approach (link) volumes were then input into a NCHRP Report 255 spreadsheet and, through an iterative process, the 2035 turning-movement volumes were calculated. These volumes were rounded to the nearest five vehicles and then balanced in Synchro. This link-based process was also used for the US 26 mainline projections. Interchange ramp volumes were held constant based on the intersection forecasts, and the freeway mainline volumes were balanced outward from the freeway segment between the Cornelius Pass and Brookwood/Helvetia interchanges. **Figures 9** and **10** depict future year 2035 volumes for No Build and Build lane configurations, respectively. All volumes shown are in calculated turn vehicles (NOT PCE's).

INTERIM YEAR VOLUME DEVELOPMENT

Interim year volumes were calculated using a compounding growth rate equation, resulting in less growth in the earlier years and more growth in each subsequent year. An analysis of METRO's MetroScope models over the years has shown that a compounding growth rate more closely fits projected volumes than linear growth equations. **Figures 11** through **13** depict interim year 2015 and 2025 volumes for the No Build and Build lane configurations. All volumes shown are in vehicles (NOT PCE's).

AVERAGE DAILY TRAFFIC AND TRUCK PERCENTAGE

Average daily traffic (ADT) volumes were calculated using the 16-hour counts collected at the interchange ramp terminals and 18-hour counts collected along the US 26 mainline to the east of the Brookwood Parkway interchange.

The Federal Highway Administration breaks down the traffic composition into 13 classifications. ODOT's standard is to denote classes four through 13 as heavy vehicles. An evaluation of the METRO travel demand model heavy vehicle travel patterns was conducted and deemed to be not representative of actual conditions. Therefore, existing heavy vehicle percentages were assumed for all future year phases.

Figure 14 depicts link based ADT volumes and heavy vehicle percentages within the JTA study area for the years 2011, 2015, and 2035.

SAFETY ANALYSES

Traffic and roadway design engineers are continually engaged in working to ensure that a system is designed and operated such that the frequency and severity of crashes can be reduced for all modes of travel. Improving roadway safety (reducing the frequency and/or severity of crashes) requires consideration of several elements that influence traffic operations: in addition to design aspects of a roadway, driver education, enforcement, and emergency medical services are also essential.

A crash analysis was conducted to determine whether any significant, documented safety issues exist within the JTA study area and to identify specific measures or general strategies for improving overall safety. As part of the crash analysis, historical crash data was reviewed,

intersection crash rates were calculated, and the state's Safety Priority Index System (SPIS) was examined.

Crash Rates

Crash rates were calculated for the JTA study area intersections, and for the segment of US 26 surrounding the interchange. At intersections, the crash rate is calculated as the number of crashes per million vehicles entering the intersection. Intersections with a crash rate greater than 1.0 crashes per million entering vehicles (crashes/mev) generally warrant closer investigation but are not necessarily indicative of safety concerns. None of the study intersections had a crash rate higher than 1.0 crashes/mev. In fact, the highest crash rate is 0.20 at the eastbound ramp terminal.

For the US 26 mainline segment surrounding the interchange (M.P. 61.79-62.79), the crash rate is calculated as the number of crashes per million vehicle miles traveled (crashes/mvm). Along the US 26 segment surrounding the JTA study area, the two-year average crash rate is 0.29. For comparable freeway/expressways within urban segments, the three year crash rate was approximately three times the rate at 0.64 crashes/mvm.[1]

Crash History

The crash analysis included a review of crash history data supplied by the ODOT Crash Analysis and Reporting Unit for the period between January 1, 2008, and December 31, 2010, which represents the three most recent full years for which crash data were available at the time of the analysis. The data is summarized in **Table 1**, with the detailed reports contained in **Appendix D.**

For the study intersections, the ODOT database includes records for 13 crashes. The data highlights the corridor as having a low incidence of traffic crashes, and no reported serious injuries or fatalities. Approximately 38 percent (5 crashes) of all reported crashes involved minor injuries, and the remaining 62 percent (8 crashes) were property-damage-only (PDO) crashes. The majority of crashes (8) were rear-end-related, a type of crash that is frequently attributed to congestion and queuing. None of the reported crashes were recorded as speed- or alcohol-related. There were not any reported bicycle or pedestrian crashes within the JTA study area. There are no obvious crash trends that would warrant mitigation.

For the segment of US 26 surrounding the interchange, the ODOT database includes records for 21 crashes. The data highlights the corridor as having a low incidence of traffic crashes (with a crash rate lower than the statewide average), only one report of a serious injury (5 percent of the freeway crashes), and no fatalities.

Looking at the entire study (US 26 and the JTA study area intersections), approximately 50 percent of the reported crashes involved minor injuries, 47 percent were PDO, and only three percent were serious injury crashes. Rear-end-related (21), and fixed-object related (5) crashes make up the majority of the collision types. None of the reported crashes were recorded as alcohol-related, and only two of the crashes were recorded as speed-related. There are no obvious crash trends that would warrant mitigation.

[1] 2009 Oregon State Highway Crash Rate Tables, Table 4, ODOT, August 2010.

Looking at the interchange area as a whole, the severity of crashes are relatively low, as shown in the chart to the right. The review of historical crash data does not suggest that any significant crash patterns are present, with regard to details such as location, year, time of day, or weather.

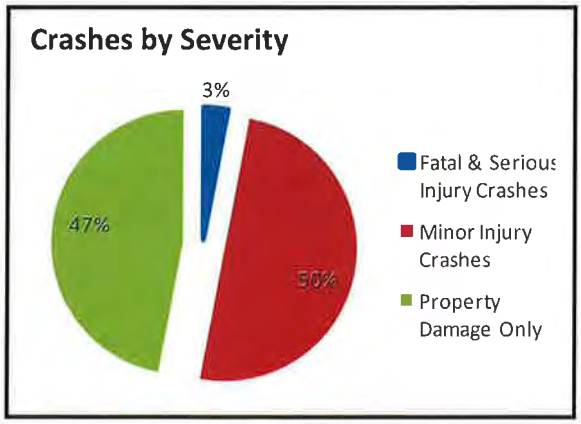

Table 1. Summary of Collision Types within the Brookwood JTA Study Area (January 1, 2008, through December 31, 2010)

Study Location	Collision Type								Total	Severity			Crash Rate
	Rear End	Fixed Object	Angle	Turning	Head On	Non-Collision	Bicycle	Pedestrian		Fatal & Serious Injury Crashes	Minor Injury Crashes	Property Damage Only	
Brookwood Parkway / Helvetia Road													
At Jacobson Rd	0	0	0	0	0	0	0	0	**0**	0	0	0	0.00
At WB Ramp Terminal	2	1	0	1	0	0	0	0	**4**	0	3	1	0.18
At EB Ramp Terminal	3	1	0	1	0	1	0	0	**6**	0	2	4	0.20
At Meek Rd	3	0	0	0	0	0	0	0	**3**	0	0	3	0.10
US 26 (M.P. 61.79-62.79)	13	3	0	0	0	0	0	0	**21**	1	12	8	0.34
Total JTA Study Area Crashes	**21**	**5**	**0**	**2**	**0**	**1**	**0**	**0**	**34**	1	17	16	
% Crashes by Type	62%	15%	0%	6%	0%	3%	0%	0%		3%	50%	47%	

NOTE: Crashes occurred between January 1, 2008 and December 31, 2010.

Safety Priority Index System (SPIS)

The SPIS is a method used in Oregon to identify safety problem areas along state highways. Highways are evaluated in approximately one-tenth-mile increments (often grouped into larger segments). Each year these segments are ranked by assigning a SPIS score based on the frequency and severity crashes observed, while taking traffic volume into account. When a segment is ranked in the top 10 percent of the index, a crash analysis is typically warranted and corrective actions are considered. Along US 26 within the JTA study area, there are no segments identified in the top 10 percent of the most recent (2010) SPIS rankings.

MOBILITY STANDARDS

ODOT mobility standards apply to the US 26 mainline and ramps, and to both ramp terminals. ODOT uses the volume-to-capacity (v/c) ratio as its standard measurment. As volume approaches capacity, the v/c ratio increases towards 1.0. A v/c ratio of 1.0 indicates that the volume at the given location is at capacity. A v/c ratio greater than 1.0 indicates that the volume exceeds the capacity of the location. For existing and no-build conditions, the applicable v/c standard is based on the Oregon Highway Plan (OHP) and is not to exceed 0.99. For any build conditions, the applicable v/c standard is based on the Highway Design Manual (HDM) and is not to exceed 0.75. The Washington County v/c standard applies to all other intersections in the JTA study area and is 0.99. None of the JTA study area intersections are governed by the City of Hillsboro.

Due to the cost of the ultimate design, the interchange will have to be phased over multiple years as funding becomes available. The initial goal of each phase is to meet HDM standards (v/c of less than 0.75) on the opening day of the phase. The following phase should be opened before the preceeding phase fails to meet OHP standards (v/c of less than 1.00). For example, Phase 1 should be built before existing operations exceed a v/c ratio 1.00. When Phase 1 construction completes, it should operate at a v/c ratio of less than 0.75. Phase 2A or 2B should be build before phase 1 operations exceed a v/c ratio of 1.00. When Phase 2A or 2B construction completes it should operate at a v/c ratio of less than 0.75. Etc…

TRAFFIC OPERATIONS RESULTS

This section describes, in detail, the operations of each phase under opening day volume as well as breakdown year volume. Breakdown is defined as an intersection or ramp area that fails to meet applicable standards and/or queuing that poses a potential safety concern. Detailed operational analysis is in **Appendix C.**

One trouble spot common to all scenarios in all time periods and lane configurations is the western approach to the intersection of Brookwood Pkwy at Meek Rd. This approach experiences excessive congestion today and is not expected to improve under any scenario. Although not included in this analysis, it is ODOT's intention to close Meek Rd and, with the City of Hillsboro and/or Washington County assistance, provide alternative access to Brookwood Pkwy via a new roadway. The alternative access for Meek Rd will be identified as part of the IAMP process for the Brookwood/Helvetia interchange.

Existing (2011):

All ODOT and Washington County facilities meet applicable OHP standards (v/c less than 1.00) and Washington County standards (v/c less than 0.99) with existing year volumes. **Figures 15** and **16** depict the existing 2011 v/c ratios, delay, and queue lengths.

No-Build (2015):

With a 11 percent growth in total interchange traffic volumes, an increase that is likely to occur around 2015, the existing ODOT facilities meet the applicable OHP standards (v/c less than 1.00), but the SimTraffic micro-simulation model shows queuing on the westbound off-ramp

from US 26 to Brookwood that extends back into the safe stopping sight distance for traffic exiting the freeway. All Washington County facilities meet applicable standards. There are no other excessive queues or delays experienced by drivers under the 2015 no-build conditions. **Figures 17** and **18** depict the 2015 no-build v/c ratios, delay, and queue lengths.

Phase 1, New Loop Ramp (2015):

All ODOT facilities are expected to meet the applicable HDM standards (v/c less than 0.75) under Phase 1 operations in 2015. The addition of the westbound-to-southbound loop ramp with this phase improves operations at the westbound ramp terminal and eliminates the safety concerns for vehicles exiting the freeway that were present in the no-build scenario. All Washington County facilities meet applicable standards. There are no other excessive queues or delays experienced by drivers under the 2015 Phase 1 conditions. **Figures 19** and **20** depict the 2015 Phase 1 v/c ratios, delay, and queue lengths.

Phase 1, New Loop Ramp (2023-2027):

With a 28 percent growth in total interchange traffic volumes, an increase that is likely to occur between the year 2023 and the year 2027, the Phase 1 ODOT facilities meet the applicable OHP standards (v/c less than 1.00), but the SimTraffic micro-simulation model shows slowing and congestion around the diverge point of the westbound-to-southbound loop ramp from US 26 to Brookwood. This exit ramp has a v/c ratio of 0.83 and traffic volumes near the capacity point, and any small amounts of friction (lane changing, cautious driving, tapping the breaks) can lead to the breakdown of the traffic stream.

Demand for the eastbound on-ramp meter exceeds its capacity of 800 vehicles per hour (vph) in the PM peak hour and is creating a standing queue that affects operations along northbound Brookwood. All Washington County facilities meet applicable standards. There are no other excessive queues or delays experienced by drivers under the 2025 Phase 1 conditions. **Figures 21** and **22** depict the 2023-2027 Phase 1 v/c ratios, delay, and queue lengths.

Phase 2, Option A, Widen Southbound Brookwood/Helvetia (2023-2027):

With a 28 percent growth in total interchange traffic volumes, and the addition of a southbound through lane on Brookwood in Phase 2, Option A, one ODOT facility is expected to continue to fail to meet the applicable HDM standards. The westbound off-ramp from US 26 to southbound Brookwood is expected to have a v/c ratio of 0.83, which exceeds the HDM standard of 0.75. The addition of a southbound through lane on Brookwood to the south of the westbound ramp terminal fails to alleviate the slowing and congestion around the diverge point of the westbound-to southbound loop ramp from US 26 to Brookwood. As a result, the addition of another southbound through lane on Brookwood under Phase 2A does not extend the functional life of the interchange compared to Phase 1, because congestion will remain on the freeway at the diverge point of the westbound-to-southbound loop ramp from US 26 to Brookwood.

Demand for the eastbound on-ramp meter exceeds its capacity of 800 vehicles per hour (vph) in the PM peak hour and is creating a standing queue that affects operations along northbound Brookwood. All Washington County facilities meet applicable standards. There are no other excessive queues or delays experienced by drivers under the 2025 Phase 2A conditions. **Figures 23** and **24** depict the 2023-2027 Phase 2, Option A v/c ratios, delay, and queue lengths.

Phase 2, Option B, Two-Lane Loop Ramp Exit (2023-2027):

With a 28 percent growth in total interchange traffic volumes, and the addition of a second exit lane to the loop ramp in Phase 2, Option B, one ODOT facility fails to meet the applicable HDM standard. The eastbound ramp terminal is expected to have a v/c ratio of 0.78, which exceeds the HDM standard of 0.75. While the v/c ratio is over the standard, the average vehicle through the intersection would only experience a 14-second delay, and no long standing queues are expected to be present.

The addition of the second off-ramp lane from westbound US 26 to southbound Brookwood also alleviates the slowing and congestion around the diverge point of the westbound-to-southbound loop ramp from US 26 to Brookwood.

The demand for the eastbound on-ramp to US 26 exceeds capacity and continues to affect operations on northbound Brookwood with a 28 percent growth in total interchange traffic volumes. All Washington County facilities meet applicable standards. There are no other excessive queues or delays experienced by drivers under the 2025 Phase 2B conditions. **Figures 25** and **26** depict the 2023-2027 Phase 2, Option B v/c ratios, delay, and queue lengths.

No-Build (2035):

By 2035, without interchange improvements, both ramp terminals would fail to meet the OHP standard (v/c less than 1.00) in at least one peak hour with demands that are expected to exceed capacity in 2035. The demand for both the westbound and eastbound off-ramps from US 26 to Brookwood/Helvetia are expected to exceed capacity. The resulting queues are expected to influence operations on the US 26 mainline and result in safety concerns in both directions.

The demand for the eastbound on-ramp to US 26 exceeds its capacity and affects operations on northbound Brookwood. The merge area from Brookwood to US 26 eastbound is expected to operate with a v/c ratio of 0.84. This ratio could be higher if there is a change in the ramp-meter rate. Today the ramp-meter allows 800 vph onto westbound US 26 in the PM peak hour. In 2035 the demand for the ramp is expected to climb to 950 vph. If the ramp-meter rate were to increase, it could result in slowing, congestion, and safety concerns around the merge area.

The east approach to the intersection of Helvetia at Jacobson is expected to have a demand that exceeds the capacity of the stopped side street. This condition fails to meet applicable Washington County standards. **Figures 27** and **28** depict the 2035 no-build v/c ratios, delay, and queue lengths.

Phase 2, Option B, Two-Lane Loop Ramp Exit (2035+):

With a 50 percent growth in total interchange traffic volumes, an increase that is likely to occur on or after 2035, the ODOT facilities meet the applicable OHP standards (v/c less than 1.00) under Phase 2, Option B. However, both ramp terminals would fail to meet the HDM standards (v/c less than 0.75) which the ODOT regulations require if this was the ultimate design.

While the v/c ratios are over the standard, the vehicles through the intersections would experience an average delay of less than 27 seconds. The only queue that would be expected is a roughly 850 foot queue on the loop ramp as it approaches southbound Brookwood. This queue

does not cause safety concerns, as there is still safe stopping sight distance after the diverge point from US 26.

Consistent with the results shown in the 2023-2027 analysis, the second off-ramp lane from westbound US 26 to southbound Brookwood has alleviated the slowing and congestion around the diverge point of the westbound-to-southbound loop ramp.

The demand for the eastbound on-ramp to US 26 continues to exceed capacity and continues to affect operations on northbound Brookwood. As with the no-build scenario, the merge area from Brookwood to US 26 eastbound operates near capacity.

All Washington County facilities meet applicable standards. There are no other excessive queues or delays experienced by drivers under the 2035 Phase 2, Option B conditions. **Figures 29** and **30** depict the 2035 Phase 2, Option B v/c ratios, delay, and queue lengths.

It should be noted that development patterns around the interchange may not follow those used in the METRO travel demand model, because the areas to the southwest of the interchange are likely to experience significant land use development over the next 20 years or more. As a result of the uncertainty in growth patterns, it is possible that Phase 2, Option B will not function adequately and that the addition of an additional southbound lane on Brookwood as part of Phase 2, Option A may be needed sooner than 2035. In fact, it is possible that changes in growth patterns could result in Phase 2, Option A improvements being needed before Phase 2, Option B improvements.

Phase 3, Ultimate Design (2035+):

This alternative combines the improvements of Phase 1, Phase 2A, and Phase 2B and results in a two-lane off-ramp from US 26 to southbound Brookwood Parkway and three southbound through lanes on Brookwood to south of the JTA study area. With a 50 percent growth in total interchange traffic volumes, an increase that is likely to occur on or after 2035, the westbound ramp terminal fails to meet ODOT HDM standards (v/c less than 0.75), with an expected v/c ratio of 0.86. Although the v/c ratio is greater than the standard, the average vehicle through the intersection would experience a delay of less than a 15 seconds. A design exception would need to be obtained for a design that fails to meet ODOT's standards in the forecast year.

The demand for the eastbound on-ramp to US 26 exceeds capacity and continues to affect operations on northbound Brookwood. As with the 2035 no-build and 2035 Phase 2, Option B scenarios, the merge area from Brookwood to US 26 eastbound operates near capacity.

All Washington County facilities meet applicable standards. There are no other excessive queues or delays experienced by drivers under the 2035 Phase 3 conditions. **Figures 31** and **32** depict the 2035 Phase 3 v/c ratios, delay, and queue lengths.

SUMMARY OF FINDINGS

Analysis of the proposed phases and eventual fully redesigned Brookwood/Helvetia interchange using projected interim and 2035 future year traffic volumes reveal the following high-level findings.

No-Build:

- Review of existing crash data in the interchange study area found relatively low crash rates and no significant safety concerns.
- With an 11 percent increase (roughly year 2015) in total interchange traffic volumes through the study area intersections, the existing interchange is expected to have operations degrade to a point where capacity constraints at the westbound ramp terminal would cause queuing that would extend back into the safe stopping distance of the westbound US 26 off ramp, causing a safety concern.

Phase 1, New Loop Ramp:

- An opening day (year 2015) analysis of Phase 1 shows that the proposed new westbound US 26 to southbound Brookwood Pkwy exit loop ramp operations would meet jurisdictional standards. The demand at the US 26 eastbound on-ramp meter is higher than the ramp meter service rate, resulting in a standing queues that would influence operations along northbound Brookwood Parkway.
- A 28 percent growth in total interchange traffic volumes (roughly years 2023 to 2027) would cause Phase 1 to fail to meet jurisdictional standards due to slowing and friction on mainline US 26 westbound around the diverge area to southbound Brookwood.

Phase 2, Increase Westbound-to-Southbound Capacity:

- Analysis of Phase 2A with a 28 percent growth in total interchange traffic volumes (roughly years 2023 to 2027), shows that the addition of a third southbound lane on Brookwood/Helvetia would not address the first breakdown in operations of the Phase 1 interchange, which is projected to occur along westbound US 26 as traffic volumes increase on the exit loop ramp to southbound Brookwood Pkwy.
- Analysis of Phase 2B, with a 28 percent growth in total interchange traffic volumes (roughly years 2023 to 2027), shows that the addition of a second exit lane (choice lane) to the loop ramp results in a notable improvement in operations on the US 26 mainline. Phase 2B is expected to be a viable phase until total interchange traffic volume grows by 50 percent, which, based on the Metro model, is not expected to occur until roughly year 2035 or later.
- It should be noted that development patterns around the interchange may not follow those used in the Metro travel demand model, because the areas to the southwest of the interchange are likely to experience significant land use development over the next 20 years and more. As a result of the uncertainty in growth patterns, it is possible that Phase 2, Option B will not function adequately and that the addition of an additional southbound lane on Brookwood as part of Phase 2, Option A may be needed sooner than 2035. In fact, it is possible that Phase 2, Option A may be needed on a time frame similar to that of Phase 2, Option B.

Phase 3, Ultimate Design:

- Under the 50 percent traffic growth time frame (roughly year 2035), there is only one area of potential concern of Phase 3. The demand at the ramp-meter to eastbound US 26 is higher than the ramp meter service rate, which may result in standing queues that would exceed the storage length of the additional northbound right-turn lane and end up having an influence on operations along northbound Brookwood Parkway.

Table 2 on the next page shows a summary of the operations of each phase on opening day and when and how each phase would be expected to fail to meet standards. Only operations that would be expected to fail to meet standards or would create unsafe operations are listed in the summary table. The picture below **Table** 2 represents a graphical timeline of when each phase would be expected to open and when it would be expected to fail to meet standards, based on projected METRO growth patterns.

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Table 2: Traffic Operations Summary

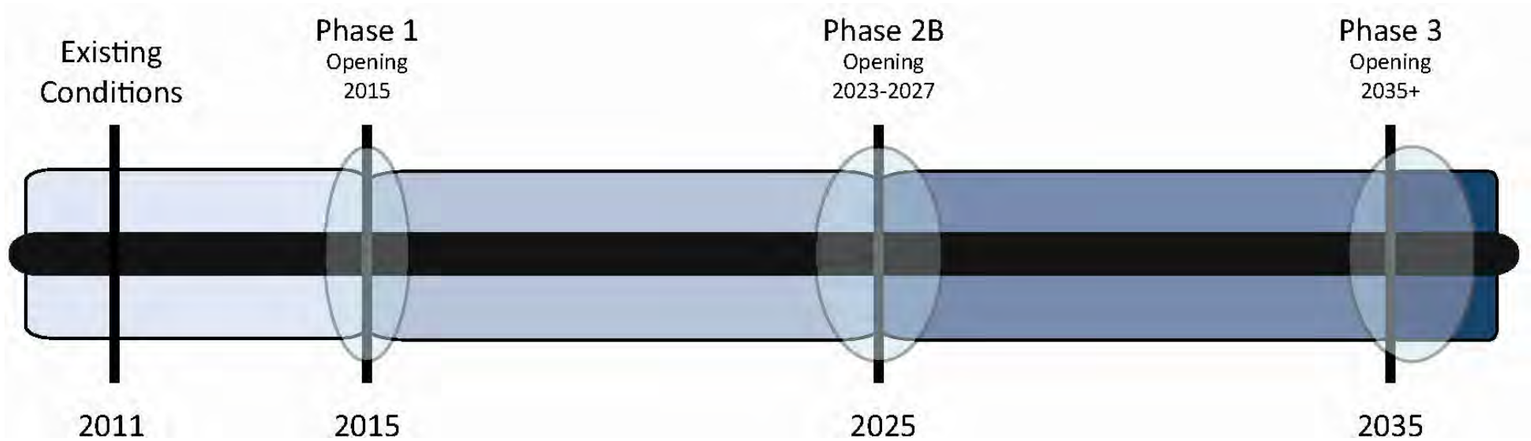
Scenario / Standard	Existing	No-Build		Phase 1		Phase 2A	Phase 2B		Phase 3
	2011 (v/c[1] < 0.99)	**2015 (v/c < 0.99)**	**2035 + (v/c < 0.99)**	**2015 (v/c < 0.75)**	**2023-2027 (v/c < 0.99)**	**2023-2027 (v/c < 0.75)**	**2023-2027 (v/c < 0.75)**	**2035+ (v/c < 0.99)**	**2035+ (v/c < 0.75)**
Ramp Terminal Capacity	Meets Standards	Meets Standards	Both ramp terminals would fail to meet Oregon Highway Plan (OHP) v/c standards in at least one time period.	Meets Standards	Meets Standards	Westbound ramp terminal would not meet Highway Design Manual (HDM) v/c standards in the AM peak.	Eastbound ramp terminal would not meet HDM v/c standards in the AM peak.	Meets Standards	Westbound ramp terminal would not meet HDM v/c standards in the AM peak.
Freeway Capacity	Meets Standards	Meets Standards	The westbound off-ramp to Brookwood would fail to meet the OHP v/c standards in the AM peak.	Meets Standards	Meets Standards	Westbound off-ramp to southbound Brookwood would not meet HDM v/c standards in the AM peak.	Meets Standards	Meets Standards	Meets Standards
Queuing	Meets Standards	Eastbound on-ramp demand exceeds capacity, and the associated queue impacts operations on northbound Brookwood in the PM peak. Westbound off-ramp queuing approaching Brookwood/Helvetia backs into the safe stopping sight distance of the US26 mainline off-ramp, causing a safety concern.	Eastbound on-ramp demand exceeds capacity, and the associated queue impacts operations on northbound Brookwood in the PM peak. Congestion/queuing would be expected to occur on the US 26 mainline due to demand that exceeds capacity for the westbound off-ramp to Brookwood/Helvetia.	Eastbound on-ramp demand exceeds capacity, and the associated queue impacts operations on northbound Brookwood in the PM peak.	Eastbound on-ramp demand exceeds capacity, and the associated queue impacts operations on northbound Brookwood in the PM peak. The demand for the westbound loop ramp to southbound Brookwood exceeds capacity and causes slowing/friction on the US 26 mainline in the AM peak.	Eastbound on-ramp demand exceeds capacity, and the associated queue impacts operations on northbound Brookwood in the PM peak. The demand for the westbound loop ramp to southbound Brookwood exceeds capacity and causes slowing/friction on the US 26 mainline in the AM peak.	Eastbound on-ramp demand exceeds capacity, and the associated queue impacts operations on northbound Brookwood in the PM peak.	Eastbound on-ramp demand exceeds capacity, and the associated queue impacts operations on northbound Brookwood in the PM peak.	Eastbound on-ramp demand exceeds capacity, and the associated queue impacts operations on northbound Brookwood in the PM peak.

[1] *v/c = volume-to-capacity ratio.*

SOURCE: Intersection operational results were obtained through the use of the Synchro/SimTraffic model. US 26 operational results were obtained through the use of the Highway Capacity Software.

NOTE: All HCS freeway results are based on the 2003 Highway Capacity Manual (HCM) Methodologies and are subject to the exlusions of the 2003 HCM.

Potential JTA Phasing Timeline



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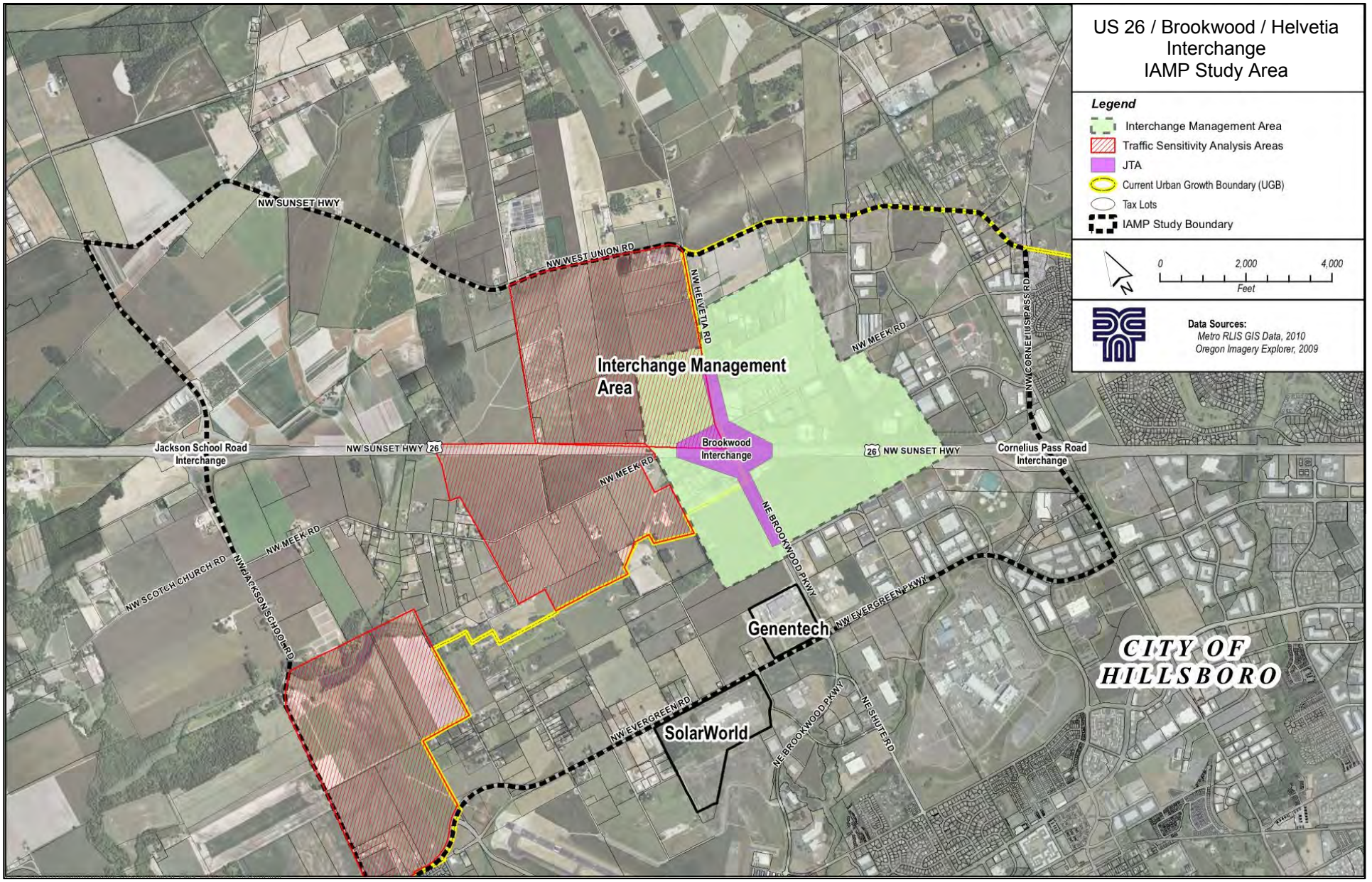

DAVID EVANS AND ASSOCIATES INC.

FIGURE 1

JTA Study Area

JTA Brookwood Interchange Analysis

Printed: 1/12/2012

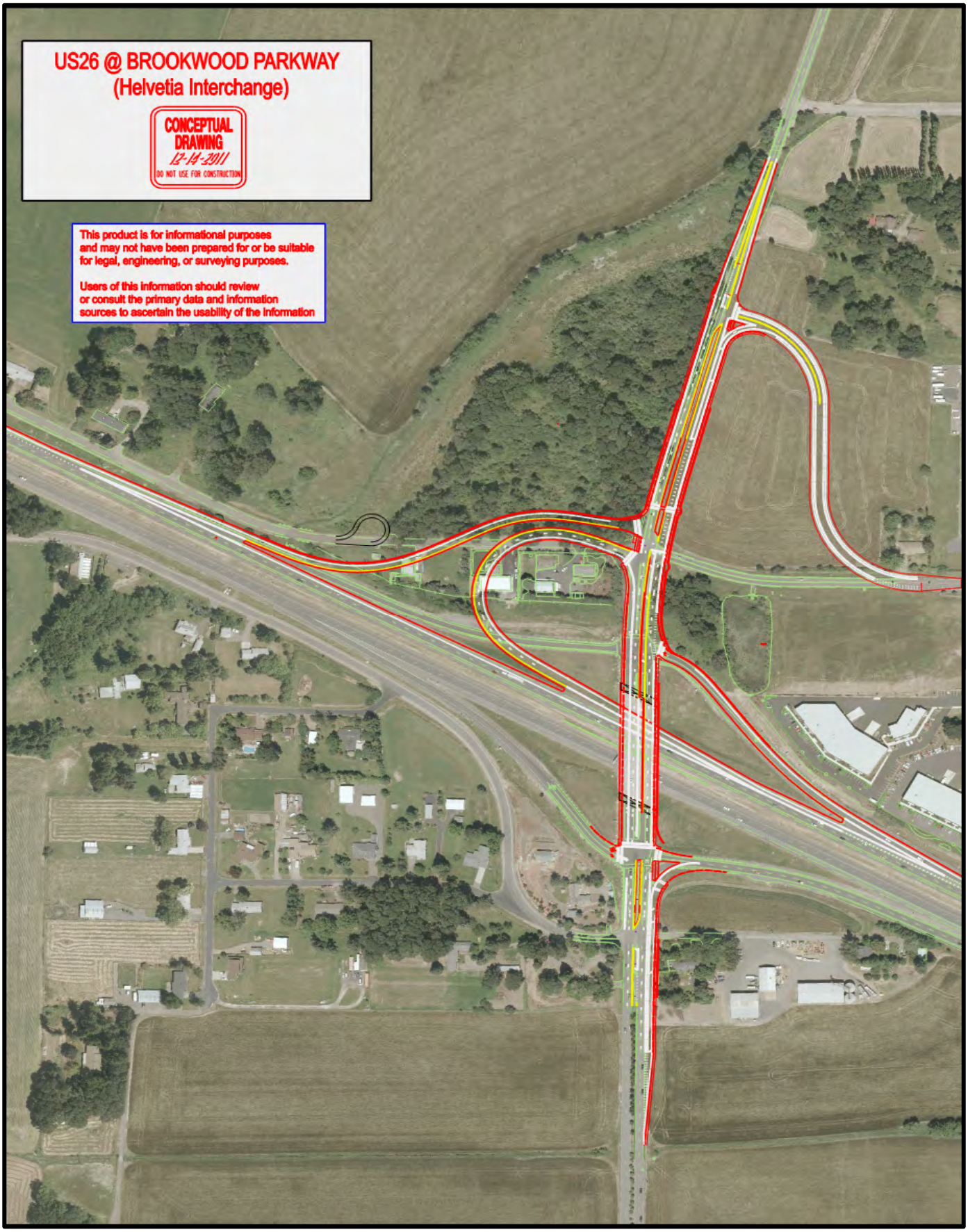

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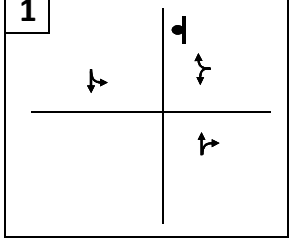
FIGURE 2

Proposed Phase 1 Design

JTA Brookwood Interchange Analysis

Printed: 1/12/2012

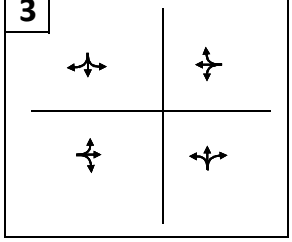
1 Helvetia Rd @ Schaff Rd



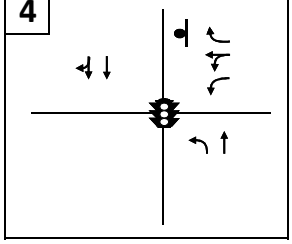
2 Helvetia @ N/A

Intersection Proposed in Build Scenarios Only

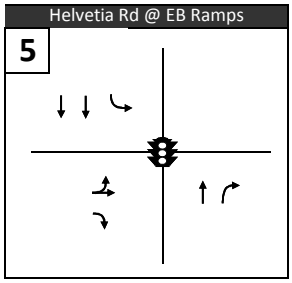
3 Helvetia Rd @ Jacobson Rd



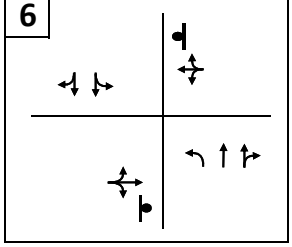
4 Helvetia Rd & WB Ramps



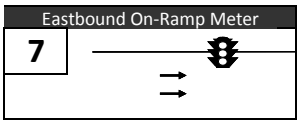
5 Helvetia Rd @ EB Ramps



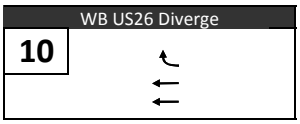
6 Helvetia Rd @ Meek Rd



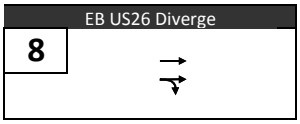
7 Eastbound On-Ramp Meter



10 WB US26 Diverge



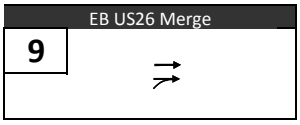
8 EB US26 Diverge



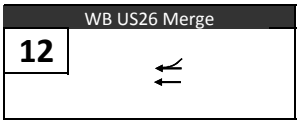
11 WB US26 to N/A

Intersection Proposed in Build Scenarios Only

9 EB US26 Merge



12 WB US26 Merge



DAVID EVANS AND ASSOCIATES INC.

Legend

→ Existing Turning Movement

FIGURE 3

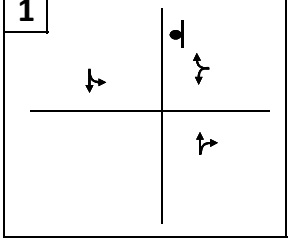
Existing Lane Configurations

JTA Brookwood Interchange Analysis

Printed: 1/12/2012

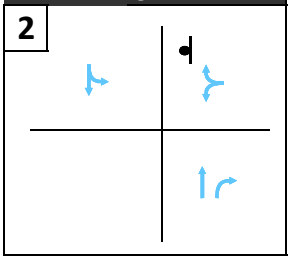
Helvetia Rd @ Schaff Rd

1



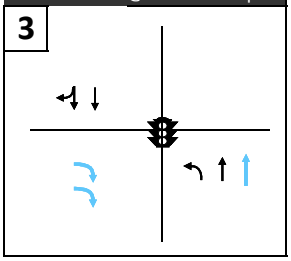
Helvetia Rd @ Jacobson Rd

2



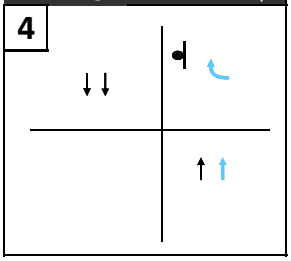
Helvetia Rd @ WB On-Ramp

3



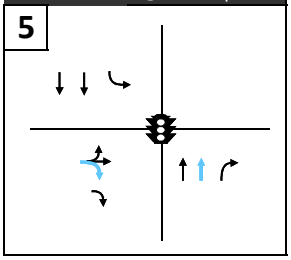
Helvetia @ WB to NB Off-Ramp

4



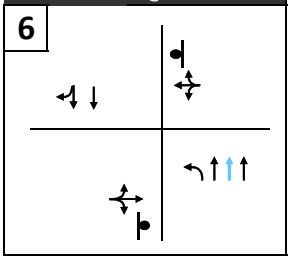
Helvetia Rd @ EB Ramps

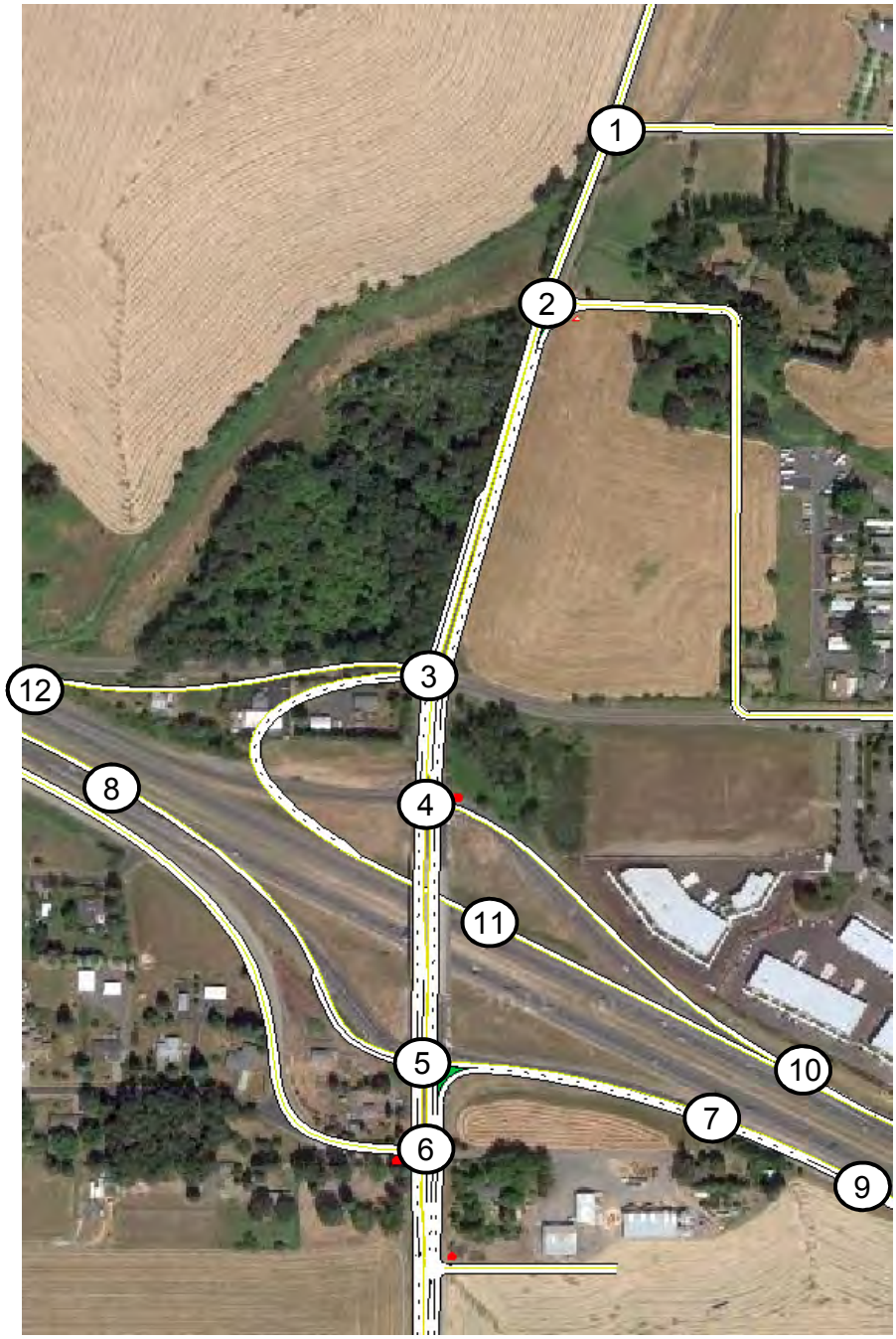
5



Helvetia Rd @ Meek Rd

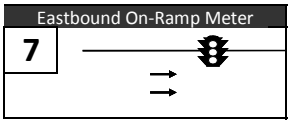
6





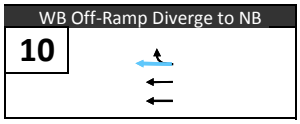
Eastbound On-Ramp Meter

7



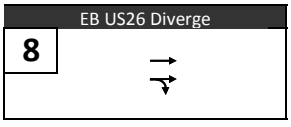
WB Off-Ramp Diverge to NB

10



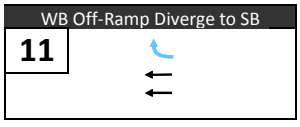
EB US26 Diverge

8



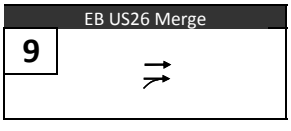
WB Off-Ramp Diverge to SB

11



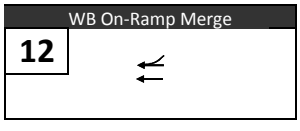
EB US26 Merge

9



WB On-Ramp Merge

12



DAVID EVANS AND ASSOCIATES INC.

Legend

Existing Turning Movement

New Phase 1 Turning Movement

FIGURE 4

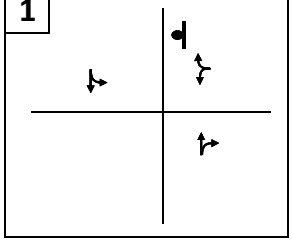
Phase 1 Lane Configurations

JTA Brookwood Interchange Analysis

Printed: 1/12/2012

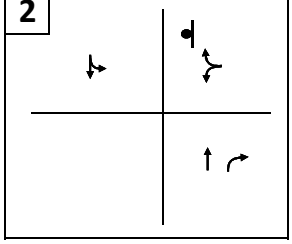
Helvetia Rd @ Schaff Rd

1



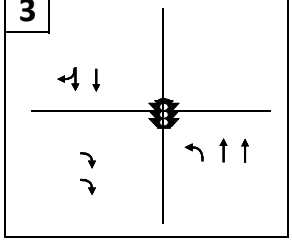
Helvetia Rd @ Jacobson Rd

2



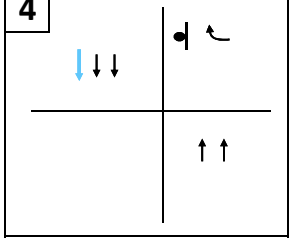
Helvetia Rd @ WB On-Ramp

3



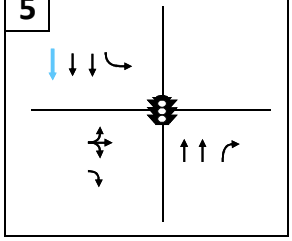
Helvetia @ WB to NB Off-Ramp

4



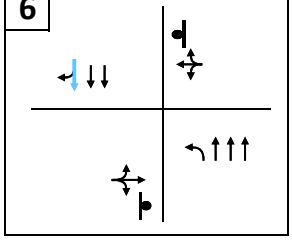
Helvetia Rd @ EB Ramps

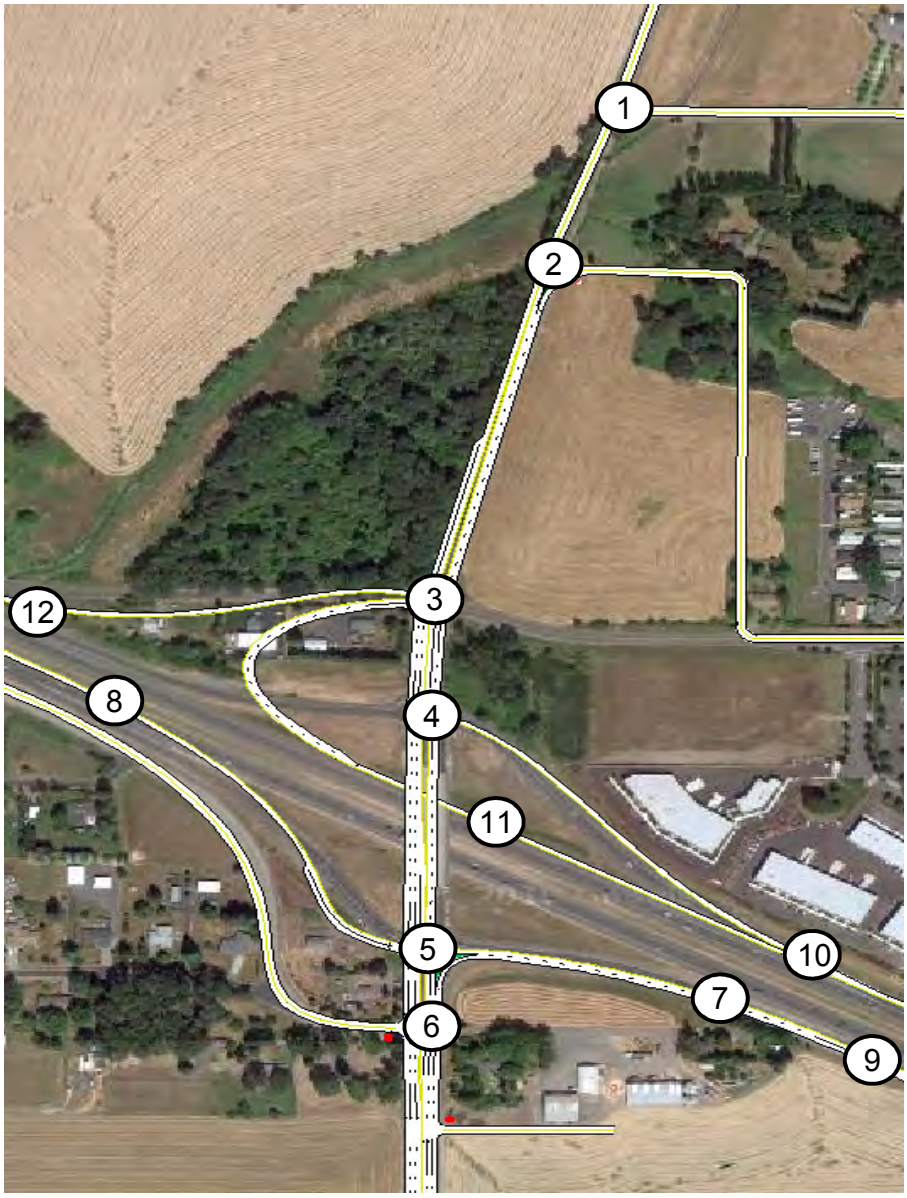
5



Helvetia Rd @ Meek Rd

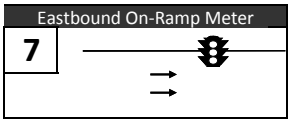
6





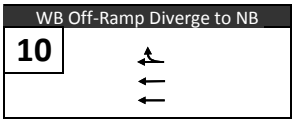
Eastbound On-Ramp Meter

7



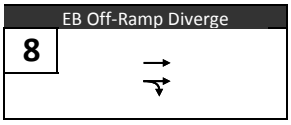
WB Off-Ramp Diverge to NB

10



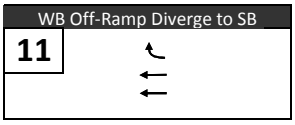
EB Off-Ramp Diverge

8



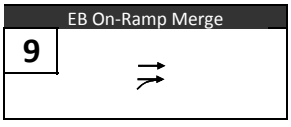
WB Off-Ramp Diverge to SB

11



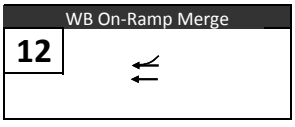
EB On-Ramp Merge

9



WB On-Ramp Merge

12



DAVID EVANS AND ASSOCIATES INC.

Legend

Phase 1 Turning Movement

New Phase 2, Option A Turning Movement

FIGURE 5

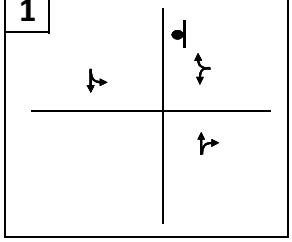
Phase 2, Option A Lane Configurations

JTA Brookwood Interchange Analysis

Printed: 1/12/2012

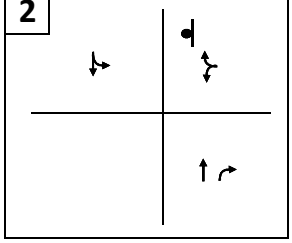
Helvetia Rd @ Schaff Rd

1



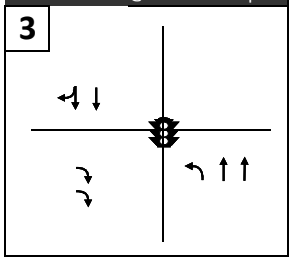
Helvetia Rd @ Jacobson Rd

2



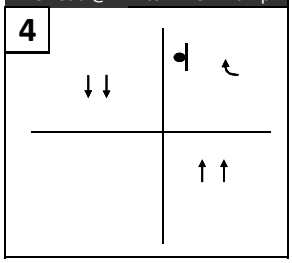
Helvetia Rd @ WB On-Ramp

3



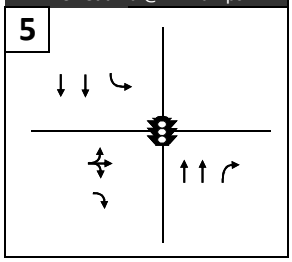
Helvetia @ WB to NB Off-Ramp

4



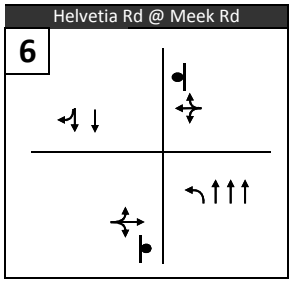
Helvetia Rd @ EB Ramps

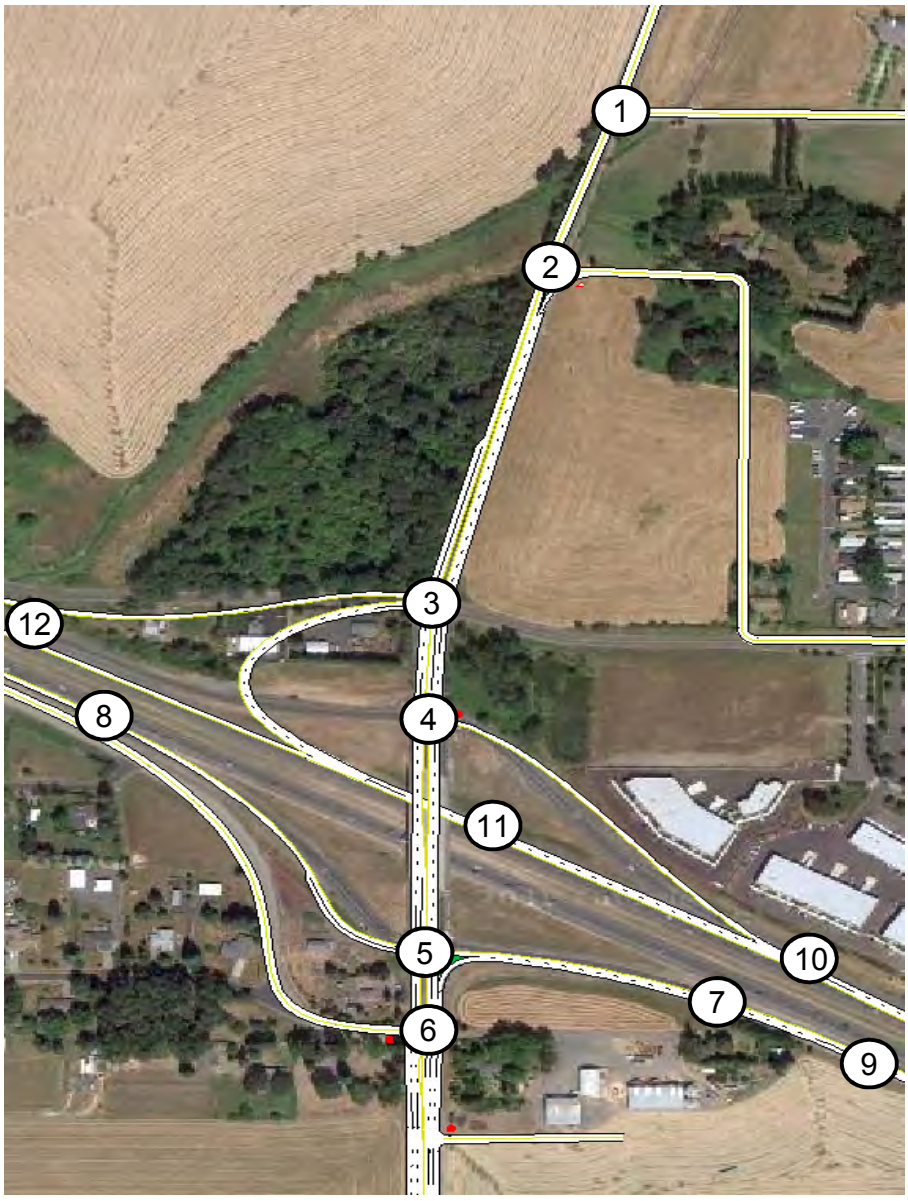
5



Helvetia Rd @ Meek Rd

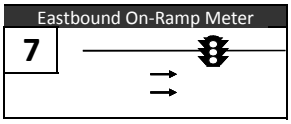
6





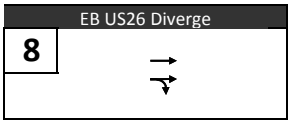
Eastbound On-Ramp Meter

7



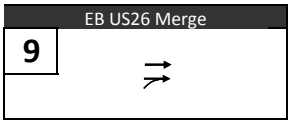
EB US26 Diverge

8



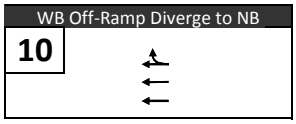
EB US26 Merge

9



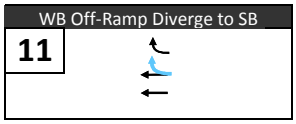
WB Off-Ramp Diverge to NB

10



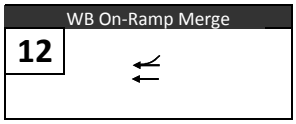
WB Off-Ramp Diverge to SB

11



WB On-Ramp Merge

12



DAVID EVANS AND ASSOCIATES INC.

Legend

Phase 1 Turning Movement

New Phase 2 Option B Turning Movement

FIGURE 6

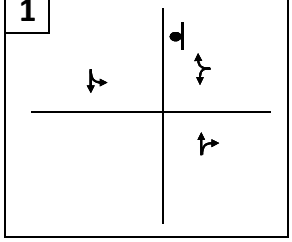
Phase 2, Option B Lane Configurations

JTA Brookwood Interchange Analysis

Printed: 1/12/2012

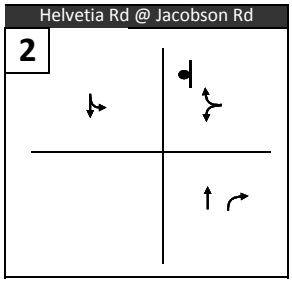
Helvetia Rd @ Schaff Rd

1



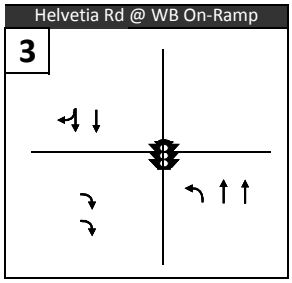
Helvetia Rd @ Jacobson Rd

2



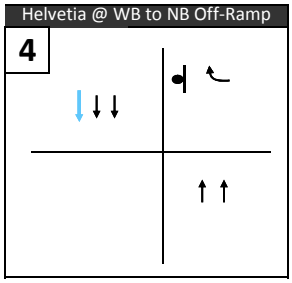
Helvetia Rd @ WB On-Ramp

3



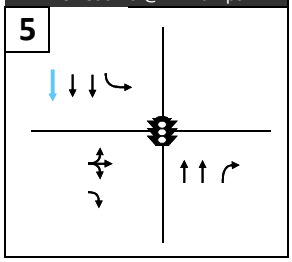
Helvetia @ WB to NB Off-Ramp

4



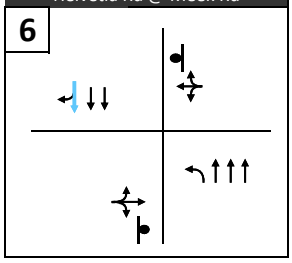
Helvetia Rd @ EB Ramps

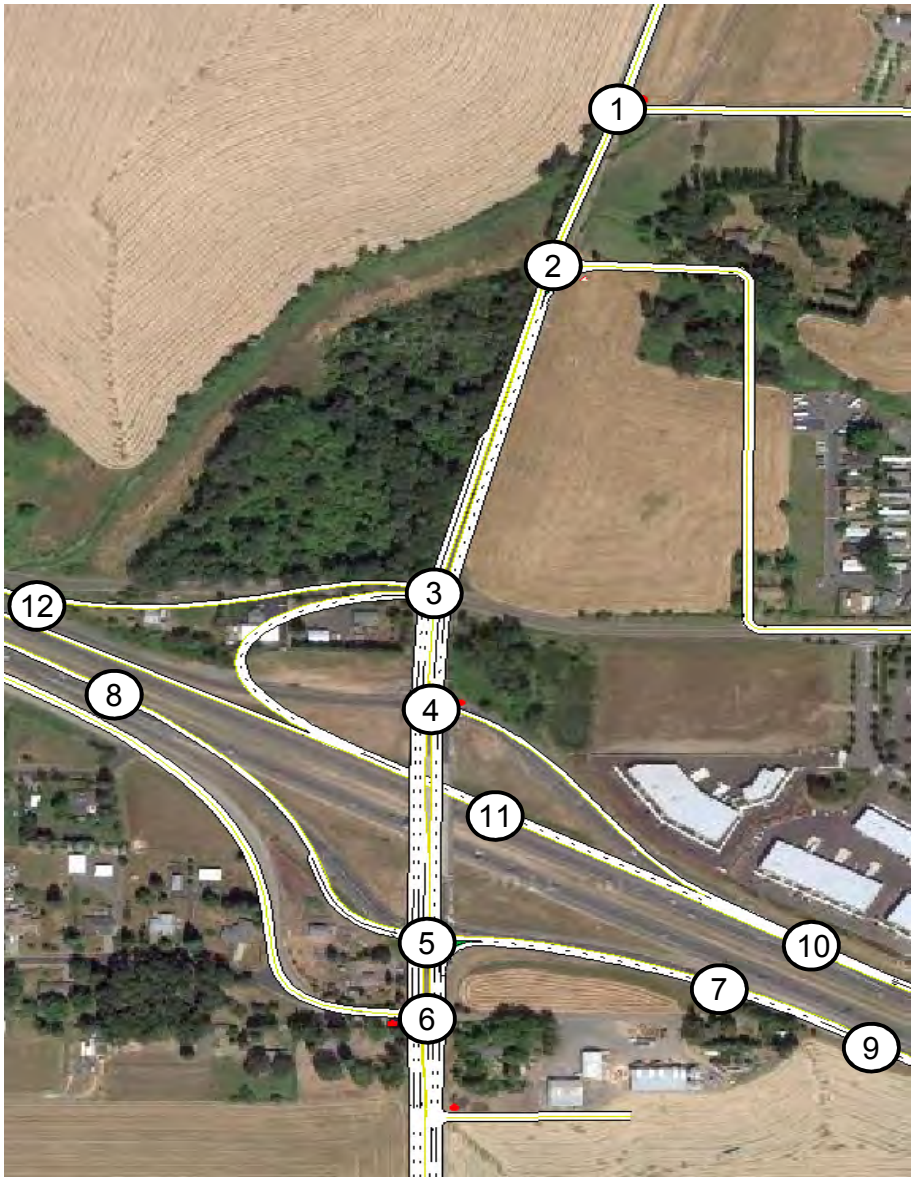
5



Helvetia Rd @ Meek Rd

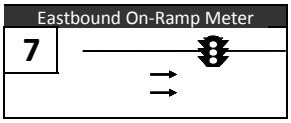
6





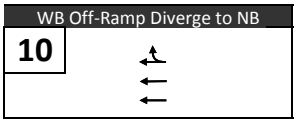
Eastbound On-Ramp Meter

7



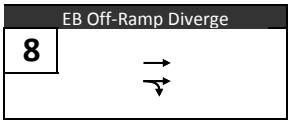
WB Off-Ramp Diverge to NB

10



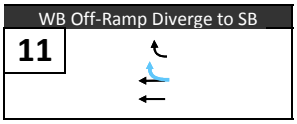
EB Off-Ramp Diverge

8



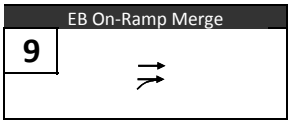
WB Off-Ramp Diverge to SB

11



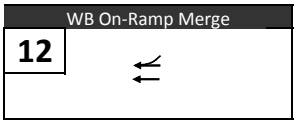
EB On-Ramp Merge

9



WB On-Ramp Merge

12



DAVID EVANS AND ASSOCIATES INC.

Legend

Phase 1 Turning Movement

New Phase 3 Turning Movement

FIGURE 7

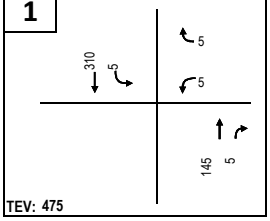
Phase 3 Lane Configurations

JTA Brookwood Interchange Analysis

Printed: 1/12/2012

AM Peak Period

Helvetia Rd & Schaff Rd
1

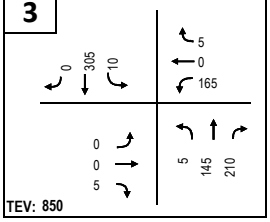


TEV: 475

Helvetia Rd @ N/A
2

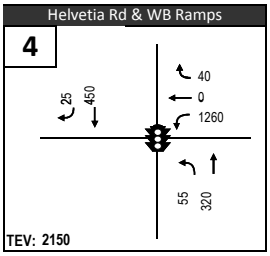
Intersection Proposed in Build Scenarios Only

Helvetia Rd & Jacobson Rd
3



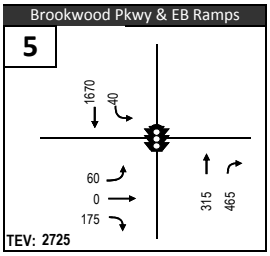
TEV: 850

Helvetia Rd & WB Ramps
4



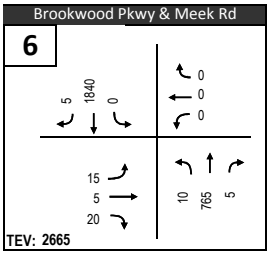
TEV: 2150

Brookwood Pkwy & EB Ramps
5



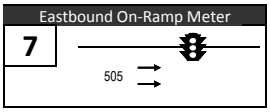
TEV: 2725

Brookwood Pkwy & Meek Rd
6



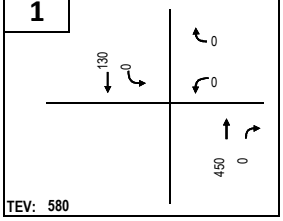
TEV: 2665

Eastbound On-Ramp Meter
7



PM Peak Period

Helvetia Rd & Schaff Rd
1

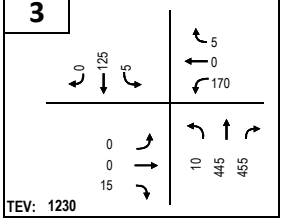


TEV: 580

Helvetia Rd @ N/A
2

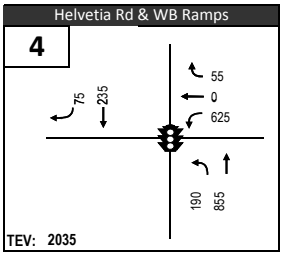
Intersection Proposed in Build Scenarios Only

Helvetia Rd & Jacobson Rd
3



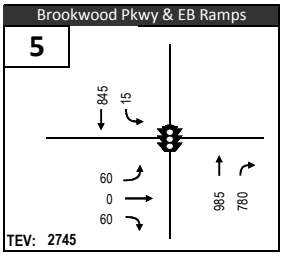
TEV: 1230

Helvetia Rd & WB Ramps
4



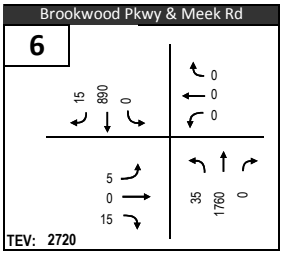
TEV: 2035

Brookwood Pkwy & EB Ramps
5



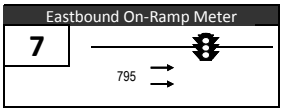
TEV: 2745

Brookwood Pkwy & Meek Rd
6



TEV: 2720

Eastbound On-Ramp Meter
7



AM Peak Period

EB US26 Diverge
8

EB US26 Merge
9

WB US26 Diverge
10

WB US26 to N/A
11

Intersection Proposed in Build Scenarios Only

WB US26 Merge
12

PM Peak Period

EB US26 Diverge
8

EB US26 Merge
9

WB US26 Diverge
10

WB US26 to N/A
11

Intersection Proposed in Build Scenarios Only

WB US26 Merge
12

DAVID EVANS AND ASSOCIATES INC.

Legend

TEV: Total Entering Volume

Peak Hour Volume

→ Turning Movement

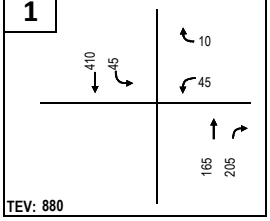
FIGURE 8

Year 2011 Turning Movement Volumes
Existing Configurations

JTA Brookwood Interchange Analysis

AM Peak Period

Helvetia Rd & Schaff Rd
1

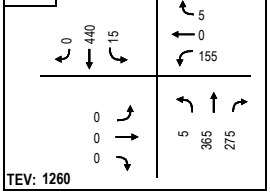


TEV: 880

Helvetia Rd @ N/A
2

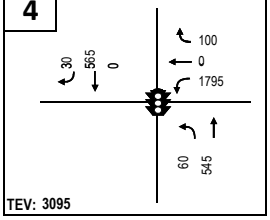
Intersection Proposed in Build Scenarios Only

Helvetia Rd & Jacobson Rd
3



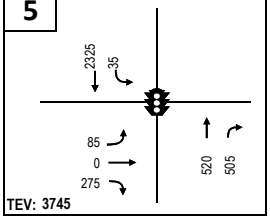
TEV: 1260

Helvetia Rd & WB Ramps
4



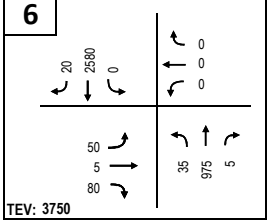
TEV: 3095

Brookwood Pkwy & EB Ramps
5



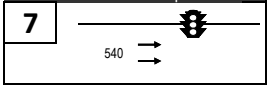
TEV: 3745

Brookwood Pkwy & Meek Rd
6



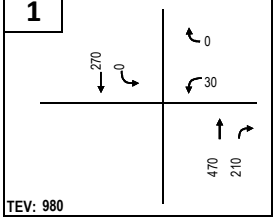
TEV: 3750

Eastbound On-Ramp Meter
7



PM Peak Period

Helvetia Rd & Schaff Rd
1

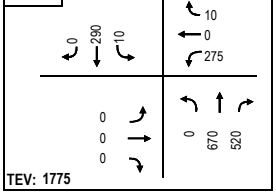


TEV: 980

Helvetia Rd @ N/A
2

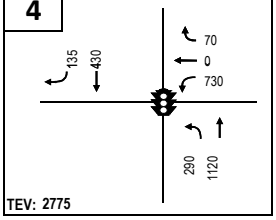
Intersection Proposed in Build Scenarios Only

Helvetia Rd & Jacobson Rd
3



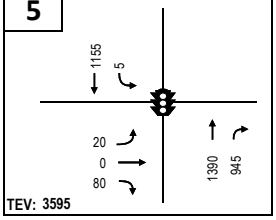
TEV: 1775

Helvetia Rd & WB Ramps
4



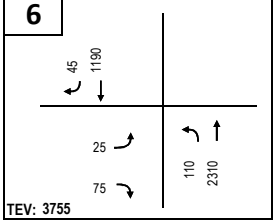
TEV: 2775

Brookwood Pkwy & EB Ramps
5



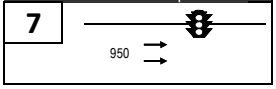
TEV: 3595

Brookwood Pkwy & Meek Rd
6



TEV: 3755

Eastbound On-Ramp Meter
7



AM Peak Period

EB US26 Diverge
8

EB US26 Merge
9

WB US26 Diverge
10

WB US26 to N/A
11

Intersection Proposed in Build Scenarios Only

WB US26 Merge
12

PM Peak Period

EB US26 Diverge
8

EB US26 Merge
9

WB US26 Diverge
10

WB US26 to N/A
11

Intersection Proposed in Build Scenarios Only

WB US26 Merge
12

DAVID EVANS AND ASSOCIATES INC.

Legend

TEV: Total Entering Volume

Peak Hour Volume

→ Turning Movement

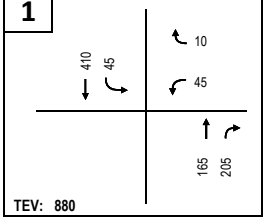
FIGURE 9

Year 2035 Turning Movement Volumes
No Build Configurations

JTA Brookwood Interchange Analysis

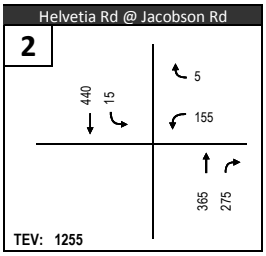
AM Peak Period

Helvetia Rd @ Schaff Rd
1



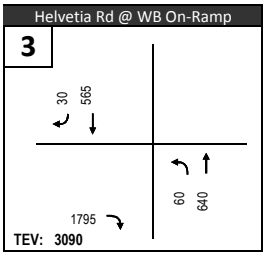
TEV: 880

Helvetia Rd @ Jacobson Rd
2



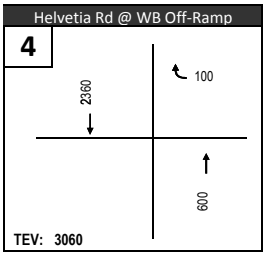
TEV: 1255

Helvetia Rd @ WB On-Ramp
3



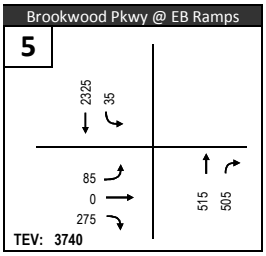
TEV: 3090

Helvetia Rd @ WB Off-Ramp
4



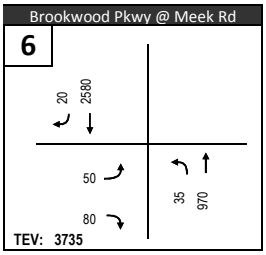
TEV: 3060

Brookwood Pkwy @ EB Ramps
5



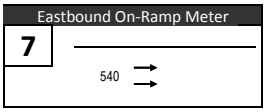
TEV: 3740

Brookwood Pkwy @ Meek Rd
6



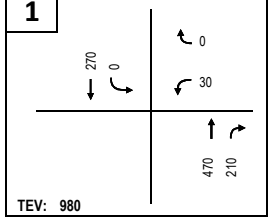
TEV: 3735

Eastbound On-Ramp Meter
7



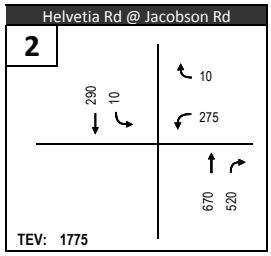
PM Peak Period

Helvetia Rd @ Schaff Rd
1



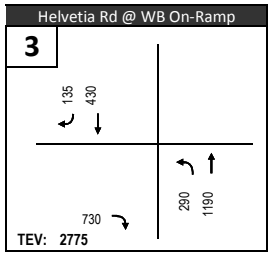
TEV: 980

Helvetia Rd @ Jacobson Rd
2



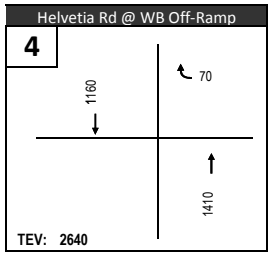
TEV: 1775

Helvetia Rd @ WB On-Ramp
3



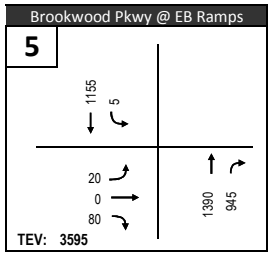
TEV: 2775

Helvetia Rd @ WB Off-Ramp
4



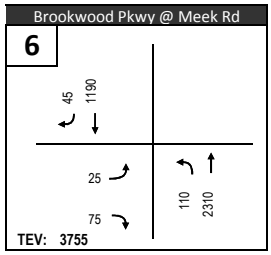
TEV: 2640

Brookwood Pkwy @ EB Ramps
5



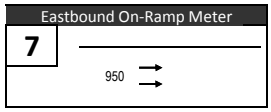
TEV: 3595

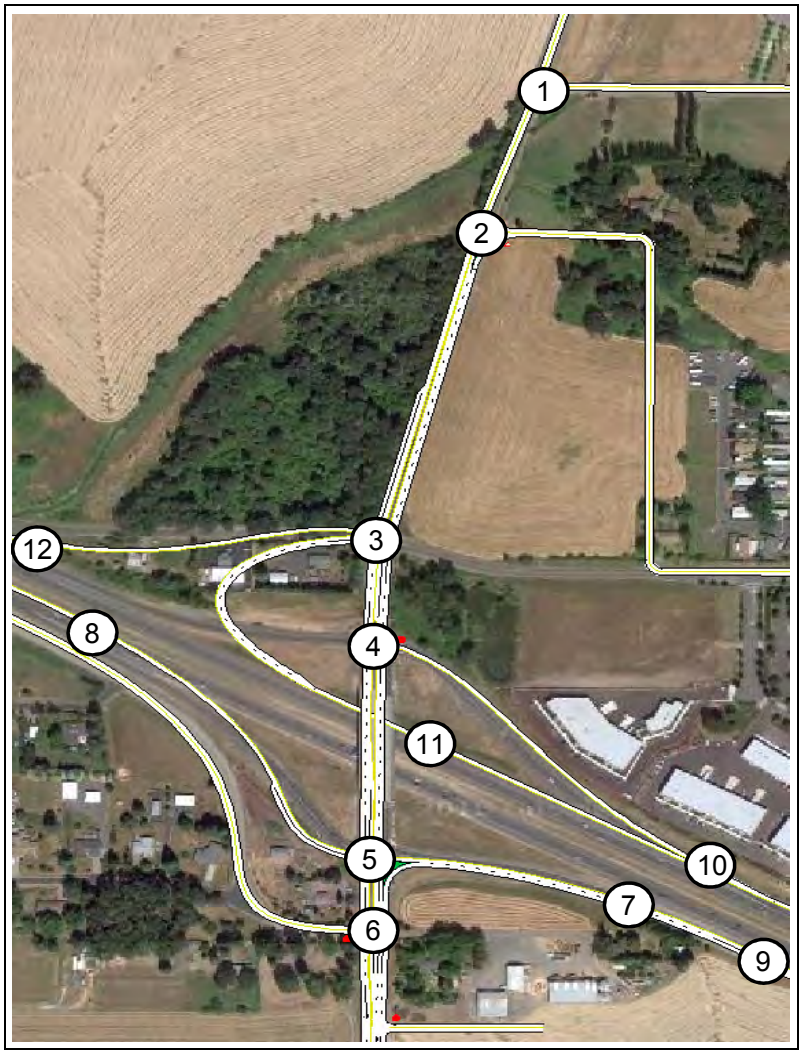
Brookwood Pkwy @ Meek Rd
6



TEV: 3755

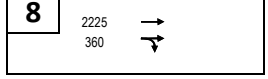
Eastbound On-Ramp Meter
7



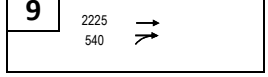


AM Peak Period

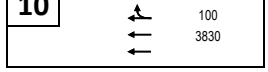
EB US26 Diverge
8



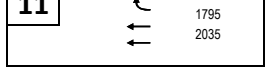
EB US26 Merge
9



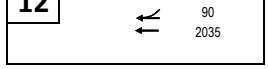
WB Off-Ramp Diverge to NB
10



WB Off-Ramp Diverge to SB
11

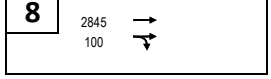


WB US26 Merge
12

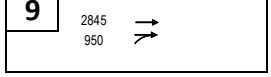


PM Peak Period

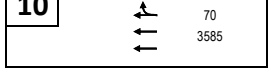
EB US26 Diverge
8



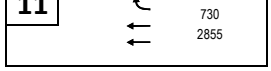
EB US26 Merge
9



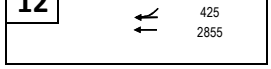
WB Off-Ramp Diverge to NB
10



WB Off-Ramp Diverge to SB
11



WB US26 Merge
12



DAVID EVANS AND ASSOCIATES INC.

Legend

TEV: Total Entering Volume

Peak Hour Volume

→ Turning Movement

FIGURE 10

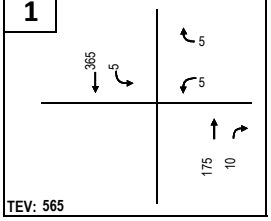
Year 2035 Turning Movement Volumes
Build Configurations

JTA Brookwood Interchange Analysis

Printed: 1/12/2012

AM Peak Period

Helvetia Rd & Schaff Rd
1

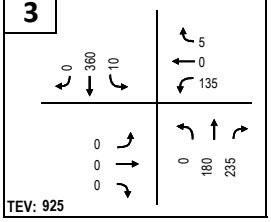


TEV: 565

Helvetia Rd @ N/A
2

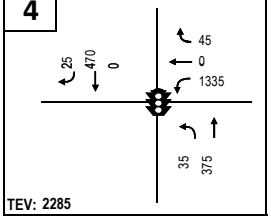
Intersection Proposed in Build Scenarios Only

Helvetia Rd & Jacobson Rd
3



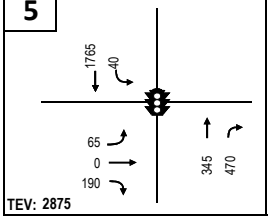
TEV: 925

Helvetia Rd & WB Ramps
4



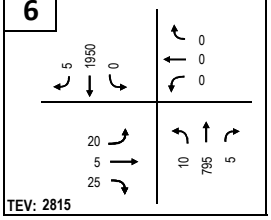
TEV: 2285

Brookwood Pkwy & EB Ramps
5



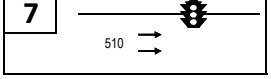
TEV: 2875

Brookwood Pkwy & Meek Rd
6



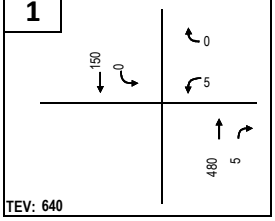
TEV: 2815

Eastbound On-Ramp Meter
7



PM Peak Period

Helvetia Rd & Schaff Rd
1

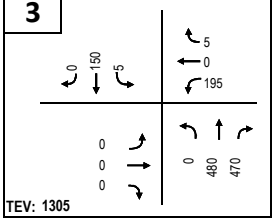


TEV: 640

Helvetia Rd @ N/A
2

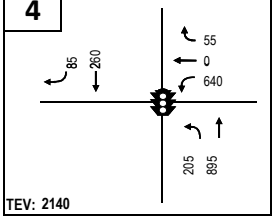
Intersection Proposed in Build Scenarios Only

Helvetia Rd & Jacobson Rd
3



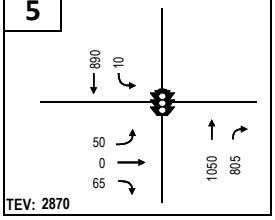
TEV: 1305

Helvetia Rd & WB Ramps
4



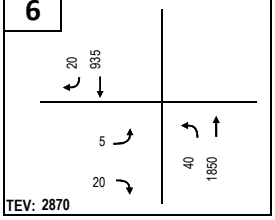
TEV: 2140

Brookwood Pkwy & EB Ramps
5



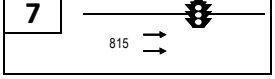
TEV: 2870

Brookwood Pkwy & Meek Rd
6



TEV: 2870

Eastbound On-Ramp Meter
7



AM Peak Period

EB US26 Diverge
8

EB US26 Merge
9

WB US26 Diverge
10

WB US26 to N/A
11

Intersection Proposed in Build Scenarios Only

WB US26 Merge
12

PM Peak Period

EB US26 Diverge
8

EB US26 Merge
9

WB US26 Diverge
10

WB US26 to N/A
11

Intersection Proposed in Build Scenarios Only

WB US26 Merge
12

DAVID EVANS AND ASSOCIATES INC.

Legend

TEV: Total Entering Volume

Peak Hour Volume

→ Turning Movement

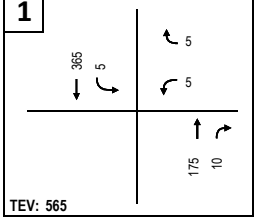
FIGURE 11

Year 2015 Turning Movement Volumes
No Build Configurations

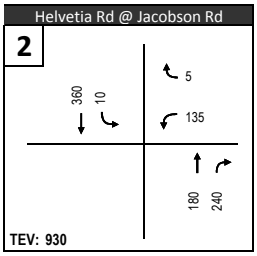
JTA Brookwood Interchange Analysis

AM Peak Period

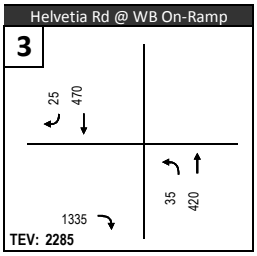
1 Helvetia Rd @ Schaff Rd



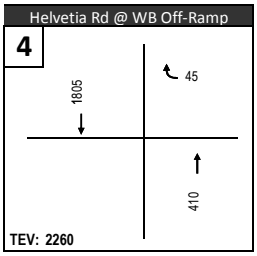
2 Helvetia Rd @ Jacobson Rd



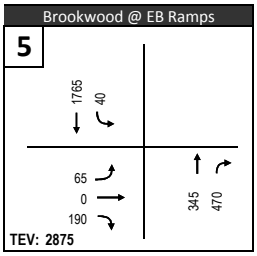
3 Helvetia Rd @ WB On-Ramp



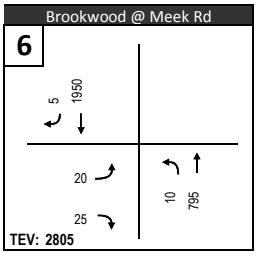
4 Helvetia Rd @ WB Off-Ramp



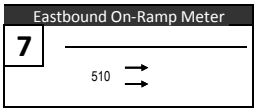
5 Brookwood @ EB Ramps



6 Brookwood @ Meek Rd

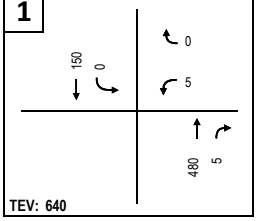


7 Eastbound On-Ramp Meter

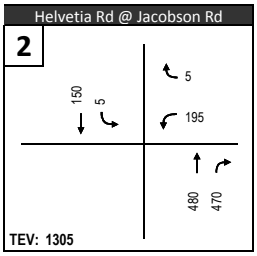


PM Peak Period

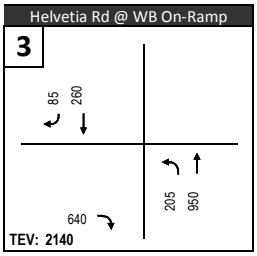
1 Helvetia Rd @ Schaff Rd



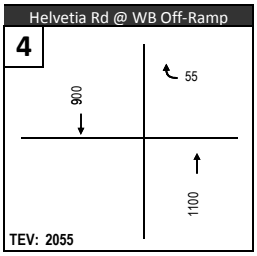
2 Helvetia Rd @ Jacobson Rd



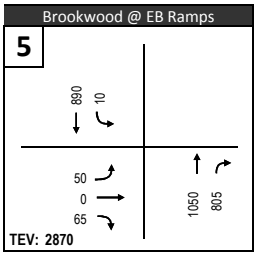
3 Helvetia Rd @ WB On-Ramp



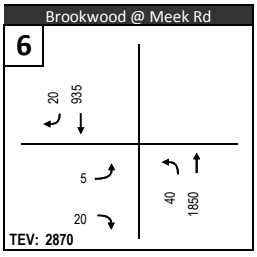
4 Helvetia Rd @ WB Off-Ramp



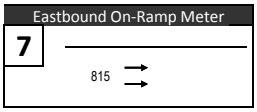
5 Brookwood @ EB Ramps

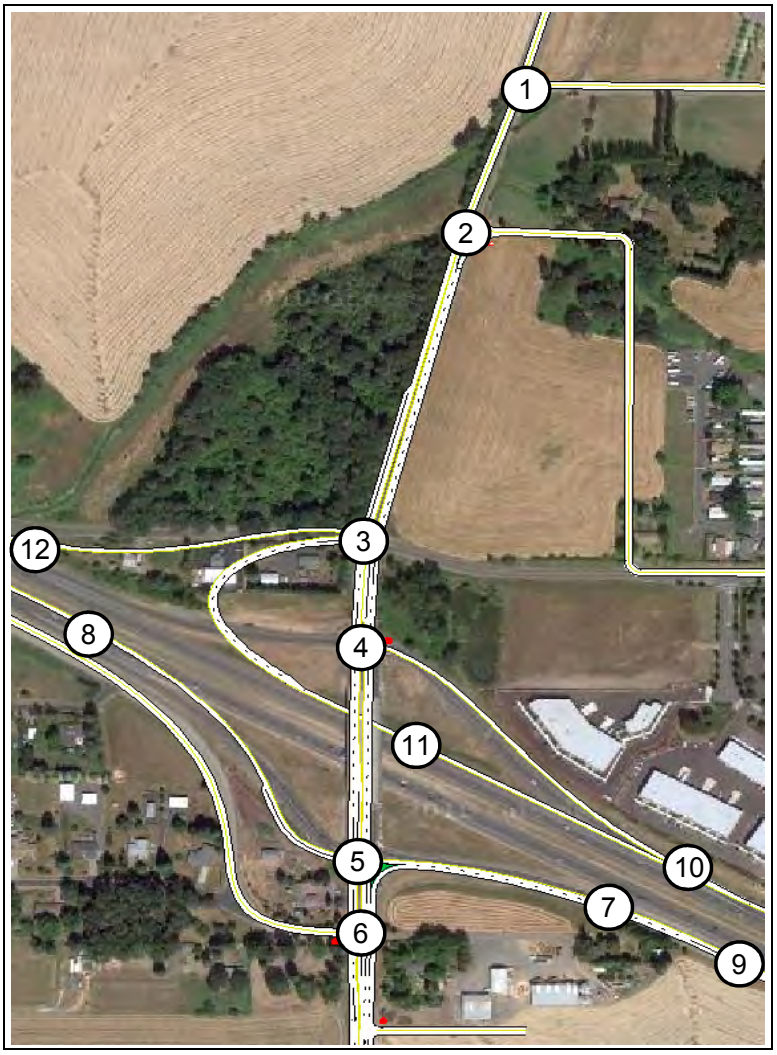


6 Brookwood @ Meek Rd



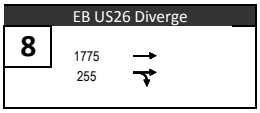
7 Eastbound On-Ramp Meter



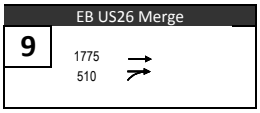


AM Peak Period

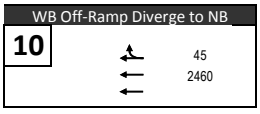
8 EB US26 Diverge



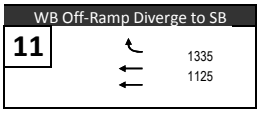
9 EB US26 Merge



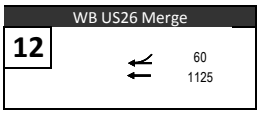
10 WB Off-Ramp Diverge to NB



11 WB Off-Ramp Diverge to SB

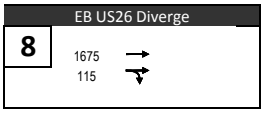


12 WB US26 Merge

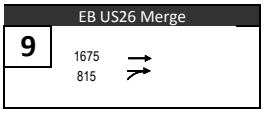


PM Peak Period

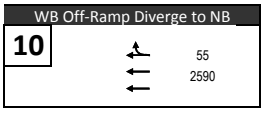
8 EB US26 Diverge



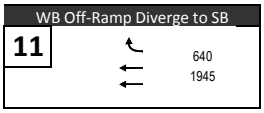
9 EB US26 Merge



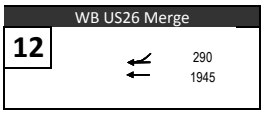
10 WB Off-Ramp Diverge to NB



11 WB Off-Ramp Diverge to SB



12 WB US26 Merge



DAVID EVANS AND ASSOCIATES INC.

Legend

TEV:	Total Entering Volume
###	Peak Hour Volume
→	Turning Movement

FIGURE 12

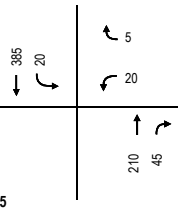
Year 2015 Turning Movement Volumes
Build Configurations

JTA Brookwood Interchange Analysis

Printed: 1/12/2012

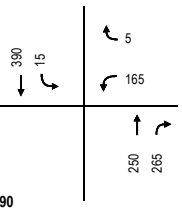
AM Peak Period

Helvetia Rd @ Schaff Rd
1



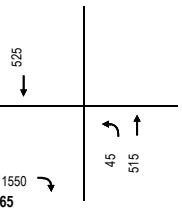
TEV: 685

Helvetia Rd @ Jacobson Rd
2



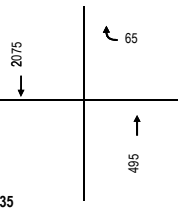
TEV: 1090

Helvetia Rd @ WB On-Ramp
3



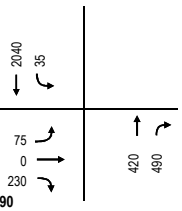
TEV: 2665

Helvetia Rd @ WB Off-Ramp
4



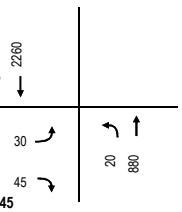
TEV: 2635

Brookwood @ EB Ramps
5



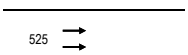
TEV: 3290

Brookwood @ Meek Rd
6



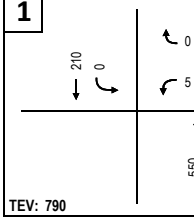
TEV: 3245

Eastbound On-Ramp Meter
7



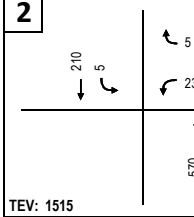
PM Peak Period

Helvetia Rd @ Schaff Rd
1



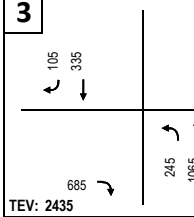
TEV: 790

Helvetia Rd @ Jacobson Rd
2



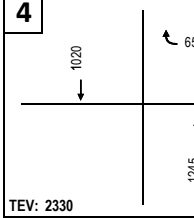
TEV: 1515

Helvetia Rd @ WB On-Ramp
3



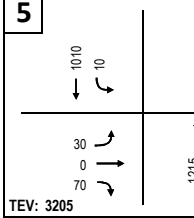
TEV: 2435

Helvetia Rd @ WB Off-Ramp
4



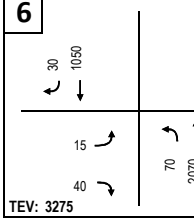
TEV: 2330

Brookwood @ EB Ramps
5



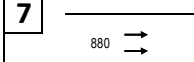
TEV: 3205

Brookwood @ Meek Rd
6



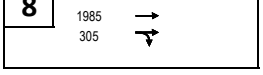
TEV: 3275

Eastbound On-Ramp Meter
7

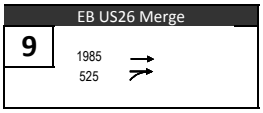


AM Peak Period

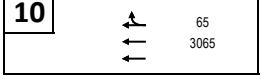
EB US26 Diverge
8



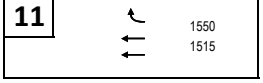
EB US26 Merge
9



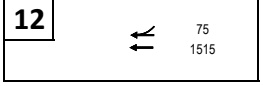
WB Off-Ramp Diverge to NB
10



WB Off-Ramp Diverge to SB
11

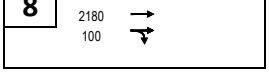


WB US26 Merge
12

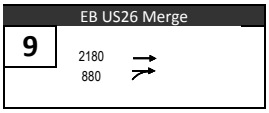


PM Peak Period

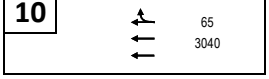
EB US26 Diverge
8



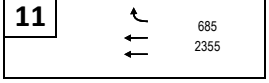
EB US26 Merge
9



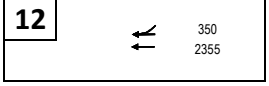
WB Off-Ramp Diverge to NB
10



WB Off-Ramp Diverge to SB
11



WB US26 Merge
12



DAVID EVANS AND ASSOCIATES INC.

Legend

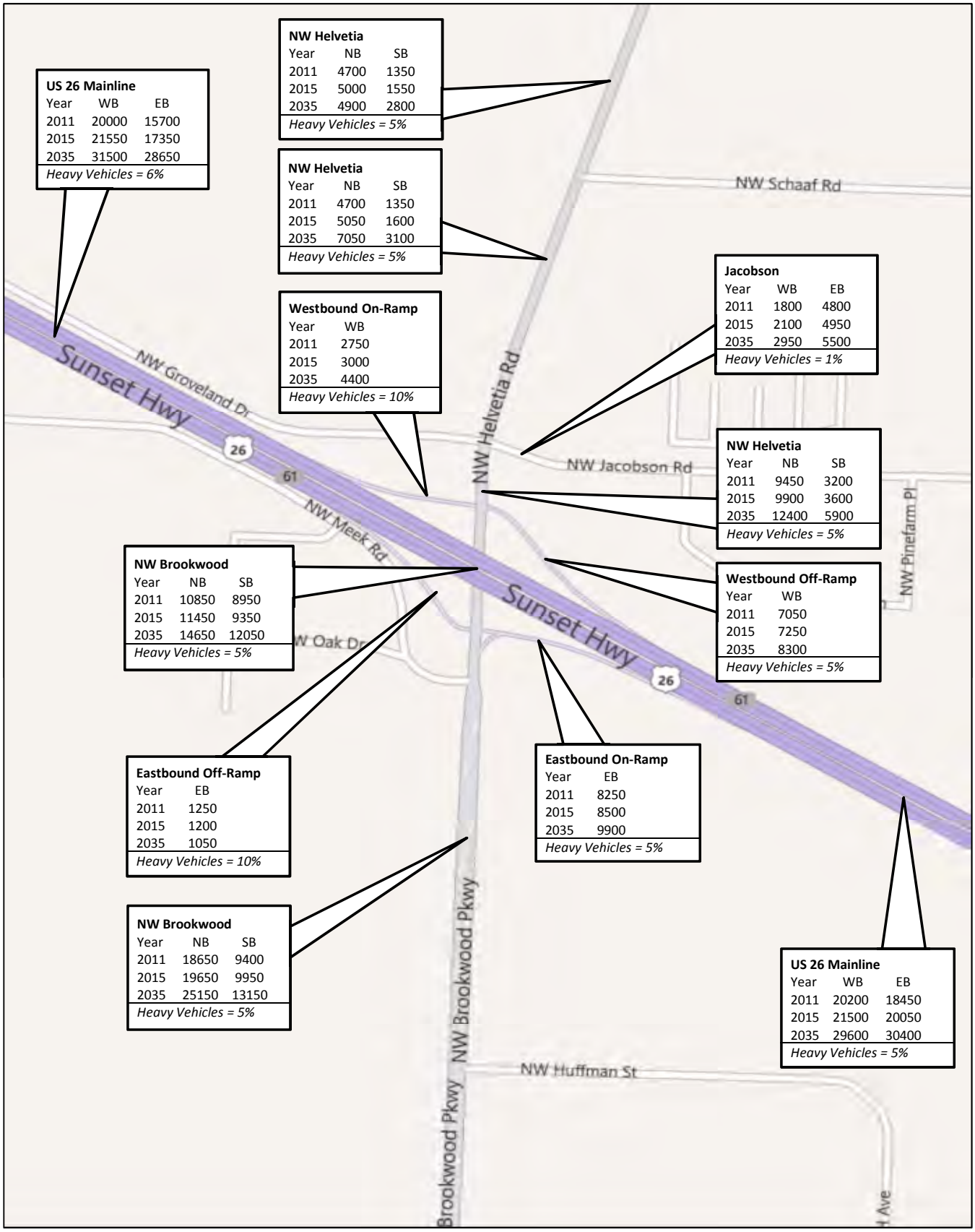
TEV:	Total Entering Volume
###	Peak Hour Volume
→	Turning Movement

FIGURE 13

Year 2025 Turning Movement Volumes
Build Configurations

JTA Brookwood Interchange Analysis

Printed: 1/12/2012



DAVID EVANS AND ASSOCIATES INC.

Legend

NOTE: Heavy vehicle percentages are bi-directional and are assumed to remain constant into future years.

FIGURE 14

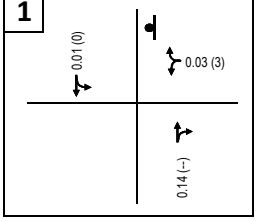
Average Daily Traffic
Vehicle Volumes and Heavy Vehicle Percentages

JTA Brookwood Interchange Analysis

Printed: 12/8/2011

AM Peak Period

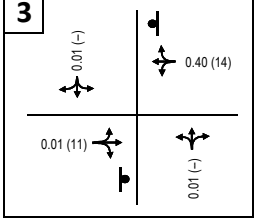
Helvetia Rd @ Schaff Rd
1



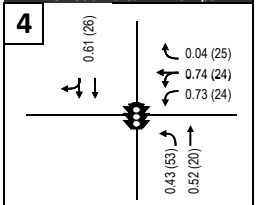
Helvetia Rd @ N/A
2

Intersection Proposed in Build Scenarios Only

Helvetia Rd @ Jacobson Rd
3

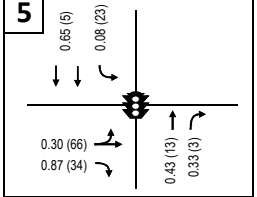


Helvetia Rd & WB Ramps
4



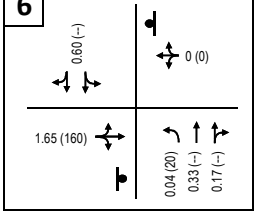
Overall V/C: 0.68 (25)

Brookwood Pkwy @ EB Ramps
5

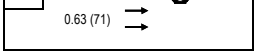


Overall V/C: 0.68 (9)

Brookwood Pkwy @ Meek Rd
6

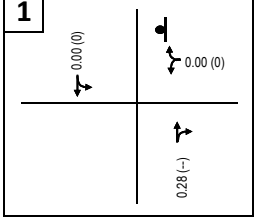


EB On-Ramp Meter
7



PM Peak Period

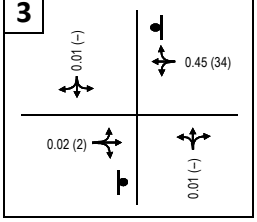
Helvetia Rd @ Schaff Rd
1



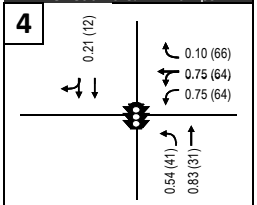
Helvetia Rd @ N/A
2

Intersection Proposed in Build Scenarios Only

Helvetia Rd @ Jacobson Rd
3

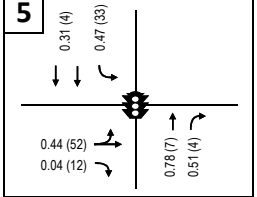


Helvetia Rd & WB Ramps
4



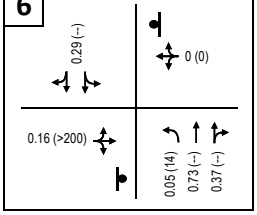
Overall V/C: 0.81 (40)

Brookwood Pkwy @ EB Ramps
5

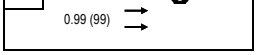


Overall V/C: 0.75 (6)

Brookwood Pkwy @ Meek Rd
6

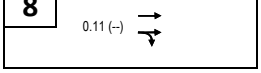


EB On-Ramp Meter
7

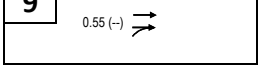


AM Peak Period

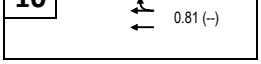
EB US26 Diverge
8



EB US26 Merge
9



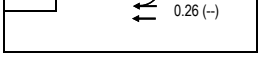
WB US26 Diverge
10



WB US26 to N/A
11

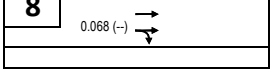
Intersection Proposed in Build Scenarios Only

WB US26 Merge
12

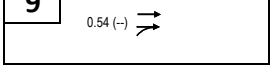


PM Peak Period

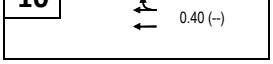
EB US26 Diverge
8



EB US26 Merge
9



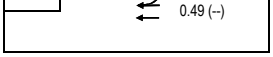
WB US26 Diverge
10



WB US26 to N/A
11

Intersection Proposed in Build Scenarios Only

WB US26 Merge
12



DAVID EVANS AND ASSOCIATES INC.

Legend

→ Turning Movement

#.## (##) Lane Group V/C Ratio (Lane Group Delay in Seconds)

Note: (--) Delay is not a HCM output for Merge or Diverge areas, or uncontrolled approaches to intersections.

Source: V/C ratio from Synchro and Delay values from SimTraffic

FIGURE 15

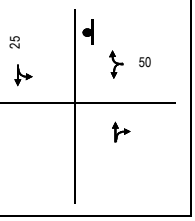
Existing (2011)
Volume to Capacity Ratios (V/C)
and Delay

JTA Brookwood Interchange Analysis

Printed: 1/12/2012

AM Peak Period

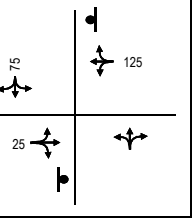
Helvetia Rd @ Schaff Rd
1



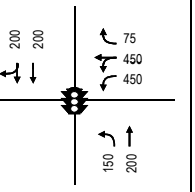
Helvetia Rd @ N/A
2

Intersection Proposed in Build Scenarios Only

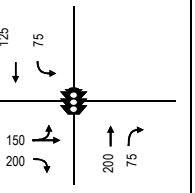
Helvetia Rd @ Jacobson Rd
3



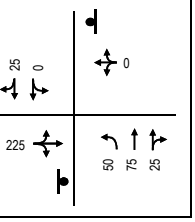
Helvetia Rd & WB Ramps
4



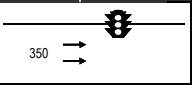
Brookwood Pkwy @ EB Ramps
5



Brookwood Pkwy @ Meek Rd
6

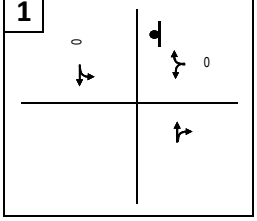


EB On-Ramp Meter
7



PM Peak Period

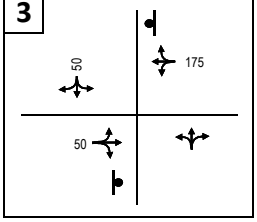
Helvetia Rd @ Schaff Rd
1



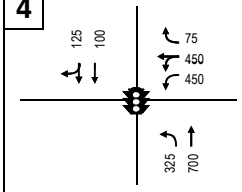
Helvetia Rd @ N/A
2

Intersection Proposed in Build Scenarios Only

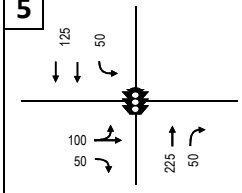
Helvetia Rd @ Jacobson Rd
3



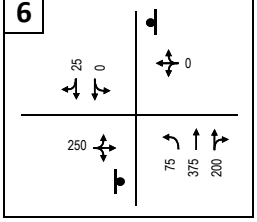
Helvetia Rd & WB Ramps
4



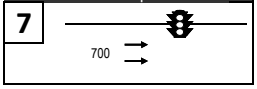
Brookwood Pkwy @ EB Ramps
5

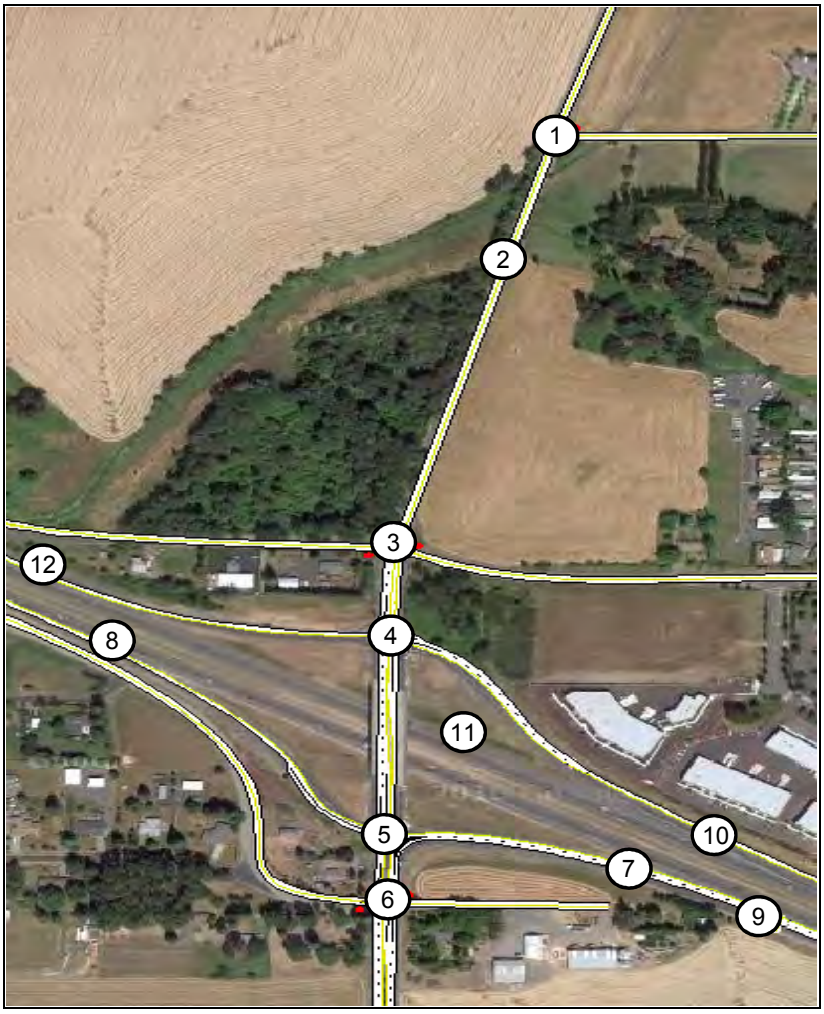


Brookwood Pkwy @ Meek Rd
6



EB On-Ramp Meter
7





AM Peak Period

EB US26 Diverge
8

EB US26 Merge
9

WB US26 Diverge to NB
10

WB US26 Diverge to SB
11

Intersection Proposed in Build Scenarios Only

WB US26 Merge
12

PM Peak Period

EB US26 Diverge
8

EB US26 Merge
9

WB US26 Diverge to NB
10

WB US26 Diverge to SB
11

Intersection Proposed in Build Scenarios Only

WB US26 Merge
12

DAVID EVANS AND ASSOCIATES INC.

Legend

→ Turning Movement

95% Queue Length (Feet)

Source: SimTraffic

FIGURE 16

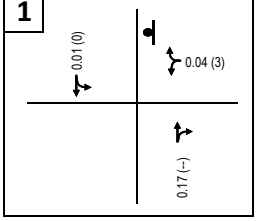
Existing (2011) Queue Length

JTA Brookwood Interchange Analysis

Printed: 1/12/2012

AM Peak Period

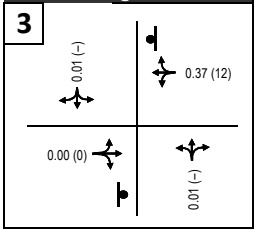
Helvetia Rd @ Schaff Rd
1



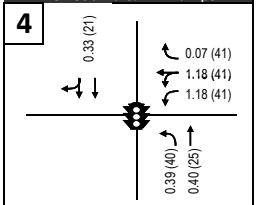
Helvetia Rd @ N/A
2

Intersection Proposed in Build Scenarios Only

Helvetia Rd @ Jacobson Rd
3

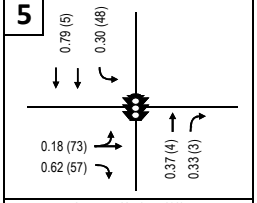


Helvetia Rd & WB Ramps
4



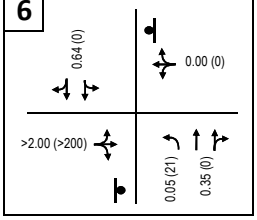
Overall V/C: 0.71 (34)

Helvetia Rd @ EB Ramps
5

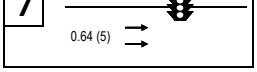


Overall V/C: 0.75 (10)

Helvetia Rd @ Meek Rd
6

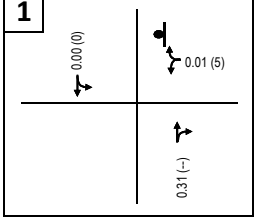


EB On-Ramp Meter
7



PM Peak Period

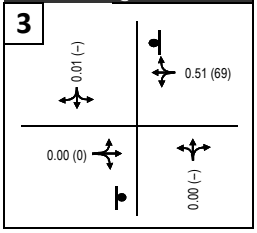
Helvetia Rd @ Schaff Rd
1



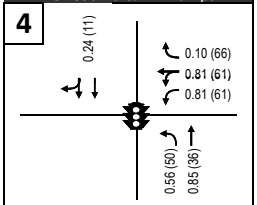
Helvetia Rd @ N/A
2

Intersection Proposed in Build Scenarios Only

Helvetia Rd @ Jacobson Rd
3

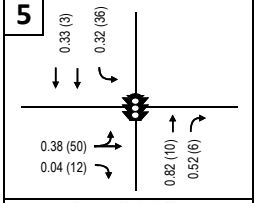


Helvetia Rd & WB Ramps
4



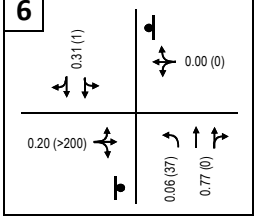
Overall V/C: 0.84 (42)

Helvetia Rd @ EB Ramps
5

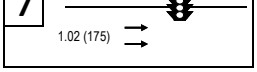


Overall V/C: 0.79 (8)

Helvetia Rd @ Meek Rd
6



EB On-Ramp Meter
7



AM Peak Period

EB US26 Diverge
8

EB US26 Merge
9

WB US26 Diverge
10

WB US26 to N/A
11

Intersection Proposed in Build Scenarios Only

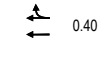
WB US26 Merge
12

PM Peak Period

EB US26 Diverge
8

EB US26 Merge
9

WB US26 Diverge
10



WB US26 to N/A
11

Intersection Proposed in Build Scenarios Only

WB US26 Merge
12

DAVID EVANS AND ASSOCIATES INC.

Legend

→ Turning Movement

#.## (##) Lane Group V/C Ratio (Lane Group Delay in Seconds)

Note: (--) Delay is not a HCM output for Merge or Diverge areas, or uncontrolled approaches to intersections.

Source: V/C ratio from Synchro and Delay values from SimTraffic

FIGURE 17

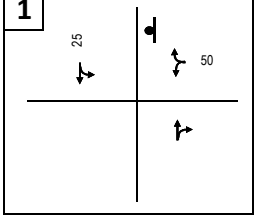
No-Build (2015)
Volume to Capacity Ratios (V/C) and Delay

JTA Brookwood Interchange Analysis

Printed: 1/12/2012

AM Peak Period

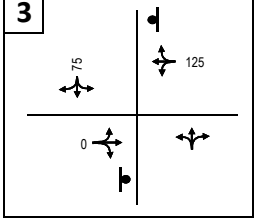
1 Helvetia Rd @ Schaff Rd



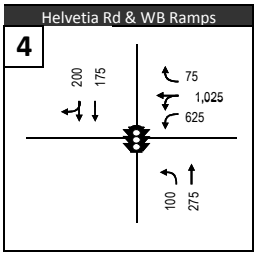
2 Helvetia Rd @ N/A

Intersection Proposed in Build Scenarios Only

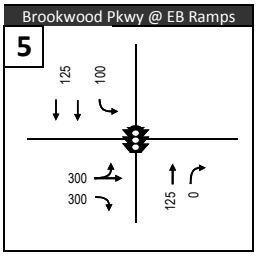
3 Helvetia Rd @ Jacobson Rd



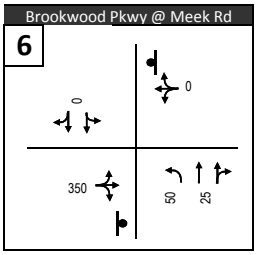
4 Helvetia Rd & WB Ramps



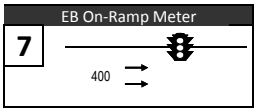
5 Brookwood Pkwy @ EB Ramps



6 Brookwood Pkwy @ Meek Rd

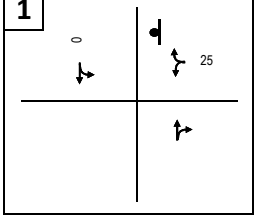


7 EB On-Ramp Meter



PM Peak Period

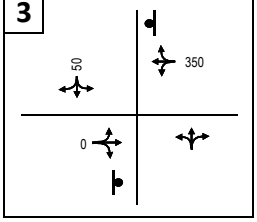
1 Helvetia Rd @ Schaff Rd



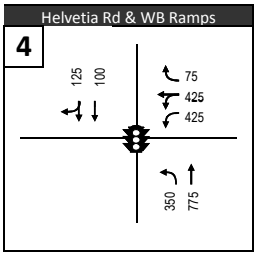
2 Helvetia Rd @ N/A

Intersection Proposed in Build Scenarios Only

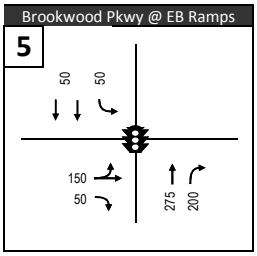
3 Helvetia Rd @ Jacobson Rd



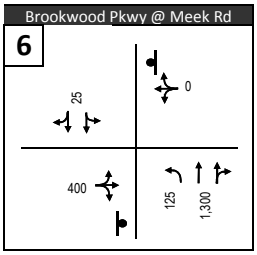
4 Helvetia Rd & WB Ramps



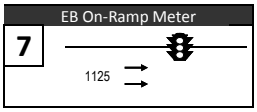
5 Brookwood Pkwy @ EB Ramps

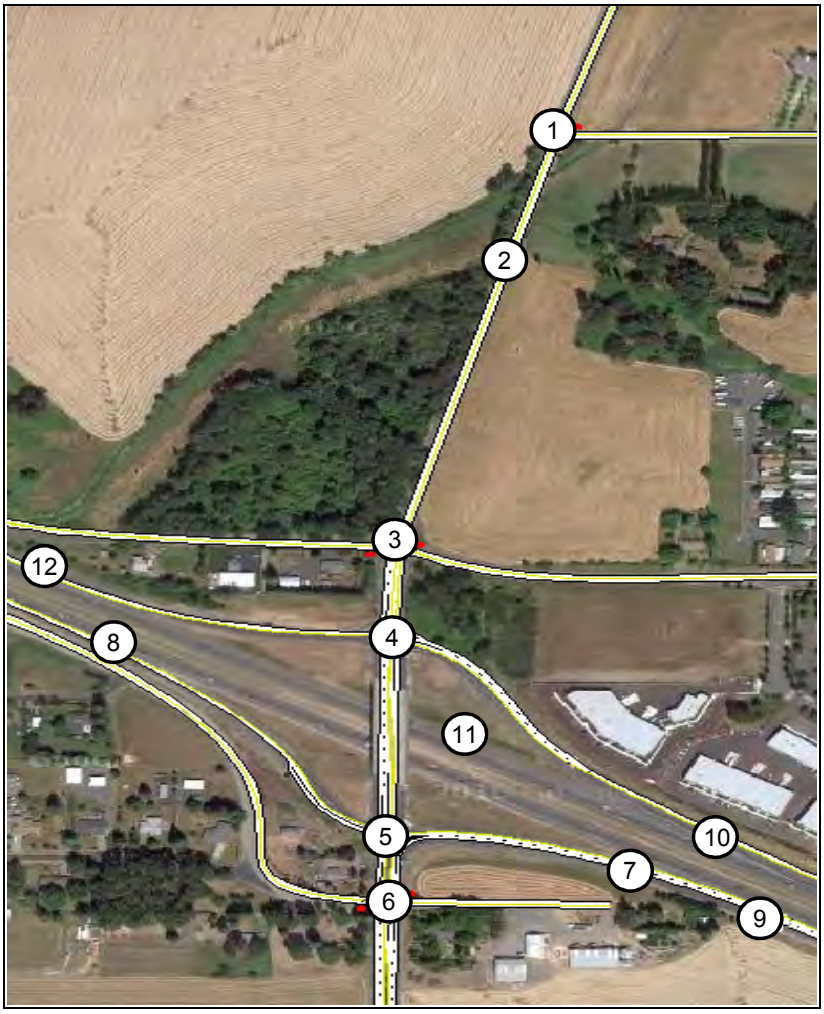


6 Brookwood Pkwy @ Meek Rd



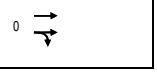
7 EB On-Ramp Meter



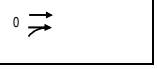


AM Peak Period

8 EB US26 Diverge



9 EB US26 Merge

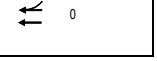


10 WB US26 Diverge to NB

11 WB US26 Diverge to SB

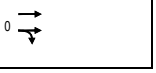
Intersection Proposed in Build Scenarios Only

12 WB US26 Merge

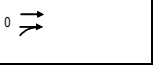


PM Peak Period

8 EB US26 Diverge



9 EB US26 Merge

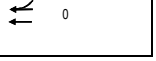


10 WB US26 Diverge to NB

11 WB US26 Diverge to SB

Intersection Proposed in Build Scenarios Only

12 WB US26 Merge



DAVID EVANS AND ASSOCIATES INC.

Legend

→ Turning Movement

95% Queue Length (Feet)

Source: SimTraffic

FIGURE 18

No-Build (2015)
Queue Length

JTA Brookwood Interchange Analysis

Printed: 1/12/2012

AM Peak Period

Helvetia Rd @ Schaff Rd
1
0.00 (1)
0.02 (5)
0.12 (--)

Helvetia Rd @ Jacobson Rd
2
0.01 (1)
0.34 (10)
0.12 (0)
0.16 (0)

Helvetia Rd @ WB On-Ramp
3
0.65 (20)
0.63 (8)
0.04 (27)
0.14 (13)
Overall V/C: 0.64 (12)

Helvetia @ WB to NB Off-Ramp
4
0.54 (--)
0.06 (5)
0.12 (--)

Brookwood Pkwy @ EB Ramps
5
0.69 (6)
0.38 (63)
0.55 (107)
0.57 (45)
0.16 (3)
0.34 (3)
Overall V/C: 0.68 (11)

Brookwood Pkwy @ Meek Rd
6
0.59 (1)
0.87 (97)
0.03 (30)
0.19 (0)

EB On-Ramp Meter
7
0.64 (15)

PM Peak Period

Helvetia Rd @ Schaff Rd
1
0.00 (0)
0.01 (7)
0.31 (--)

Helvetia Rd @ Jacobson Rd
2
0.01 (1)
0.56 (15)
0.31 (0)
0.31 (0)

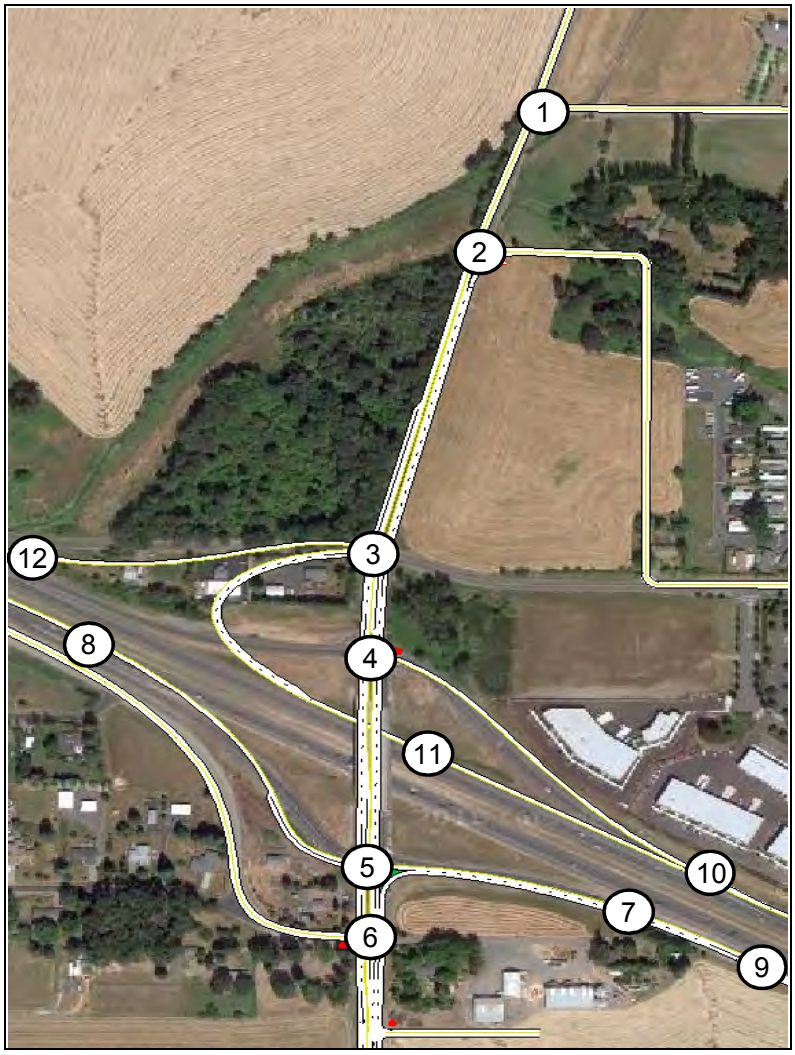
Helvetia Rd @ WB On-Ramp
3
0.27 (15)
0.23 (4)
0.25 (19)
0.33 (7)
Overall V/C: 0.32 (8)

Helvetia @ WB to NB Off-Ramp
4
0.28 (--)
0.10 (11)
0.35 (--)

Brookwood Pkwy @ EB Ramps
5
0.33 (2)
0.24 (48)
0.37 (56)
0.04 (9)
0.41 (2)
0.57 (5)
Overall V/C: 0.55 (4)

Brookwood Pkwy @ Meek Rd
6
0.31 (1)
0.13 (26)
0.06 (7)
0.46 (0)

EB On-Ramp Meter
7
1.02 (197)



AM Peak Period

EB Off-Ramp Diverge
8
0.11 (--)

EB On-Ramp Merge
9
0.53 (--)

WB Off-Ramp Diverge to NB
10
0.02 (--)

WB Off-Ramp Diverge to SB
11
0.72 (--)

WB On-Ramp Merge
12
0.28 (--)

PM Peak Period

EB Off-Ramp Diverge
8
0.07 (--)

EB On-Ramp Merge
9
0.57 (--)

WB Off-Ramp Diverge to NB
10
0.03 (--)

WB Off-Ramp Diverge to SB
11
0.34 (--)

WB On-Ramp Merge
12
0.52 (--)

DAVID EVANS AND ASSOCIATES INC.

Legend

→ Turning Movement

#.## (##) Lane Group V/C Ratio (Lane Group Delay in Seconds)

Note: (--) Delay is not a HCM output for Merge or Diverge areas, or uncontrolled approaches to intersections.

Source: V/C ratio from Synchro and Delay values from SimTraffic

FIGURE 19

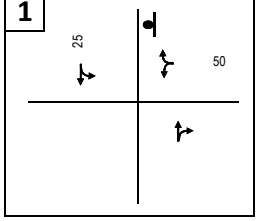
Phase 1 (2015)
Volume to Capacity Ratios (V/C) and Delay

JTA Brookwood Interchange Analysis

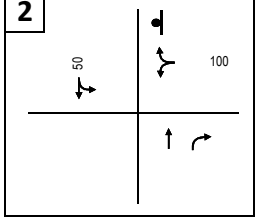
Printed: 1/12/2012

AM Peak Period

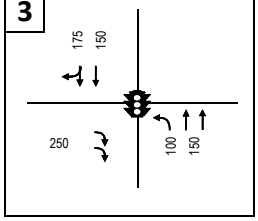
Helvetia Rd @ Schaff Rd
1



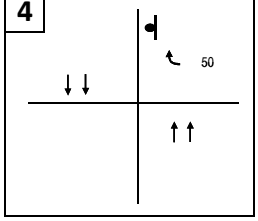
Helvetia Rd @ Jacobson Rd
2



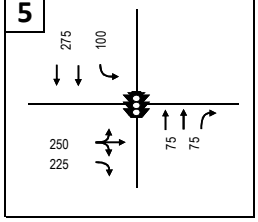
Helvetia Rd @ WB On-Ramp
3



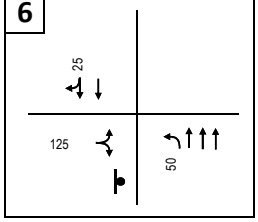
Helvetia @ WB to NB Off-Ramp
4



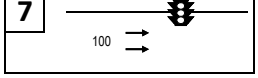
Brookwood Pkwy @ EB Ramps
5



Brookwood Pkwy @ Meek Rd
6

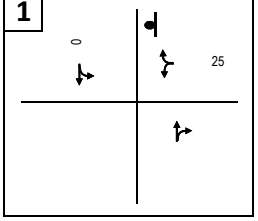


EB On-Ramp Meter
7

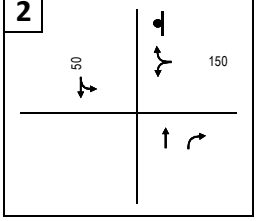


PM Peak Period

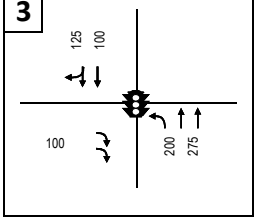
Helvetia Rd @ Schaff Rd
1



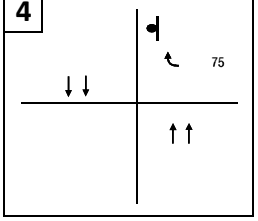
Helvetia Rd @ Jacobson Rd
2



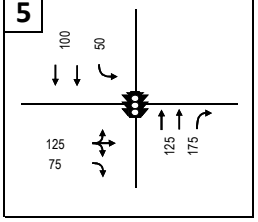
Helvetia Rd @ WB On-Ramp
3



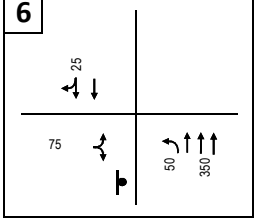
Helvetia @ WB to NB Off-Ramp
4



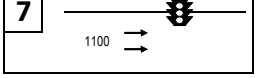
Brookwood Pkwy @ EB Ramps
5

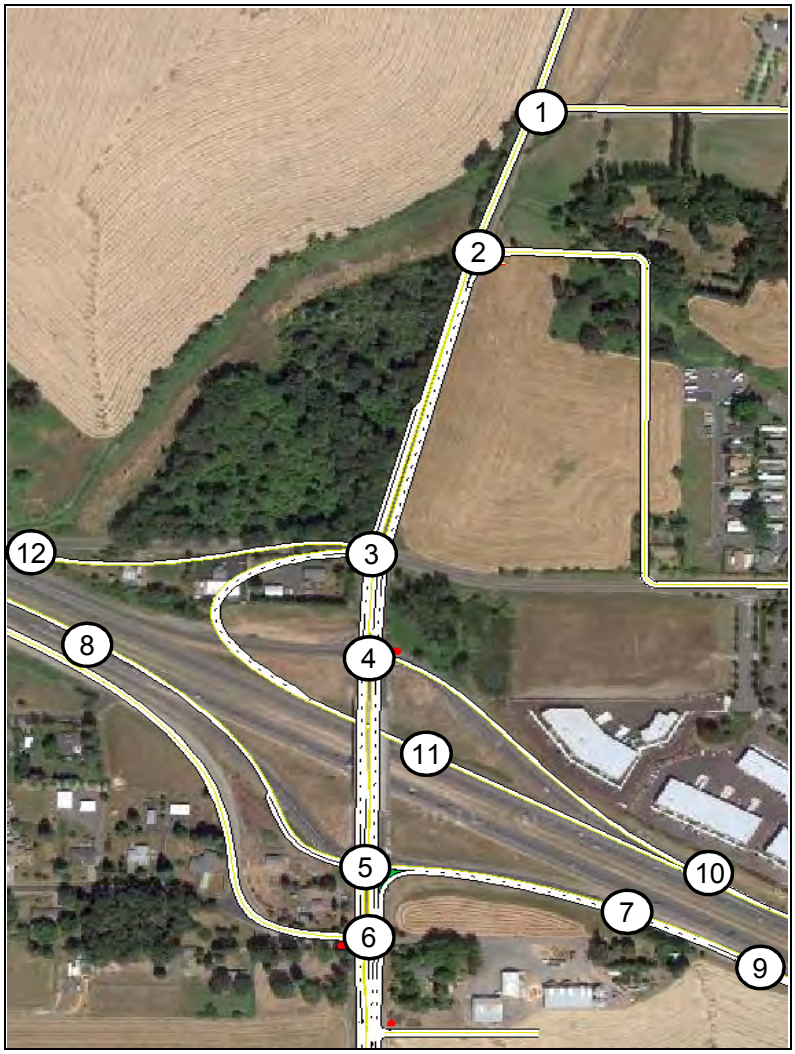


Brookwood Pkwy @ Meek Rd
6



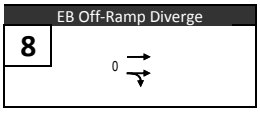
EB On-Ramp Meter
7



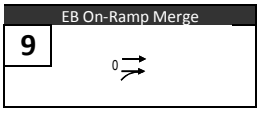


AM Peak Period

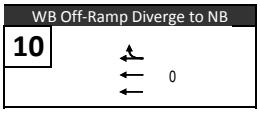
EB Off-Ramp Diverge
8



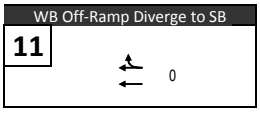
EB On-Ramp Merge
9



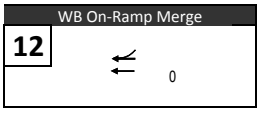
WB Off-Ramp Diverge to NB
10



WB Off-Ramp Diverge to SB
11

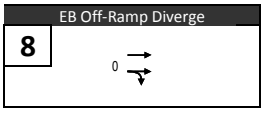


WB On-Ramp Merge
12

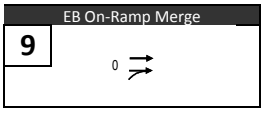


PM Peak Period

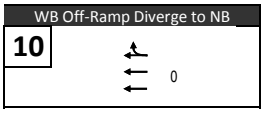
EB Off-Ramp Diverge
8



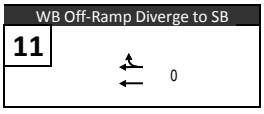
EB On-Ramp Merge
9



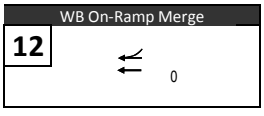
WB Off-Ramp Diverge to NB
10



WB Off-Ramp Diverge to SB
11



WB On-Ramp Merge
12



DAVID EVANS AND ASSOCIATES INC.

Legend

→ Turning Movement

95% Queue Length (Feet)

Source: SimTraffic

FIGURE 20

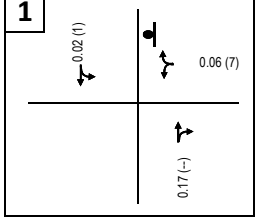
Phase 1 (2015)
Queue Length

JTA Brookwood Interchange Analysis

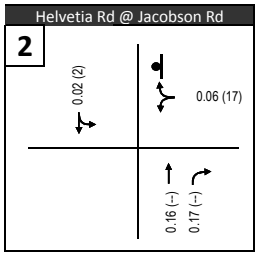
Printed: 1/12/2012

AM Peak Period

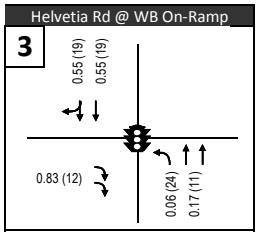
Helvetia Rd @ Schaff Rd
1



Helvetia Rd @ Jacobson Rd
2

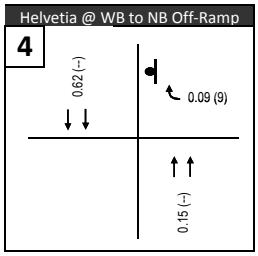


Helvetia Rd @ WB On-Ramp
3

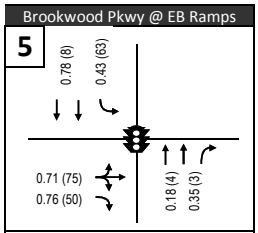


Overall V/C: 0.73 (13)

Helvetia @ WB to NB Off-Ramp
4

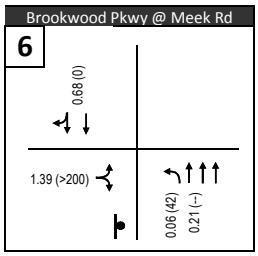


Brookwood Pkwy @ EB Ramps
5

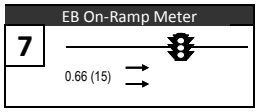


Overall V/C: 0.78 (12)

Brookwood Pkwy @ Meek Rd
6

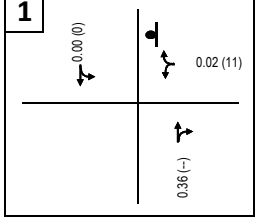


EB On-Ramp Meter
7

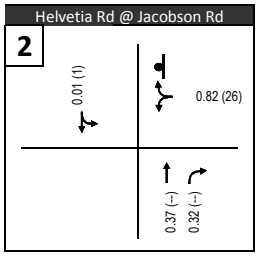


PM Peak Period

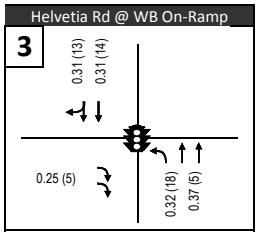
Helvetia Rd @ Schaff Rd
1



Helvetia Rd @ Jacobson Rd
2

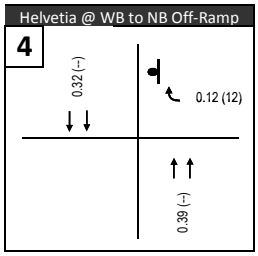


Helvetia Rd @ WB On-Ramp
3

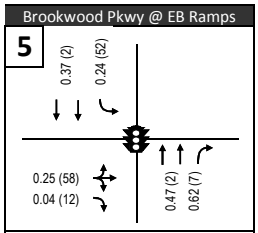


Overall V/C: 0.36 (8)

Helvetia @ WB to NB Off-Ramp
4

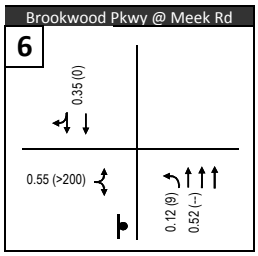


Brookwood Pkwy @ EB Ramps
5

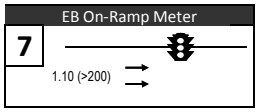


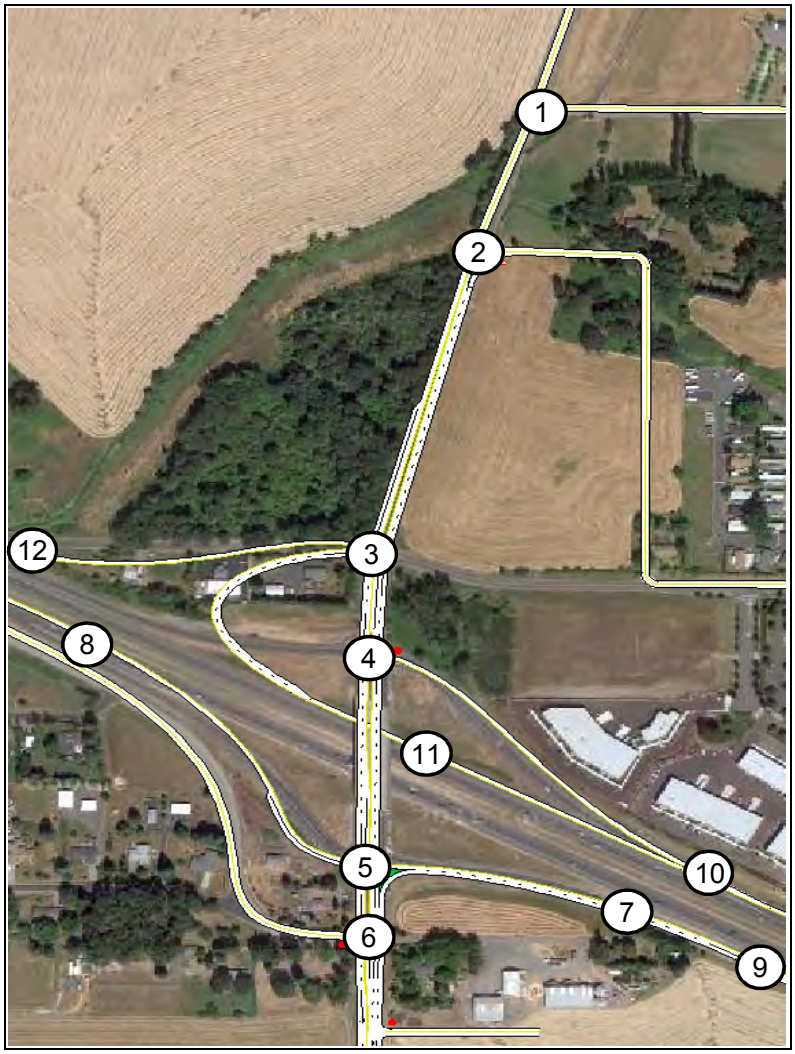
Overall V/C: 0.58 (4)

Brookwood Pkwy @ Meek Rd
6



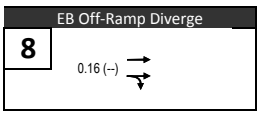
EB On-Ramp Meter
7



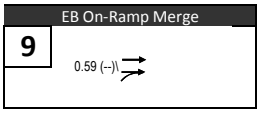


AM Peak Period

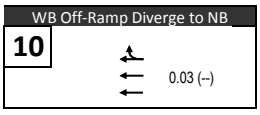
EB Off-Ramp Diverge
8



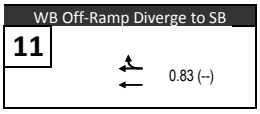
EB On-Ramp Merge
9



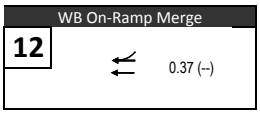
WB Off-Ramp Diverge to NB
10



WB Off-Ramp Diverge to SB
11

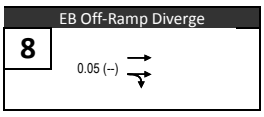


WB On-Ramp Merge
12

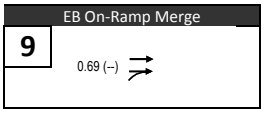


PM Peak Period

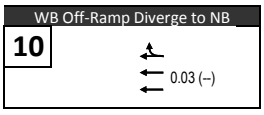
EB Off-Ramp Diverge
8



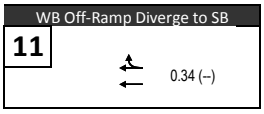
EB On-Ramp Merge
9



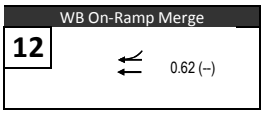
WB Off-Ramp Diverge to NB
10



WB Off-Ramp Diverge to SB
11



WB On-Ramp Merge
12



DAVID EVANS AND ASSOCIATES INC.

Legend

→ Turning Movement

#.## (##) Lane Group V/C Ratio (Lane Group Delay in Seconds)

Note: (--) Delay is not a HCM output for Merge or Diverge areas, or uncontrolled approaches to intersections.

Source: V/C ratio from Synchro and Delay values from SimTraffic

FIGURE 21

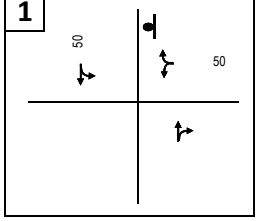
Phase 1 (2023 - 2027)
Volume to Capacity Ratios (V/C)
and Delay

JTA Brookwood Interchange Analysis

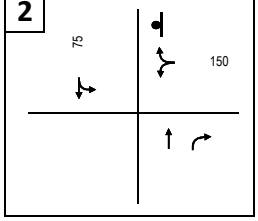
Printed: 1/12/2012

AM Peak Period

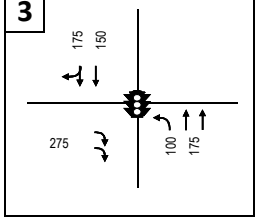
Helvetia Rd @ Schaff Rd
1



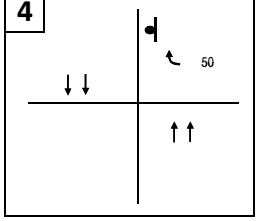
Helvetia Rd @ Jacobson Rd
2



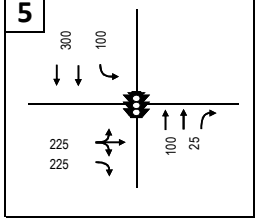
Helvetia Rd @ WB On-Ramp
3



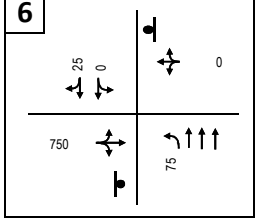
Helvetia @ WB to NB Off-Ramp
4



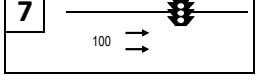
Brookwood Pkwy @ EB Ramps
5



Brookwood Pkwy @ Meek Rd
6

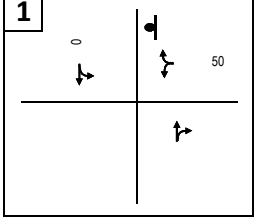


EB On-Ramp Meter
7

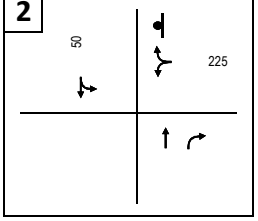


PM Peak Period

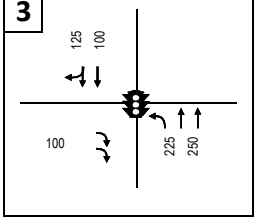
Helvetia Rd @ Schaff Rd
1



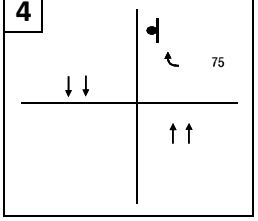
Helvetia Rd @ Jacobson Rd
2



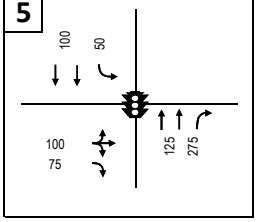
Helvetia Rd @ WB On-Ramp
3



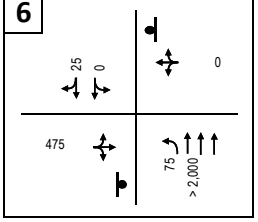
Helvetia @ WB to NB Off-Ramp
4



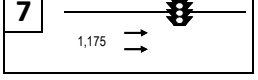
Brookwood Pkwy @ EB Ramps
5

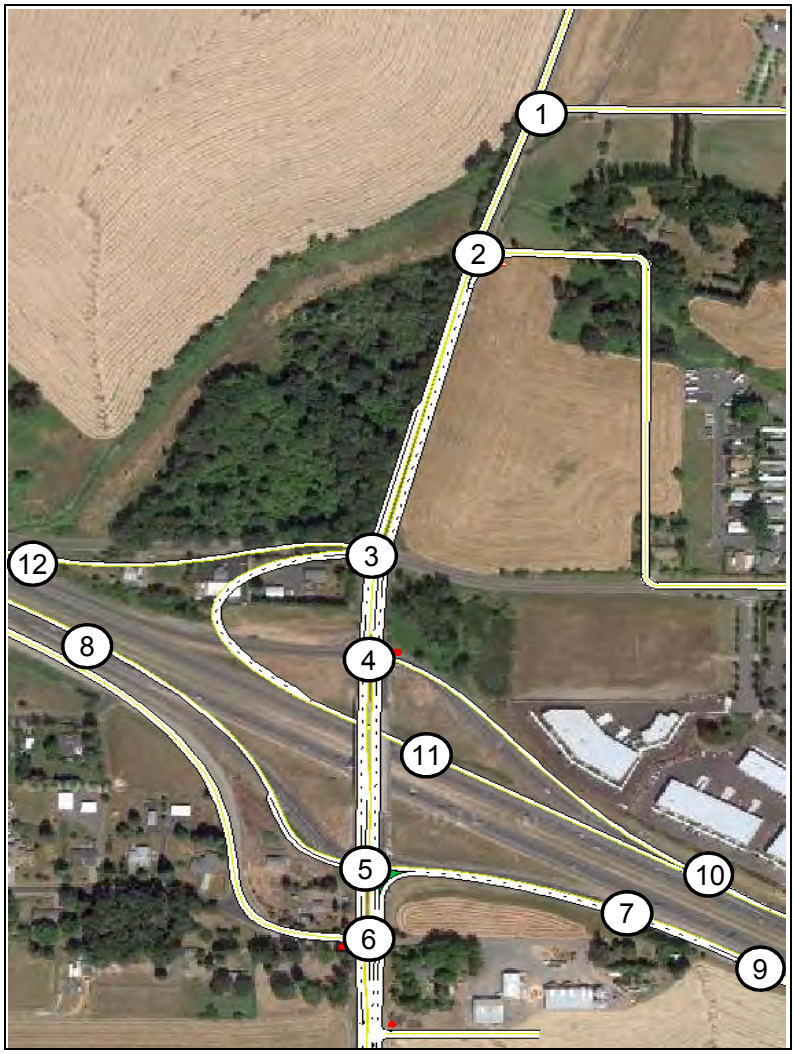


Brookwood Pkwy @ Meek Rd
6



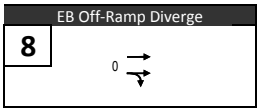
EB On-Ramp Meter
7



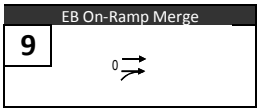


AM Peak Period

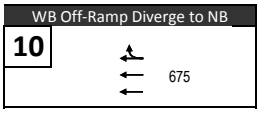
EB Off-Ramp Diverge
8



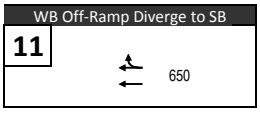
EB On-Ramp Merge
9



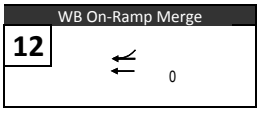
WB Off-Ramp Diverge to NB
10



WB Off-Ramp Diverge to SB
11

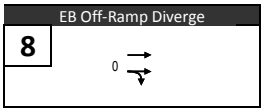


WB On-Ramp Merge
12

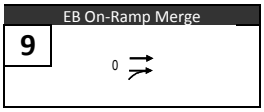


PM Peak Period

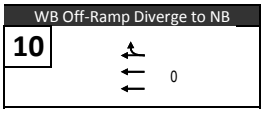
EB Off-Ramp Diverge
8



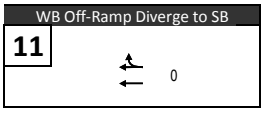
EB On-Ramp Merge
9



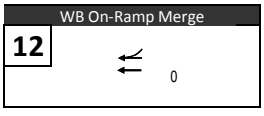
WB Off-Ramp Diverge to NB
10



WB Off-Ramp Diverge to SB
11



WB On-Ramp Merge
12



DAVID EVANS AND ASSOCIATES INC.

Legend

→ Turning Movement

95% Queue Length (Feet)

Source: SimTraffic

FIGURE 22

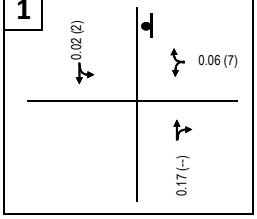
Phase 1 (2023 - 2027)
Queue Length

JTA Brookwood Interchange Analysis

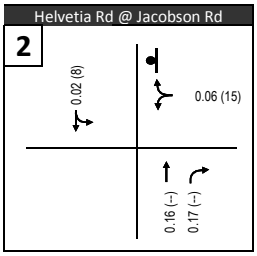
Printed: 1/12/2012

AM Peak Period

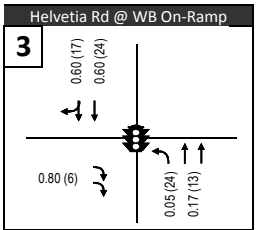
Helvetia Rd @ Schaff Rd
1



Helvetia Rd @ Jacobson Rd
2

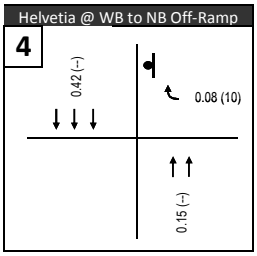


Helvetia Rd @ WB On-Ramp
3

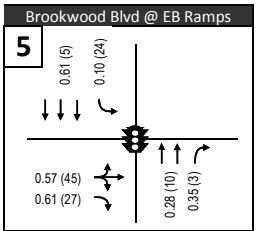


Overall V/C: 0.74 (11)

Helvetia @ WB to NB Off-Ramp
4

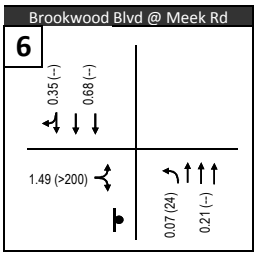


Brookwood Blvd @ EB Ramps
5

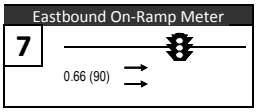


Overall V/C: 0.61 (8)

Brookwood Blvd @ Meek Rd
6

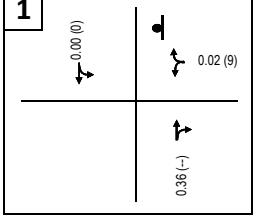


Eastbound On-Ramp Meter
7

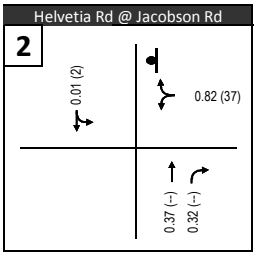


PM Peak Period

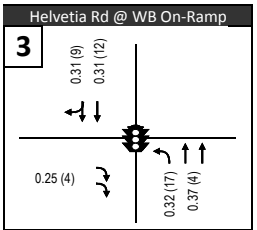
Helvetia Rd @ Schaff Rd
1



Helvetia Rd @ Jacobson Rd
2

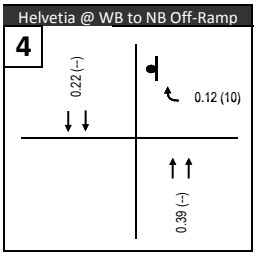


Helvetia Rd @ WB On-Ramp
3

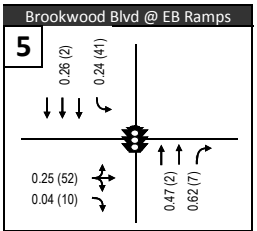


Overall V/C: 0.36 (6)

Helvetia @ WB to NB Off-Ramp
4

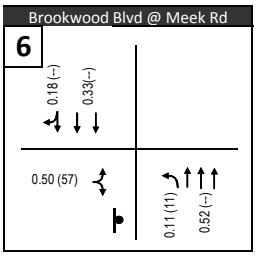


Brookwood Blvd @ EB Ramps
5

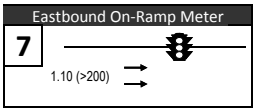


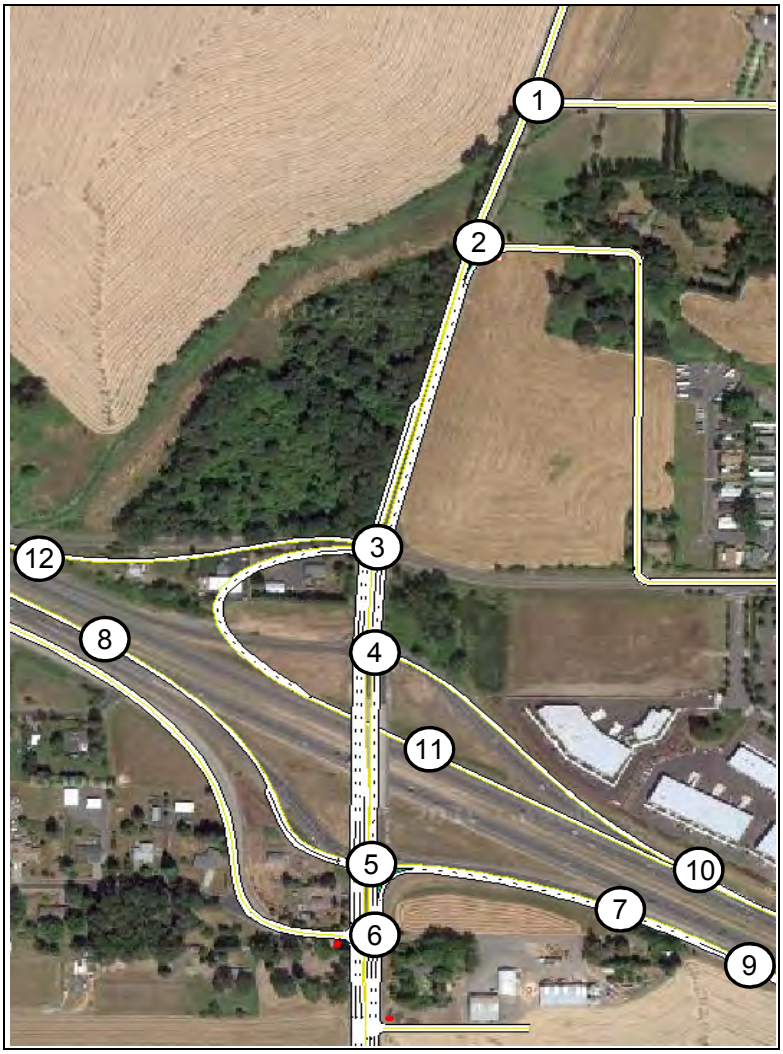
Overall V/C: 0.58 (4)

Brookwood Blvd @ Meek Rd
6



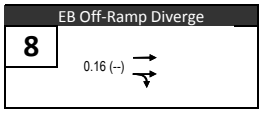
Eastbound On-Ramp Meter
7



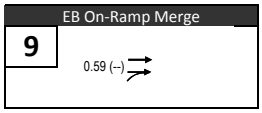


AM Peak Period

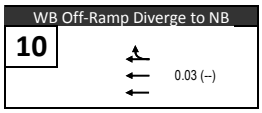
EB Off-Ramp Diverge
8



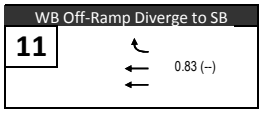
EB On-Ramp Merge
9



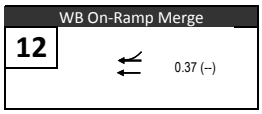
WB Off-Ramp Diverge to NB
10



WB Off-Ramp Diverge to SB
11

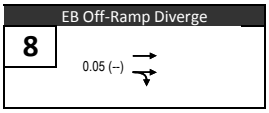


WB On-Ramp Merge
12

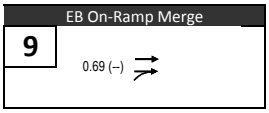


PM Peak Period

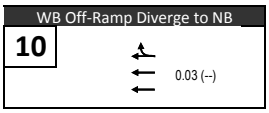
EB Off-Ramp Diverge
8



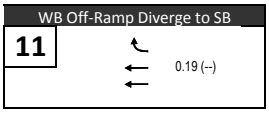
EB On-Ramp Merge
9



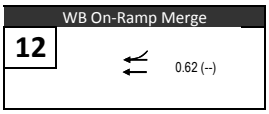
WB Off-Ramp Diverge to NB
10



WB Off-Ramp Diverge to SB
11



WB On-Ramp Merge
12



DAVID EVANS AND ASSOCIATES INC.

Legend

→ Turning Movement

#.## (##) Lane Group V/C Ratio (Lane Group Delay in Seconds)

Note: (--) Delay is not a HCM output for Merge or Diverge areas, or uncontrolled approaches to intersections.

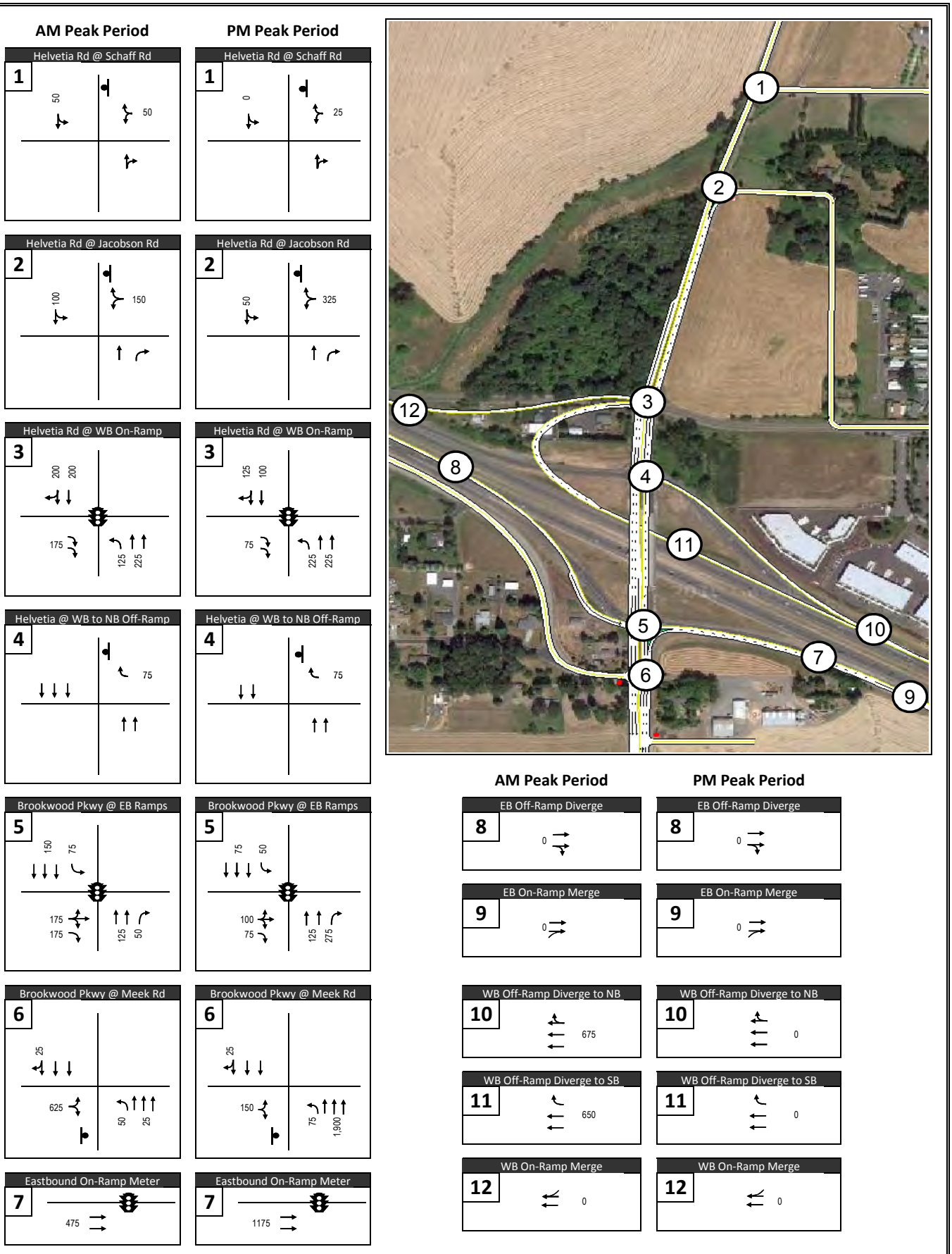
Source: V/C ratio from Synchro and Delay values from SimTraffic

FIGURE 23

Phase 2 Option A (2023 - 2027)
Volume to Capacity Ratios (V/C)
and Delay

JTA Brookwood Interchange Analysis

Printed: 1/12/2012



DAVID EVANS AND ASSOCIATES INC.

Legend

→ Turning Movement

95% Queue Length (Feet)

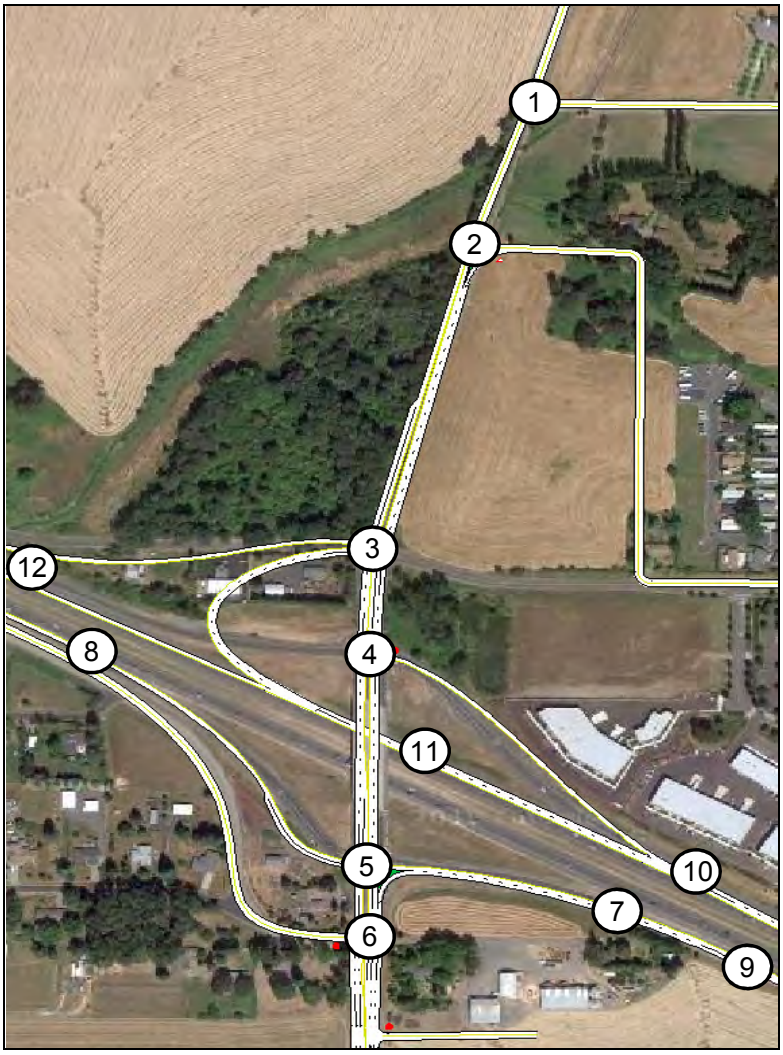
Source: SimTraffic

FIGURE 24

Phase 2 Option A (2023 - 2027)
Queue Length

JTA Brookwood Interchange Analysis

Printed: 1/12/2012



AM Peak Period

1 Helvetia Rd @ Schaff Rd
0.02 (1) | 0.06 (7) | 0.17 (--)

2 Helvetia Rd @ Jacobson Rd
0.02 (1) | 0.49 (13) | 0.16 (--) | 0.17 (--)

3 Helvetia Rd @ WB On-Ramp
0.55 (14) | 0.55 (19) | 0.83 (15) | 0.06 (26) | 0.17 (12)
Overall V/C: 0.73 (15)

4 Helvetia @ WB to NB Off-Ramp
0.62 (--) | 0.09 (4) | 0.15 (--)

5 Brookwood Pkwy @ EB Ramps
0.78 (10) | 0.43 (66) | .71 (75) | .76 (53) | 0.18 (5) | 0.35 (3)
Overall V/C: 0.78 (14)

6 Brookwood Pkwy @ Meek Rd
0.68 (0) | 1.39 (>200) | 0.06 (46) | 0.21 (--)

7 Eastbound On-Ramp Meter
0.66 (15)

PM Peak Period

1 Helvetia Rd @ Schaff Rd
0.00 (0) | 0.02 (9) | 0.36 (--)

2 Helvetia Rd @ Jacobson Rd
0.01 (2) | 0.82 (28) | 0.37 (--) | 0.32 (--)

3 Helvetia Rd @ WB On-Ramp
0.31 (10) | 0.31 (14) | 0.25 (5) | 0.32 (17) | 0.37 (5)
Overall V/C: 0.36 (8)

4 Helvetia @ WB to NB Off-Ramp
0.32 (--) | 0.12 (12) | 0.39 (--)

5 Brookwood Pkwy @ EB Ramps
0.37 (2) | 0.24 (52) | .25 (61) | .04 (12) | 0.47 (2) | 0.62 (7)
Overall V/C: 0.58 (5)

6 Brookwood Pkwy @ Meek Rd
0.35 (0) | 0.55 (138) | 0.12 (9) | 0.52 (--)

7 Eastbound On-Ramp Meter
1.10 (>200)

AM Peak Period

8 EB Off-Ramp Diverge
0.16 (--)

9 EB On-Ramp Merge
0.59 (--)

10 WB Off-Ramp Diverge to NB
0.03 (--)

11 WB Off-Ramp Diverge to SB
0.44 (--)

12 WB On-Ramp Merge
0.37 (--)

PM Peak Period

8 EB Off-Ramp Diverge
0.05 (--)

9 EB On-Ramp Merge
0.69 (--)

10 WB Off-Ramp Diverge to NB
0.03 (--)

11 WB Off-Ramp Diverge to SB
0.19 (--)

12 WB On-Ramp Merge
0.62 (--)

DAVID EVANS AND ASSOCIATES INC.

Legend

→ Turning Movement

#.## (##) Lane Group V/C Ratio (Lane Group Delay in Seconds)

Note: (--) Delay is not a HCM output for Merge or Diverge areas, or uncontrolled approaches to intersections.

Source: V/C ratio from Synchro and Delay values from SimTraffic

FIGURE 25

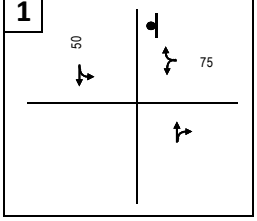
Phase 2 Option B (2023 - 2027)
Volume to Capacity Ratios (V/C)
and Delay

JTA Brookwood Interchange Analysis

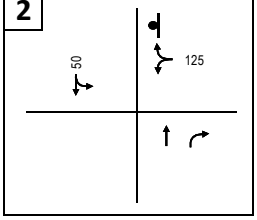
Printed: 1/12/2012

AM Peak Period

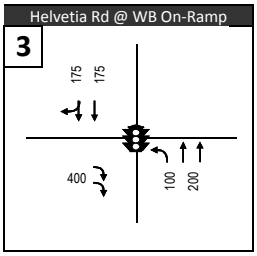
Helvetia Rd @ Schaff Rd
1



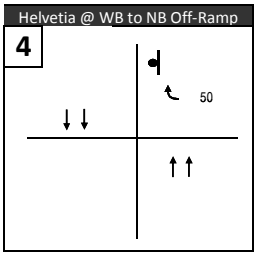
Helvetia Rd @ Jacobson Rd
2



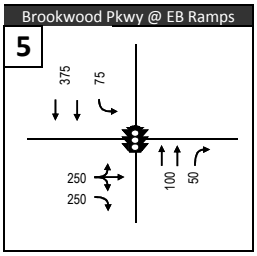
Helvetia Rd @ WB On-Ramp
3



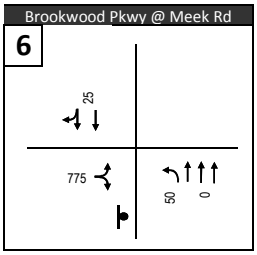
Helvetia @ WB to NB Off-Ramp
4



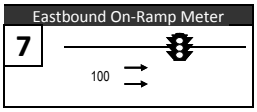
Brookwood Pkwy @ EB Ramps
5



Brookwood Pkwy @ Meek Rd
6

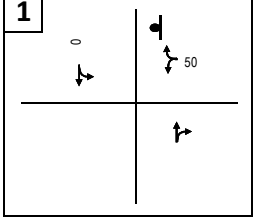


Eastbound On-Ramp Meter
7

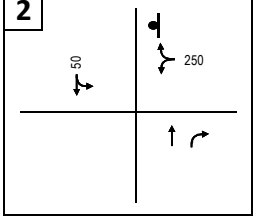


PM Peak Period

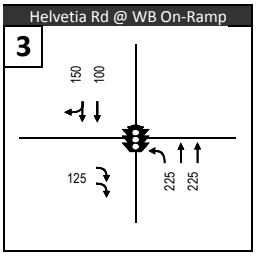
Helvetia Rd @ Schaff Rd
1



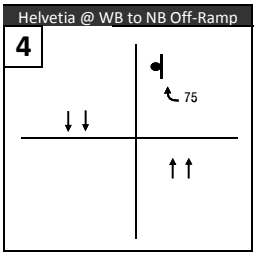
Helvetia Rd @ Jacobson Rd
2



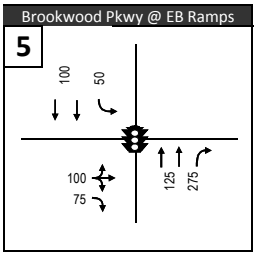
Helvetia Rd @ WB On-Ramp
3



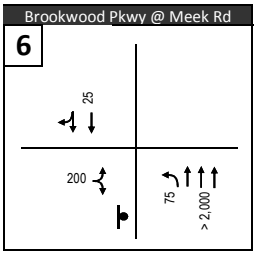
Helvetia @ WB to NB Off-Ramp
4



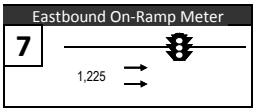
Brookwood Pkwy @ EB Ramps
5

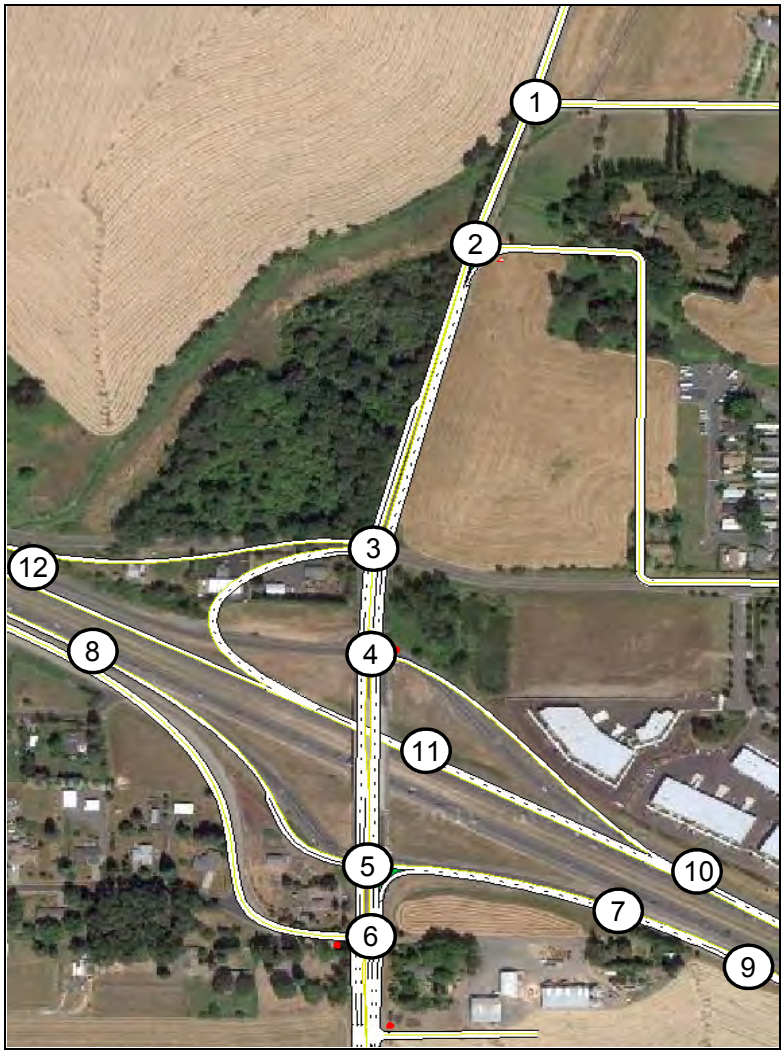


Brookwood Pkwy @ Meek Rd
6



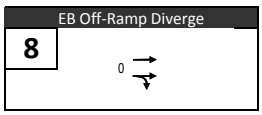
Eastbound On-Ramp Meter
7



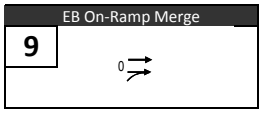


AM Peak Period

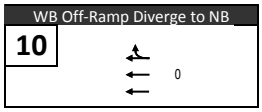
EB Off-Ramp Diverge
8



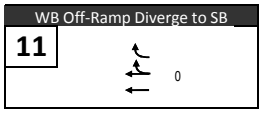
EB On-Ramp Merge
9



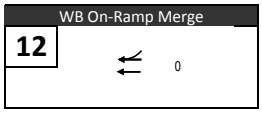
WB Off-Ramp Diverge to NB
10



WB Off-Ramp Diverge to SB
11

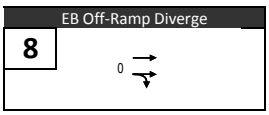


WB On-Ramp Merge
12

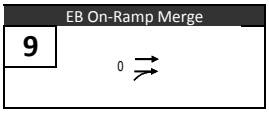


PM Peak Period

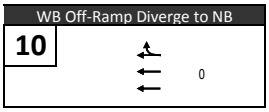
EB Off-Ramp Diverge
8



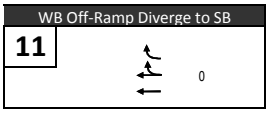
EB On-Ramp Merge
9



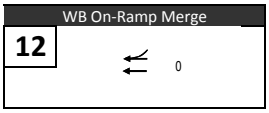
WB Off-Ramp Diverge to NB
10



WB Off-Ramp Diverge to SB
11



WB On-Ramp Merge
12



DAVID EVANS AND ASSOCIATES INC.

Legend

→ Turning Movement

95% Queue Length (Feet)

Source: SimTraffic

FIGURE 26

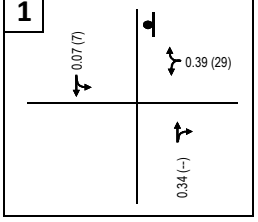
Phase 2 Option B (2023 - 2027)
Queue Length

JTA Brookwood Interchange Analysis

Printed: 1/12/2012

AM Peak Period

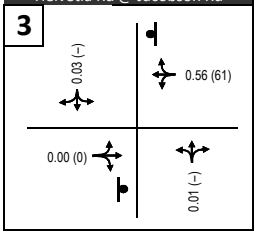
1 Helvetia Rd @ Schaff Rd



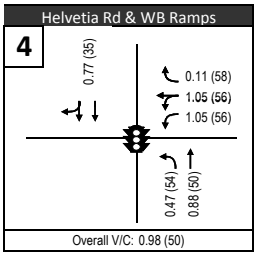
2 Helvetia Rd @ N/A

Intersection Proposed in Build Scenarios Only

3 Helvetia Rd @ Jacobson Rd

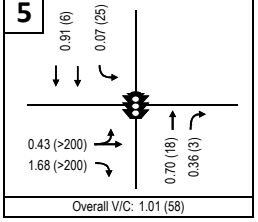


4 Helvetia Rd & WB Ramps



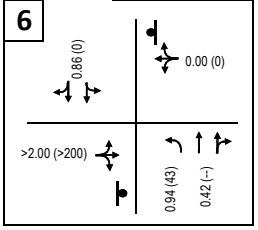
Overall V/C: 0.98 (50)

5 Brookwood Pkwy @ EB Ramps

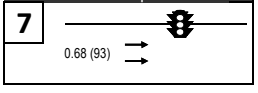


Overall V/C: 1.01 (58)

6 Brookwood Pkwy @ Meek Rd

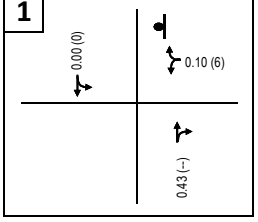


7 EB On-Ramp Meter



PM Peak Period

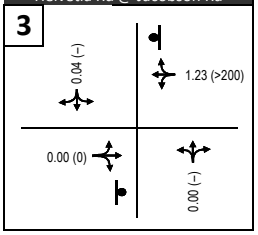
1 Helvetia Rd @ Schaff Rd



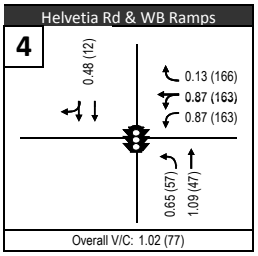
2 Helvetia Rd @ N/A

Intersection Proposed in Build Scenarios Only

3 Helvetia Rd @ Jacobson Rd

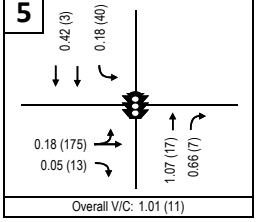


4 Helvetia Rd & WB Ramps



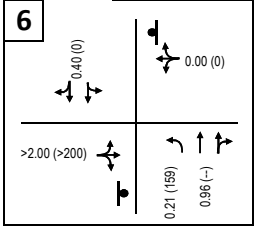
Overall V/C: 1.02 (77)

5 Brookwood Pkwy @ EB Ramps

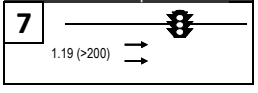


Overall V/C: 1.01 (11)

6 Brookwood Pkwy @ Meek Rd

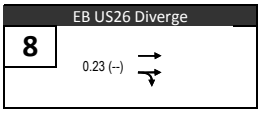


7 EB On-Ramp Meter

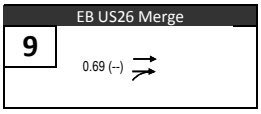


AM Peak Period

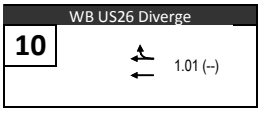
8 EB US26 Diverge



9 EB US26 Merge



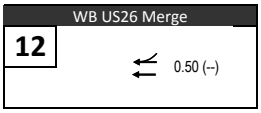
10 WB US26 Diverge



11 WB US26 to N/A

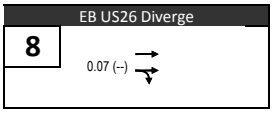
Intersection Proposed in Build Scenarios Only

12 WB US26 Merge

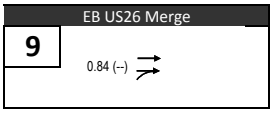


PM Peak Period

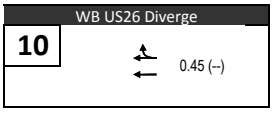
8 EB US26 Diverge



9 EB US26 Merge



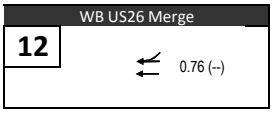
10 WB US26 Diverge



11 WB US26 to N/A

Intersection Proposed in Build Scenarios Only

12 WB US26 Merge



DAVID EVANS AND ASSOCIATES INC.

Legend

→ Turning Movement

#.## (##) Lane Group V/C Ratio (Lane Group Delay in Seconds)

Note: (--) Delay is not a HCM output for Merge or Diverge areas, or uncontrolled approaches to intersections.

Source: V/C ratio from Synchro and Delay values from SimTraffic

FIGURE 27

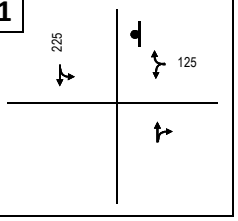
No-Build (2035+)
Volume to Capacity Ratios (V/C) and Delay

JTA Brookwood Interchange Analysis

Printed: 1/12/2012

AM Peak Period

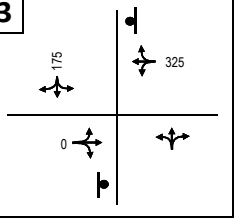
Helvetia Rd @ Schaff Rd
1



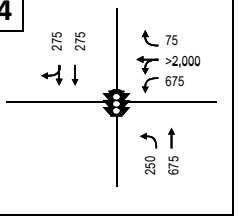
Helvetia Rd @ N/A
2

Intersection Proposed in Build Scenarios Only

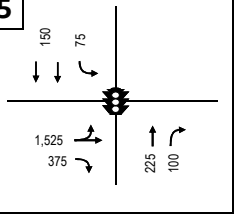
Helvetia Rd @ Jacobson Rd
3



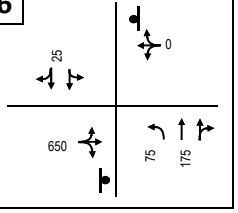
Helvetia Rd & WB Ramps
4



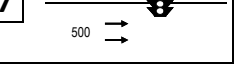
Brookwood Pkwy @ EB Ramps
5



Brookwood Pkwy @ Meek Rd
6



EB On-Ramp Meter
7



EB US26 Diverge
8

EB US26 Merge
9

WB US26 Diverge to NB
10

WB US26 Diverge to SB
11

Intersection Proposed in Build Scenarios Only

WB US26 Merge
12

PM Peak Period

Helvetia Rd @ Schaff Rd
1

Helvetia Rd @ N/A
2

Intersection Proposed in Build Scenarios Only

Helvetia Rd @ Jacobson Rd
3

Helvetia Rd & WB Ramps
4

Brookwood Pkwy @ EB Ramps
5

Brookwood Pkwy @ Meek Rd
6

EB On-Ramp Meter
7

EB US26 Diverge
8

EB US26 Merge
9

WB US26 Diverge to NB
10

WB US26 Diverge to SB
11

Intersection Proposed in Build Scenarios Only

WB US26 Merge
12

DAVID EVANS AND ASSOCIATES INC.

Legend

→ Turning Movement

95% Queue Length (Feet)

Source: SimTraffic

FIGURE 28

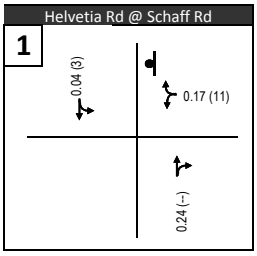
No-Build (2035+)
Queue Length

JTA Brookwood Interchange Analysis

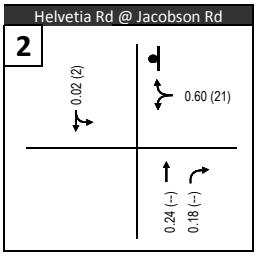
Printed: 1/12/2012

AM Peak Period

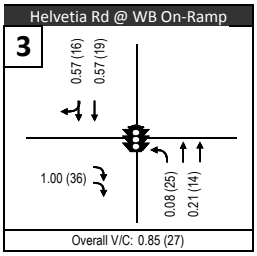
1 Helvetia Rd @ Schaff Rd



2 Helvetia Rd @ Jacobson Rd

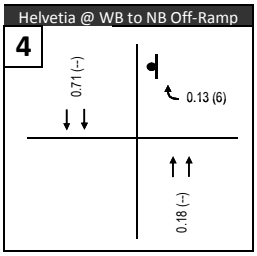


3 Helvetia Rd @ WB On-Ramp

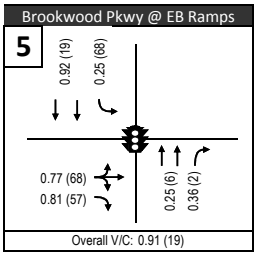


Overall V/C: 0.85 (27)

4 Helvetia @ WB to NB Off-Ramp

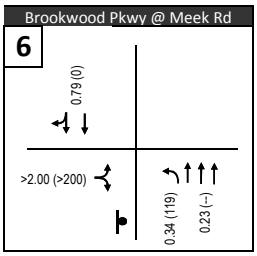


5 Brookwood Pkwy @ EB Ramps

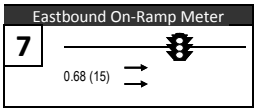


Overall V/C: 0.91 (19)

6 Brookwood Pkwy @ Meek Rd

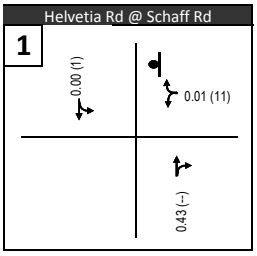


7 Eastbound On-Ramp Meter

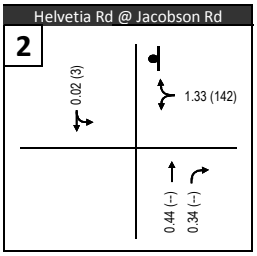


PM Peak Period

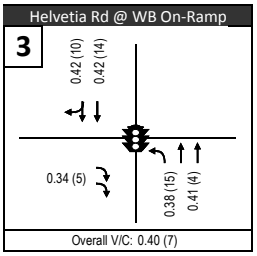
1 Helvetia Rd @ Schaff Rd



2 Helvetia Rd @ Jacobson Rd

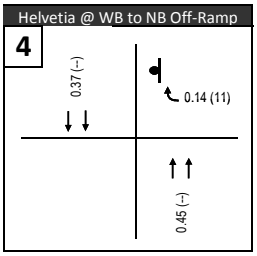


3 Helvetia Rd @ WB On-Ramp

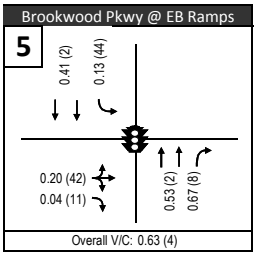


Overall V/C: 0.40 (7)

4 Helvetia @ WB to NB Off-Ramp

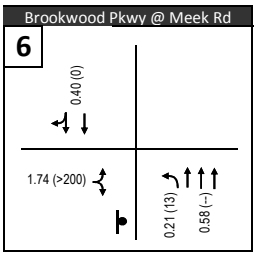


5 Brookwood Pkwy @ EB Ramps

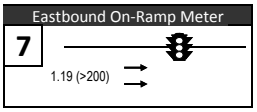


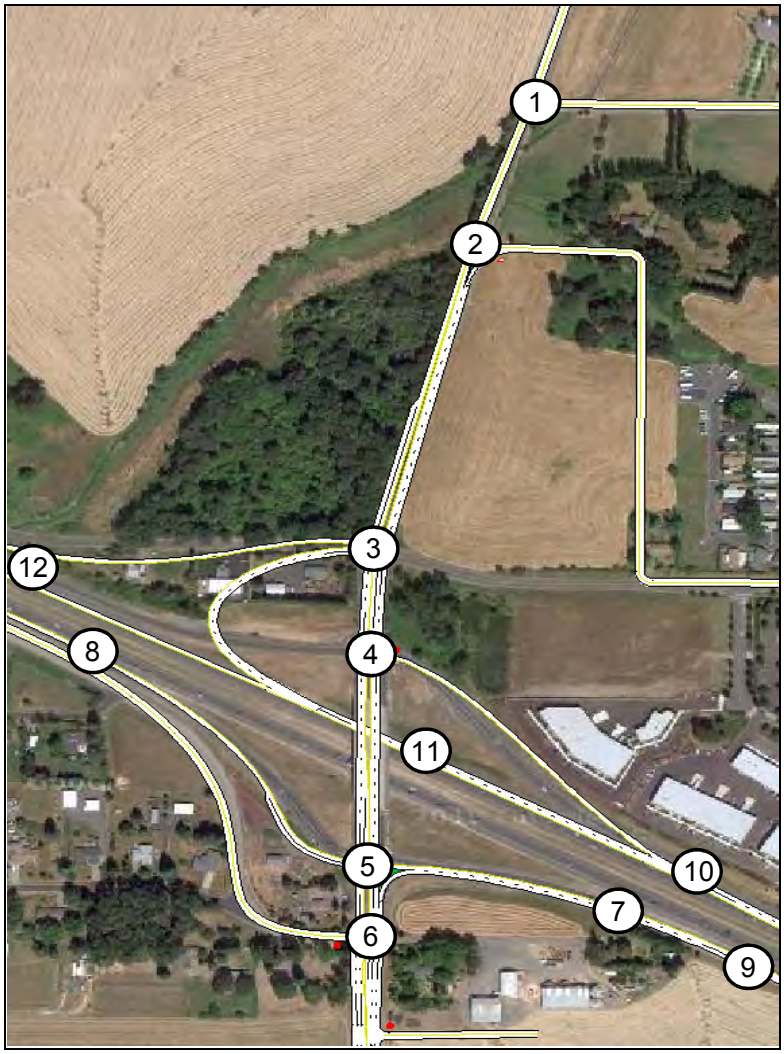
Overall V/C: 0.63 (4)

6 Brookwood Pkwy @ Meek Rd



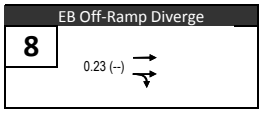
7 Eastbound On-Ramp Meter



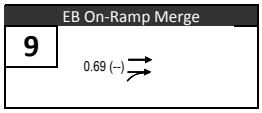


AM Peak Period

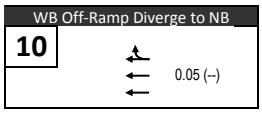
8 EB Off-Ramp Diverge



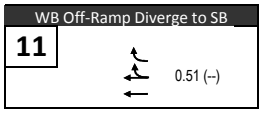
9 EB On-Ramp Merge



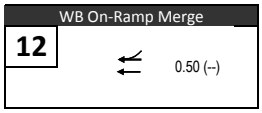
10 WB Off-Ramp Diverge to NB



11 WB Off-Ramp Diverge to SB

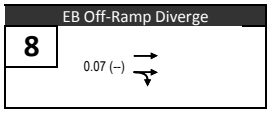


12 WB On-Ramp Merge

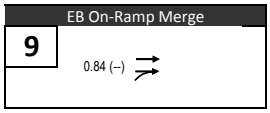


PM Peak Period

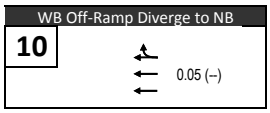
8 EB Off-Ramp Diverge



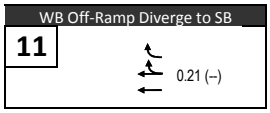
9 EB On-Ramp Merge



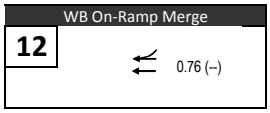
10 WB Off-Ramp Diverge to NB



11 WB Off-Ramp Diverge to SB



12 WB On-Ramp Merge



DAVID EVANS AND ASSOCIATES INC.

Legend

→ Turning Movement

#.## (##) Lane Group V/C Ratio (Lane Group Delay in Seconds)

Note: (--) Delay is not a HCM output for Merge or Diverge areas, or uncontrolled approaches to intersections.

Source: V/C ratio from Synchro and Delay values from SimTraffic

FIGURE 29

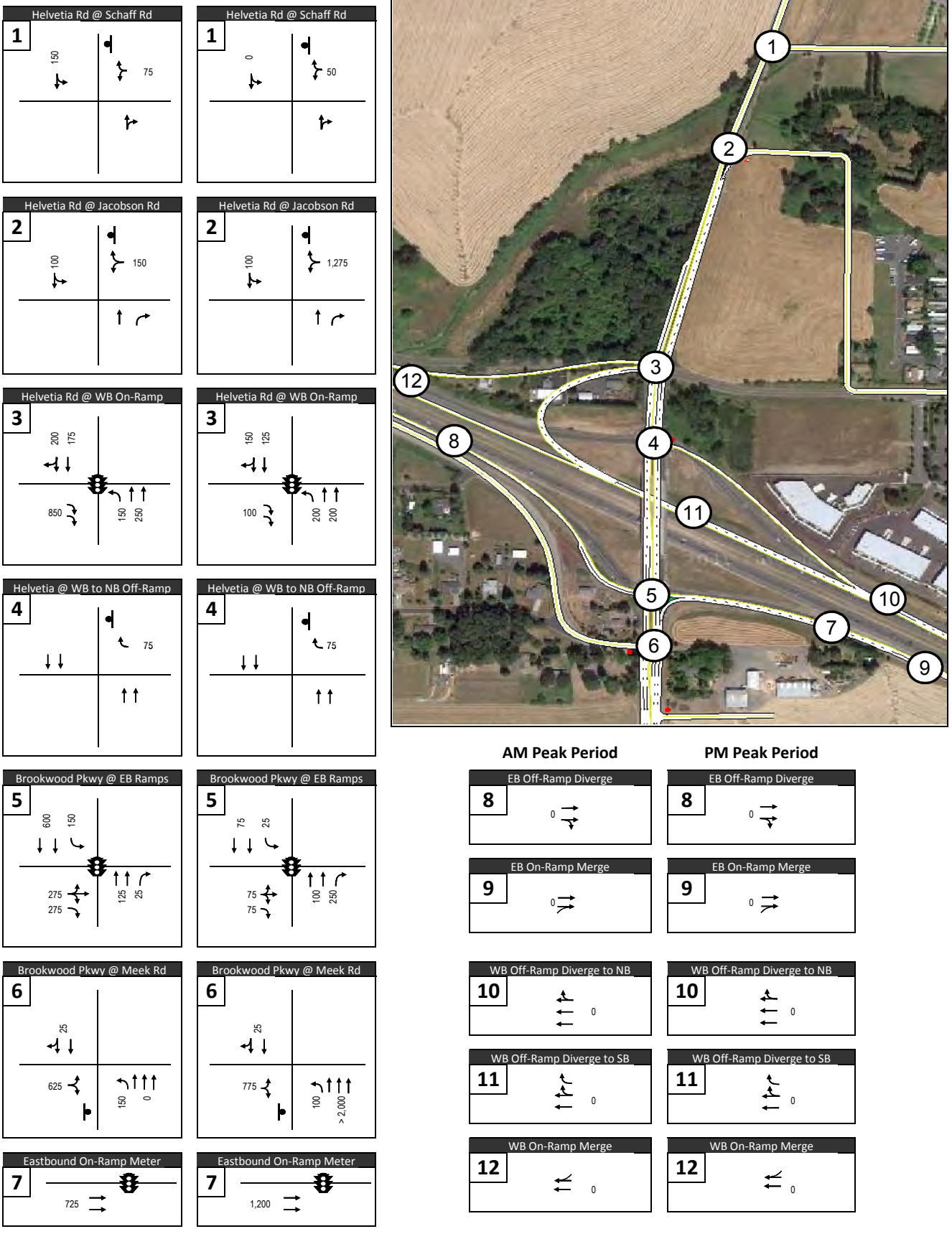
Phase 2 Option B (2035+)
Volume to Capacity Ratios (V/C) and Delay

JTA Brookwood Interchange Analysis

Printed: 1/12/2012

AM Peak Period

PM Peak Period



AM Peak Period

PM Peak Period

EB Off-Ramp Diverge
8
0

EB On-Ramp Merge
9
0

WB Off-Ramp Diverge to NB
10
0

WB Off-Ramp Diverge to SB
11
0

WB On-Ramp Merge
12
0

DAVID EVANS AND ASSOCIATES INC.

Legend

→ Turning Movement

95% Queue Length (Feet)

Source: SimTraffic

FIGURE 30

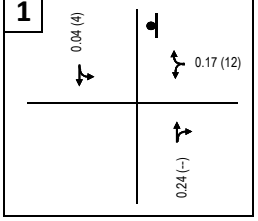
Phase 2 Option B (2035+)
Queue Length

JTA Brookwood Interchange Analysis

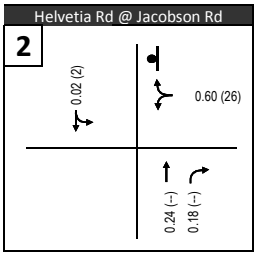
Printed: 1/12/2012

AM Peak Period

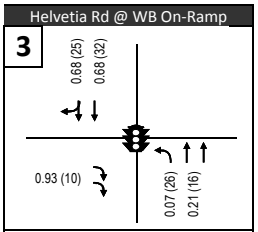
Helvetia Rd @ Schaff Rd
1



Helvetia Rd @ Jacobson Rd
2

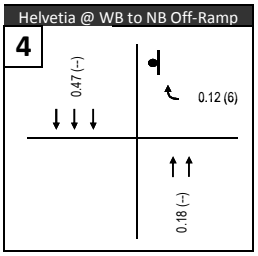


Helvetia Rd @ WB On-Ramp
3

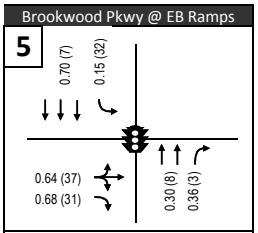


Overall V/C: 0.86 (14)

Helvetia @ WB to NB Off-Ramp
4

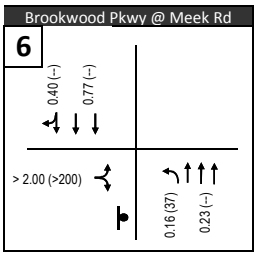


Brookwood Pkwy @ EB Ramps
5

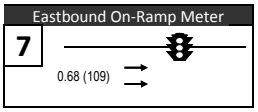


Overall V/C: 0.70 (9)

Brookwood Pkwy @ Meek Rd
6

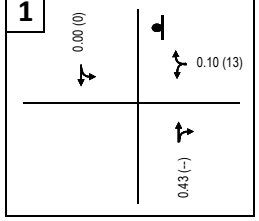


Eastbound On-Ramp Meter
7

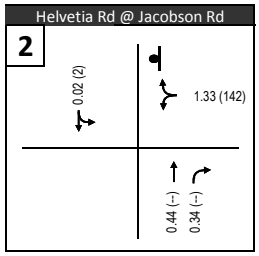


PM Peak Period

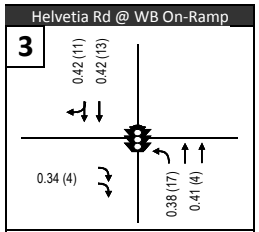
Helvetia Rd @ Schaff Rd
1



Helvetia Rd @ Jacobson Rd
2

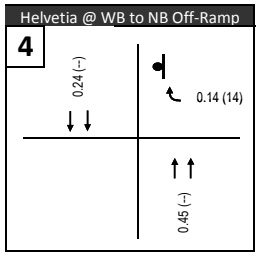


Helvetia Rd @ WB On-Ramp
3

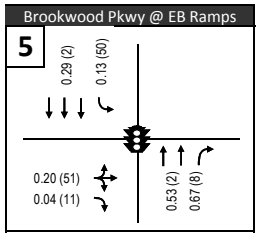


Overall V/C: 0.40 (7)

Helvetia @ WB to NB Off-Ramp
4

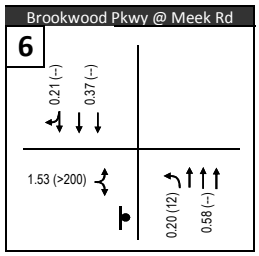


Brookwood Pkwy @ EB Ramps
5

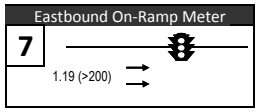


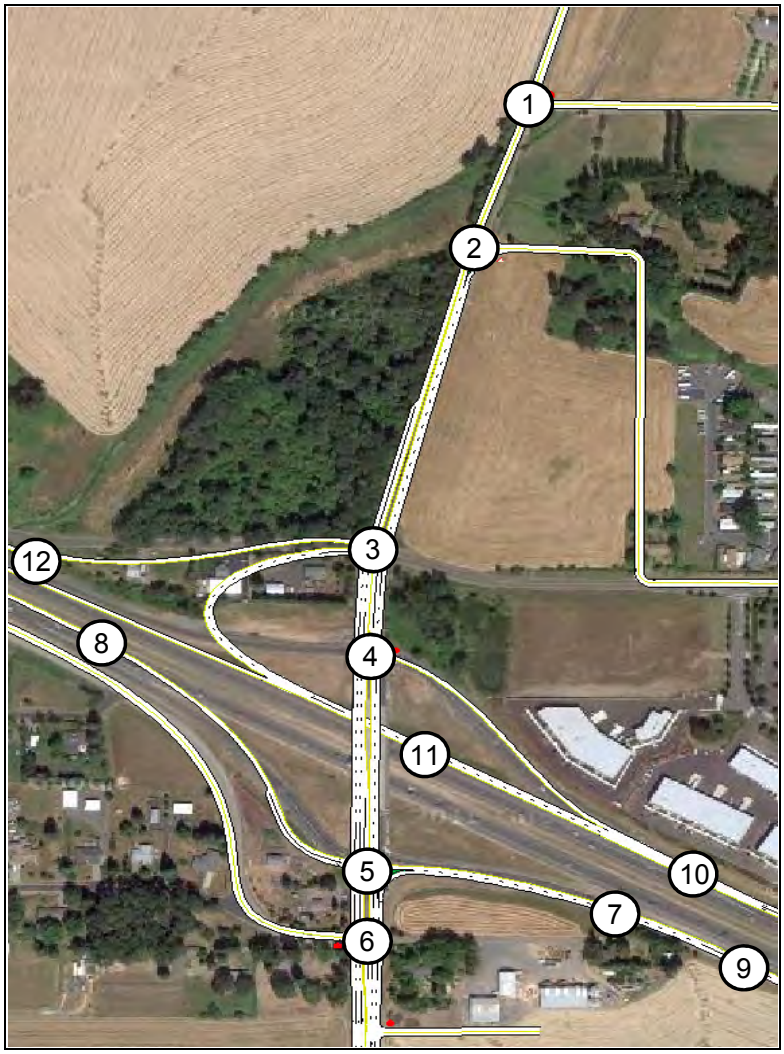
Overall V/C: 0.62 (4)

Brookwood Pkwy @ Meek Rd
6



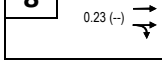
Eastbound On-Ramp Meter
7



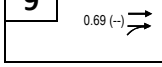


AM Peak Period

EB Off-Ramp Diverge
8



EB On-Ramp Merge
9



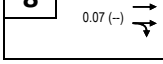
WB Off-Ramp Diverge to NB
10

WB Off-Ramp Diverge to SB
11

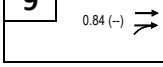
WB On-Ramp Merge
12

PM Peak Period

EB Off-Ramp Diverge
8



EB On-Ramp Merge
9



WB Off-Ramp Diverge to NB
10

WB Off-Ramp Diverge to SB
11

WB On-Ramp Merge
12

DAVID EVANS AND ASSOCIATES INC.

Legend

→ Turning Movement

#.## (##) Lane Group V/C Ratio (Lane Group Delay in Seconds)

Note: (--) Delay is not a HCM output for Merge or Diverge areas, or uncontrolled approaches to intersections.

Source: V/C ratio from Synchro and Delay values from SimTraffic

FIGURE 31

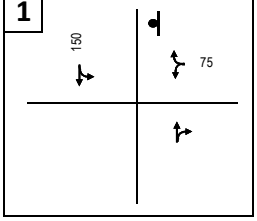
Phase 3 (2035+)
Volume to Capacity Ratios (V/C) and Delay

JTA Brookwood Interchange Analysis

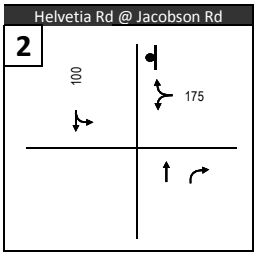
Printed: 1/12/2012

AM Peak Period

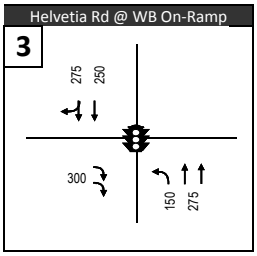
Helvetia Rd @ Schaff Rd
1



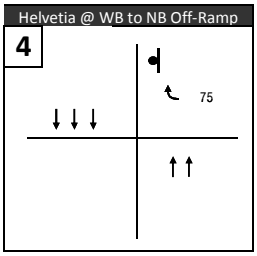
Helvetia Rd @ Jacobson Rd
2



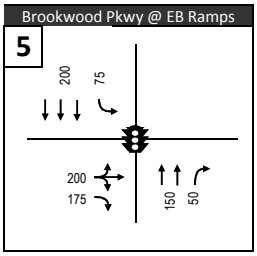
Helvetia Rd @ WB On-Ramp
3



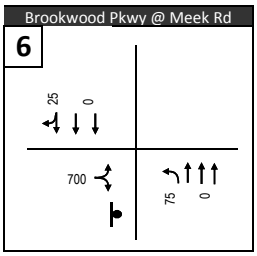
Helvetia @ WB to NB Off-Ramp
4



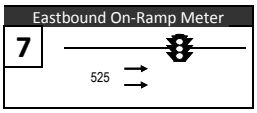
Brookwood Pkwy @ EB Ramps
5



Brookwood Pkwy @ Meek Rd
6

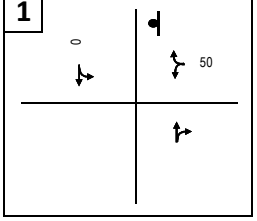


Eastbound On-Ramp Meter
7

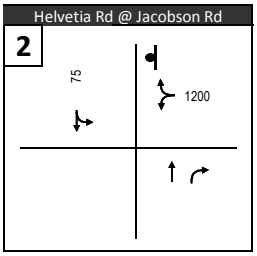


PM Peak Period

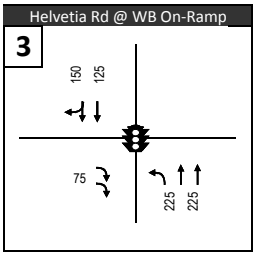
Helvetia Rd @ Schaff Rd
1



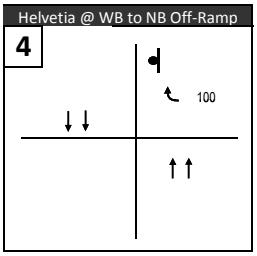
Helvetia Rd @ Jacobson Rd
2



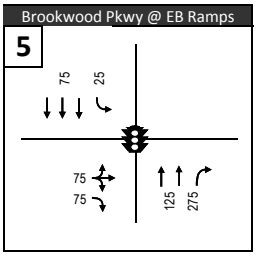
Helvetia Rd @ WB On-Ramp
3



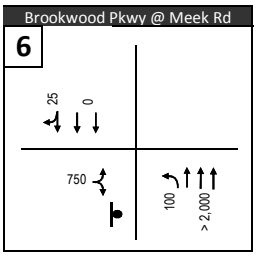
Helvetia @ WB to NB Off-Ramp
4



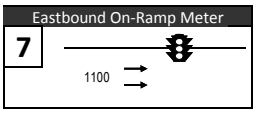
Brookwood Pkwy @ EB Ramps
5

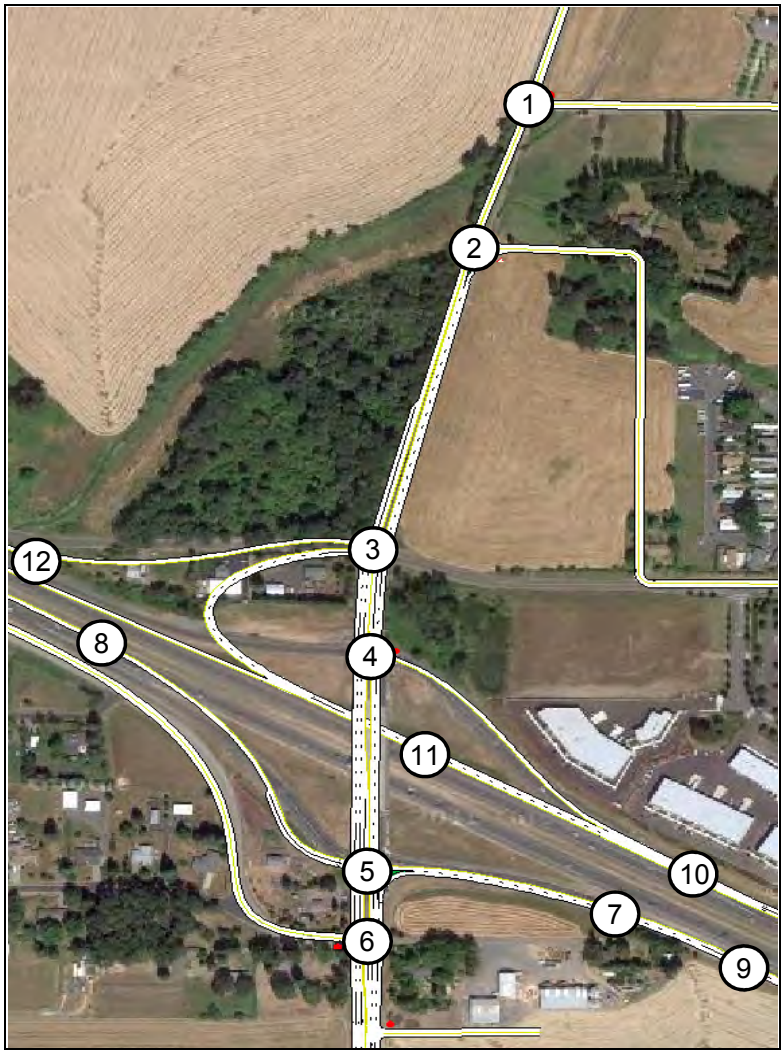


Brookwood Pkwy @ Meek Rd
6



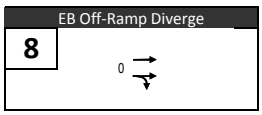
Eastbound On-Ramp Meter
7



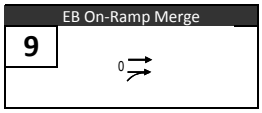


AM Peak Period

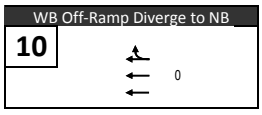
EB Off-Ramp Diverge
8



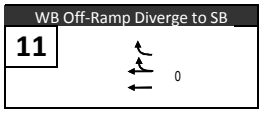
EB On-Ramp Merge
9



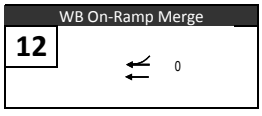
WB Off-Ramp Diverge to NB
10



WB Off-Ramp Diverge to SB
11

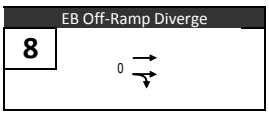


WB On-Ramp Merge
12

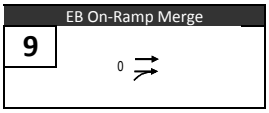


PM Peak Period

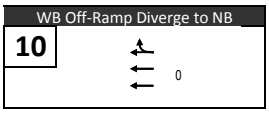
EB Off-Ramp Diverge
8



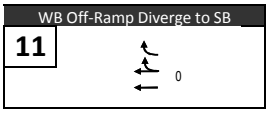
EB On-Ramp Merge
9



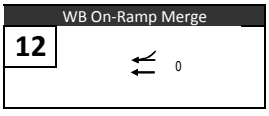
WB Off-Ramp Diverge to NB
10



WB Off-Ramp Diverge to SB
11



WB On-Ramp Merge
12



DAVID EVANS AND ASSOCIATES INC.

Legend

→ Turning Movement

Queue Length (Feet)

Source: SimTraffic

FIGURE 32

Phase 3 (2035+)
Queue Length

JTA Brookwood Interchange Analysis

Printed: 1/12/2012

Appendices

Appendix A: Existing Traffic Counts

Appendix B: Volume Development

Appendix C: Operations

Appendix D: Crash Data

US 26/Brookwood Parkway/Helvetia Road Interchange Project

JTA US 26/Brookwood/Helvetia Interchange Analysis Key # 16842

Technical Appendix

Prepared for:

Oregon Department of Transportation
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Portland, OR 97209

Prepared by:

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2100 SW River Parkway
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January 2012

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Year 2035 No-Build……Page 107

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Year 2035 Phase 2B……Page 332

Year 2035 Phase 3……Page 379

Appendix D: Raw Crash Data……Page 426

Appendix A:
Traffic Count Summary

DATE : 5-25-2011	LOCATION: BROOKWOOD PKWY @ HWY 26 WB RAMPS

	Eastbound			Westbound			Northbound			Southbound			Totals	
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	15-min	Hourly
0500	0	0	0	70	0	0	2	7	0	0	6	0	85	
0515	0	0	0	180	1	0	1	10	0	0	16	2	210	
0530	0	0	0	255	1	1	3	28	0	0	31	1	320	
0545	0	0	0	164	0	1	1	48	0	0	31	0	245	860
0600	0	0	0	137	0	0	3	31	0	0	28	0	199	974
0615	0	0	0	150	0	5	2	45	0	0	44	1	247	1011
0630	0	0	0	402	0	18	11	141	0	0	99	8	679	1370
0645	0	0	0	213	0	10	5	39	0	0	51	6	324	1449
0700	0	0	0	213	0	10	7	39	0	0	54	6	329	1579
0715	0	0	0	222	0	6	18	72	0	0	69	14	401	1733
0730	0	0	0	257	0	8	11	118	0	0	114	10	518	1572
0745	0	0	0	281	0	7	17	89	0	0	128	4	526	1774
0800	0	0	0	288	0	13	16	70	0	0	92	6	485	1930
0815	0	0	0	270	0	8	12	52	0	0	83	6	431	1960
0830	0	0	0	253	0	9	14	110	0	0	114	6	506	1948
0845	0	0	0	262	1	16	9	91	0	0	114	8	501	1923
0900	0	0	0	235	0	3	8	45	0	0	78	6	375	1813
0915	0	0	0	177	0	9	20	46	0	0	47	4	303	1685
0930	0	0	0	175	0	10	16	40	0	0	47	3	291	1470
0945	0	0	0	166	0	11	5	34	0	0	44	9	269	1238
1000	0	0	0	114	0	7	9	42	0	0	54	8	234	1097
1015	0	0	0	112	0	13	14	39	0	0	44	3	225	1019
1030	0	0	0	111	0	10	19	46	0	0	42	9	237	965
1045	0	0	0	93	1	10	16	36	0	0	51	5	212	908
1100	0	0	0	104	0	11	26	40	0	0	63	4	248	922
1115	0	0	0	122	0	14	20	31	0	0	47	2	236	933
1130	0	0	0	107	0	15	27	44	0	0	37	8	238	934
1145	0	0	0	104	1	12	12	48	0	0	47	11	235	957
1200	0	0	0	125	2	11	20	64	0	0	49	5	276	985
1215	0	0	0	114	0	6	21	55	0	0	51	6	253	1002
1230	0	0	0	106	0	17	13	48	0	0	60	6	250	1014
1245	0	0	0	131	0	19	15	49	0	0	42	3	259	1038
1300	0	0	0	120	1	15	21	46	0	0	60	8	271	1033
1315	0	0	0	93	0	12	15	64	0	0	43	7	234	1014
1330	0	0	0	90	0	14	19	57	0	0	82	6	268	1032
1345	0	0	0	113	0	17	18	53	0	0	59	9	269	1042
1400	0	0	0	97	0	15	31	40	0	0	55	6	244	1015
1415	0	0	0	100	0	11	27	51	0	0	57	5	251	1032
1430	0	0	0	106	0	18	31	64	0	0	57	13	289	1053
1445	0	0	0	120	1	12	34	55	0	0	54	12	288	1072
1500	0	0	0	135	1	9	34	49	0	0	49	13	290	1118
1515	0	0	0	133	0	12	24	76	0	0	57	5	307	1174
1530	0	0	0	143	0	12	52	116	0	0	96	27	446	1331
1545	0	0	0	152	0	13	51	122	0	0	69	17	424	1467
1600	0	0	0	138	1	24	39	112	0	0	63	8	385	1562
1615	0	0	0	153	4	13	48	200	0	0	63	25	506	1761
1630	0	0	0	144	1	12	44	233	0	0	88	30	552	1867
1645	0	0	0	154	1	12	44	175	0	0	52	15	453	1896
1700	0	0	0	142	1	22	53	227	0	0	52	18	515	2026
1715	0	0	0	148	0	21	57	253	0	0	49	14	542	2062
1730	0	0	0	145	0	22	51	186	0	0	87	14	505	2015
1745	0	0	0	146	0	20	38	138	0	0	54	8	404	1966
1800	0	0	0	117	0	11	30	131	0	0	58	13	360	1811
1815	0	0	0	112	0	9	37	96	0	0	38	12	304	1573
1830	0	0	0	87	0	15	25	80	0	0	62	12	281	1349
1845	0	0	0	126	0	9	26	45	0	0	40	15	261	1206
1900	0	0	0	102	0	13	16	44	0	0	35	9	219	1065
1915	0	0	0	87	0	3	22	62	0	0	38	6	218	979
1930	0	0	0	63	1	7	25	43	0	0	30	12	181	879
1945	0	0	0	82	0	3	23	29	0	0	28	2	167	785
2000	0	0	0	61	0	4	23	28	0	0	30	13	159	725
2015	0	0	0	74	0	4	10	29	0	0	50	3	170	677
2030	0	0	0	77	0	6	12	24	0	0	53	9	181	677
2045	0	0	0	69	0	15	11	29	0	0	41	1	166	676

DATE : 5-25-2011	LOCATION: BROOKWOOD PKWY @ HWY 26 EB RAMPS

	Eastbound			Westbound			Northbound			Southbound			Totals	
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	15-min	Hourly
0500	2	0	11	0	0	0	0	5	53	3	69	0	143	
0515	5	0	20	0	0	0	0	7	61	3	179	0	275	
0530	11	0	20	0	0	0	0	15	74	3	281	0	404	
0545	19	0	38	0	0	0	0	31	88	5	214	0	395	1217
0600	7	0	24	0	0	0	0	33	140	9	146	0	359	1433
0615	5	0	26	0	0	0	0	34	166	7	205	0	443	1601
0630	8	0	44	0	0	0	0	48	154	1	269	0	524	1721
0645	14	0	54	0	0	0	0	79	122	3	311	0	583	1909
0700	8	0	41	0	0	0	0	37	126	4	302	0	518	2068
0715	11	0	42	0	0	0	0	71	126	8	314	0	572	2197
0730	14	1	54	0	0	0	0	111	115	10	391	0	696	2369
0745	21	0	58	0	0	0	0	88	101	9	462	0	739	2525
0800	13	0	29	0	0	0	0	68	106	10	412	0	638	2645
0815	13	0	34	0	0	0	0	53	123	7	390	0	620	2693
0830	7	0	38	0	0	0	0	100	117	6	372	0	640	2637
0845	13	0	27	0	0	0	0	85	90	9	411	0	635	2533
0900	4	0	23	0	0	0	0	48	103	9	335	0	522	2417
0915	3	1	17	0	0	0	0	62	113	3	261	0	460	2257
0930	6	0	25	0	0	0	0	48	102	9	220	0	410	2027
0945	6	0	28	0	0	0	0	28	72	4	243	0	381	1773
1000	4	0	25	0	0	0	0	45	101	20	173	0	368	1619
1015	9	0	22	0	0	0	0	46	102	8	173	0	360	1519
1030	9	0	24	0	0	0	0	52	114	11	173	0	383	1492
1045	5	0	20	0	0	0	0	45	94	9	145	0	318	1429
1100	4	0	19	0	0	0	0	58	133	20	162	0	396	1457
1115	4	0	23	0	0	0	0	43	145	13	174	0	402	1499
1130	5	0	19	0	0	0	0	65	121	10	162	0	382	1498
1145	8	0	26	0	0	0	0	63	108	12	155	0	372	1552
1200	9	0	13	0	0	0	0	76	146	7	171	0	422	1578
1215	4	0	11	0	0	0	0	76	130	11	182	0	414	1590
1230	10	0	17	0	0	0	0	48	123	8	186	0	392	1600
1245	10	0	21	0	0	0	0	54	113	11	173	0	382	1610
1300	10	0	29	0	0	0	0	54	133	17	188	0	431	1619
1315	13	0	22	0	0	0	0	69	125	12	137	0	378	1583
1330	9	1	19	0	0	0	0	62	122	16	176	0	405	1596
1345	8	0	17	0	0	0	0	61	108	6	178	0	378	1592
1400	7	0	19	0	0	0	0	61	131	13	159	0	390	1551
1415	4	0	12	0	0	0	0	77	155	14	152	0	414	1587
1430	8	0	15	0	0	0	0	83	160	13	168	0	447	1629
1445	6	1	22	0	0	0	0	86	164	20	163	0	462	1713
1500	4	1	22	0	0	0	0	75	166	11	177	0	456	1779
1515	7	2	19	0	0	0	0	106	190	14	190	0	528	1893
1530	24	0	24	0	0	0	0	127	227	9	220	0	631	2077
1545	16	0	18	0	0	0	0	152	196	9	232	0	623	2238
1600	7	0	16	0	0	0	0	148	216	8	200	0	595	2377
1615	7	0	14	0	0	0	0	233	184	2	224	0	664	2513
1630	12	0	21	0	0	0	0	266	152	5	238	0	694	2576
1645	16	0	9	0	0	0	0	198	184	6	210	0	623	2576
1700	19	1	15	0	0	0	0	253	196	4	201	0	689	2670
1715	15	0	14	0	0	0	0	287	179	1	203	0	699	2705
1730	15	0	20	0	0	0	0	237	185	8	241	0	706	2717
1745	5	0	18	0	0	0	0	172	218	4	213	0	630	2724
1800	11	0	18	0	0	0	0	157	210	6	170	0	572	2607
1815	4	0	12	0	0	0	0	134	246	4	140	0	540	2448
1830	5	0	7	0	0	0	0	105	253	11	143	0	524	2266
1845	7	0	13	0	0	0	0	83	149	8	160	0	420	2056
1900	6	0	4	0	0	0	0	50	130	12	150	0	352	1836
1915	10	0	18	0	0	0	0	70	96	8	111	0	313	1609
1930	6	0	6	0	0	0	0	57	81	8	91	0	249	1334
1945	3	0	2	0	0	0	0	50	70	7	103	0	235	1149
2000	3	0	4	0	0	0	0	54	62	7	105	0	235	1032
2015	1	0	3	0	0	0	0	37	76	10	109	0	236	955
2030	3	0	3	0	0	0	0	37	54	3	127	0	227	933
2045	3	0	3	0	0	0	0	35	50	10	108	0	209	907

Date Counted: 7/20/11
Location/Intersection: Helvetia Rd & US 26 WB Ramps

Summary of all movements (AM)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
7:00 AM	0	0	0	213	0	4	11	49	0	0	45	4	326
7:15 AM	0	0	0	261	0	13	9	60	0	0	69	4	416
7:30 AM	0	0	0	335	0	9	7	66	0	0	101	5	523
7:45 AM	0	0	0	385	0	8	6	82	0	0	113	15	609
8:00 AM	0	0	0	271	0	12	8	51	0	0	88	3	433
8:15 AM	0	0	0	269	0	12	10	46	0	0	84	3	424
8:30 AM	0	0	0	295	0	7	5	48	0	0	73	8	436
8:45 AM	0	0	0	290	0	12	16	38	0	0	83	1	440

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
7:30 - 8:30	0	0	0	1260	0	41	31	245	0	0	386	26	1989

Summary of all movements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
4:00 PM	0	0	0	137	1	12	43	107	0	0	62	18	380
4:15 PM	0	0	0	154	0	17	47	167	0	0	58	21	464
4:30 PM	0	0	0	173	0	13	48	145	0	0	79	31	489
4:45 PM	0	0	0	148	0	11	46	139	0	0	55	17	416
5:00 PM	0	0	0	150	1	16	50	181	0	0	56	16	470
5:15 PM	0	0	0	156	0	17	47	214	0	0	45	13	492
5:30 PM	0	0	0	150	0	20	54	180	0	0	56	10	470
5:45 PM	0	0	0	152	0	9	33	138	0	0	53	6	391

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
4:30 - 5:30	0	0	0	627	1	57	191	679	0	0	235	77	1867

Date Counted: 7/20/11
Location/Intersection: Brookwood Parkway & US 26 EB Ramps

Summary of all movements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
7:00 AM	9	0	44	0	0	0	0	55	133	2	260	0	503
7:15 AM	13	0	33	0	0	0	0	59	128	6	328	0	567
7:30 AM	10	0	37	0	0	0	0	59	107	9	435	0	657
7:45 AM	16	0	48	0	0	0	0	72	98	11	475	0	720
8:00 AM	6	0	21	0	0	0	0	51	116	9	351	0	554
8:15 AM	8	0	33	0	0	0	0	45	115	12	336	0	549
8:30 AM	5	0	27	0	0	0	0	38	110	8	367	0	555
8:45 AM	11	0	35	0	0	0	0	45	88	11	360	0	550

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
7:30 - 8:30	40	0	139	0	0	0	0	227	436	41	1597	0	2480

Summary of all movements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
4:00 PM	8	0	18	0	0	0	0	143	217	6	199	0	591
4:15 PM	9	1	18	0	0	0	0	203	174	6	199	0	610
4:30 PM	8	0	18	0	0	0	0	192	172	5	252	0	647
4:45 PM	3	0	13	0	0	0	0	181	179	4	200	0	580
5:00 PM	10	0	14	0	0	0	0	221	224	4	205	0	678
5:15 PM	15	1	17	0	0	0	0	243	204	3	189	0	672
5:30 PM	12	0	11	0	0	0	0	216	199	4	204	0	646
5:45 PM	15	1	15	0	0	0	0	162	201	4	207	0	605

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
4:30 - 5:30	36	1	62	0	0	0	0	837	779	16	846	0	2577

LOCATION: HELVETIA RD @ SCHAFF RD 1600-1900
CITY: HILLSBORO, OR
FILENAME: V12CJ 11-024 S

Site: 0016
Date: 5/25/2011
Wednesday

Peak Hour Detail

Interval		Southbound HELVETIA				Westbound SCHAFF				Northbound HELVETIA				Eastbound			
Begin	Ped1	Right	Thru	Left	Ped2	Right	Thru	Left	Ped3	Right	Thru	Left	Ped4	Right	Thru	Left	Total
4:00 PM	0	0	31	0	0	0	0	1	0	1	65	0	0	0	0	0	98
4:15 PM	0	0	47	0	0	1	0	0	0	0	86	0	0	0	0	0	134
4:30 PM	0	0	46	0	0	0	0	0	0	0	119	0	0	0	0	0	165
4:45 PM	0	0	26	0	0	0	0	1	0	0	95	0	0	0	0	0	122
5:00 PM	0	0	32	0	0	0	0	0	0	0	123	0	0	0	0	0	155
5:15 PM	0	0	33	0	0	0	0	0	0	1	112	0	0	0	0	0	146
5:30 PM	0	0	48	0	0	0	0	1	0	1	103	0	0	0	0	0	153
5:45 PM	0	0	32	0	0	0	0	1	0	0	69	0	0	0	0	0	102
6:00 PM	0	0	34	0	0	0	0	0	0	0	69	0	0	0	0	0	103
6:15 PM	0	0	26	0	0	0	0	0	0	1	56	0	0	0	0	0	83
6:30 PM	1	0	37	0	0	0	0	0	0	1	47	0	0	0	0	0	86
6:45 PM	0	0	41	0	0	0	0	0	0	0	36	0	0	0	0	0	77
Totals	1	0	433	0	0	1	0	4	0	5	980	0	0	0	0	0	1424
Entering			433				5				985				0		
Exiting			437				0				981				5		

Vehicle Totals

Cars	1	0	428	0	0	1	0	4	0	5	972	0	0	0	0	0	1411
	100%		98.8%			100%		100%		100%	99.2%						99.1%
Light	0	0	3	0	0	0	0	0	0	0	4	0	0	0	0	0	7
	0.0%		0.7%			0.0%		0.0%		0.0%	0.4%						0.5%
Bike	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
	0.0%		0.5%			0.0%		0.0%		0.0%	0.0%						0.1%
Medium	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	4
	0.0%		0.0%			0.0%		0.0%		0.0%	0.4%						0.3%
Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.0%		0.0%			0.0%		0.0%		0.0%	0.0%						0.0%

LOCATION: HELVETIA RD @ SCHAFF RD 1600-1900
CITY: HILLSBORO, OR
FILENAME: V12CJ 11-024 S

Site: 0016
Date: 5/25/2011
Wednesday

Peak Hour Detail

Peak Hour: 4:30 PM - 5:30 PM

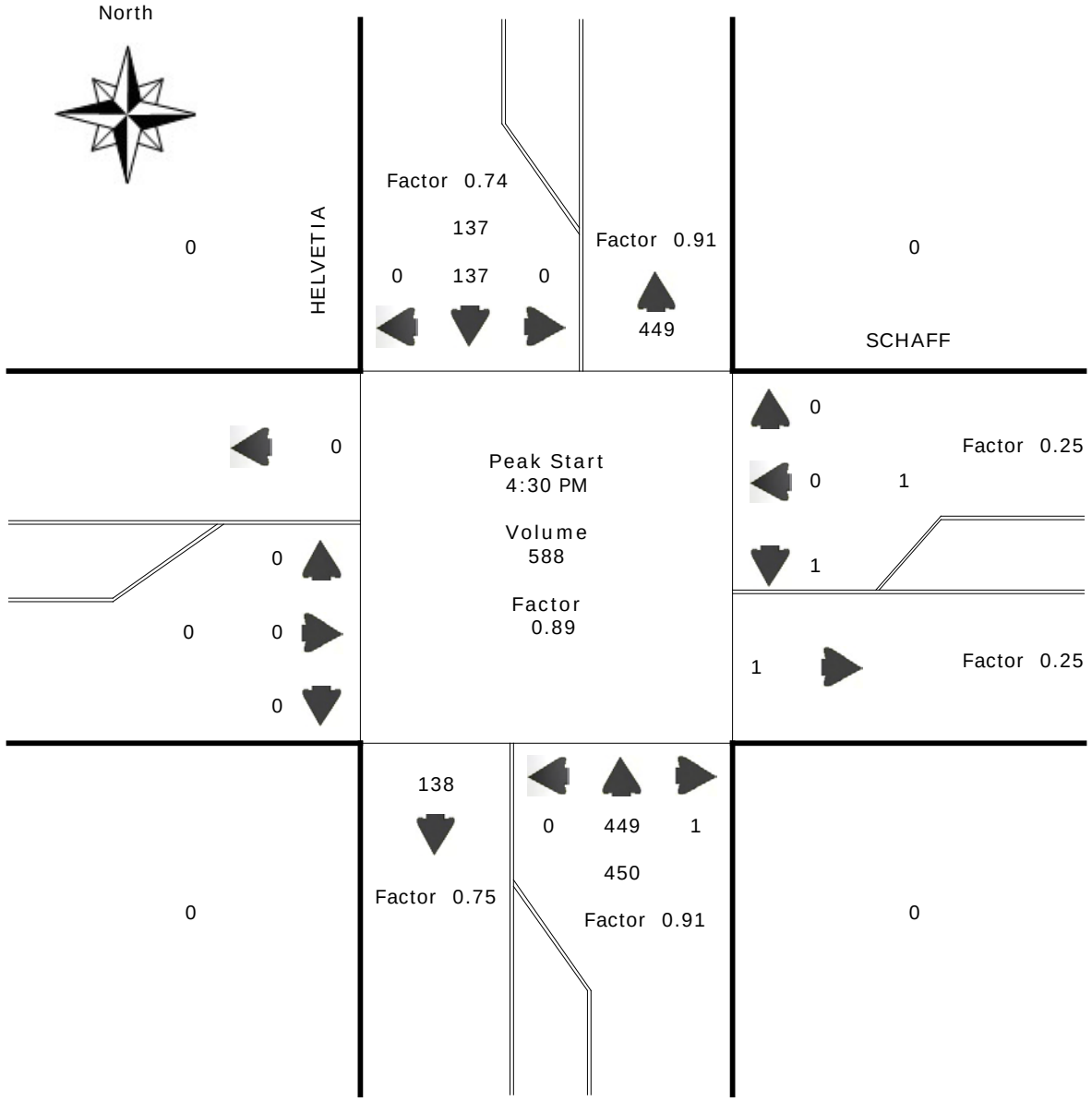
Interval		Southbound HELVETIA				Westbound SCHAFF				Northbound HELVETIA				Eastbound			
Begin	Ped1	Right	Thru	Left	Ped2	Right	Thru	Left	Ped3	Right	Thru	Left	Ped4	Right	Thru	Left	Total
Totals	0	0	137	0	0	0	0	1	0	1	449	0	0	0	0	0	588
Factor			0.74					0.25		0.25	0.91						0.89
Entering			137				1				450				0		
Factor			0.74				0.25				0.91						
Exiting			138				0				449				1		
Factor			0.75								0.91				0.25		
Peak Vehicles																	
Cars	0	0	136	0	0	0	0	1	0	1	447	0	0	0	0	0	585
			99.3%					100%		100%	99.6%						99.5%
Light	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	2
			0.7%					0.0%		0.0%	0.2%						0.3%
Bike	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0.0%					0.0%		0.0%	0.0%						0.0%
Medium	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
			0.0%					0.0%		0.0%	0.2%						0.2%
Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0.0%					0.0%		0.0%	0.0%						0.0%

LOCATION: HELVETIA RD @ SCHAFF RD 1600-1900
CITY: HILLSBORO, OR
FILENAME: V12CJ 11-024 S

Site: 0016
Date: 5/25/2011
Wednesday

Peak Hour Detail

Peak Hour Diagram



LOCATION: HELVETIA RD @ SCHAFF RD 0600-0900
CITY: HILLSBORO, OR
FILENAME: V12CI 11-024 S

Site: 0016
Date: 5/25/2011
Wednesday

Peak Hour Detail

Interval		Southbound HELVETIA				Westbound				Northbound HELVETIA				Eastbound SCHAFF			
Begin	Ped1	Right	Thru	Left	Ped2	Right	Thru	Left	Ped3	Right	Thru	Left	Ped4	Right	Thru	Left	Total
6:00 AM	0	0	15	0	0	0	0	0	0	0	10	0	0	0	0	0	25
6:15 AM	0	0	26	0	0	0	0	0	0	0	14	0	0	0	0	0	40
6:30 AM	0	0	28	0	0	0	0	0	0	0	25	0	0	0	0	0	53
6:45 AM	0	0	23	0	0	1	0	0	0	1	31	0	0	0	0	0	56
7:00 AM	0	0	38	0	0	0	0	1	0	2	29	0	0	0	0	0	70
7:15 AM	0	0	58	0	0	0	0	1	0	0	43	0	0	0	0	0	102
7:30 AM	0	0	100	1	0	2	0	1	0	0	73	0	0	0	0	0	177
7:45 AM	0	0	86	1	0	0	0	2	0	0	32	0	0	0	0	0	121
8:00 AM	0	0	55	0	0	1	0	0	0	1	26	0	0	0	0	0	83
8:15 AM	0	0	52	0	1	0	0	0	0	0	22	0	0	0	0	0	75
8:30 AM	0	0	49	0	0	0	0	0	0	0	22	0	0	0	0	0	71
8:45 AM	0	0	53	0	0	0	0	0	0	0	18	0	0	0	0	0	71
Totals	0	0	583	2	1	4	0	5	0	4	345	0	0	0	0	0	944
Entering			585				9				349				0		
Exiting			588				0				349				6		

Vehicle Totals

Cars	0	0	571	2	1	3	0	5	0	3	330	0	0	0	0	0	915
			97.9%	100%	100%	75.0%		100%		75.0%	95.7%						96.9%
Light	0	0	11	0	0	0	0	0	0	0	10	0	0	0	0	0	21
			1.9%	0.0%	0.0%	0.0%		0.0%		0.0%	2.9%						2.2%
Bike	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	3
			0.2%	0.0%	0.0%	0.0%		0.0%		0.0%	0.6%						0.3%
Medium	0	0	0	0	0	1	0	0	0	1	3	0	0	0	0	0	5
			0.0%	0.0%	0.0%	25.0%		0.0%		25.0%	0.9%						0.5%
Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0.0%	0.0%	0.0%	0.0%		0.0%		0.0%	0.0%						0.0%

LOCATION: HELVETIA RD @ SCHAFF RD 0600-0900
CITY: HILLSBORO, OR
FILENAME: V12CI 11-024 S

Site: 0016
Date: 5/25/2011
Wednesday

Peak Hour Detail

Peak Hour: 7:15 AM - 8:15 AM

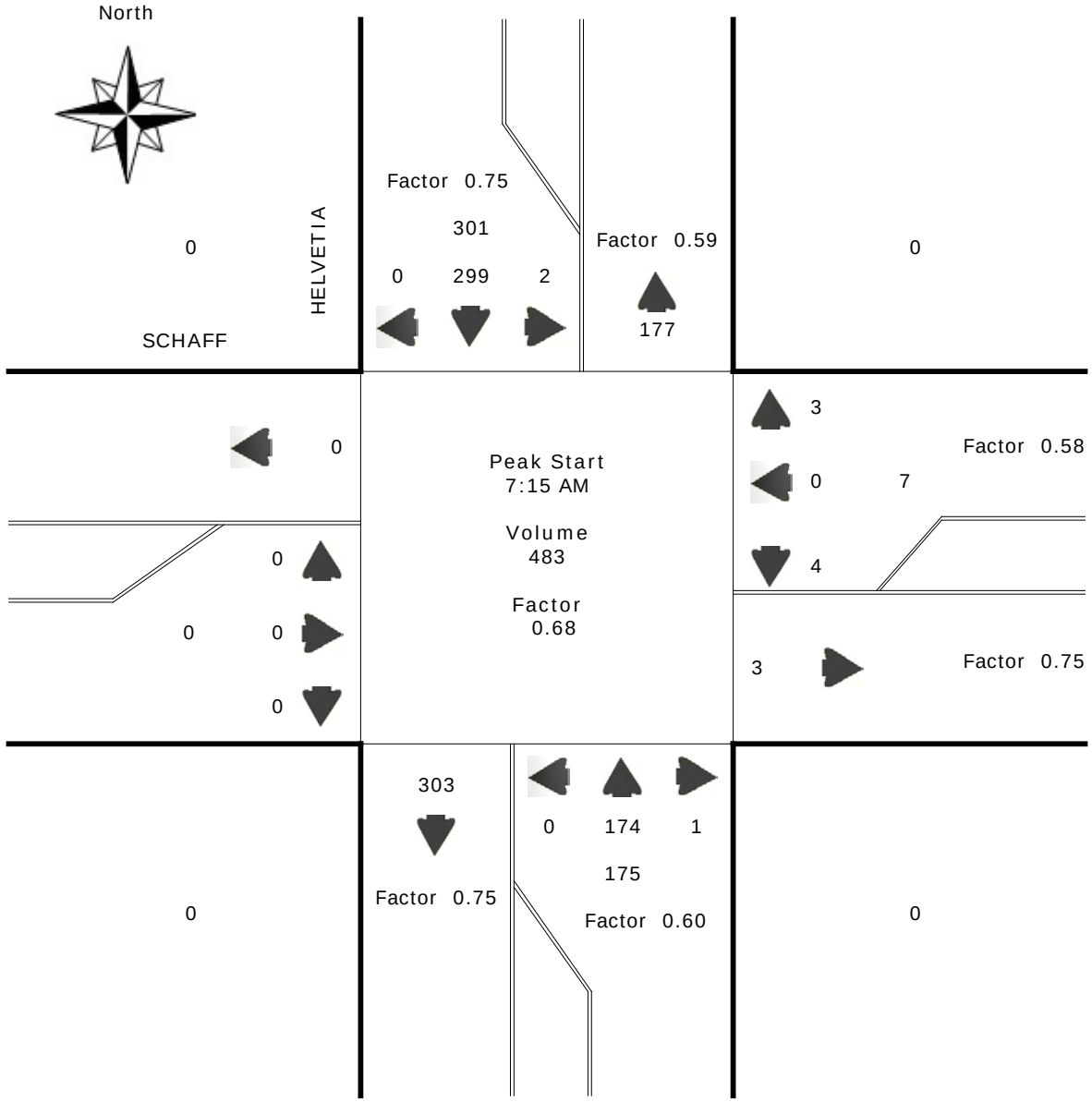
Interval		Southbound HELVETIA				Westbound				Northbound HELVETIA				Eastbound SCHAFF			
Begin	Ped1	Right	Thru	Left	Ped2	Right	Thru	Left	Ped3	Right	Thru	Left	Ped4	Right	Thru	Left	Total
Totals	0	0	299	2	0	3	0	4	0	1	174	0	0	0	0	0	483
Factor			0.75	0.50		0.38		0.50		0.25	0.60						0.68
Entering			301				7				175				0		
Factor			0.75				0.58				0.60						
Exiting			303				0				177				3		
Factor			0.75								0.59				0.75		
Peak Vehicles																	
Cars	0	0	293	2	0	2	0	4	0	0	166	0	0	0	0	0	467
			98.0%	100%		66.7%		100%		0.0%	95.4%						96.7%
Light	0	0	6	0	0	0	0	0	0	0	8	0	0	0	0	0	14
			2.0%	0.0%		0.0%		0.0%		0.0%	4.6%						2.9%
Bike	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0.0%	0.0%		0.0%		0.0%		0.0%	0.0%						0.0%
Medium	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	2
			0.0%	0.0%		33.3%		0.0%		100%	0.0%						0.4%
Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0.0%	0.0%		0.0%		0.0%		0.0%	0.0%						0.0%

LOCATION: HELVETIA RD @ SCHAFF RD 0600-0900
CITY: HILLSBORO, OR
FILENAME: V12CI 11-024 S

Site: 0016
Date: 5/25/2011
Wednesday

Peak Hour Detail

Peak Hour Diagram



LOCATION: BROOKWOOD PKWY @ MEEK RD 1600-1900 Site: 0016
CITY: HILLSBORO, OR Date: 5/25/2011
FILENAME: V12CE 11-024 N Wednesday

Peak Hour Detail

Interval		Southbound BROOKWOOD				Westbound MEEK				Northbound BROOKWOOD				Eastbound MEEK			
Begin	Ped1	Right	Thru	Left	Ped2	Right	Thru	Left	Ped3	Right	Thru	Left	Ped4	Right	Thru	Left	Total
4:00 PM	0	8	212	0	0	0	0	0	0	0	354	6	0	3	0	1	584
4:15 PM	0	2	231	0	0	0	0	0	0	0	433	9	0	5	0	2	682
4:30 PM	0	6	249	0	0	0	0	0	0	0	432	11	0	3	0	0	701
4:45 PM	0	3	218	0	0	0	0	0	0	0	384	8	0	3	0	2	618
5:00 PM	0	5	207	0	0	0	0	0	0	0	461	8	0	1	0	0	682
5:15 PM	0	1	203	0	0	0	0	2	0	0	486	6	0	7	0	1	706
5:30 PM	0	3	266	0	0	0	0	0	0	0	383	3	0	5	0	1	661
5:45 PM	0	3	248	0	0	0	0	0	0	0	378	1	0	0	0	0	630
6:00 PM	0	5	188	1	0	2	0	0	0	0	358	4	0	0	0	1	559
6:15 PM	0	4	138	0	0	0	0	0	0	0	288	7	0	0	0	0	437
6:30 PM	0	1	149	0	0	0	0	0	0	0	341	3	0	1	0	0	495
6:45 PM	0	0	169	0	0	0	0	0	0	0	216	5	0	1	0	0	391
Totals	0	41	2478	1	0	2	0	2	0	0	4514	71	0	29	0	8	7146
Entering			2520				4				4585				37		
Exiting			2509				112				4524				1		

Vehicle Totals

Cars	0	41	2434	1	0	2	0	2	0	0	4445	70	0	29	0	8	7032
		100%	98.2%	100%		100%		100%			98.5%	98.6%		100%		100%	98.4%
Light	0	0	24	0	0	0	0	0	0	0	31	1	0	0	0	0	56
		0.0%	1.0%	0.0%		0.0%		0.0%			0.7%	1.4%		0.0%		0.0%	0.8%
Bike	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	2
		0.0%	0.0%	0.0%		0.0%		0.0%			0.0%	0.0%		0.0%		0.0%	0.0%
Medium	0	0	19	0	0	0	0	0	0	0	31	0	0	0	0	0	50
		0.0%	0.8%	0.0%		0.0%		0.0%			0.7%	0.0%		0.0%		0.0%	0.7%
Heavy	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	6
		0.0%	0.0%	0.0%		0.0%		0.0%			0.1%	0.0%		0.0%		0.0%	0.1%

LOCATION: BROOKWOOD PKWY @ MEEK RD 1600-1900
CITY: HILLSBORO, OR
FILENAME: V12CE 11-024 N

Site: 0016
Date: 5/25/2011
Wednesday

Peak Hour Detail

Peak Hour: 4:30 PM - 5:30 PM

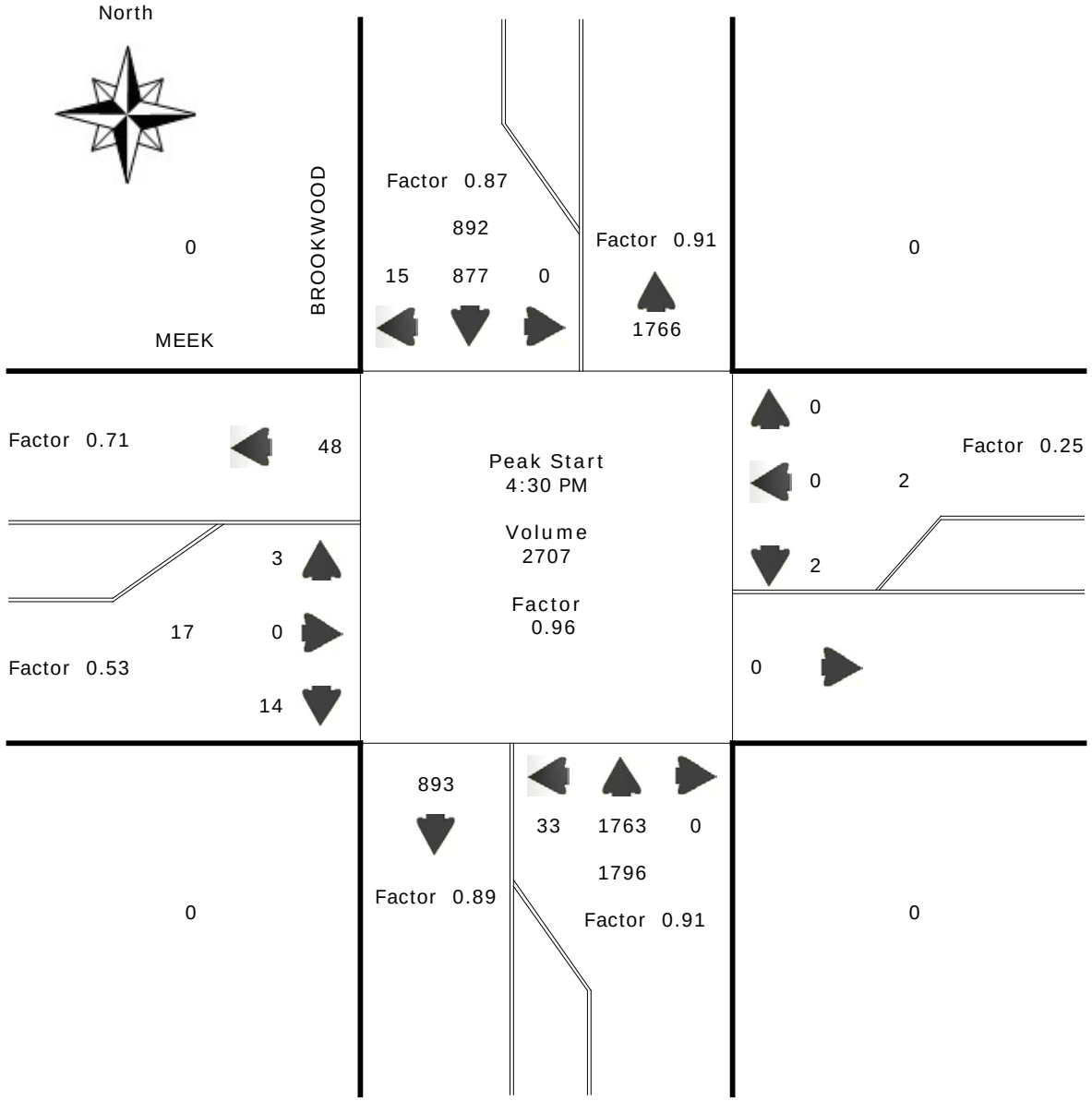
Interval		Southbound BROOKWOOD				Westbound MEEK				Northbound BROOKWOOD				Eastbound MEEK			
Begin	Ped1	Right	Thru	Left	Ped2	Right	Thru	Left	Ped3	Right	Thru	Left	Ped4	Right	Thru	Left	Total
Totals	0	15	877	0	0	0	0	2	0	0	1763	33	0	14	0	3	2707
Factor		0.63	0.88					0.25			0.91	0.75		0.50		0.38	0.96
Entering			892				2				1796				17		
Factor			0.87				0.25				0.91				0.53		
Exiting			893				48				1766				0		
Factor			0.89				0.71				0.91						
Peak Vehicles																	
Cars	0	15	869	0	0	0	0	2	0	0	1736	33	0	14	0	3	2672
		100%	99.1%					100%			98.5%	100%		100%		100%	98.7%
Light	0	0	5	0	0	0	0	0	0	0	9	0	0	0	0	0	14
		0.0%	0.6%					0.0%			0.5%	0.0%		0.0%		0.0%	0.5%
Bike	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0.0%	0.0%					0.0%			0.0%	0.0%		0.0%		0.0%	0.0%
Medium	0	0	3	0	0	0	0	0	0	0	16	0	0	0	0	0	19
		0.0%	0.3%					0.0%			0.9%	0.0%		0.0%		0.0%	0.7%
Heavy	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2
		0.0%	0.0%					0.0%			0.1%	0.0%		0.0%		0.0%	0.1%

LOCATION: BROOKWOOD PKWY @ MEEK RD 1600-1900
CITY: HILLSBORO, OR
FILENAME: V12CE 11-024 N

Site: 0016
Date: 5/25/2011
Wednesday

Peak Hour Detail

Peak Hour Diagram



LOCATION: BROOKWOOD PKWY @ MEEK RD 0600-0900
CITY: HILLSBORO, OR
FILENAME: V12CF 11-024 N

Site: 0016
Date: 5/25/2011
Wednesday

Peak Hour Detail

Interval		Southbound BROOKWOOD				Westbound MEEK				Northbound BROOKWOOD				Eastbound MEEK			
Begin	Ped1	Right	Thru	Left	Ped2	Right	Thru	Left	Ped3	Right	Thru	Left	Ped4	Right	Thru	Left	Total
6:00 AM	0	1	176	0	0	0	0	0	0	0	162	1	0	3	0	0	343
6:15 AM	0	0	219	0	0	0	0	0	0	0	205	0	0	1	0	6	431
6:30 AM	0	2	308	0	0	0	0	0	0	0	196	0	0	2	0	0	508
6:45 AM	0	0	347	0	0	0	0	0	0	0	205	1	0	5	0	0	558
7:00 AM	0	0	343	0	0	0	0	0	0	1	159	0	0	5	0	2	510
7:15 AM	0	0	351	0	0	2	0	0	0	2	206	3	0	4	0	1	569
7:30 AM	0	1	428	0	0	0	0	0	0	1	218	2	0	4	0	6	660
7:45 AM	0	1	519	0	0	0	0	0	0	0	200	3	0	8	2	3	736
8:00 AM	0	1	441	0	0	0	0	0	0	0	174	0	0	3	0	4	623
8:15 AM	0	3	454	0	0	0	0	0	0	1	171	4	0	4	1	3	641
8:30 AM	0	1	413	0	0	0	0	0	0	1	228	1	0	2	0	3	649
8:45 AM	0	2	425	0	0	0	0	0	0	0	176	1	0	5	0	3	612
Totals	0	12	4424	0	0	2	0	0	0	6	2300	16	0	46	3	31	6840
Entering			4436				2				2322				80		
Exiting			4470				28				2333				9		

Vehicle Totals

Cars	0	10	4224	0	0	0	0	0	0	4	2150	15	0	43	0	26	6472
		83.3%	95.5%			0.0%				66.7%	93.5%	93.8%		93.5%	0.0%	83.9%	94.6%
Light	0	1	48	0	0	1	0	0	0	1	65	1	0	3	3	2	125
		8.3%	1.1%			50.0%				16.7%	2.8%	6.3%		6.5%	100%	6.5%	1.8%
Bike	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	2	5
		8.3%	0.0%			0.0%				0.0%	0.0%	0.0%		0.0%	0.0%	6.5%	0.1%
Medium	0	0	114	0	0	1	0	0	0	1	71	0	0	0	0	1	188
		0.0%	2.6%			50.0%				16.7%	3.1%	0.0%		0.0%	0.0%	3.2%	2.7%
Heavy	0	0	36	0	0	0	0	0	0	0	14	0	0	0	0	0	50
		0.0%	0.8%			0.0%				0.0%	0.6%	0.0%		0.0%	0.0%	0.0%	0.7%

LOCATION: BROOKWOOD PKWY @ MEEK RD 0600-0900
CITY: HILLSBORO, OR
FILENAME: V12CF 11-024 N

Site: 0016
Date: 5/25/2011
Wednesday

Peak Hour Detail

Peak Hour: 7:30 AM - 8:30 AM

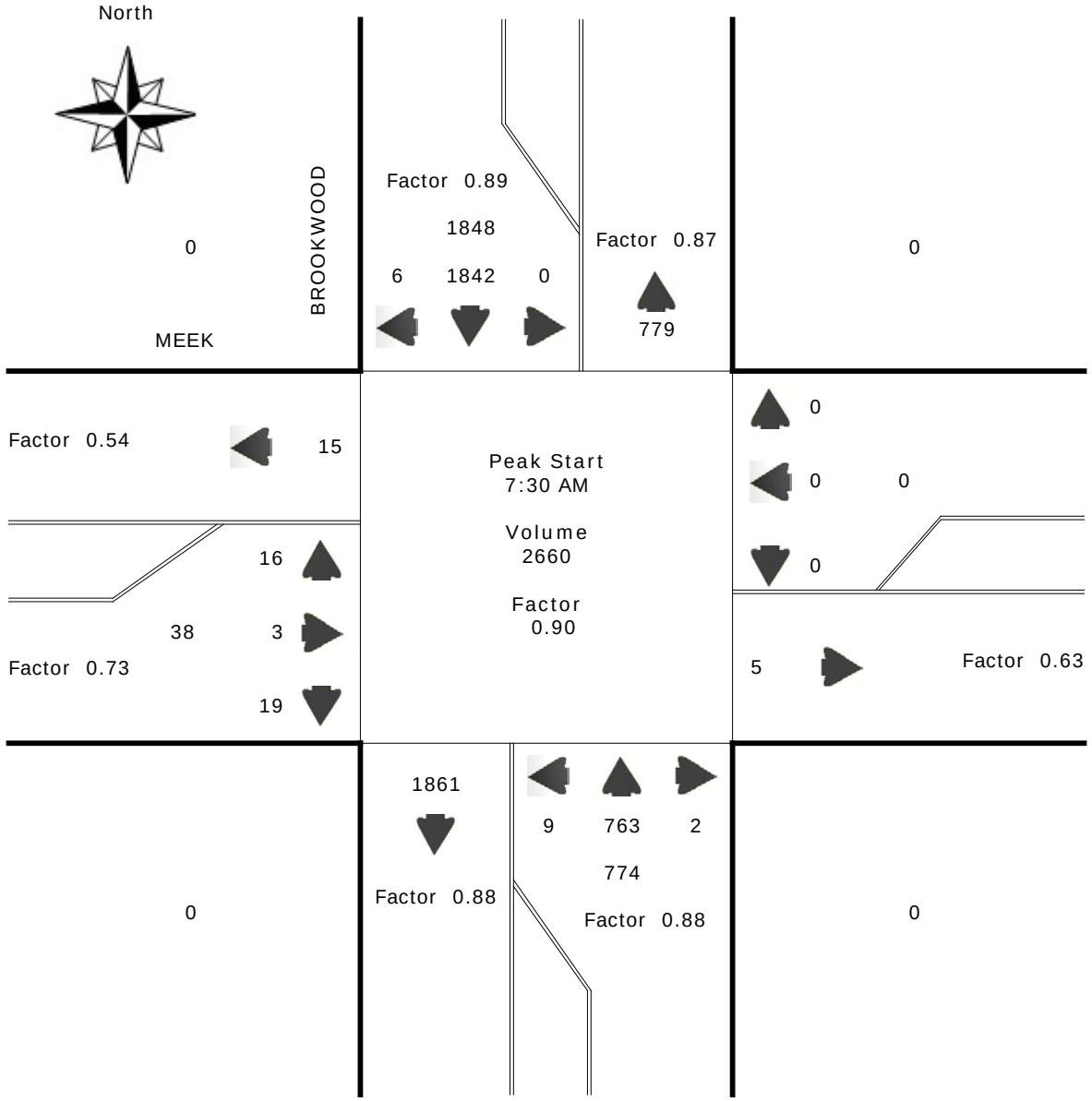
Interval		Southbound BROOKWOOD				Westbound MEEK				Northbound BROOKWOOD				Eastbound MEEK			
Begin	Ped1	Right	Thru	Left	Ped2	Right	Thru	Left	Ped3	Right	Thru	Left	Ped4	Right	Thru	Left	Total
Totals	0	6	1842	0	0	0	0	0	0	2	763	9	0	19	3	16	2660
Factor		0.50	0.89							0.50	0.88	0.56		0.59	0.38	0.67	0.90
Entering			1848				0				774				38		
Factor			0.89								0.88				0.73		
Exiting			1861				15				779				5		
Factor			0.88				0.54				0.87				0.63		
Peak Vehicles																	
Cars	0	5	1778	0	0	0	0	0	0	2	702	8	0	17	0	15	2527
		83.3%	96.5%							100%	92.0%	88.9%		89.5%	0.0%	93.8%	95.0%
Light	0	1	18	0	0	0	0	0	0	0	25	1	0	2	3	1	51
		16.7%	1.0%							0.0%	3.3%	11.1%		10.5%	100%	6.3%	1.9%
Bike	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0.0%	0.0%							0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%
Medium	0	0	35	0	0	0	0	0	0	0	27	0	0	0	0	0	62
		0.0%	1.9%							0.0%	3.5%	0.0%		0.0%	0.0%	0.0%	2.3%
Heavy	0	0	11	0	0	0	0	0	0	0	9	0	0	0	0	0	20
		0.0%	0.6%							0.0%	1.2%	0.0%		0.0%	0.0%	0.0%	0.8%

LOCATION: BROOKWOOD PKWY @ MEEK RD 0600-0900
CITY: HILLSBORO, OR
FILENAME: V12CF 11-024 N

Site: 0016
Date: 5/25/2011
Wednesday

Peak Hour Detail

Peak Hour Diagram



LOCATION: HELVETIA RD @ GROVELAND RD 1600-1900
CITY: HILLSBORO, OR
FILENAME: V12BG 11-024 S 1

Site: 0014
Date: 5/25/2011
Wednesday

Peak Hour Detail

Interval		Southbound HELVETIA				Westbound JACOBSON				Northbound HELVETIA				Eastbound GROVELAND			
Begin	Ped1	Right	Thru	Left	Ped2	Right	Thru	Left	Ped3	Right	Thru	Left	Ped4	Right	Thru	Left	Total
4:00 PM	0	0	35	0	0	0	1	39	0	66	62	2	0	1	1	0	207
4:15 PM	0	0	45	2	0	0	0	47	0	120	87	4	0	4	0	0	309
4:30 PM	0	1	43	2	0	2	1	73	0	132	118	1	0	4	0	1	378
4:45 PM	0	0	25	0	0	1	0	40	0	92	95	2	0	3	0	0	258
5:00 PM	0	0	33	2	0	1	0	36	0	122	129	2	0	3	0	0	328
5:15 PM	0	0	29	1	0	2	0	32	0	159	111	5	0	2	0	0	341
5:30 PM	0	1	45	2	0	1	1	53	0	106	97	0	0	2	0	1	309
5:45 PM	0	0	31	2	0	4	0	33	0	103	67	0	0	0	0	0	240
6:00 PM	0	0	34	1	0	0	0	36	0	57	63	1	0	1	1	0	194
6:15 PM	0	0	23	2	0	1	0	30	0	50	54	2	0	0	0	0	162
6:30 PM	0	0	39	3	0	0	0	32	0	43	42	1	0	0	0	0	160
6:45 PM	0	0	34	1	0	1	0	18	0	29	37	2	0	2	0	0	124
Totals	0	2	416	18	0	13	3	469	0	1079	962	22	0	22	2	2	3010
Entering			436				485				2063				26		
Exiting			907				27				977				1099		

Vehicle Totals

Cars	0	2	413	17	0	13	3	463	0	1064	950	20	0	21	2	1	2969
		100%	99.3%	94.4%		100%	100%	98.7%		98.6%	98.8%	90.9%		95.5%	100%	50.0%	98.6%
Light	0	0	3	0	0	0	0	4	0	7	9	1	0	1	0	1	26
		0.0%	0.7%	0.0%		0.0%	0.0%	0.9%		0.6%	0.9%	4.5%		4.5%	0.0%	50.0%	0.9%
Bike	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	2
		0.0%	0.0%	5.6%		0.0%	0.0%	0.0%		0.1%	0.0%	0.0%		0.0%	0.0%	0.0%	0.1%
Medium	0	0	0	0	0	0	0	1	0	0	3	0	0	0	0	0	4
		0.0%	0.0%	0.0%		0.0%	0.0%	0.2%		0.0%	0.3%	0.0%		0.0%	0.0%	0.0%	0.1%
Heavy	0	0	0	0	0	0	0	1	0	7	0	1	0	0	0	0	9
		0.0%	0.0%	0.0%		0.0%	0.0%	0.2%		0.6%	0.0%	4.5%		0.0%	0.0%	0.0%	0.3%

LOCATION: HELVETIA RD @ GROVELAND RD 1600-1900 Site: 0014
CITY: HILLSBORO, OR Date: 5/25/2011
FILENAME: V12BG 11-024 S 1 Wednesday

Peak Hour Detail

Peak Hour: 4:30 PM - 5:30 PM

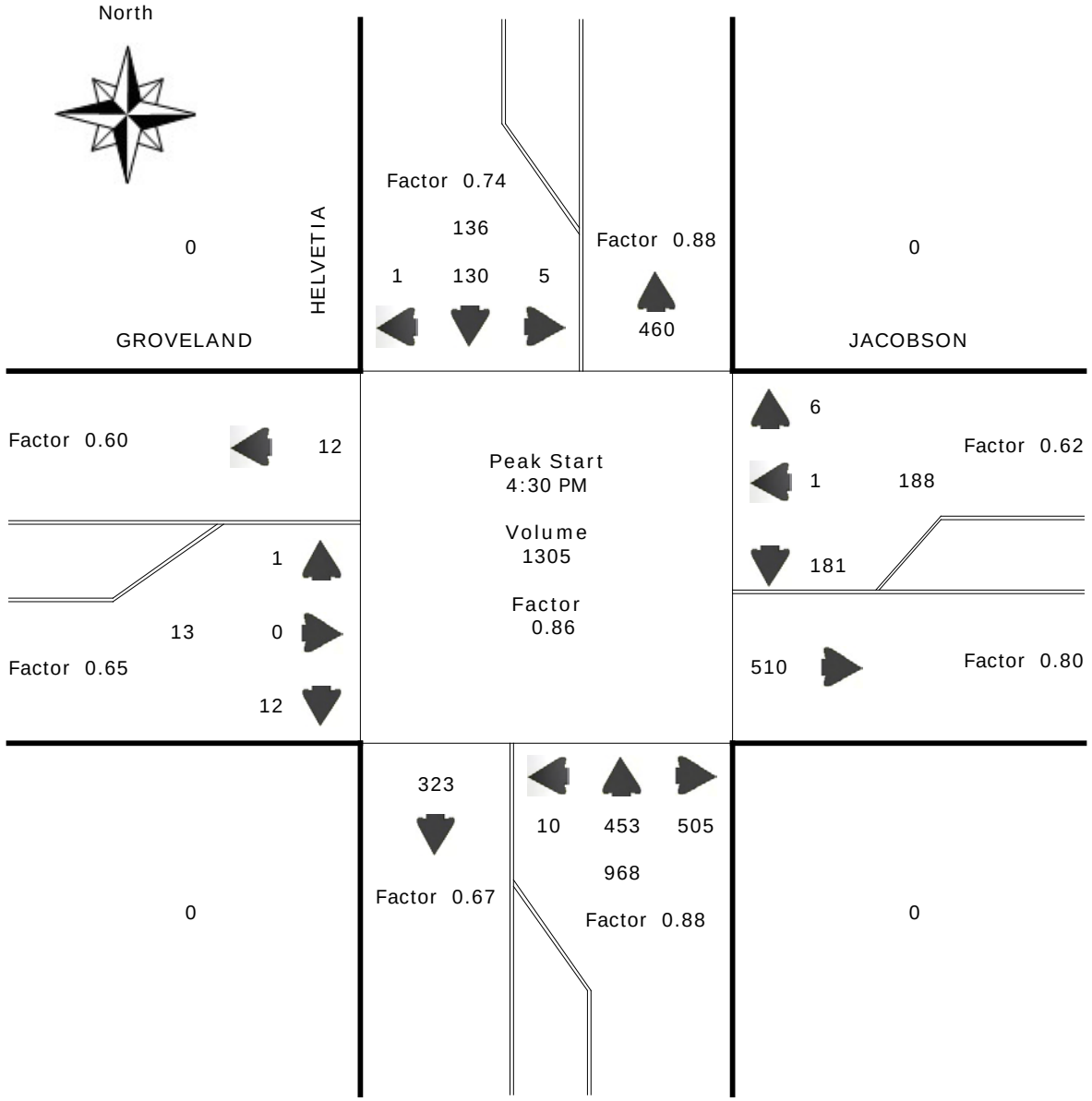
Interval		Southbound HELVETIA				Westbound JACOBSON				Northbound HELVETIA				Eastbound GROVELAND			
Begin	Ped1	Right	Thru	Left	Ped2	Right	Thru	Left	Ped3	Right	Thru	Left	Ped4	Right	Thru	Left	Total
Totals	0	1	130	5	0	6	1	181	0	505	453	10	0	12	0	1	1305
Factor		0.25	0.76	0.63		0.75	0.25	0.62		0.79	0.88	0.50		0.75		0.25	0.86
Entering			136				188				968				13		
Factor			0.74				0.62				0.88				0.65		
Exiting			323				12				460				510		
Factor			0.67				0.60				0.88				0.80		
Peak Vehicles																	
Cars	0	1	130	5	0	6	1	181	0	496	448	9	0	11	0	0	1288
		100%	100%	100%		100%	100%	100%		98.2%	98.9%	90.0%		91.7%		0.0%	98.7%
Light	0	0	0	0	0	0	0	0	0	3	5	1	0	1	0	1	11
		0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.6%	1.1%	10.0%		8.3%		100%	0.8%
Bike	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%		0.0%	0.0%
Medium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%		0.0%	0.0%
Heavy	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	6
		0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		1.2%	0.0%	0.0%		0.0%		0.0%	0.5%

LOCATION: HELVETIA RD @ GROVELAND RD 1600-1900
CITY: HILLSBORO, OR
FILENAME: V12BG 11-024 S 1

Site: 0014
Date: 5/25/2011
Wednesday

Peak Hour Detail

Peak Hour Diagram



LOCATION: HELVETIA RD @ GROVELAND RD 0600-0900
CITY: HILLSBORO, OR
FILENAME: V12BF 11-024 S

Site: 0016
Date: 5/25/2011
Wednesday

Peak Hour Detail

Interval		Southbound HELVETIA				Westbound JACOBSON				Northbound HELVETIA				Eastbound GROVELAND			
Begin	Ped1	Right	Thru	Left	Ped2	Right	Thru	Left	Ped3	Right	Thru	Left	Ped4	Right	Thru	Left	Total
6:00 AM	0	0	16	0	0	0	0	11	0	25	12	0	0	1	0	0	65
6:15 AM	0	0	26	0	0	1	0	20	0	32	12	1	0	0	0	0	92
6:30 AM	0	0	26	0	0	0	0	27	0	35	25	1	0	0	1	0	115
6:45 AM	0	0	23	1	0	1	0	35	0	70	31	1	0	1	0	0	163
7:00 AM	0	0	36	1	0	2	0	18	0	25	34	0	0	2	0	0	118
7:15 AM	0	1	60	1	0	1	1	39	0	41	42	0	0	0	0	0	186
7:30 AM	0	0	95	4	0	1	0	54	0	51	68	0	0	1	0	0	274
7:45 AM	0	0	87	2	0	1	0	51	0	74	33	0	0	1	0	0	249
8:00 AM	0	0	51	2	0	1	0	45	0	54	30	4	0	2	0	0	189
8:15 AM	0	0	48	2	0	0	0	43	0	40	21	1	0	0	0	0	155
8:30 AM	0	0	46	3	0	1	0	76	0	86	20	3	0	1	0	0	236
8:45 AM	0	0	49	7	0	1	0	81	0	89	20	2	0	0	1	0	250
Totals	0	1	563	23	0	10	1	500	0	622	348	13	0	9	2	0	2092
Entering			587				511				983				11		
Exiting			1072				15				358				647		

Vehicle Totals

Cars	0	1	550	22	0	7	1	479	0	596	335	12	0	9	2	0	2014
		100%	97.7%	95.7%		70.0%	100%	95.8%		95.8%	96.3%	92.3%		100%	100%		96.3%
Light	0	0	12	1	0	2	0	14	0	23	8	1	0	0	0	0	61
		0.0%	2.1%	4.3%		20.0%	0.0%	2.8%		3.7%	2.3%	7.7%		0.0%	0.0%		2.9%
Bike	0	0	1	0	0	0	0	2	0	0	2	0	0	0	0	0	5
		0.0%	0.2%	0.0%		0.0%	0.0%	0.4%		0.0%	0.6%	0.0%		0.0%	0.0%		0.2%
Medium	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	3
		0.0%	0.0%	0.0%		10.0%	0.0%	0.2%		0.2%	0.0%	0.0%		0.0%	0.0%		0.1%
Heavy	0	0	0	0	0	0	0	4	0	2	3	0	0	0	0	0	9
		0.0%	0.0%	0.0%		0.0%	0.0%	0.8%		0.3%	0.9%	0.0%		0.0%	0.0%		0.4%

LOCATION: HELVETIA RD @ GROVELAND RD 0600-0900 Site: 0016
CITY: HILLSBORO, OR Date: 5/25/2011
FILENAME: V12BF 11-024 S Wednesday

Peak Hour Detail

Peak Hour: 7:15 AM - 8:15 AM

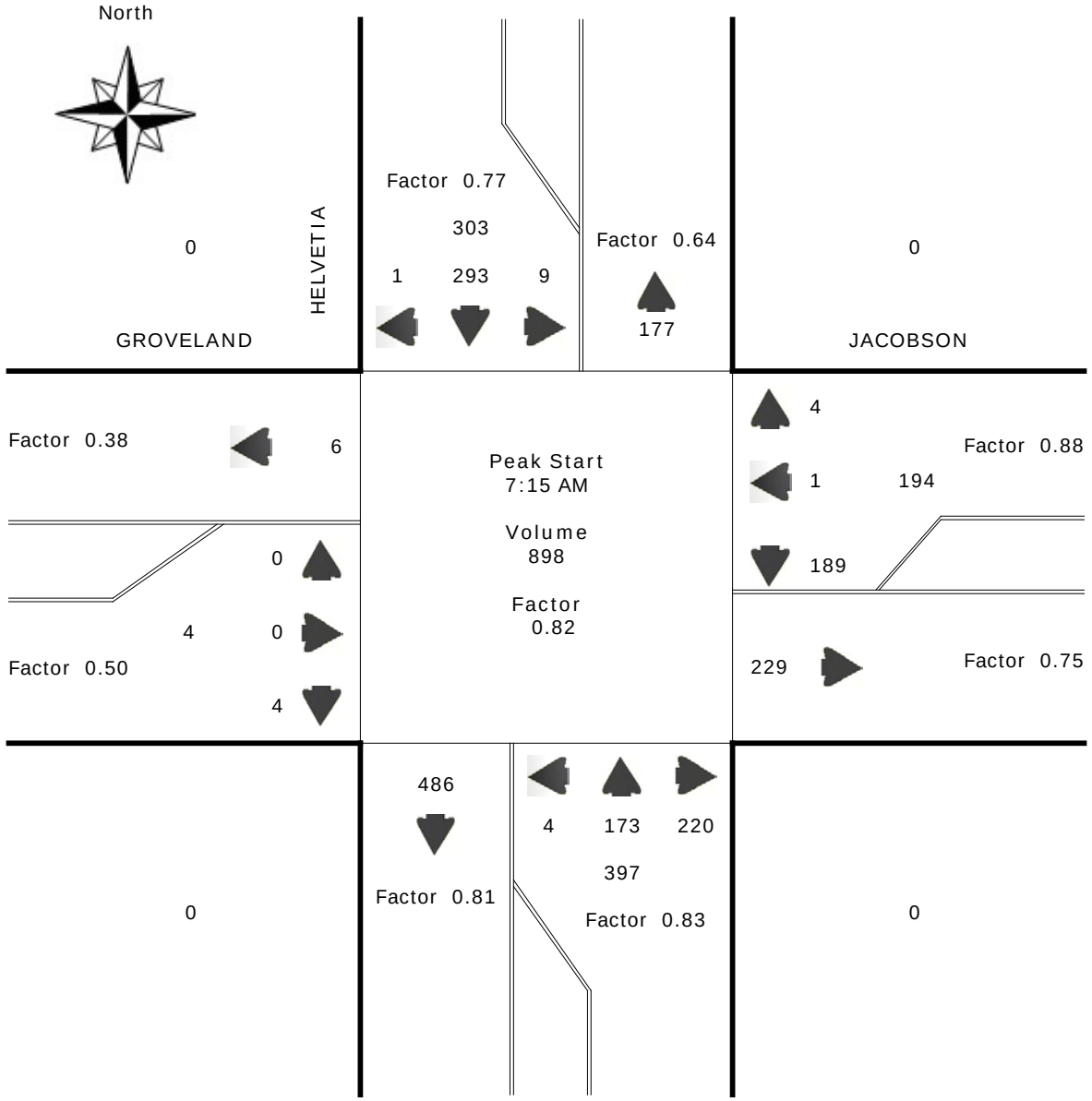
Interval		Southbound HELVETIA				Westbound JACOBSON				Northbound HELVETIA				Eastbound GROVELAND			
Begin	Ped1	Right	Thru	Left	Ped2	Right	Thru	Left	Ped3	Right	Thru	Left	Ped4	Right	Thru	Left	Total
Totals	0	1	293	9	0	4	1	189	0	220	173	4	0	4	0	0	898
Factor		0.25	0.77	0.56		1.00	0.25	0.88		0.74	0.64	0.25		0.50			0.82
Entering			303				194				397				4		
Factor			0.77				0.88				0.83				0.50		
Exiting			486				6				177				229		
Factor			0.81				0.38				0.64				0.75		
Peak Vehicles																	
Cars	0	1	285	9	0	1	1	181	0	215	167	4	0	4	0	0	868
		100%	97.3%	100%		25.0%	100%	95.8%		97.7%	96.5%	100%		100%			96.7%
Light	0	0	8	0	0	2	0	6	0	2	6	0	0	0	0	0	24
		0.0%	2.7%	0.0%		50.0%	0.0%	3.2%		0.9%	3.5%	0.0%		0.0%			2.7%
Bike	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%			0.0%
Medium	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	2
		0.0%	0.0%	0.0%		25.0%	0.0%	0.0%		0.5%	0.0%	0.0%		0.0%			0.2%
Heavy	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	4
		0.0%	0.0%	0.0%		0.0%	0.0%	1.1%		0.9%	0.0%	0.0%		0.0%			0.4%

LOCATION: HELVETIA RD @ GROVELAND RD 0600-0900
CITY: HILLSBORO, OR
FILENAME: V12BF 11-024 S

Site: 0016
Date: 5/25/2011
Wednesday

Peak Hour Detail

Peak Hour Diagram



Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

16285 SW 85th Ave, Ste 302
Tigard, OR 97224
Ph:503-620-4242

Date Counted: 7/20/11
Location/Intersection: US 26 Mainline East of Brookwood Pkwy Interchange

	Eastbound						
	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6 - 13	
	Motorcycles	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single - >6 Axle Multi	Interval Total
5:00 AM	1	96	52	0	3	9	161
5:15 AM	4	142	88	0	3	7	244
5:30 AM	2	163	140	0	0	9	314
5:45 AM	2	167	144	0	3	9	325
6:00 AM	3	218	219	4	5	16	465
6:15 AM	1	276	272	1	18	25	593
6:30 AM	3	287	248	0	13	16	567
6:45 AM	4	277	269	1	12	13	576
7:00 AM	4	311	228	0	7	11	561
7:15 AM	4	282	287	1	10	30	614
7:30 AM	6	322	252	1	15	19	615
7:45 AM	3	232	247	2	11	25	520
8:00 AM	2	243	232	4	17	18	516
8:15 AM	3	227	247	3	10	29	519
8:30 AM	5	245	183	1	12	17	463
8:45 AM	2	197	213	0	7	30	449
9:00 AM	1	156	191	2	14	19	383
9:15 AM	1	208	224	1	7	23	464
9:30 AM	3	173	204	1	12	17	410
9:45 AM	0	170	167	1	16	31	385
10:00 AM	2	171	186	2	12	22	395
10:15 AM	2	150	170	1	11	28	362
10:30 AM	1	156	174	1	15	26	373
10:45 AM	0	154	207	0	10	15	386
11:00 AM	2	157	174	2	9	21	365
11:15 AM	2	175	195	0	17	22	411
11:30 AM	4	212	190	1	18	31	456
11:45 AM	4	159	199	1	14	21	398
12:00 PM	5	188	225	2	20	34	474
12:15 PM	12	198	204	3	12	25	454
12:30 PM	4	188	236	2	12	25	467
12:45 PM	7	189	215	2	13	21	447
1:00 PM	4	203	198	5	9	15	434
1:15 PM	3	203	193	2	23	31	455
1:30 PM	2	199	212	0	14	26	453
1:45 PM	1	178	209	3	10	23	424
2:00 PM	0	163	202	2	9	21	397
2:15 PM	9	193	194	2	7	21	426
2:30 PM	5	189	204	0	13	15	426
2:45 PM	3	202	241	0	14	19	479
3:00 PM	1	171	200	1	21	15	409
3:15 PM	1	212	273	2	11	11	510
3:30 PM	7	271	237	2	12	14	543
3:45 PM	3	256	211	5	6	9	490
4:00 PM	2	256	215	4	12	4	493
4:15 PM	3	260	224	1	9	9	506
4:30 PM	3	278	225	1	7	3	517
4:45 PM	4	277	223	0	9	9	522
5:00 PM	6	304	228	3	9	1	551
5:15 PM	7	352	268	1	4	9	641
5:30 PM	7	317	253	2	6	8	593
5:45 PM	6	326	240	2	6	4	584
6:00 PM	10	323	228	3	4	4	572
6:15 PM	5	297	221	0	4	7	534
6:30 PM	2	248	177	0	5	3	435
6:45 PM	5	233	188	1	4	4	435
7:00 PM	4	218	172	1	3	5	403
7:15 PM	2	169	131	0	5	5	312
7:30 PM	3	143	113	0	7	4	270
7:45 PM	4	146	139	0	3	3	295
8:00 PM	5	141	131	1	1	2	281
8:15 PM	2	183	155	1	0	3	344
8:30 PM	2	125	91	1	3	4	226
8:45 PM	1	93	111	0	0	3	208
9:00 PM	0	127	87	0	1	0	215
9:15 PM	1	135	67	0	3	4	210
9:30 PM	1	137	80	0	1	4	223
9:45 PM	2	81	54	0	0	1	138
10:00 PM	0	86	49	0	2	4	141
10:15 PM	0	79	34	0	0	2	115
10:30 PM	2	75	57	0	0	2	136
10:45 PM	1	51	43	0	0	4	99
Total	228	14389	13260	86	615	999	29577
%	0.77%	48.65%	44.83%	0.29%	2.08%	3.38%	
	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6 - 13	

	Westbound						
	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6 - 13	
	Motorcycles	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single - >6 Axle Multi	Interval Total
5:00 AM	0	43	52	0	3	6	104
5:15 AM	4	85	131	0	6	9	235
5:30 AM	6	150	176	1	8	13	354
5:45 AM	1	120	136	0	3	16	276
6:00 AM	2	121	105	0	3	18	249
6:15 AM	0	147	171	0	9	13	340
6:30 AM	2	195	192	1	6	26	422
6:45 AM	4	191	220	1	8	27	451
7:00 AM	7	191	203	1	8	12	422
7:15 AM	6	240	218	3	9	24	500
7:30 AM	9	263	329	0	12	23	636
7:45 AM	6	259	295	0	14	25	599
8:00 AM	2	241	240	1	13	26	523
8:15 AM	5	241	250	2	18	27	543
8:30 AM	2	231	290	5	21	15	564
8:45 AM	4	254	281	2	12	14	567
9:00 AM	4	221	261	5	16	20	527
9:15 AM	4	231	224	2	18	23	502
9:30 AM	0	206	230	2	14	28	480
9:45 AM	2	191	226	7	12	31	469
10:00 AM	2	190	193	3	11	36	435
10:15 AM	6	166	226	1	24	24	447
10:30 AM	3	175	227	1	14	29	449
10:45 AM	1	177	235	0	15	31	459
11:00 AM	3	177	208	3	16	28	435
11:15 AM	4	143	246	2	12	10	417
11:30 AM	8	186	230	1	23	19	467
11:45 AM	2	150	216	0	23	30	421
12:00 PM	8	167	202	1	12	20	410
12:15 PM	2	177	228	0	14	19	440
12:30 PM	2	168	203	1	11	21	406
12:45 PM	1	175	229	1	14	20	440
1:00 PM	0	195	210	3	7	23	438
1:15 PM	3	245	208	3	13	20	492
1:30 PM	1	284	230	0	6	18	539
1:45 PM	0	217	184	0	3	22	426
2:00 PM	1	224	203	2	3	27	460
2:15 PM	2	233	256	0	2	16	509
2:30 PM	2	239	251	1	2	14	509
2:45 PM	4	254	229	0	8	9	504
3:00 PM	3	248	236	2	4	3	496
3:15 PM	2	289	239	3	2	4	539
3:30 PM	4	284	264	3	8	11	574
3:45 PM	0	259	347	0	6	3	615
4:00 PM	0	284	314	4	6	5	613
4:15 PM	1	262	323	6	5	7	604
4:30 PM	0	304	330	0	7	9	650
4:45 PM	2	334	292	0	9	8	645
5:00 PM	1	315	326	0	3	5	650
5:15 PM	2	318	327	1	4	5	657
5:30 PM	2	289	279	0	2	3	575
5:45 PM	2	270	272	0	0	8	552
6:00 PM	3	283	259	1	8	5	559
6:15 PM	2	247	225	1	4	1	480
6:30 PM	3	241	210	1	3	4	462
6:45 PM	0	161	151	0	5	2	319
7:00 PM	0	149	142	0	1	3	295
7:15 PM	0	189	184	0	1	5	379
7:30 PM	0	155	150	0	3	5	313
7:45 PM	0	138	159	0	3	0	300
8:00 PM	0	136	146	0	4	4	290
8:15 PM	0	134	139	0	0	3	276
8:30 PM	0	128	132	0	3	1	264
8:45 PM	0	146	104	0	3	3	256
9:00 PM	2	120	129	0	0	4	255
9:15 PM	0	107	124	0	4	2	237
9:30 PM	0	148	119	0	1	0	268
9:45 PM	1	93	75	0	3	0	172
10:00 PM	0	108	78	0	1	2	189
10:15 PM	0	90	83	0	0	1	174
10:30 PM	0	68	61	0	0	2	131
10:45 PM	0	62	70	0	2	0	134
Total	155	14122	14933	78	551	950	30789
%	0.50%	45.87%	48.50%	0.25%	1.79%	3.09%	
	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6 - 13	

Appendix B:

Volume Development Worksheets

Table 1: Seasonal Adjustment Worksheet

Bend-Empire (09-007) US97; MP 135.95; THE DALLES-CALIFORNIA HIGHWAY NO. 4; 0.49 mile south of Empire Avenue

Peak Month

Year	Month	% ADT	AWT
2009	Aug	118	50,000
2008	Jul	118	51,366
2007	Aug	117	54,739
2006	Aug	117	54,043
2005	Aug	121	52,537
		117.7	**52,035**

Count Month (May)

Year	Month	% ADT	AWT
2009	May	112	47,067
2008	May	113	49,172
2007	May	110	51,388
2006	May	109	50,069
2005	May	110	47,796

Count Month (June)

Year	Month	% ADT	AWT
2009	June	116	49,000
2008	June	117	50,599
2007	June	116	54,126
2006	June	115	52,992
2005	June	112	48,800

Count Month Average

Year	Month	% ADT	AWT
2009	May-Jun	114	48,034
2008	May-Jun	115	49,886
2007	May-Jun	113	52,757
2006	May-Jun	112	51,531
2005	May-Jun	111	48,298
		113.0	**50,774**

Seasonal Factor **1.04**

Beltline (20-011) OR569; MP 12.00; BELTLINE HIGHWAY NO. 69; 0.76 mile west of Pacific Highway No. 1 (I-5)

Peak Month

Year	Month	% ADT	AWT
2009	Aug	118	57,413
2008	June	112	50,600
2007	Aug	110	52,000
2006	June	112	55,584
2005	June	127	66,607
		114.0	**54,532**

Count Month (May)

Year	Month	% ADT	AWT
2009	May	103	50,000
2008	May	106	48,200
2007	May	106	50,100
2006	May	107	53,195
2005	May	112	58,336

Count Month (June)

Year	Month	% ADT	AWT
2009	June	107	52,000
2008	June	112	50,600
2007	June	107	50,500
2006	June	112	55,584
2005	June	127	66,607

Count Month Average

Year	Month	% ADT	AWT
2009	May-Jun	105	51,000
2008	May-Jun	109	49,400
2007	May-Jun	106.5	50,300
2006	May-Jun	109.5	54,390
2005	May-Jun	119.5	62,472
		108.3	**51,363**

Seasonal Factor **1.05**

2 ATR Average **1.05**

Note: Data shown in grray was removed from calculation as per APM

Table 2: 2035 Link Volume Calculations for the AM Peak Period

Road	From	To	Direction	Volumes 2011	Model 2005	Model 2035	2005-2035 Model Comparison: Annual Growth	Total Growth	Volume Growth	2035 Volume Estimates: Volume Difference	Volume Growth	Absolute Difference	Average	Forecast Used	Method Used	Comments
Helvetia Rd/Brookwood Pkwy	Genentech	Huffman St	NB	850	1098	1406	0.9%	22.4%	246	1096	1041	5%	1069	**1096**	Difference Method	To be consistent with method used for opposing direction
	Huffman St	Genentech	SB	1825	1322	2281	2.4%	58.0%	767	2592	2884	11%	2738	**2592**	Difference Method	Absolute difference >10% --> Used difference only
	Huffman St	Meek Rd	NB	855	1016	1429	1.4%	32.5%	330	1185	1133	5%	1159	**1185**	Difference Method	To be consistent with method used for opposing direction
	Meek Rd	Huffman St	SB	1955	1360	2491	2.8%	66.5%	905	2860	3256	13%	3058	**2860**	Difference Method	Absolute difference >10% --> Used difference only
	Meek Rd	EB Ramp Terminal	NB	855	1069	1508	1.4%	32.9%	351	1206	1136	6%	1171	**1206**	Difference Method	To be consistent with method used for opposing direction
	EB Ramp Terminal	Meek Rd	SB	1935	1313	2408	2.8%	66.7%	876	2811	3226	14%	3018	**2811**	Difference Method	Absolute difference >10% --> Used difference only
	EB Ramp Terminal	WB off-ramps	NB	415	595	1004	2.3%	55.0%	327	742	643	14%	693	**742**	Difference Method	Absolute difference >10% --> Used difference only
	WB off-ramps	EB Ramp Terminal	SB	1780	1246	2141	2.4%	57.5%	716	2496	2803	12%	2649	**2496**	Difference Method	Absolute difference >10% --> Used difference only
	WB off-ramps	WB on-ramp	NB	455	648	1129	2.5%	59.4%	385	840	725	15%	782	**840**	Difference Method	Absolute difference >10% --> Used difference only
	WB on-ramp	WB off-ramps	SB	490	596	823	1.3%	30.5%	182	672	639	5%	655	**672**	Difference Method	To be consistent with method used for opposing direction
	WB on-ramp	Jacobson Rd	NB	395	556	961	2.4%	58.3%	324	719	625	14%	672	**719**	Difference Method	Absolute difference >10% --> Used difference only
	Jacobson Rd	WB on-ramp	SB	515	711	1002	1.4%	32.7%	233	748	684	9%	716	**748**	Difference Method	To be consistent with method used for opposing direction
	Jacobson Rd	Schaff Rd	NB	165	259	529	3.5%	83.4%	216	381	303	23%	342	**381**	Difference Method	Absolute difference >10% --> Used difference only
	Schaff Rd	Jacobson Rd	SB	315	427	724	2.3%	55.6%	238	553	490	12%	521	**553**	Difference Method	Absolute difference >10% --> Used difference only
	Schaff Rd	West Union Rd	NB	165	259	308	0.6%	15.1%	39	204	190	7%	197	**204**	Difference Method	To be consistent with method used for opposing direction
	West Union Rd	Schaff Rd	SB	315	427	690	2.1%	49.3%	210	525	470	11%	498	**525**	Difference Method	Absolute difference >10% --> Used difference only
Huffman Street	E of Brookwood Pkwy	Brookwood Pkwy	WB	40	33	392	36.3%	870.3%	287	327	388	17%	358	**327**	Difference Method	Absolute difference >10% --> Used difference only
	Brookwood Pkwy	E of Brookwood Pkwy	EB	165	154	436	6.1%	146.5%	226	391	407	4%	399	**391**	Difference Method	To be consistent with method used for opposing direction
	Brookwood Pkwy	W of Brookwood Pkwy	WB	0	0	371	-	-	371	371	-	-	371	**371**	Manual	Not in 2005 model - used 2035 volume
	W of Brookwood Pkwy	Brookwood Pkwy	EB	0	0	229	-	-	229	229	-	-	229	**229**	Manual	Not in 2005 model - used 2035 volume
Meek Road	Brookwood Pkwy	Sewell Rd	WB	15	8	53	18.8%	450.0%	36	51	83	47%	67	**51**	Difference Method	Absolute difference >10% --> Used difference only
	Sewell Rd	Brookwood Pkwy	EB	45	109	215	3.2%	77.8%	85	130	80	47%	105	**130**	Difference Method	Absolute difference >10% --> Used difference only
EB Ramp Terminal	US-26 off	Brookwood Pkwy	EB	260	249	509	3.5%	83.5%	208	468	477	2%	473	**473**	Average of Difference and Growth	
	Brookwood Pkwy	US-26 on	EB	545	656	746	0.5%	11.0%	72	617	605	2%	611	**611**	Average of Difference and Growth	
WB Off-Ramps	US-26 off	NB Helvetia	WB	40	54	124	4.3%	103.7%	56	96	81	16%	89	**96**	Difference Method	Absolute difference >10% --> Used difference only
	US-26 off	SB Helvetia	EB	1290	650	1318	3.4%	82.2%	534	1824	2351	25%	2087	**1824**	Difference Method	Absolute difference >10% --> Used difference only
WB on-ramp	Helvetia Rd	US-26 on	WB	85	209	346	2.2%	52.4%	110	195	130	40%	162	**130**	Difference Method	Absolute difference >10% --> Used difference only
Jacobson Road	E of Helvetia Rd	Helvetia Rd	WB	215	285	302	0.2%	4.8%	14	229	225	1%	227	**227**	Average of Difference and Growth	
	Helvetia Rd	E of Helvetia Rd	EB	245	298	456	1.8%	42.4%	126	371	349	6%	360	**360**	Average of Difference and Growth	
Schaff Road	E of Helvetia Rd	Helvetia Rd	WB	10	0	46	-	-	46	56	-	-	56	**56**	Manual	Not in 2005 model - used 2035 volume
	Helvetia Rd	E of Helvetia Rd	EB	10	0	232	-	-	232	242	-	-	242	**242**	Manual	Not in 2005 model - used 2035 volume

Greater than 10% difference between difference and growth methods

Table 3: 2035 Link Volume Calculations for the PM Peak Period

Road	From	To	Direction	Volumes 2011	Model 2005	Model 2035	2005-2035 Model Comparison Annual Growth	Total Growth	Volume Difference	2035 Volume Estimates Volume Difference	Volume Growth	Absolute Difference	Average	Forecast Used	Method Used	Comments
Helvetia Rd/Brookwood Pkwy	Genentech	Huffman St	NB	1750	1178	2025	2.4%	57.5%	678	2428	2757	13%	2592	**2428**	Difference Method	Absolute difference >10% --> Used difference only
	Huffman St	Genentech	SB	930	1160	1389	0.7%	15.8%	183	1113	1077	3%	1095	**1113**	Difference Method	To be consistent with method used for opposing direction
	Huffman St	Meek Rd	NB	1900	1196	2162	2.7%	64.6%	773	2673	3128	16%	2900	**2673**	Difference Method	Absolute difference >10% --> Used difference only
	Meek Rd	Huffman St	SB	960	1086	1522	1.3%	32.1%	349	1309	1268	3%	1289	**1309**	Difference Method	To be consistent with method used for opposing direction
	Meek Rd	EB Ramp Terminal	NB	1870	1164	2068	2.6%	62.1%	723	2593	3032	16%	2813	**2593**	Difference Method	Absolute difference >10% --> Used difference only
	EB Ramp Terminal	Meek Rd	SB	955	1087	1498	1.3%	30.2%	329	1284	1244	3%	1264	**1284**	Difference Method	To be consistent with method used for opposing direction
	EB Ramp Terminal	WB off-ramps	NB	1165	680	1293	3.0%	72.1%	490	1655	2005	19%	1830	**1655**	Difference Method	Absolute difference >10% --> Used difference only
	WB off-ramps	EB Ramp Terminal	SB	910	1045	1345	1.0%	23.0%	240	1150	1119	3%	1134	**1150**	Difference Method	To be consistent with method used for opposing direction
	WB off-ramps	WB on-ramp	NB	1235	786	1422	2.7%	64.7%	509	1744	2034	15%	1889	**1744**	Difference Method	Absolute difference >10% --> Used difference only
	WB on-ramp	WB off-ramps	SB	265	430	599	1.3%	31.4%	135	400	348	14%	374	**400**	Difference Method	Absolute difference >10% --> Used difference only
	WB on-ramp	Jacobson Rd	NB	1025	596	1109	2.9%	68.9%	410	1435	1731	19%	1583	**1435**	Difference Method	Absolute difference >10% --> Used difference only
	Jacobson Rd	WB on-ramp	SB	345	592	841	1.4%	33.6%	199	544	461	17%	503	**544**	Difference Method	Absolute difference >10% --> Used difference only
	Jacobson Rd	Schaff Rd	NB	485	349	722	3.6%	85.5%	298	783	900	14%	842	**783**	Difference Method	Absolute difference >10% --> Used difference only
	Schaff Rd	Jacobson Rd	SB	155	317	484	1.8%	42.1%	134	289	220	27%	254	**289**	Difference Method	Absolute difference >10% --> Used difference only
	Schaff Rd	West Union Rd	NB	480	349	490	1.3%	32.3%	113	593	635	7%	614	**614**	Average of Difference and Growth	
	West Union Rd	Schaff Rd	SB	150	317	339	0.2%	5.6%	18	168	158	6%	163	**163**	Average of Difference and Growth	
Huffman Street	E of Brookwood Pkwy	Brookwood Pkwy	WB	175	148	477	7.4%	177.8%	263	438	486	10%	462	**438**	Difference Method	Absolute difference >10% --> Used difference only
	Brookwood Pkwy	E of Brookwood Pkwy	EB	55	56	589	31.7%	761.4%	426	481	474	2%	478	**481**	Difference Method	To be consistent with method used for opposing direction
	Brookwood Pkwy	W of Brookwood Pkwy	WB	0	0	323	-	-	258	258	-	-	258	**258**	Manual	Not in 2005 model - used 2035 volume
	W of Brookwood Pkwy	Brookwood Pkwy	EB	0	0	439	-	-	351	351	-	-	351	**351**	Manual	Not in 2005 model - used 2035 volume
Meek Road	Brookwood Pkwy	Sewell Rd	WB	50	52	189	8.8%	210.8%	110	160	155	3%	157	**157**	Average of Difference and Growth	
	Sewell Rd	Brookwood Pkwy	EB	20	20	119	16.5%	396.0%	79	99	99	0%	99	**99**	Average of Difference and Growth	
EB Ramp Terminal	US-26 off	Brookwood Pkwy	EB	125	220	219	0.0%	-0.4%	-1	124	125	0%	124	**124**	Average of Difference and Growth	
	Brookwood Pkwy	US-26 on	EB	785	663	841	0.9%	21.5%	142	927	954	3%	941	**941**	Average of Difference and Growth	
WB Off-Ramps	US-26 off	NB Helvetia	WB	70	106	129	0.7%	17.4%	18	88	82	7%	85	**85**	Average of Difference and Growth	
	US-26 off	SB Helvetia	EB	645	615	746	0.7%	17.0%	105	750	755	1%	752	**752**	Average of Difference and Growth	
WB on-ramp	Helvetia Rd	US-26 on	WB	290	353	556	1.9%	46.0%	162	452	423	7%	438	**438**	Average of Difference and Growth	
Jacobson Road	E of Helvetia Rd	Helvetia Rd	WB	200	277	363	1.0%	24.8%	69	269	250	7%	259	**269**	Difference Method	To be consistent with method used for opposing direction
	Helvetia Rd	E of Helvetia Rd	EB	550	248	393	1.9%	46.8%	116	666	807	19%	737	**666**	Difference Method	Absolute difference >10% --> Used difference only
Schaff Road	E of Helvetia Rd	Helvetia Rd	WB	5	0	157	-	-	126	131	-	-	131	**131**	Manual	Not in 2005 model - used 2035 volume
	Helvetia Rd	E of Helvetia Rd	EB	5	0	244	-	-	195	200	-	-	200	**200**	Manual	Not in 2005 model - used 2035 volume

Greater than 10% difference between difference and growth methods

Project: Brookwood IAMP
Job #: ODOT0000-0701
Subject: Turning Movement Volume Development
AM Peak Hour Volumes 7:30 AM - 8:30 AM

Table 4: Turning Movements for 2011 and 2035
AM Peak Hour Volumes 7:30 AM - 8:30 AM

	Intersection	Direction	Movement	2011 Existing Raw Counts	Annual Growth Factor = 1.00 Seasonal GF = 1.05	Seasonal Growth	Volumes rounded to nearest 5 vehicles	Final Balanced Volumes for Synchro (2011 config)	Balanced and Rounded Volumes Change	Final Balanced Volumes for Synchro (2035 config)		2035 Fatal Flaw NCHRP 255-Link Unbalanced	Final Balanced Volumes for Synchro	2011 - 2035 Volume Growth		Opening Year 2015	Opening Year 2025
				2011 Existing Conditions								*2035 Fatal Flaw*					
1	**Helvetia Rd & Schaff Rd**		L	0	0	0	0	0	0	0		0	0	0			
	3 hr Turning Movement Counts	EB	T	0	0	0	0	0	0	0		0	0	0			
	Count Date: 5/25/2011		R	0	0	0	0	0	0	0		0	0	0			
			L	3	3	0	5	5	2	5		50	45	40		5	20
	Unsignalized	WB	T	0	0	0	0	0	0	0		0	0	0			
			R	3	3	0	5	5	2	5		9	10	5		5	5
			L	0	0	0	0	0	0	0		0	0	0			
	AM Peak Hour: 7:15 AM-8:15 AM	NB	T	153	161	8	160	145	-16	155		150	155	0		175	210
	AM Peak Hour Used: 7:30 AM-8:30 AM		R	1	1	0	0	5	4	5		196	200	195		10	45
			L	2	2	0	0	5	3	5		46	45	40		5	20
	PHF:	SB	T	293	308	15	310	310	2	315		443	425	110		365	385
	0.64		R	0	0	0	0	0	0	0		0	0	0			
		TEV		**455**	**478**	**23**	**480**	**475**	**-3**	**490**		**894**	**880**	**390**		**540**	**690**
2	**Helvetia Rd & Jacobson Rd**		L	0	0	0	0	0	0	0		0	0	0			
	3 hr Turning Movement Counts	EB	T	0	0	0	0	0	0	0		0	0	0			
	Count Date: 5/25/2011		R	4	4	0	5	5	1	0		0	0	0			
			L	193	203	10	205	165	-38	165		171	165	0		165	165
	Unsignalized	WB	T	0	0	0	0	0	0	0		0	0	0			
			R	3	3	0	5	5	2	5		7	5	0		5	5
			L	5	5	0	5	5	0	0		0	0	0			
	AM Peak Hour: 7:15 AM-8:15 AM	NB	T	152	160	8	160	145	-15	155		329	350	195		180	250
	AM Peak Hour Used: 7:30 AM-8:30 AM		R	219	230	11	230	210	-20	230		268	290	60		240	265
			L	10	11	1	10	10	-1	10		14	15	5		10	15
	PHF:	SB	T	281	295	14	295	305	10	310		471	455	145		360	390
	0.79		R	0	0	0	0	0	0	0		0	0	0			
		TEV		**867**	**910**	**43**	**915**	**850**	**-60**	**875**		**1260**	**1280**	**405**		**930**	**1090**
3	**Helvetia Rd & WB On-ramp**		L	0	0	0	0	0	0	0		0	0	0			
	16 hr Turning Movement Counts	EB	T	0	0	0	0	0	0	0		0	0	0			
	Count Date: 7/20/2011		R	0	0	0	0	0	0	0		0	0	0			
			L	0	0	0	0	0	0	0		0	0	0			
	Signalized	WB	T	0	0	0	0	0	0	0		0	0	0			
			R	0	0	0	0	0	0	0		0	0	0			
			L	31	31	0	30	0	-31	30		50	55	25		35	45
	AM Peak Hour: 7:30 AM-8:30 AM	NB	T	245	245	0	245	0	-245	385		609	640	255		420	515
	AM Peak Hour Used: 7:30 AM-8:30 AM		R	0	0	0	0	0	0	0		0	0	0			
			L	0	0	0	0	0	0	0		0	0	0			
	PHF:	SB	T	386	386	0	385	0	-386	450		567	585	135		470	525
	0.82		R	26	26	0	25	0	-26	25		33	35	10		25	30
		TEV		**688**	**688**	**0**	**685**	**0**	**-688**	**890**		**1259**	**1315**	**425**		**950**	**1120**
4	**Helvetia Rd & WB Off-ramps**		L	0	0	0	0	0	0	0		0	0	0			
	16 hr Turning Movement Counts	EB	T	0	0	0	0	0	0	0		0	0	0			
	Count Date: 7/20/2011		R	0	0	0	0	0	0	1260		1794	1795	535		1335	1550
			L	1260	1260	0	1260	1260	0	0		0	0	0			
	Signalized (2011)	WB	T	0	0	0	0	0	0	0		0	0	0			
	Unsignalized (2035)		R	41	41	0	40	40	-1	40		96	95	55		45	65
			L	31	31	0	30	55	24	0		0	0	0			
	AM Peak Hour: 7:30 AM-8:30 AM	NB	T	245	245	0	245	320	75	375		604	600	225		405	495
	AM Peak Hour Used: 7:30 AM-8:30 AM		R	0	0	0	0	0	0	0		0	0	0			
			L	0	0	0	0	0	0	0		0	0	0			
	PHF:	SB	T	386	386	0	385	450	64	450		567	585	135		470	525
	0.82		R	26	26	0	25	25	-1	0		0	0	0			
		TEV		**1989**	**1989**	**0**	**1985**	**2150**	**161**	**2125**		**3061**	**3075**	**950**		**2260**	**2635**
5	**Brookwood Pkwy & EB Ramps**		L	40	40	0	40	60	20	60		87	85	25		65	75
	16 hr Turning Movement Counts	EB	T	0	0	0	0	0	0	0		0	0	0			
	Count Date: 7/20/2011		R	139	139	0	140	175	36	175		274	275	100		190	230
			L	0	0	0	0	0	0	0		0	0	0			
	Signalized	WB	T	0	0	0	0	0	0	0		0	0	0			
			R	0	0	0	0	0	0	0		0	0	0			
			L	0	0	0	0	0	0	0		0	0	0			
	AM Peak Hour: 7:15 AM-8:15 AM	NB	T	227	227	0	225	315	88	315		515	515	200		345	420
	AM Peak Hour Used: 7:30 AM-8:30 AM		R	436	436	0	435	465	29	465		503	505	40		470	490
			L	41	41	0	40	40	-1	40		34	35	-5		40	35
	PHF:	SB	T	1597	1597	0	1595	1670	73	1670		2347	2345	675		1765	2040
	0.86		R	0	0	0	0	0	0	0		0	0	0			
		TEV		**2480**	**2480**	**0**	**2475**	**2725**	**245**	**2725**		**3760**	**3760**	**1035**		**2875**	**3290**
6	**Brookwood Pkwy & Meek Rd**		L	16	17	1	15	15	-2	15		51	50	35		20	30
	3 hr Turning Movement Counts	EB	T	3	3	0	5	5	2	5		0	0	-5		0	0
	Count Date: 5/25/2011		R	19	20	1	20	20	0	20		78	80	60		25	45
			L	0	0	0	0	0	0	0		0	0	0			
	Unsignalized	WB	T	0	0	0	0	0	0	0		0	0	0			
			R	0	0	0	0	0	0	0		0	0	0			
			L	9	9	0	10	10	1	10		33	35	25		10	20
	AM Peak Hour: 7:30 AM-8:30 AM	NB	T	763	801	38	800	765	-36	765		970	970	205		795	880
	AM Peak Hour Used: 7:30 AM-8:30 AM		R	2	2	0	0	5	3	5		0	0	-5		0	0
			L	0	0	0	0	0	0	0		0	0	0			
	PHF:	SB	T	1842	1934	92	1935	1840	-94	1840		2591	2600	760		1950	2060
	0.90		R	6	6	0	5	5	-1	5		18	20	15		5	10
		TEV		**2660**	**2793**	**133**	**2790**	**2665**	**-128**	**2665**		**3742**	**3755**	**1090**		**2820**	**3255**

Project: Brookwood IAMP
Job #: ODOT0000-0701
Subject: Turning Movement Volume Development
PM Peak Hour Volumes 4:30 PM - 5:30 PM

Table 5: Turning Movements for 2011 and 2035
PM Peak Hour Volumes 4:30 PM - 5:30 PM

				2011 Existing Conditions								*2035 Fatal Flaw*				
	Intersection	Direction	Movement	2011 Existing Raw Counts	Annual Growth Factor = 1.00 Seasonal GF = 1.05	Seasonal Growth	Volumes rounded to nearest 5 vehicles	Final Balanced Volumes for Synchro (2011 config)	Balanced and Rounded Volumes Change	Final Balanced Volumes for Synchro (2035 config)		2035 Fatal Flaw NCHRP 255-Link Unbalanced	Final Balanced Volumes for Synchro	2011 - 2035 Volume Growth		Opening Year 2015	Opening Year 2025
1	**Helvetia Rd & Schaff Rd**		L	0	0	0	0	0	0	0		0	0	0			
	3 hr Turning Movement Counts	EB	T	0	0	0	0	0	0	0		0	0	0			
	Count Date: 5/25/2011		R	0	0	0	0	0	0	0		0	0	0			
			L	1	1	0	0	0	-1	0		0	30	30		5	5
	Unsignalized	WB	T	0	0	0	0	0	0	0		0	0	0			
			R	0	0	0	0	0	0	0		0	0	0			
			L	0	0	0	0	0	0	0		0	0	0			
	PM Peak Hour: 4:30 PM-5:30 PM	NB	T	449	471	22	470	450	-21	450		469	470	20		480	550
	PM Peak Hour Used: 4:30 PM-5:30 PM		R	1	1	0	0	0	-1	0		0	210	210		5	25
			L	0	0	0	0	0	0	0		0	0	0			
	PHF:	SB	T	137	144	7	145	130	-14	130		269	270	140		150	210
	0.89		R	0	0	0	0	0	0	0		0	0	0			
		TEV		**588**	**617**	**29**	**615**	**580**	**-37**	**580**		**737**	**980**	**400**		**635**	**790**
2	**Helvetia Rd & Jacobson Rd**		L	1	1	0	0	0	-1	0		0	0	0			
	3 hr Turning Movement Counts	EB	T	0	0	0	0	0	0	0		0	0	0			
	Count Date: 5/25/2011		R	12	13	1	15	15	2	0		0	0	0			
			L	181	190	9	190	170	-20	180		247	275	95		195	230
	Unsignalized	WB	T	1	1	0	0	0	-1	0		0	0	0			
			R	6	6	0	5	5	-1	5		8	10	5		5	5
			L	10	11	1	10	10	-1	0		0	0	0			
	PM Peak Hour: 4:30 PM-5:30 PM	NB	T	453	476	23	475	445	-31	450		646	670	220		480	570
	PM Peak Hour Used: 4:30 PM-5:30 PM		R	505	530	25	530	455	-75	460		498	520	60		470	495
			L	5	5	0	5	5	0	5		8	10	5		5	5
	PHF:	SB	T	130	137	7	135	125	-12	125		262	290	165		150	210
	0.86		R	1	1	0	0	0	-1	0		0	0	0			
		TEV		**1305**	**1370**	**65**	**1365**	**1230**	**-140**	**1225**		**1669**	**1775**	**550**		**1305**	**1520**
3	**Helvetia Rd & WB On-ramp**		L	0	0	0	0	0	0	0		0	0	0			
	16 hr Turning Movement Counts	EB	T	0	0	0	0	0	0	0		0	0	0			
	Count Date: 7/20/2011		R	0	0	0	0	0	0	0		0	0	0			
			L	0	0	0	0	0	0	0		0	0	0			
	Signalized	WB	T	0	0	0	0	0	0	0		0	0	0			
			R	0	0	0	0	0	0	0		0	0	0			
			L	191	191	0	190	0	-191	190		275	290	100		205	245
	PM Peak Hour: 4:30 PM-5:30 PM	NB	T	679	679	0	680	0	-679	910		1145	1190	280		950	1065
	PM Peak Hour Used: 4:30 PM-5:30 PM		R	0	0	0	0	0	0	0		0	0	0			
			L	0	0	0	0	0	0	0		0	0	0			
	PHF:	SB	T	235	235	0	235	0	-235	235		370	430	195		260	335
	0.95		R	77	77	0	75	0	-77	75		133	135	60		85	105
		TEV		**1182**	**1182**	**0**	**1180**	**0**	**-1182**	**1410**		**1923**	**2045**	**635**		**1500**	**1750**
4	**Helvetia Rd & WB Off-ramps**		L	0	0	0	0	0	0	0		0	0	0			
	16 hr Turning Movement Counts	EB	T	0	0	0	0	0	0	0		0	0	0			
	Count Date: 7/20/2011		R	0	0	0	0	0	0	625		730	730	105		640	685
			L	627	627	0	625	625	-2	0		0	0	0			
	Signalized (2011)	WB	T	1	1	0	0	0	-1	0		0	0	0			
	Unsignalized (2035)		R	57	57	0	55	55	-2	55		69	70	15		55	65
			L	191	191	0	190	190	-1	0		0	0	0			
	PM Peak Hour: 4:30 PM-5:30 PM	NB	T	679	679	0	680	855	176	1045		1365	1410	365		1100	1245
	PM Peak Hour Used: 4:30 PM-5:30 PM		R	0	0	0	0	0	0	0		0	0	0			
			L	0	0	0	0	0	0	0		0	0	0			
	PHF:	SB	T	235	235	0	235	235	0	235		370	430	195		260	335
	0.95		R	77	77	0	75	75	-2	0		0	0	0			
		TEV		**1867**	**1867**	**0**	**1860**	**2035**	**168**	**1960**		**2534**	**2640**	**680**		**2060**	**2330**
5	**Brookwood Pkwy & EB Ramps**		L	36	36	0	35	60	24	60		20	20	-40		50	30
	16 hr Turning Movement Counts	EB	T	1	1	0	0	0	-1	0		0	0	0			
	Count Date: 7/20/2011		R	62	62	0	60	60	-2	60		78	80	20		65	70
			L	0	0	0	0	0	0	0		0	0	0			
	Signalized	WB	T	0	0	0	0	0	0	0		0	0	0			
			R	0	0	0	0	0	0	0		0	0	0			
			L	0	0	0	0	0	0	0		0	0	0			
	PM Peak Hour: 4:30 PM-5:30 PM	NB	T	837	837	0	835	985	148	985		1340	1390	405		1050	1215
	PM Peak Hour Used: 4:30 PM-5:30 PM		R	779	779	0	780	780	1	780		945	945	165		805	870
			L	16	16	0	15	15	-1	15		7	5	-10		10	10
	PHF:	SB	T	846	846	0	845	845	-1	845		1156	1155	310		890	1010
	0.95		R	0	0	0	0	0	0	0		0	0	0			
		TEV		**2577**	**2577**	**0**	**2570**	**2745**	**168**	**2745**		**3546**	**3595**	**850**		**2870**	**3215**
6	**Brookwood Pkwy & Meek Rd**		L	3	3	0	5	5	2	5		26	25	20		5	15
	3 hr Turning Movement Counts	EB	T	0	0	0	0	0	0	0		0	0	0			
	Count Date: 5/25/2011		R	14	15	1	15	15	0	15		73	75	60		20	40
			L	2	2	0	0	0	-2	0		0	0	0			
	Unsignalized	WB	T	0	0	0	0	0	0	0		0	0	0			
			R	0	0	0	0	0	0	0		0	0	0			
			L	33	35	2	35	35	0	35		110	110	75		40	70
	PM Peak Hour: 4:30 PM-5:30 PM	NB	T	1763	1851	88	1850	1760	-91	1760		2312	2310	550		1850	2070
	PM Peak Hour Used: 4:30 PM-5:30 PM		R	0	0	0	0	0	0	0		0	0	0			
			L	0	0	0	0	0	0	0		0	0	0			
	PHF:	SB	T	877	921	44	920	890	-31	890		1181	1190	300		935	1050
	0.96		R	15	16	1	15	15	-1	15		47	45	30		20	30
		TEV		**2707**	**2842**	**135**	**2840**	**2720**	**-122**	**2720**		**3749**	**3755**	**1035**		**2870**	**3285**

Appendix C: Synchro/SimTraffic Reports

Year 2011 Existing Conditions

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	5	5	145	5	5	310
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.64	0.64	0.64	0.64	0.64	0.64
Hourly flow rate (vph)	8	8	227	8	8	484
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	730	230			234	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	730	230			234	
tC, single (s)	6.4	6.5			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.6			2.2	
p0 queue free %	98	99			99	
cM capacity (veh/h)	390	738			1345	

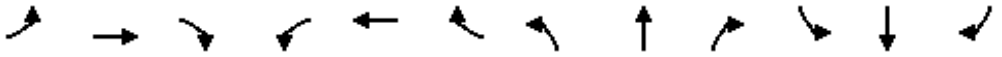
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	16	234	492
Volume Left	8	0	8
Volume Right	8	8	0
cSH	510	1700	1345
Volume to Capacity	0.03	0.14	0.01
Queue Length 95th (ft)	2	0	0
Control Delay (s)	12.3	0.0	0.2
Lane LOS	B		A
Approach Delay (s)	12.3	0.0	0.2
Approach LOS	B		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	30.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	5	165	0	5	5	145	210	10	305	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	0	0	6	209	0	6	6	184	266	13	386	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			None	
Median storage veh)								2				
Upstream signal (ft)								305				
pX, platoon unblocked	0.85	0.85		0.85	0.85	0.85				0.85		
vC, conflicting volume	747	873	386	747	741	316	386			449		
vC1, stage 1 conf vol	411	411		329	329							
vC2, stage 2 conf vol	335	462		418	411							
vCu, unblocked vol	617	765	386	617	610	112	386			268		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.5	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.6	2.2			2.2		
p0 queue free %	100	100	99	61	100	99	99			99		
cM capacity (veh/h)	537	467	666	532	516	736	1183			1115		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	6	215	456	399
Volume Left	0	209	6	13
Volume Right	6	6	266	0
cSH	666	536	1183	1115
Volume to Capacity	0.01	0.40	0.01	0.01
Queue Length 95th (ft)	1	48	0	1
Control Delay (s)	10.5	16.1	0.2	0.4
Lane LOS	B	C	A	A
Approach Delay (s)	10.5	16.1	0.2	0.4
Approach LOS	B	C		

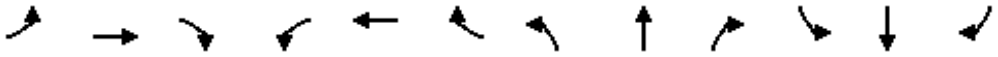
Intersection Summary				
Average Delay	3.5			
Intersection Capacity Utilization	45.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	1260	0	40	55	320	0	0	450	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.6	3.6	3.6	2.0	3.0			3.0	
Lane Util. Factor				0.95	0.95	1.00	1.00	1.00			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.99	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1615	1421	1863			3581	
Flt Permitted				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (perm)				1681	1681	1615	1421	1863			3581	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	0	0	1355	0	43	59	344	0	0	484	27
RTOR Reduction (vph)	0	0	0	0	0	6	0	0	0	0	5	0
Lane Group Flow (vph)	0	0	0	677	678	37	59	344	0	0	506	0
Heavy Vehicles (%)	0%	0%	0%	2%	0%	0%	27%	2%	0%	0%	0%	0%
Turn Type				Perm		Perm	Prot					
Protected Phases					4		1	6			2	
Permitted Phases				4		4						
Actuated Green, G (s)				37.0	37.0	37.0	4.7	23.0			14.3	
Effective Green, g (s)				38.4	38.4	38.4	6.7	25.0			16.3	
Actuated g/C Ratio				0.55	0.55	0.55	0.10	0.36			0.23	
Clearance Time (s)				5.0	5.0	5.0	4.0	5.0			5.0	
Vehicle Extension (s)				2.3	2.3	2.3	2.3	3.0			5.2	
Lane Grp Cap (vph)				922	922	886	136	665			834	
v/s Ratio Prot							0.04	c0.18			c0.14	
v/s Ratio Perm				0.40	0.40	0.02						
v/c Ratio				0.73	0.74	0.04	0.43	0.52			0.61	
Uniform Delay, d1				11.9	12.0	7.3	29.9	17.7			24.0	
Progression Factor				1.00	1.00	1.00	0.71	0.55			1.00	
Incremental Delay, d2				5.2	5.2	0.1	1.2	2.7			3.3	
Delay (s)				17.1	17.2	7.4	22.5	12.4			27.2	
Level of Service				B	B	A	C	B			C	
Approach Delay (s)		0.0			16.8			13.9			27.2	
Approach LOS		A			B			B			C	

Intersection Summary			
HCM Average Control Delay	18.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	9.6
Intersection Capacity Utilization	87.4%	ICU Level of Service	E
Analysis Period (min)	15		

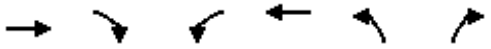
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	0	175	0	0	0	0	315	465	40	1670	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.6	3.6					3.0	3.0	2.0	3.0	
Lane Util. Factor		1.00	1.00					1.00	1.00	1.00	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1805	1442					1776	1553	1805	3574	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1805	1442					1776	1553	1805	3574	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	66	0	192	0	0	0	0	346	511	44	1835	0
RTOR Reduction (vph)	0	0	41	0	0	0	0	0	277	0	0	0
Lane Group Flow (vph)	0	66	151	0	0	0	0	346	234	44	1835	0
Heavy Vehicles (%)	0%	0%	12%	0%	0%	0%	0%	7%	4%	0%	1%	0%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		8						6		5	2	
Permitted Phases	8		8						6			
Actuated Green, G (s)		7.0	7.0					30.0	30.0	19.0	53.0	
Effective Green, g (s)		8.4	8.4					32.0	32.0	21.0	55.0	
Actuated g/C Ratio		0.12	0.12					0.46	0.46	0.30	0.79	
Clearance Time (s)		5.0	5.0					5.0	5.0	4.0	5.0	
Vehicle Extension (s)		2.3	2.3					4.7	4.7	2.3	4.7	
Lane Grp Cap (vph)		217	173					812	710	542	2808	
v/s Ratio Prot								0.19		0.02	c0.51	
v/s Ratio Perm		0.04	c0.10						0.15			
v/c Ratio		0.30	0.87					0.43	0.33	0.08	0.65	
Uniform Delay, d1		28.1	30.3					12.8	12.1	17.6	3.3	
Progression Factor		1.00	1.00					1.00	1.00	1.13	0.48	
Incremental Delay, d2		0.5	34.3					1.6	1.2	0.2	0.9	
Delay (s)		28.6	64.6					14.4	13.4	20.1	2.5	
Level of Service		C	E					B	B	C	A	
Approach Delay (s)		55.4			0.0			13.8			2.9	
Approach LOS		E			A			B			A	

Intersection Summary			
HCM Average Control Delay	10.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	6.6
Intersection Capacity Utilization	87.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	505	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3539					
Flt Permitted	1.00					
Satd. Flow (perm)	3539					
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	549	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	549	0	0	0	0	0
Turn Type						
Protected Phases	4					
Permitted Phases						
Actuated Green, G (s)	2.2					
Effective Green, g (s)	2.2					
Actuated g/C Ratio	0.09					
Clearance Time (s)	5.8					
Lane Grp Cap (vph)	311					
v/s Ratio Prot	c0.16					
v/s Ratio Perm						
v/c Ratio	1.77					
Uniform Delay, d1	11.4					
Progression Factor	1.00					
Incremental Delay, d2	357.2					
Delay (s)	368.6					
Level of Service	F					
Approach Delay (s)	368.6			0.0	0.0	
Approach LOS	F			A	A	

Intersection Summary			
HCM Average Control Delay	368.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.76		
Actuated Cycle Length (s)	25.0	Sum of lost time (s)	22.8
Intersection Capacity Utilization	18.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	15	5	20	0	0	0	10	765	5	0	1840	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	17	6	22	0	0	0	11	850	6	0	2044	6
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											227	
pX, platoon unblocked	0.74	0.74	0.74	0.74	0.74		0.74					
vC, conflicting volume	2494	2925	1025	1922	2925	428	2050			856		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2320	2899	345	1551	2899	428	1723			856		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	52	95	100	100	100	96			100		
cM capacity (veh/h)	15	11	489	34	11	581	277			793		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	44	0	11	567	289	1022	1028
Volume Left	17	0	11	0	0	0	0
Volume Right	22	0	0	0	6	0	6
cSH	27	1700	277	1700	1700	793	1700
Volume to Capacity	1.65	0.00	0.04	0.33	0.17	0.00	0.60
Queue Length 95th (ft)	133	0	3	0	0	0	0
Control Delay (s)	632.3	0.0	18.6	0.0	0.0	0.0	0.0
Lane LOS	F	A	C				
Approach Delay (s)	632.3	0.0	0.2			0.0	
Approach LOS	F	A					

Intersection Summary				
Average Delay	9.6			
Intersection Capacity Utilization	61.0%	ICU Level of Service		B
Analysis Period (min)	15			

200: Schaaf Rd & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.0	0.2	0.0	0.0	0.0	0.2
Delay / Veh (s)	5.8	1.5	3.8	1.0	1.5	0.6	1.7
Vehicles Entered	3	6	159	6	6	301	481
Vehicles Exited	3	6	160	6	6	301	482
Hourly Exit Rate	3	6	160	6	6	301	482
Input Volume	5	5	158	5	5	310	488
% of Volume	60	120	101	120	120	97	99
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

210: Groveland Dr & Helvetia Rd Performance by movement

Movement	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.7	0.0	0.0	0.3	0.2	0.0	0.3	1.5
Delay / Veh (s)	11.2	14.1	14.0	6.3	6.6	3.1	3.3	3.2	6.0
Vehicles Entered	4	174	5	7	168	217	9	317	901
Vehicles Exited	4	174	5	7	167	215	9	317	898
Hourly Exit Rate	4	174	5	7	167	215	9	317	898
Input Volume	5	165	5	5	163	210	10	328	891
% of Volume	76	106	95	133	103	103	90	97	101
Denied Entry Before	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0

220: US-26 WB Helvetia On-ramp & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	8.5	0.3	0.8	1.8	3.5	0.1	15.0
Delay / Veh (s)	24.4	24.7	52.7	19.5	26.4	16.1	24.7
Vehicles Entered	1253	44	54	334	474	25	2184
Vehicles Exited	1253	43	53	336	478	25	2188
Hourly Exit Rate	1253	43	53	336	478	25	2188
Input Volume	1260	40	55	322	474	25	2176
% of Volume	99	108	96	104	101	101	101
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	1.1	1.7	1.2	0.3	0.3	2.1	6.7
Delay / Veh (s)	65.5	34.3	13.2	2.6	22.8	4.5	8.8
Vehicles Entered	60	180	326	473	43	1682	2764
Vehicles Exited	62	180	326	473	43	1689	2773
Hourly Exit Rate	62	180	326	473	43	1689	2773
Input Volume	60	175	318	465	40	1682	2740
% of Volume	103	103	103	102	107	100	101
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

231: US-26 EB Helvetia On-ramp & Performance by movement

Movement	EBT	All
Total Delay (hr)	10.3	10.3
Delay / Veh (s)	70.5	70.5
Vehicles Entered	521	521
Vehicles Exited	526	526
Hourly Exit Rate	526	526
Input Volume	513	513
% of Volume	103	103
Denied Entry Before	0	0
Denied Entry After	0	0

240: Meek Rd & Brookwood Pkwy Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	NBR	SBT	SBR	All
Total Delay (hr)	0.8	0.3	0.9	0.0	1.1	0.0	0.6	0.0	3.7
Delay / Veh (s)	186.2	209.2	127.9	19.7	5.0	1.4	1.2	0.4	5.0
Vehicles Entered	15	7	23	8	779	7	1857	6	2702
Vehicles Exited	15	7	24	8	779	7	1859	6	2705
Hourly Exit Rate	15	7	24	8	779	7	1859	6	2705
Input Volume	15	5	20	10	765	5	1845	5	2671
% of Volume	102	133	122	78	102	133	101	114	101
Denied Entry Before	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0

Total Network Performance

Total Delay (hr)	44.5
Delay / Veh (s)	53.5
Vehicles Entered	2981
Vehicles Exited	3003
Hourly Exit Rate	3003
Input Volume	21557
% of Volume	14
Denied Entry Before	0
Denied Entry After	0

Intersection: 200: Schaaf Rd & Helvetia Rd

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	52	24
Average Queue (ft)	7	1
95th Queue (ft)	31	13
Link Distance (ft)	1714	562
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 210: Groveland Dr & Helvetia Rd

Movement	EB	WB	NB	SB
Directions Served	LR	LR	LTR	LTR
Maximum Queue (ft)	24	155	74	90
Average Queue (ft)	3	56	5	8
95th Queue (ft)	16	120	37	59
Link Distance (ft)	398	1693	218	1385
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 220: US-26 WB Helvetia On-ramp & Helvetia Rd

Movement	WB	WB	WB	B221	NB	NB	SB	SB
Directions Served	L	LT	R	T	L	T	T	TR
Maximum Queue (ft)	473	454	50	96	167	241	223	227
Average Queue (ft)	268	289	30	3	58	103	111	114
95th Queue (ft)	427	434	57	69	130	194	186	187
Link Distance (ft)	604	604		689		606	218	218
Upstream Blk Time (%)	0	0					1	1
Queuing Penalty (veh)	0	0					3	2
Storage Bay Dist (ft)			25		150			
Storage Blk Time (%)		47	4		1	2		
Queuing Penalty (veh)		19	23		3	1		

Intersection: 230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy

Movement	EB	EB	NB	NB	SB	SB	SB
Directions Served	LT	R	T	R	L	T	T
Maximum Queue (ft)	159	245	181	136	78	116	144
Average Queue (ft)	59	103	114	6	24	45	51
95th Queue (ft)	133	195	185	56	61	100	114
Link Distance (ft)	1138		168	168		606	606
Upstream Blk Time (%)			2	0			
Queuing Penalty (veh)			7	0			
Storage Bay Dist (ft)		300			175		
Storage Blk Time (%)		0					
Queuing Penalty (veh)		0					

Intersection: 231: US-26 EB Helvetia On-ramp &

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	334	344
Average Queue (ft)	177	195
95th Queue (ft)	326	340
Link Distance (ft)	991	991
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 240: Meek Rd & Brookwood Pkwy

Movement	EB	NB	NB	NB	SB
Directions Served	LTR	L	T	TR	TR
Maximum Queue (ft)	224	33	122	23	11
Average Queue (ft)	78	6	9	1	0
95th Queue (ft)	220	26	55	13	8
Link Distance (ft)	603		1910	1910	168
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		100			
Storage Blk Time (%)			0		
Queuing Penalty (veh)			0		

Network Summary

Network wide Queuing Penalty: 58

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	0	450	0	0	130
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	0	484	0	0	140
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	624	484			484	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	624	484			484	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	453	587			1089	

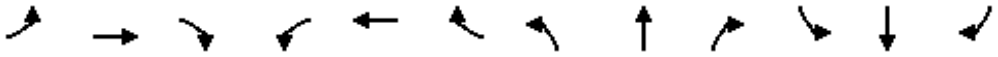
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	484	140
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1089
Volume to Capacity	0.00	0.28	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	27.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	15	170	0	5	10	445	455	5	125	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	0	16	187	0	5	11	489	500	5	137	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			None	
Median storage veh)								2				
Upstream signal (ft)								305				
pX, platoon unblocked	0.57	0.57		0.57	0.57	0.57				0.57		
vC, conflicting volume	915	1159	137	926	909	739	137			989		
vC1, stage 1 conf vol	148	148		761	761							
vC2, stage 2 conf vol	766	1011		165	148							
vCu, unblocked vol	467	899	137	487	458	157	137			598		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	98	56	100	99	99			99		
cM capacity (veh/h)	421	253	916	429	400	506	1459			560		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	16	192	1000	143
Volume Left	0	187	11	5
Volume Right	16	5	500	0
cSH	916	431	1459	560
Volume to Capacity	0.02	0.45	0.01	0.01
Queue Length 95th (ft)	1	56	1	1
Control Delay (s)	9.0	19.9	0.2	0.6
Lane LOS	A	C	A	A
Approach Delay (s)	9.0	19.9	0.2	0.6
Approach LOS	A	C		

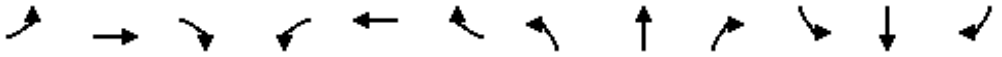
Intersection Summary				
Average Delay	3.2			
Intersection Capacity Utilization	78.3%	ICU Level of Service	D	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	625	0	55	190	855	0	0	235	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.6	3.6	3.6	2.0	7.0			3.0	
Lane Util. Factor				0.95	0.95	1.00	1.00	1.00			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.96	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1715	1715	1615	1787	1881			3479	
Flt Permitted				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (perm)				1715	1715	1615	1787	1881			3479	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	0	0	672	0	59	204	919	0	0	253	81
RTOR Reduction (vph)	0	0	0	0	0	18	0	0	0	0	33	0
Lane Group Flow (vph)	0	0	0	336	336	41	204	919	0	0	301	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%
Turn Type				Perm		Perm	Prot					
Protected Phases					4		1	6			2	
Permitted Phases				4		4						
Actuated Green, G (s)				17.0	17.0	17.0	12.7	43.0			26.3	
Effective Green, g (s)				18.4	18.4	18.4	14.7	41.0			28.3	
Actuated g/C Ratio				0.26	0.26	0.26	0.21	0.59			0.40	
Clearance Time (s)				5.0	5.0	5.0	4.0	5.0			5.0	
Vehicle Extension (s)				2.3	2.3	2.3	2.3	3.0			5.2	
Lane Grp Cap (vph)				451	451	425	375	1102			1407	
v/s Ratio Prot							0.11	c0.49			0.09	
v/s Ratio Perm				c0.20	0.20	0.03						
v/c Ratio				0.75	0.75	0.10	0.54	0.83			0.21	
Uniform Delay, d1				23.6	23.6	19.5	24.7	11.7			13.6	
Progression Factor				1.00	1.00	1.00	0.80	1.42			1.00	
Incremental Delay, d2				10.7	10.7	0.4	0.8	5.7			0.3	
Delay (s)				34.3	34.3	20.0	20.5	22.4			13.9	
Level of Service				C	C	B	C	C			B	
Approach Delay (s)		0.0			33.2			22.1			13.9	
Approach LOS		A			C			C			B	

Intersection Summary			
HCM Average Control Delay	24.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	71.5%	ICU Level of Service	C
Analysis Period (min)	15		

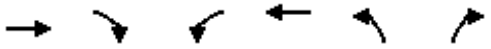
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	0	60	0	0	0	0	985	780	15	845	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0					5.0	5.0	4.0	5.0	
Lane Util. Factor		1.00	1.00					1.00	1.00	1.00	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1805	1615					1881	1599	1805	3610	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1805	1615					1881	1599	1805	3610	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	62	0	62	0	0	0	0	1026	812	16	880	0
RTOR Reduction (vph)	0	0	57	0	0	0	0	0	241	0	0	0
Lane Group Flow (vph)	0	62	5	0	0	0	0	1026	571	16	880	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		8						6		5	2	
Permitted Phases	8		8						6			
Actuated Green, G (s)		5.5	5.5					49.2	49.2	1.3	54.5	
Effective Green, g (s)		5.5	5.5					49.2	49.2	1.3	54.5	
Actuated g/C Ratio		0.08	0.08					0.70	0.70	0.02	0.78	
Clearance Time (s)		5.0	5.0					5.0	5.0	4.0	5.0	
Vehicle Extension (s)		2.3	2.3					4.7	4.7	2.3	4.7	
Lane Grp Cap (vph)		142	127					1322	1124	34	2811	
v/s Ratio Prot								c0.55		0.01	c0.24	
v/s Ratio Perm		0.03	0.00						0.36			
v/c Ratio		0.44	0.04					0.78	0.51	0.47	0.31	
Uniform Delay, d1		30.8	29.8					6.8	4.8	34.0	2.3	
Progression Factor		1.00	1.00					1.00	1.00	1.12	0.38	
Incremental Delay, d2		1.3	0.1					4.5	1.6	4.7	0.2	
Delay (s)		32.0	29.9					11.3	6.4	42.9	1.1	
Level of Service		C	C					B	A	D	A	
Approach Delay (s)		31.0			0.0			9.2			1.8	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM Average Control Delay	7.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	71.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	795	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3610					
Flt Permitted	1.00					
Satd. Flow (perm)	3610					
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	864	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	864	0	0	0	0	0
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%
Turn Type						
Protected Phases	4					
Permitted Phases						
Actuated Green, G (s)	2.5					
Effective Green, g (s)	2.5					
Actuated g/C Ratio	0.14					
Clearance Time (s)	4.5					
Lane Grp Cap (vph)	501					
v/s Ratio Prot	c0.24					
v/s Ratio Perm						
v/c Ratio	1.72					
Uniform Delay, d1	7.8					
Progression Factor	1.00					
Incremental Delay, d2	334.4					
Delay (s)	342.1					
Level of Service	F					
Approach Delay (s)	342.1			0.0	0.0	
Approach LOS	F			A	A	

Intersection Summary			
HCM Average Control Delay	342.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.72		
Actuated Cycle Length (s)	18.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	25.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	0	15	0	0	0	35	1760	0	0	890	15
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	5	0	16	0	0	0	37	1872	0	0	947	16
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											227	
pX, platoon unblocked	0.93	0.93	0.93	0.93	0.93		0.93					
vC, conflicting volume	1965	2902	481	2436	2910	936	963			1872		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1885	2894	285	2392	2903	936	804			1872		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	87	100	98	100	100	100	95			100		
cM capacity (veh/h)	40	14	666	16	14	270	769			326		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	21	0	37	1248	624	473	489
Volume Left	5	0	37	0	0	0	0
Volume Right	16	0	0	0	0	0	16
cSH	134	1700	769	1700	1700	326	1700
Volume to Capacity	0.16	0.00	0.05	0.73	0.37	0.00	0.29
Queue Length 95th (ft)	14	0	4	0	0	0	0
Control Delay (s)	36.8	0.0	9.9	0.0	0.0	0.0	0.0
Lane LOS	E	A	A				
Approach Delay (s)	36.8	0.0	0.2			0.0	
Approach LOS	E	A					

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	58.7%	ICU Level of Service	B	
Analysis Period (min)	15			

200: Schaaf Rd & Helvetia Rd Performance by movement

Movement	NBT	SBT	All
Total Delay (hr)	0.7	0.0	0.7
Delay / Veh (s)	5.3	0.2	4.1
Vehicles Entered	449	140	589
Vehicles Exited	451	139	590
Hourly Exit Rate	451	139	590
Input Volume	453	130	583
% of Volume	100	107	101
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

210: Groveland Dr & Helvetia Rd Performance by movement

Movement	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.0	1.6	0.0	0.0	1.2	0.6	0.0	0.1	3.6
Delay / Veh (s)	2.4	34.0	19.6	7.5	9.7	4.9	19.7	2.0	10.4
Vehicles Entered	15	168	5	11	451	438	6	134	1228
Vehicles Exited	15	168	5	11	451	440	6	133	1229
Hourly Exit Rate	15	168	5	11	451	440	6	133	1229
Input Volume	15	170	5	10	452	455	5	126	1238
% of Volume	98	99	100	107	100	97	120	106	99
Denied Entry Before	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0

220: US-26 WB Helvetia On-ramp & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	11.2	1.0	2.2	7.2	0.9	0.2	22.7
Delay / Veh (s)	63.6	66.2	41.3	30.7	13.3	7.2	39.9
Vehicles Entered	631	55	190	852	242	77	2047
Vehicles Exited	638	57	189	845	240	77	2046
Hourly Exit Rate	638	57	189	845	240	77	2046
Input Volume	625	55	190	864	238	75	2046
% of Volume	102	103	100	98	101	103	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.8	0.2	1.9	0.8	0.1	0.9	4.8
Delay / Veh (s)	52.3	11.5	7.0	3.6	32.5	3.9	6.2
Vehicles Entered	55	60	990	779	14	869	2767
Vehicles Exited	55	61	990	778	14	865	2763
Hourly Exit Rate	55	61	990	778	14	865	2763
Input Volume	60	60	994	780	15	852	2762
% of Volume	92	102	100	100	92	102	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

231: US-26 EB Helvetia On-ramp & Performance by movement

Movement	EBT	All
Total Delay (hr)	21.9	21.9
Delay / Veh (s)	99.1	99.1
Vehicles Entered	804	804
Vehicles Exited	786	786
Hourly Exit Rate	786	786
Input Volume	806	806
% of Volume	98	98
Denied Entry Before	0	0
Denied Entry After	0	0

240: Meek Rd & Brookwood Pkwy Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	0.6	1.5	0.1	5.9	0.3	0.0	8.3
Delay / Veh (s)	663.7	356.6	14.1	12.1	1.0	0.4	11.0
Vehicles Entered	4	17	35	1759	907	17	2739
Vehicles Exited	2	13	35	1755	906	17	2728
Hourly Exit Rate	2	13	35	1755	906	17	2728
Input Volume	5	15	35	1760	894	15	2725
% of Volume	40	85	101	100	101	111	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

Total Network Performance

Total Delay (hr)	68.6
Delay / Veh (s)	82.7
Vehicles Entered	3010
Vehicles Exited	2971
Hourly Exit Rate	2971
Input Volume	21876
% of Volume	14
Denied Entry Before	0
Denied Entry After	0

Intersection: 200: Schaaf Rd & Helvetia Rd

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 210: Groveland Dr & Helvetia Rd

Movement	EB	WB	NB	SB
Directions Served	LR	LR	LTR	LTR
Maximum Queue (ft)	27	200	92	76
Average Queue (ft)	9	92	8	9
95th Queue (ft)	27	173	52	42
Link Distance (ft)	1815	1693	218	1385
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 220: US-26 WB Helvetia On-ramp & Helvetia Rd

Movement	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	LT	R	L	T	T	TR
Maximum Queue (ft)	454	489	50	324	626	113	131
Average Queue (ft)	264	277	36	158	415	55	61
95th Queue (ft)	430	445	60	309	678	99	109
Link Distance (ft)	604	604			606	218	218
Upstream Blk Time (%)					3		
Queuing Penalty (veh)					32		
Storage Bay Dist (ft)			25	150			
Storage Blk Time (%)		74	19	4	24		
Queuing Penalty (veh)		41	60	36	45		

Intersection: 230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy

Movement	EB	EB	NB	NB	SB	SB	SB
Directions Served	LT	R	T	R	L	T	T
Maximum Queue (ft)	113	68	192	105	58	105	124
Average Queue (ft)	49	24	128	5	11	24	37
95th Queue (ft)	97	50	222	50	36	76	106
Link Distance (ft)	1138		168	168		606	606
Upstream Blk Time (%)			6	0			
Queuing Penalty (veh)			49	1			
Storage Bay Dist (ft)		300			175		
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 231: US-26 EB Helvetia On-ramp &

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	556	597
Average Queue (ft)	350	374
95th Queue (ft)	657	695
Link Distance (ft)	991	991
Upstream Blk Time (%)		1
Queuing Penalty (veh)		3
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 240: Meek Rd & Brookwood Pkwy

Movement	EB	NB	NB	NB	SB
Directions Served	LR	L	T	TR	TR
Maximum Queue (ft)	195	121	513	311	5
Average Queue (ft)	66	19	98	23	0
95th Queue (ft)	235	72	358	183	3
Link Distance (ft)	603		1910	1910	168
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		100			
Storage Blk Time (%)		0	5		
Queuing Penalty (veh)		0	2		

Network Summary

Network wide Queuing Penalty: 269

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Eastbound Off-ramp to Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1875	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	180	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1875	180		vph
Peak-hour factor, PHF	0.88	0.86		
Peak 15-min volume, v15	533	52		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2173	213	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2173 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2173	4600	No
$v_{FO} = v_F - v_R$	1960	4600	No
v_R	213	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 2173		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2173	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 9.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	D_S = 0.447	
Space mean speed in ramp influence area,	S_R = 52.0	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 52.0	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	AM Peak Period
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Eastbound On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1695	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	475	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1695	475		vph
Peak-hour factor, PHF	0.88	0.86		
Peak 15-min volume, v15	482	138		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1965	563	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 1965 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2528	4600	No

$v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 1965 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1965	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_{R} + 0.0078\ v_{12} - 0.00627\ L_A =$ 22.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.341	
Space mean speed in ramp influence area,	S_R = 53.9	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 53.9	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Westbound Off-ramp to Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2300	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	1300	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2300	1300		vph
Peak-hour factor, PHF	0.91	0.82		
Peak 15-min volume, v15	632	396		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2578	1617	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2578 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2578	4600	No
$v_{FO} = v_F - v_R$	961	4600	No
v_R	1617	2000	No
$v_{3 \text{ or } av34}$	0 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34} > 2700$ pc/h?		No	
Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$		No	

If yes, v_{12A} = 2578 (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2578	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 12.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.574	
Space mean speed in ramp influence area,	S_R = 49.7	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 49.7	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	AM Peak Period
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Westbound On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1000	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	55	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1000	55		vph
Peak-hour factor, PHF	0.91	0.82		
Peak 15-min volume, v15	275	17		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1121	68	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 1121 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	1189	4600	No

$v_{3 \text{ or } av34}$ 0 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 1121 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1121	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_{R} + 0.0078\ v_{12} - 0.00627\ L_A$ = 12.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.305	
Space mean speed in ramp influence area,	S_R = 54.5	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 54.5	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Eastbound Off-ramp to Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1635	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	130	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1635	130		vph
Peak-hour factor, PHF	0.92	0.96		
Peak 15-min volume, v15	444	34		v
Trucks and buses	1	1		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.995	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1786	136	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1786 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	1786	4600	No
$v_{FO} = v_F - v_R$	1650	4600	No
v_R	136	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 1786		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1786	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 6.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	D_S = 0.440	
Space mean speed in ramp influence area,	S_R = 52.1	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 52.1	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	PM Peak Period
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Eastbound On-Ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1505	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	800	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1505	800		vph
Peak-hour factor, PHF	0.92	0.96		
Peak 15-min volume, v15	409	208		v
Trucks and buses	1	1		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.995	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1644	838	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 1644 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2482	4600	No

$v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 1644 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1644	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 21.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.339

Space mean speed in ramp influence area, S_R = 53.9 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.9 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Westbound Off-ramp to Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2525	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	725	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2525	725		vph
Peak-hour factor, PHF	0.93	0.93		
Peak 15-min volume, v15	679	195		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2729	791	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2729 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2729	4600	No
$v_{FO} = v_F - v_R$	1938	4600	No
v_R	791	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 2729		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2729	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 14.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.499	
Space mean speed in ramp influence area,	S_R = 51.0	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.0	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	PM Peak Period
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2011
Description:	Westbound On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1800	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	280	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1800	280		vph
Peak-hour factor, PHF	0.93	0.93		
Peak 15-min volume, v15	484	75		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1945	306	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 1945 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2251	4600	No

v_3 or v_{av34} 0 pc/h (Equation 25-4 or 25-5)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 1945 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1945	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_{R} + 0.0078\ v_{12} - 0.00627\ L_A$ = 20.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.329	
Space mean speed in ramp influence area,	S_R = 54.1	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 54.1	mph

Year 2015 No-Build

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	5	5	175	10	5	365
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.64	0.64	0.64	0.64	0.64	0.64
Hourly flow rate (vph)	8	8	273	16	8	570
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	867	281			289	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	867	281			289	
tC, single (s)	6.4	6.5			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.6			2.2	
p0 queue free %	98	99			99	
cM capacity (veh/h)	324	689			1284	

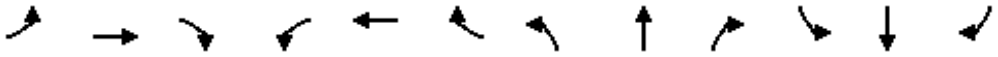
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	16	289	578
Volume Left	8	0	8
Volume Right	8	16	0
cSH	441	1700	1284
Volume to Capacity	0.04	0.17	0.01
Queue Length 95th (ft)	3	0	0
Control Delay (s)	13.5	0.0	0.2
Lane LOS	B		A
Approach Delay (s)	13.5	0.0	0.2
Approach LOS	B		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	33.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	135	0	5	5	180	235	10	360	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	0	0	0	171	0	6	6	228	297	13	456	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			None	
Median storage veh)								2				
Upstream signal (ft)								305				
pX, platoon unblocked	0.87	0.87		0.87	0.87	0.87				0.87		
vC, conflicting volume	877	1019	456	870	870	377	456			525		
vC1, stage 1 conf vol	481	481		389	389							
vC2, stage 2 conf vol	396	538		481	481							
vCu, unblocked vol	784	948	456	777	777	210	456			381		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.5	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.6	2.2			2.2		
p0 queue free %	100	100	100	64	100	99	99			99		
cM capacity (veh/h)	477	419	609	479	468	660	1116			1035		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	177	532	468
Volume Left	0	171	6	13
Volume Right	0	6	297	0
cSH	1700	484	1116	1035
Volume to Capacity	0.00	0.37	0.01	0.01
Queue Length 95th (ft)	0	42	0	1
Control Delay (s)	0.0	16.7	0.2	0.4
Lane LOS	A	C	A	A
Approach Delay (s)	0.0	16.7	0.2	0.4
Approach LOS	A	C		

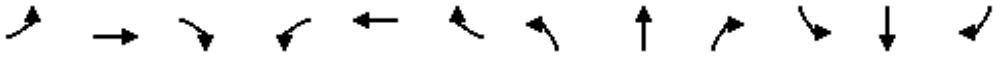
Intersection Summary				
Average Delay	2.7			
Intersection Capacity Utilization	40.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	1335	0	45	35	375	0	0	470	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.6	3.6	3.6	2.0	3.0			3.0	
Lane Util. Factor				0.95	0.95	1.00	1.00	1.00			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.99	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1615	1421	1863			3583	
Flt Permitted				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (perm)				1681	1681	1615	1421	1863			3583	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	0	0	1435	0	48	38	403	0	0	505	27
RTOR Reduction (vph)	0	0	0	0	0	7	0	0	0	0	5	0
Lane Group Flow (vph)	0	0	0	717	718	41	38	403	0	0	527	0
Heavy Vehicles (%)	0%	0%	0%	2%	0%	0%	27%	2%	0%	0%	0%	0%
Turn Type				Perm		Perm	Prot					
Protected Phases					4		1	6			2	
Permitted Phases				4		4						
Actuated Green, G (s)				24.0	24.0	24.0	2.8	36.0			29.2	
Effective Green, g (s)				25.4	25.4	25.4	4.8	38.0			31.2	
Actuated g/C Ratio				0.36	0.36	0.36	0.07	0.54			0.45	
Clearance Time (s)				5.0	5.0	5.0	4.0	5.0			5.0	
Vehicle Extension (s)				2.3	2.3	2.3	2.3	3.0			5.2	
Lane Grp Cap (vph)				610	610	586	97	1011			1597	
v/s Ratio Prot							0.03	c0.22			0.15	
v/s Ratio Perm				0.43	0.43	0.03						
v/c Ratio				1.18	1.18	0.07	0.39	0.40			0.33	
Uniform Delay, d1				22.3	22.3	14.6	31.2	9.3			12.6	
Progression Factor				1.00	1.00	1.00	0.84	0.50			1.00	
Incremental Delay, d2				95.3	96.0	0.0	1.5	1.1			0.6	
Delay (s)				117.6	118.3	14.6	27.6	5.8			13.2	
Level of Service				F	F	B	C	A			B	
Approach Delay (s)		0.0			114.6			7.7			13.2	
Approach LOS		A			F			A			B	

Intersection Summary			
HCM Average Control Delay	73.4	HCM Level of Service	E
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	6.6
Intersection Capacity Utilization	91.3%	ICU Level of Service	F
Analysis Period (min)	15		

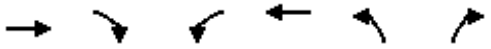
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	65	0	190	0	0	0	0	345	470	40	1765	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.6	3.6					3.0	3.0	2.0	3.0	
Lane Util. Factor		1.00	1.00					1.00	1.00	1.00	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1805	1442					1776	1553	1805	3574	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1805	1442					1776	1553	1805	3574	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	71	0	209	0	0	0	0	379	516	44	1940	0
RTOR Reduction (vph)	0	0	10	0	0	0	0	0	220	0	0	0
Lane Group Flow (vph)	0	71	199	0	0	0	0	379	296	44	1940	0
Heavy Vehicles (%)	0%	0%	12%	0%	0%	0%	0%	7%	4%	0%	1%	0%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		8						6		5	2	
Permitted Phases	8		8						6			
Actuated Green, G (s)		14.1	14.1					38.2	38.2	3.7	45.9	
Effective Green, g (s)		15.5	15.5					40.2	40.2	5.7	47.9	
Actuated g/C Ratio		0.22	0.22					0.57	0.57	0.08	0.68	
Clearance Time (s)		5.0	5.0					5.0	5.0	4.0	5.0	
Vehicle Extension (s)		2.3	2.3					4.7	4.7	2.3	4.7	
Lane Grp Cap (vph)		400	319					1020	892	147	2446	
v/s Ratio Prot								0.21		0.02	c0.54	
v/s Ratio Perm		0.04	c0.14						0.19			
v/c Ratio		0.18	0.62					0.37	0.33	0.30	0.79	
Uniform Delay, d1		22.1	24.6					8.1	7.8	30.3	7.6	
Progression Factor		1.00	1.00					1.00	1.00	1.25	0.74	
Incremental Delay, d2		0.1	3.0					1.0	1.0	0.2	1.0	
Delay (s)		22.2	27.7					9.1	8.8	38.0	6.6	
Level of Service		C	C					A	A	D	A	
Approach Delay (s)		26.3			0.0			9.0			7.3	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM Average Control Delay	9.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	6.6
Intersection Capacity Utilization	91.3%	ICU Level of Service	F
Analysis Period (min)	15		

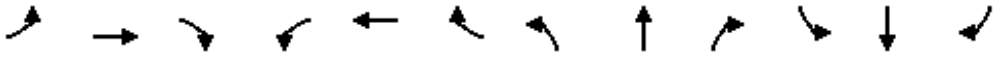
c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	510	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3539					
Flt Permitted	1.00					
Satd. Flow (perm)	3539					
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	554	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	554	0	0	0	0	0
Turn Type						
Protected Phases	4					
Permitted Phases						
Actuated Green, G (s)	20.0					
Effective Green, g (s)	20.0					
Actuated g/C Ratio	1.00					
Clearance Time (s)	4.0					
Lane Grp Cap (vph)	3539					
v/s Ratio Prot	c0.16					
v/s Ratio Perm						
v/c Ratio	0.16					
Uniform Delay, d1	0.0					
Progression Factor	1.00					
Incremental Delay, d2	0.1					
Delay (s)	0.1					
Level of Service	A					
Approach Delay (s)	0.1			0.0	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM Average Control Delay	0.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.16		
Actuated Cycle Length (s)	20.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	17.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	20	0	25	0	0	0	10	795	0	0	1950	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	22	0	28	0	0	0	11	883	0	0	2167	6
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											227	
pX, platoon unblocked	0.58	0.58	0.58	0.58	0.58		0.58					
vC, conflicting volume	2633	3075	1086	2017	3078	442	2172			883		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2364	3130	0	1294	3135	442	1564			883		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	96	100	100	100	95			100		
cM capacity (veh/h)	11	6	629	65	6	569	247			774		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	50	0	11	589	294	1083	1089
Volume Left	22	0	11	0	0	0	0
Volume Right	28	0	0	0	0	0	6
cSH	23	1700	247	1700	1700	774	1700
Volume to Capacity	2.14	0.00	0.05	0.35	0.17	0.00	0.64
Queue Length 95th (ft)	157	0	4	0	0	0	0
Control Delay (s)	875.9	0.0	20.3	0.0	0.0	0.0	0.0
Lane LOS	F	A	C				
Approach Delay (s)	875.9	0.0	0.3			0.0	
Approach LOS	F	A					

Intersection Summary				
Average Delay	14.1			
Intersection Capacity Utilization	64.1%	ICU Level of Service	C	
Analysis Period (min)	15			

200: Schaaf Rd & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.0	0.2	0.0	0.0	0.1	0.3
Delay / Veh (s)	4.9	0.9	4.0	1.8	0.9	0.6	1.8
Vehicles Entered	4	4	187	11	6	369	581
Vehicles Exited	4	5	185	11	6	369	580
Hourly Exit Rate	4	5	185	11	6	369	580
Input Volume	5	5	193	10	5	365	583
% of Volume	80	100	96	110	120	101	99
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

210: Groveland Dr & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBL	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.6	0.0	0.0	0.4	0.2	0.0	0.3	1.5
Delay / Veh (s)	15.5	8.2	5.0	7.0	3.0	6.0	3.0	5.6
Vehicles Entered	138	6	4	198	237	10	390	983
Vehicles Exited	138	6	4	199	238	11	391	987
Hourly Exit Rate	138	6	4	199	238	11	391	987
Input Volume	135	5	5	201	235	10	387	978
% of Volume	102	114	76	99	101	110	101	101
Denied Entry Before	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0

220: US-26 WB Helvetia On-ramp & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	15.6	0.5	0.4	2.7	3.0	0.1	22.3
Delay / Veh (s)	41.3	40.7	40.2	25.4	21.3	14.4	34.2
Vehicles Entered	1362	48	34	374	501	26	2345
Vehicles Exited	1353	47	34	379	503	27	2343
Hourly Exit Rate	1353	47	34	379	503	27	2343
Input Volume	1335	45	35	383	494	25	2317
% of Volume	101	104	97	99	102	109	101
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	1.3	3.0	0.3	0.3	0.6	2.4	7.9
Delay / Veh (s)	73.2	56.8	3.6	2.6	47.6	4.9	9.8
Vehicles Entered	62	188	344	471	42	1808	2915
Vehicles Exited	62	190	342	472	43	1810	2919
Hourly Exit Rate	62	190	342	472	43	1810	2919
Input Volume	65	190	349	470	40	1778	2893
% of Volume	95	100	98	100	107	102	101
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

231: US-26 EB Helvetia On-ramp & Performance by movement

Movement	EBT	All
Total Delay (hr)	0.8	0.8
Delay / Veh (s)	5.4	5.4
Vehicles Entered	521	521
Vehicles Exited	520	520
Hourly Exit Rate	520	520
Input Volume	518	518
% of Volume	100	100
Denied Entry Before	0	0
Denied Entry After	0	0

240: Meek Rd & Brookwood Pkwy Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	2.6	2.3	0.1	0.9	0.7	0.0	6.5
Delay / Veh (s)	403.4	328.5	20.8	4.2	1.3	0.2	8.3
Vehicles Entered	23	25	8	791	1987	4	2838
Vehicles Exited	23	25	9	788	1986	4	2835
Hourly Exit Rate	23	25	9	788	1986	4	2835
Input Volume	20	25	10	795	1956	5	2812
% of Volume	116	100	88	99	102	76	101
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

Total Network Performance

Total Delay (hr)	52.4
Delay / Veh (s)	59.5
Vehicles Entered	3162
Vehicles Exited	3172
Hourly Exit Rate	3172
Input Volume	22829
% of Volume	14
Denied Entry Before	0
Denied Entry After	1

Intersection: 200: Schaaf Rd & Helvetia Rd

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	33	17
Average Queue (ft)	7	1
95th Queue (ft)	26	7
Link Distance (ft)	1714	562
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 210: Groveland Dr & Helvetia Rd

Movement	WB	NB	SB
Directions Served	LR	LTR	LTR
Maximum Queue (ft)	168	35	105
Average Queue (ft)	50	2	10
95th Queue (ft)	114	15	56
Link Distance (ft)	1693	218	1385
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 220: US-26 WB Helvetia On-ramp & Helvetia Rd

Movement	WB	WB	WB	B221	NB	NB	SB	SB
Directions Served	L	LT	R	T	L	T	T	TR
Maximum Queue (ft)	629	648	50	610	115	303	208	214
Average Queue (ft)	424	444	29	50	36	168	105	108
95th Queue (ft)	616	632	57	391	86	265	173	178
Link Distance (ft)	604	604		4837		606	218	218
Upstream Blk Time (%)	1	1					0	0
Queuing Penalty (veh)	0	0					0	0
Storage Bay Dist (ft)			25		150			
Storage Blk Time (%)		52	4		0	10		
Queuing Penalty (veh)		23	30		0	3		

Intersection: 230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy

Movement	EB	EB	NB	SB	SB	SB
Directions Served	LT	R	T	L	T	T
Maximum Queue (ft)	367	323	130	104	155	159
Average Queue (ft)	93	137	46	35	53	58
95th Queue (ft)	278	279	106	78	120	127
Link Distance (ft)	1138		168		606	606
Upstream Blk Time (%)			0			
Queuing Penalty (veh)			0			
Storage Bay Dist (ft)		300		175		
Storage Blk Time (%)	0	4			0	
Queuing Penalty (veh)	0	3			0	

Intersection: 231: US-26 EB Helvetia On-ramp &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 240: Meek Rd & Brookwood Pkwy

Movement	EB	NB	NB	NB
Directions Served	LR	L	T	TR
Maximum Queue (ft)	331	43	17	23
Average Queue (ft)	153	8	1	1
95th Queue (ft)	333	31	12	11
Link Distance (ft)	603		1910	1910
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		100		
Storage Blk Time (%)			0	
Queuing Penalty (veh)			0	

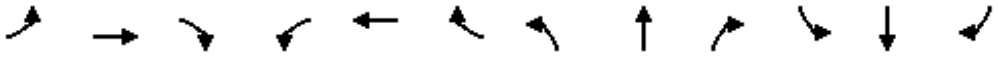
Network Summary

Network wide Queuing Penalty: 60

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	5	0	480	5	0	150
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	5	0	516	5	0	161
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	680	519			522	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	680	519			522	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	420	561			1055	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	5	522	161
Volume Left	5	0	0
Volume Right	0	5	0
cSH	420	1700	1055
Volume to Capacity	0.01	0.31	0.00
Queue Length 95th (ft)	1	0	0
Control Delay (s)	13.7	0.0	0.0
Lane LOS	B		
Approach Delay (s)	13.7	0.0	0.0
Approach LOS	B		

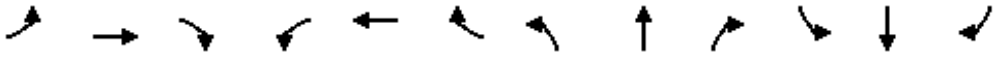
Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	35.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	195	0	5	0	480	470	5	150	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	0	0	214	0	5	0	527	516	5	165	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			None	
Median storage veh)								2				
Upstream signal (ft)								305				
pX, platoon unblocked	0.53	0.53		0.53	0.53	0.53				0.53		
vC, conflicting volume	967	1220	165	962	962	786	165			1044		
vC1, stage 1 conf vol	176	176		786	786							
vC2, stage 2 conf vol	791	1044		176	176							
vCu, unblocked vol	494	971	165	483	483	152	165			639		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	50	100	99	100			99		
cM capacity (veh/h)	414	237	885	426	390	477	1426			506		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	220	1044	170
Volume Left	0	214	0	5
Volume Right	0	5	516	0
cSH	1700	427	1426	506
Volume to Capacity	0.00	0.51	0.00	0.01
Queue Length 95th (ft)	0	72	0	1
Control Delay (s)	0.0	22.0	0.0	0.5
Lane LOS	A	C		A
Approach Delay (s)	0.0	22.0	0.0	0.5
Approach LOS	A	C		

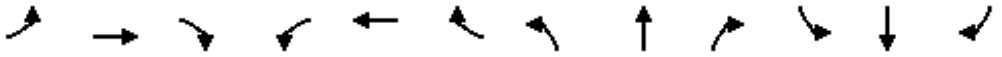
Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	71.8%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	640	0	55	205	895	0	0	260	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.6	3.6	3.6	2.0	7.0			3.0	
Lane Util. Factor				0.95	0.95	1.00	1.00	1.00			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.96	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1715	1715	1615	1787	1881			3477	
Flt Permitted				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (perm)				1715	1715	1615	1787	1881			3477	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	0	0	688	0	59	220	962	0	0	280	91
RTOR Reduction (vph)	0	0	0	0	0	18	0	0	0	0	34	0
Lane Group Flow (vph)	0	0	0	344	344	41	220	962	0	0	337	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%
Turn Type				Perm		Perm	Prot					
Protected Phases					4		1	6			2	
Permitted Phases				4		4						
Actuated Green, G (s)				15.9	15.9	15.9	13.3	44.1			26.8	
Effective Green, g (s)				17.3	17.3	17.3	15.3	42.1			28.8	
Actuated g/C Ratio				0.25	0.25	0.25	0.22	0.60			0.41	
Clearance Time (s)				5.0	5.0	5.0	4.0	5.0			5.0	
Vehicle Extension (s)				2.3	2.3	2.3	2.3	3.0			5.2	
Lane Grp Cap (vph)				424	424	399	391	1131			1431	
v/s Ratio Prot							0.12	c0.51			0.10	
v/s Ratio Perm				c0.20	0.20	0.03						
v/c Ratio				0.81	0.81	0.10	0.56	0.85			0.24	
Uniform Delay, d1				24.8	24.8	20.4	24.4	11.4			13.4	
Progression Factor				1.00	1.00	1.00	0.78	1.45			1.00	
Incremental Delay, d2				10.8	10.8	0.1	0.9	5.9			0.4	
Delay (s)				35.7	35.7	20.4	19.9	22.3			13.8	
Level of Service				D	D	C	B	C			B	
Approach Delay (s)		0.0			34.5			21.9			13.8	
Approach LOS		A			C			C			B	

Intersection Summary			
HCM Average Control Delay	24.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		

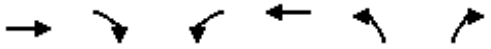
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	0	65	0	0	0	0	1050	805	10	890	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0					5.0	5.0	4.0	5.0	
Lane Util. Factor		1.00	1.00					1.00	1.00	1.00	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1805	1615					1881	1599	1805	3610	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1805	1615					1881	1599	1805	3610	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	52	0	68	0	0	0	0	1094	839	10	927	0
RTOR Reduction (vph)	0	0	63	0	0	0	0	0	246	0	0	0
Lane Group Flow (vph)	0	52	5	0	0	0	0	1094	593	10	927	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		8						6		5	2	
Permitted Phases	8		8						6			
Actuated Green, G (s)		5.3	5.3					49.5	49.5	1.2	54.7	
Effective Green, g (s)		5.3	5.3					49.5	49.5	1.2	54.7	
Actuated g/C Ratio		0.08	0.08					0.71	0.71	0.02	0.78	
Clearance Time (s)		5.0	5.0					5.0	5.0	4.0	5.0	
Vehicle Extension (s)		2.3	2.3					4.7	4.7	2.3	4.7	
Lane Grp Cap (vph)		137	122					1330	1131	31	2821	
v/s Ratio Prot								c0.58		0.01	c0.26	
v/s Ratio Perm		0.03	0.00						0.37			
v/c Ratio		0.38	0.04					0.82	0.52	0.32	0.33	
Uniform Delay, d1		30.8	30.0					7.2	4.8	34.0	2.2	
Progression Factor		1.00	1.00					1.00	1.00	1.08	0.36	
Incremental Delay, d2		1.0	0.1					5.8	1.7	2.8	0.2	
Delay (s)		31.8	30.1					13.0	6.5	39.5	1.1	
Level of Service		C	C					B	A	D	A	
Approach Delay (s)		30.8			0.0			10.2			1.5	
Approach LOS		C			A			B			A	

Intersection Summary			
HCM Average Control Delay	8.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	815	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3610					
Flt Permitted	1.00					
Satd. Flow (perm)	3610					
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	886	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	886	0	0	0	0	0
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%
Turn Type						
Protected Phases	4					
Permitted Phases						
Actuated Green, G (s)	2.5					
Effective Green, g (s)	2.5					
Actuated g/C Ratio	0.14					
Clearance Time (s)	4.5					
Lane Grp Cap (vph)	501					
v/s Ratio Prot	c0.25					
v/s Ratio Perm						
v/c Ratio	1.77					
Uniform Delay, d1	7.8					
Progression Factor	1.00					
Incremental Delay, d2	353.9					
Delay (s)	361.6					
Level of Service	F					
Approach Delay (s)	361.6			0.0	0.0	
Approach LOS	F			A	A	

Intersection Summary			
HCM Average Control Delay	361.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.77		
Actuated Cycle Length (s)	18.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	26.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	0	20	0	0	0	40	1850	0	0	935	20
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	5	0	21	0	0	0	43	1968	0	0	995	21
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											227	
pX, platoon unblocked	0.92	0.92	0.92	0.92	0.92		0.92					
vC, conflicting volume	2074	3059	508	2572	3069	984	1016			1968		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1997	3063	300	2536	3075	984	850			1968		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	83	100	97	100	100	100	94			100		
cM capacity (veh/h)	32	11	648	12	11	251	735			299		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	27	0	43	1312	656	497	519
Volume Left	5	0	43	0	0	0	0
Volume Right	21	0	0	0	0	0	21
cSH	134	1700	735	1700	1700	299	1700
Volume to Capacity	0.20	0.00	0.06	0.77	0.39	0.00	0.31
Queue Length 95th (ft)	18	0	5	0	0	0	0
Control Delay (s)	38.4	0.0	10.2	0.0	0.0	0.0	0.0
Lane LOS	E	A	B				
Approach Delay (s)	38.4	0.0	0.2			0.0	
Approach LOS	E	A					

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	61.1%	ICU Level of Service		B
Analysis Period (min)	15			

200: Schaaf Rd & Helvetia Rd Performance by movement

Movement	WBL	NBT	NBR	SBT	All
Total Delay (hr)	0.0	0.7	0.0	0.0	0.8
Delay / Veh (s)	4.5	5.5	5.3	0.2	4.3
Vehicles Entered	6	474	5	146	631
Vehicles Exited	6	478	5	146	635
Hourly Exit Rate	6	478	5	146	635
Input Volume	5	483	5	150	642
% of Volume	120	99	100	97	99
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

210: Groveland Dr & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	3.8	0.1	1.3	0.7	0.0	0.1	6.0
Delay / Veh (s)	69.8	55.0	10.1	5.2	19.5	1.9	16.5
Vehicles Entered	194	7	475	484	4	149	1313
Vehicles Exited	194	7	474	483	4	149	1311
Hourly Exit Rate	194	7	474	483	4	149	1311
Input Volume	195	5	487	470	5	151	1313
% of Volume	99	140	97	103	80	99	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

220: US-26 WB Helvetia On-ramp & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	10.7	1.1	2.7	9.1	0.9	0.1	24.6
Delay / Veh (s)	61.3	66.1	49.8	36.2	11.9	6.3	41.6
Vehicles Entered	627	57	195	907	262	82	2130
Vehicles Exited	630	58	197	907	260	82	2134
Hourly Exit Rate	630	58	197	907	260	82	2134
Input Volume	640	55	205	904	263	85	2153
% of Volume	98	105	96	100	99	96	99
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	1.3	0.2	2.9	1.3	0.1	0.8	6.6
Delay / Veh (s)	98.4	12.0	10.0	5.9	35.5	3.0	8.2
Vehicles Entered	47	62	1054	812	9	887	2871
Vehicles Exited	47	62	1055	812	9	891	2876
Hourly Exit Rate	47	62	1055	812	9	891	2876
Input Volume	50	65	1060	805	10	898	2888
% of Volume	94	95	100	101	90	99	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	1	0	0	0	1

231: US-26 EB Helvetia On-ramp & Performance by movement

Movement	EBT	All
Total Delay (hr)	39.4	39.4
Delay / Veh (s)	175.3	175.3
Vehicles Entered	830	830
Vehicles Exited	788	788
Hourly Exit Rate	788	788
Input Volume	826	826
% of Volume	95	95
Denied Entry Before	0	0
Denied Entry After	1	1

240: Meek Rd & Brookwood Pkwy Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	1.0	4.5	0.4	17.3	0.2	0.0	23.5
Delay / Veh (s)	1219.6	907.5	36.6	33.4	0.7	0.2	29.4
Vehicles Entered	4	21	42	1874	930	19	2890
Vehicles Exited	3	15	42	1855	929	19	2863
Hourly Exit Rate	3	15	42	1855	929	19	2863
Input Volume	5	20	40	1850	940	20	2876
% of Volume	60	74	105	100	99	94	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

Total Network Performance

Total Delay (hr)	107.4
Delay / Veh (s)	124.5
Vehicles Entered	3135
Vehicles Exited	3079
Hourly Exit Rate	3079
Input Volume	23011
% of Volume	13
Denied Entry Before	1
Denied Entry After	2

Intersection: 200: Schaaf Rd & Helvetia Rd

Movement	WB
Directions Served	LR
Maximum Queue (ft)	27
Average Queue (ft)	5
95th Queue (ft)	21
Link Distance (ft)	1714
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 210: Groveland Dr & Helvetia Rd

Movement	WB	NB	SB
Directions Served	LR	LTR	LTR
Maximum Queue (ft)	414	38	79
Average Queue (ft)	162	2	6
95th Queue (ft)	336	14	35
Link Distance (ft)	1693	218	1385
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 220: US-26 WB Helvetia On-ramp & Helvetia Rd

Movement	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	LT	R	L	T	T	TR
Maximum Queue (ft)	424	431	50	325	631	123	135
Average Queue (ft)	252	270	36	177	517	54	63
95th Queue (ft)	403	417	60	350	760	98	110
Link Distance (ft)	604	604			606	218	218
Upstream Blk Time (%)					7		
Queuing Penalty (veh)					79		
Storage Bay Dist (ft)			25	150			
Storage Blk Time (%)		74	23	6	27		
Queuing Penalty (veh)		41	74	53	56		

Intersection: 230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy

Movement	EB	EB	NB	NB	SB	SB	SB
Directions Served	LT	R	T	R	L	T	T
Maximum Queue (ft)	168	59	222	143	36	50	48
Average Queue (ft)	60	24	157	54	7	7	11
95th Queue (ft)	132	48	251	198	26	31	39
Link Distance (ft)	1138		168	168		606	606
Upstream Blk Time (%)			13	5			
Queuing Penalty (veh)			117	48			
Storage Bay Dist (ft)		300			175		
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 231: US-26 EB Helvetia On-ramp &

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	886	988
Average Queue (ft)	608	664
95th Queue (ft)	1060	1190
Link Distance (ft)	991	991
Upstream Blk Time (%)		15
Queuing Penalty (veh)		61
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 240: Meek Rd & Brookwood Pkwy

Movement	EB	NB	NB	NB	SB
Directions Served	LR	L	T	TR	TR
Maximum Queue (ft)	403	198	1208	1117	14
Average Queue (ft)	158	32	458	363	0
95th Queue (ft)	388	120	1300	1168	7
Link Distance (ft)	603		1910	1910	168
Upstream Blk Time (%)			0		
Queuing Penalty (veh)			0		
Storage Bay Dist (ft)		100			
Storage Blk Time (%)			14		
Queuing Penalty (veh)			5		

Network Summary

Network wide Queuing Penalty: 535

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2015
Description:	Eastbound Off-ramp to Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1990	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	210	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1990	210		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	524	55		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2137	225	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2137 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2137	4600	No
$v_{FO} = v_F - v_R$	1912	4600	No
v_R	225	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 2137		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2137	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 9.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	D_S = 0.448	
Space mean speed in ramp influence area,	S_R = 51.9	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.9	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	AM Peak Period
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2015
Description: Eastbound	On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1775	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	490	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1775	490		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	467	129		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1906	526	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 1906 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2432	4600	No

$v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 1906 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1906	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_{R} + 0.0078\ v_{12} - 0.00627\ L_A$ = 21.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.337

Space mean speed in ramp influence area, S_R = 53.9 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.9 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2015
Description:	Westbound Off-ramp to Brookwood - No-build

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1215	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	1385	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1215	1385		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	320	364		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1305	1487	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1305 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	1305	4600	No
$v_{FO} = v_F - v_R$	-182	4600	No
v_R	1487	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 1305		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1305	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 2.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	D_S = 0.562	
Space mean speed in ramp influence area,	S_R = 49.9	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 49.9	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	AM Peak Period
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2015
Description:	Westbound On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1125	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	60	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1125	60		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	296	16		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1208	64	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1208 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	1272	4600	No

v_3 or v_{av34} 0 pc/h (Equation 25-4 or 25-5)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 1208 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1208	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 12.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.306	
Space mean speed in ramp influence area,	S_R = 54.5	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 54.5	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2015
Description:	Eastbound Off-ramp to Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1805	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	130	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1805	130		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	475	34		v
Trucks and buses	1	1		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.995	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1910	138	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1910 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	1910	4600	No
$v_{FO} = v_F - v_R$	1772	4600	No
v_R	138	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 1910		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1910	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 7.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	D_S = 0.440	
Space mean speed in ramp influence area,	S_R = 52.1	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 52.1	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	PM Peak Period
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2015
Description: Eastbound	On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1675	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	800	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1675	800		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	441	211		v
Trucks and buses	1	1		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.995	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1772	846	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1772 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2618	4600	No

$v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 1772 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1772	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_{R} + 0.0078\, v_{12} - 0.00627\, L_A$ = 22.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.346	
Space mean speed in ramp influence area,	S_R = 53.8	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 53.8	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2015
Description:	Westbound Off-Ramp to Brookwood - No-Build

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2690	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	745	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2690	745		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	708	196		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2846	796	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2846 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2846	4600	No
$v_{FO} = v_F - v_R$	2050	4600	No
v_R	796	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 2846		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2846	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 15.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.500	
Space mean speed in ramp influence area,	S_R = 51.0	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.0	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	PM Peak Period
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2015
Description:	Westbound On-Ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1945	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	300	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1945	300		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	512	79		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2058	321	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2058 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2379	4600	No

$v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 2058 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2058	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_{R} + 0.0078\, v_{12} - 0.00627\, L_A$ = 21.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.334	
Space mean speed in ramp influence area,	S_R = 54.0	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 54.0	mph

Year 2035 No-Build

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	45	10	165	205	45	410
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.64	0.64	0.64	0.64	0.64	0.64
Hourly flow rate (vph)	70	16	258	320	70	641
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1199	418			578	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1199	418			578	
tC, single (s)	6.4	6.5			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.6			2.2	
p0 queue free %	63	97			93	
cM capacity (veh/h)	192	574			1006	

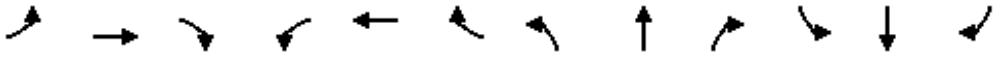
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	86	578	711
Volume Left	70	0	70
Volume Right	16	320	0
cSH	219	1700	1006
Volume to Capacity	0.39	0.34	0.07
Queue Length 95th (ft)	44	0	6
Control Delay (s)	31.7	0.0	1.8
Lane LOS	D		A
Approach Delay (s)	31.7	0.0	1.8
Approach LOS	D		

Intersection Summary			
Average Delay	2.9		
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	155	0	5	5	365	275	15	440	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	0	0	0	196	0	6	6	462	348	19	557	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			None	
Median storage veh)								2				
Upstream signal (ft)								305				
pX, platoon unblocked	0.70	0.70		0.70	0.70	0.70				0.70		
vC, conflicting volume	1250	1418	557	1244	1244	636	557			810		
vC1, stage 1 conf vol	595	595		649	649							
vC2, stage 2 conf vol	655	823		595	595							
vCu, unblocked vol	1141	1382	557	1132	1132	261	557			511		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.5	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.6	2.2			2.2		
p0 queue free %	100	100	100	45	100	99	99			97		
cM capacity (veh/h)	351	290	534	358	354	494	1024			743		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	203	816	576
Volume Left	0	196	6	19
Volume Right	0	6	348	0
cSH	1700	361	1024	743
Volume to Capacity	0.00	0.56	0.01	0.03
Queue Length 95th (ft)	0	82	0	2
Control Delay (s)	0.0	27.0	0.2	0.7
Lane LOS	A	D	A	A
Approach Delay (s)	0.0	27.0	0.2	0.7
Approach LOS	A	D		

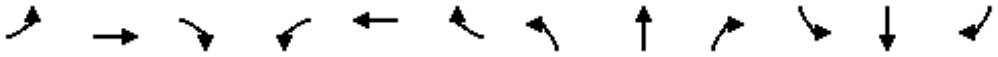
Intersection Summary				
Average Delay	3.8			
Intersection Capacity Utilization	53.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	1795	0	100	60	545	0	0	565	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.6	3.6	3.6	2.0	3.0			3.0	
Lane Util. Factor				0.95	0.95	1.00	1.00	1.00			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.99	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1615	1421	1863			3583	
Flt Permitted				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (perm)				1681	1681	1615	1421	1863			3583	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	0	0	1930	0	108	65	586	0	0	608	32
RTOR Reduction (vph)	0	0	0	0	0	12	0	0	0	0	5	0
Lane Group Flow (vph)	0	0	0	965	965	96	65	586	0	0	635	0
Heavy Vehicles (%)	0%	0%	0%	2%	0%	0%	27%	2%	0%	0%	0%	0%
Turn Type				Perm		Perm	Prot					
Protected Phases					4		1	6			2	
Permitted Phases				4		4						
Actuated Green, G (s)				37.0	37.0	37.0	4.8	23.0			14.2	
Effective Green, g (s)				38.4	38.4	38.4	6.8	25.0			16.2	
Actuated g/C Ratio				0.55	0.55	0.55	0.10	0.36			0.23	
Clearance Time (s)				5.0	5.0	5.0	4.0	5.0			5.0	
Vehicle Extension (s)				2.3	2.3	2.3	2.3	3.0			5.2	
Lane Grp Cap (vph)				922	922	886	138	665			829	
v/s Ratio Prot							0.05	c0.31			0.18	
v/s Ratio Perm				c0.57	0.57	0.06						
v/c Ratio				1.05	1.05	0.11	0.47	0.88			0.77	
Uniform Delay, d1				15.8	15.8	7.6	29.9	21.1			25.1	
Progression Factor				1.00	1.00	1.00	0.68	0.52			1.00	
Incremental Delay, d2				42.6	42.6	0.2	1.1	12.1			6.7	
Delay (s)				58.4	58.4	7.8	21.5	23.0			31.8	
Level of Service				E	E	A	C	C			C	
Approach Delay (s)		0.0			55.7			22.9			31.8	
Approach LOS		A			E			C			C	

Intersection Summary			
HCM Average Control Delay	44.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	6.6
Intersection Capacity Utilization	114.3%	ICU Level of Service	H
Analysis Period (min)	15		

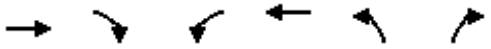
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	85	0	275	0	0	0	0	520	505	35	2325	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.6	3.6					3.0	3.0	2.0	3.0	
Lane Util. Factor		1.00	1.00					1.00	1.00	1.00	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1805	1442					1776	1553	1805	3574	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1805	1442					1776	1553	1805	3574	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	93	0	302	0	0	0	0	571	555	38	2555	0
RTOR Reduction (vph)	0	0	11	0	0	0	0	0	301	0	0	0
Lane Group Flow (vph)	0	93	291	0	0	0	0	571	254	38	2555	0
Heavy Vehicles (%)	0%	0%	12%	0%	0%	0%	0%	7%	4%	0%	1%	0%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		8						6		5	2	
Permitted Phases	8		8						6			
Actuated Green, G (s)		7.0	7.0					30.0	30.0	19.0	53.0	
Effective Green, g (s)		8.4	8.4					32.0	32.0	21.0	55.0	
Actuated g/C Ratio		0.12	0.12					0.46	0.46	0.30	0.79	
Clearance Time (s)		5.0	5.0					5.0	5.0	4.0	5.0	
Vehicle Extension (s)		2.3	2.3					4.7	4.7	2.3	4.7	
Lane Grp Cap (vph)		217	173					812	710	542	2808	
v/s Ratio Prot								0.32		0.02	c0.71	
v/s Ratio Perm		0.05	c0.20						0.16			
v/c Ratio		0.43	1.68					0.70	0.36	0.07	0.91	
Uniform Delay, d1		28.6	30.8					15.2	12.3	17.5	5.6	
Progression Factor		1.00	1.00					1.00	1.00	1.18	0.43	
Incremental Delay, d2		0.8	329.6					5.1	1.4	0.1	2.1	
Delay (s)		29.4	360.4					20.3	13.7	20.7	4.5	
Level of Service		C	F					C	B	C	A	
Approach Delay (s)		282.5			0.0			17.0			4.7	
Approach LOS		F			A			B			A	

Intersection Summary			
HCM Average Control Delay	34.8	HCM Level of Service	C
HCM Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	6.6
Intersection Capacity Utilization	114.3%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	540	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3539					
Flt Permitted	1.00					
Satd. Flow (perm)	3539					
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	587	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	587	0	0	0	0	0
Turn Type						
Protected Phases	4					
Permitted Phases						
Actuated Green, G (s)	20.0					
Effective Green, g (s)	20.0					
Actuated g/C Ratio	1.00					
Clearance Time (s)	4.0					
Lane Grp Cap (vph)	3539					
v/s Ratio Prot	c0.17					
v/s Ratio Perm						
v/c Ratio	0.17					
Uniform Delay, d1	0.0					
Progression Factor	1.00					
Incremental Delay, d2	0.1					
Delay (s)	0.1					
Level of Service	A					
Approach Delay (s)	0.1			0.0	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM Average Control Delay	0.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	20.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	18.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	50	0	80	0	0	0	35	975	0	0	2580	20
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	56	0	89	0	0	0	39	1083	0	0	2867	22
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											227	
pX, platoon unblocked	0.23	0.23	0.23	0.23	0.23		0.23					
vC, conflicting volume	3497	4039	1444	2683	4050	542	2889			1083		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	5204	7606	0	1596	7655	542	2507			1083		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	64	100	100	100	6			100		
cM capacity (veh/h)	0	0	246	2	0	490	41			651		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	144	0	39	722	361	1433	1456
Volume Left	56	0	39	0	0	0	0
Volume Right	89	0	0	0	0	0	22
cSH	0	1700	41	1700	1700	651	1700
Volume to Capacity	Err	0.00	0.94	0.42	0.21	0.00	0.86
Queue Length 95th (ft)	Err	0	91	0	0	0	0
Control Delay (s)	Err	0.0	269.4	0.0	0.0	0.0	0.0
Lane LOS	F	A	F				
Approach Delay (s)	Err	0.0	9.3			0.0	
Approach LOS	F	A					

Intersection Summary				
Average Delay	350.1			
Intersection Capacity Utilization	86.3%	ICU Level of Service		E
Analysis Period (min)	15			

200: Schaaf Rd & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.4	0.1	0.5	0.2	0.1	0.6	2.0
Delay / Veh (s)	31.5	19.0	5.8	3.9	10.4	5.5	6.7
Vehicles Entered	42	11	342	198	44	416	1053
Vehicles Exited	43	11	340	199	44	416	1053
Hourly Exit Rate	43	11	340	199	44	416	1053
Input Volume	45	10	366	205	45	410	1082
% of Volume	95	110	93	97	97	101	97
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

210: Groveland Dr & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBL	NBT	NBR	SBL	SBT	All
Total Delay (hr)	2.4	0.1	0.0	0.7	0.2	0.0	1.0	4.6
Delay / Veh (s)	61.9	43.6	9.3	7.3	3.6	11.3	7.5	13.1
Vehicles Entered	141	8	3	364	246	14	477	1253
Vehicles Exited	141	8	3	364	247	14	477	1254
Hourly Exit Rate	141	8	3	364	247	14	477	1254
Input Volume	155	5	5	396	275	15	474	1325
% of Volume	91	152	57	92	90	92	101	95
Denied Entry Before	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0

220: US-26 WB Helvetia On-ramp & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	22.3	1.3	0.9	7.0	5.9	0.2	37.6
Delay / Veh (s)	55.7	58.2	54.2	49.6	36.0	25.5	50.0
Vehicles Entered	1444	82	58	508	590	27	2709
Vehicles Exited	1436	82	57	512	592	27	2706
Hourly Exit Rate	1436	82	57	512	592	27	2706
Input Volume	1795	100	60	554	594	30	3132
% of Volume	80	82	95	92	100	91	86
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	9.9	36.6	2.5	0.4	0.2	3.4	53.0
Delay / Veh (s)	476.2	547.2	17.9	2.7	24.5	6.1	57.5
Vehicles Entered	77	251	495	488	33	1984	3328
Vehicles Exited	73	231	491	488	33	1984	3300
Hourly Exit Rate	73	231	491	488	33	1984	3300
Input Volume	85	275	528	505	35	2342	3770
% of Volume	86	84	93	97	94	85	88
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	11	31	0	0	0	0	42

231: US-26 EB Helvetia On-ramp & Performance by movement

Movement	EBT	All
Total Delay (hr)	13.6	13.6
Delay / Veh (s)	93.4	93.4
Vehicles Entered	531	531
Vehicles Exited	518	518
Hourly Exit Rate	518	518
Input Volume	550	550
% of Volume	94	94
Denied Entry Before	0	0
Denied Entry After	0	0

240: Meek Rd & Brookwood Pkwy Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	31.0	47.2	0.4	2.0	1.1	0.0	81.7
Delay / Veh (s)	15951.1	14157.5	42.6	7.5	1.8	0.4	91.0
Vehicles Entered	7	12	35	972	2192	19	3237
Vehicles Exited	6	11	35	967	2190	19	3228
Hourly Exit Rate	6	11	35	967	2190	19	3228
Input Volume	50	80	35	975	2589	20	3749
% of Volume	12	14	99	99	85	96	86
Denied Entry Before	1	2	0	0	0	0	3
Denied Entry After	42	68	0	0	0	0	110

Total Network Performance

Total Delay (hr)	475.5
Delay / Veh (s)	439.0
Vehicles Entered	3955
Vehicles Exited	3837
Hourly Exit Rate	3837
Input Volume	30579
% of Volume	13
Denied Entry Before	38
Denied Entry After	503

Intersection: 200: Schaaf Rd & Helvetia Rd

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	156	42	446
Average Queue (ft)	39	2	47
95th Queue (ft)	110	20	224
Link Distance (ft)	1714	1385	562
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 210: Groveland Dr & Helvetia Rd

Movement	WB	NB	SB
Directions Served	LR	LTR	LTR
Maximum Queue (ft)	350	101	256
Average Queue (ft)	109	5	38
95th Queue (ft)	309	46	152
Link Distance (ft)	1693	218	1385
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		1	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 220: US-26 WB Helvetia On-ramp & Helvetia Rd

Movement	WB	WB	WB	B221	NB	NB	SB	SB
Directions Served	L	LT	R	T	L	T	T	TR
Maximum Queue (ft)	679	680	50	6229	324	630	261	257
Average Queue (ft)	600	607	37	816	84	348	165	164
95th Queue (ft)	670	674	55	3894	234	672	257	256
Link Distance (ft)	604	604		6815		606	218	218
Upstream Blk Time (%)	2	3		1		3	6	6
Queuing Penalty (veh)	0	0		0		19	20	18
Storage Bay Dist (ft)			25		150			
Storage Blk Time (%)		49	10		0	33		
Queuing Penalty (veh)		49	92		1	20		

Intersection: 230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy

Movement	EB	EB	NB	NB	SB	SB	SB
Directions Served	LT	R	T	R	L	T	T
Maximum Queue (ft)	1193	325	198	161	69	171	183
Average Queue (ft)	943	320	156	11	21	68	78
95th Queue (ft)	1518	355	214	82	55	135	155
Link Distance (ft)	1138		168	168		606	606
Upstream Blk Time (%)	43		11	0			
Queuing Penalty (veh)	0		58	1			
Storage Bay Dist (ft)		300			175		
Storage Blk Time (%)	2	71				0	
Queuing Penalty (veh)	5	60				0	

Intersection: 231: US-26 EB Helvetia On-ramp &

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	416	424
Average Queue (ft)	226	245
95th Queue (ft)	478	497
Link Distance (ft)	991	991
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 240: Meek Rd & Brookwood Pkwy

Movement	EB	NB	NB	NB	SB
Directions Served	LR	L	T	TR	TR
Maximum Queue (ft)	622	91	199	127	13
Average Queue (ft)	607	33	61	5	1
95th Queue (ft)	631	73	166	49	7
Link Distance (ft)	603		1910	1910	168
Upstream Blk Time (%)	97				
Queuing Penalty (veh)	0				
Storage Bay Dist (ft)		100			
Storage Blk Time (%)		1	3		
Queuing Penalty (veh)		3	1		

Network Summary

Network wide Queuing Penalty: 348

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	30	0	470	210	0	270
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	32	0	505	226	0	290
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	909	618			731	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	909	618			731	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	90	100			100	
cM capacity (veh/h)	308	493			882	

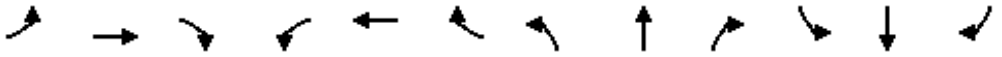
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	32	731	290
Volume Left	32	0	0
Volume Right	0	226	0
cSH	308	1700	882
Volume to Capacity	0.10	0.43	0.00
Queue Length 95th (ft)	9	0	0
Control Delay (s)	18.1	0.0	0.0
Lane LOS	C		
Approach Delay (s)	18.1	0.0	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	275	0	10	0	670	520	10	290	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	0	0	302	0	11	0	736	571	11	319	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			None	
Median storage veh)								2				
Upstream signal (ft)								305				
pX, platoon unblocked	0.42	0.42		0.42	0.42	0.42				0.42		
vC, conflicting volume	1374	1648	319	1363	1363	1022	319			1308		
vC1, stage 1 conf vol	341	341		1022	1022							
vC2, stage 2 conf vol	1033	1308		341	341							
vCu, unblocked vol	1197	1856	319	1171	1171	354	319			1039		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	0	100	96	100			96		
cM capacity (veh/h)	230	114	727	253	243	290	1253			282		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	313	1308	330
Volume Left	0	302	0	11
Volume Right	0	11	571	0
cSH	1700	254	1253	282
Volume to Capacity	0.00	1.23	0.00	0.04
Queue Length 95th (ft)	0	378	0	3
Control Delay (s)	0.0	173.8	0.0	1.5
Lane LOS	A	F		A
Approach Delay (s)	0.0	173.8	0.0	1.5
Approach LOS	A	F		

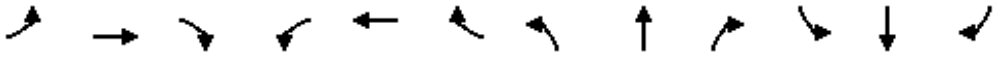
Intersection Summary			
Average Delay	28.2		
Intersection Capacity Utilization	89.5%	ICU Level of Service	E
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	730	0	70	290	1120	0	0	430	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.6	3.6	3.6	2.0	7.0			3.0	
Lane Util. Factor				0.95	0.95	1.00	1.00	1.00			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.96	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1715	1715	1615	1787	1881			3481	
Flt Permitted				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (perm)				1715	1715	1615	1787	1881			3481	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	0	0	785	0	75	312	1204	0	0	462	145
RTOR Reduction (vph)	0	0	0	0	0	20	0	0	0	0	36	0
Lane Group Flow (vph)	0	0	0	392	393	55	312	1204	0	0	571	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%
Turn Type				Perm		Perm	Prot					
Protected Phases					4		1	6			2	
Permitted Phases				4		4						
Actuated Green, G (s)				17.0	17.0	17.0	16.9	43.0			22.1	
Effective Green, g (s)				18.4	18.4	18.4	18.9	41.0			24.1	
Actuated g/C Ratio				0.26	0.26	0.26	0.27	0.59			0.34	
Clearance Time (s)				5.0	5.0	5.0	4.0	5.0			5.0	
Vehicle Extension (s)				2.3	2.3	2.3	2.3	3.0			5.2	
Lane Grp Cap (vph)				451	451	425	482	1102			1198	
v/s Ratio Prot							0.17	c0.64			0.16	
v/s Ratio Perm				0.23	0.23	0.03						
v/c Ratio				0.87	0.87	0.13	0.65	1.09			0.48	
Uniform Delay, d1				24.7	24.7	19.7	22.6	14.5			18.0	
Progression Factor				1.00	1.00	1.00	0.68	1.34			1.00	
Incremental Delay, d2				19.8	20.1	0.6	0.9	47.7			1.4	
Delay (s)				44.5	44.7	20.3	16.3	67.2			19.4	
Level of Service				D	D	C	B	E			B	
Approach Delay (s)		0.0			42.5			56.7			19.4	
Approach LOS		A			D			E			B	

Intersection Summary			
HCM Average Control Delay	45.0	HCM Level of Service	D
HCM Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	91.5%	ICU Level of Service	F
Analysis Period (min)	15		

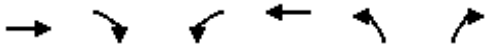
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	0	80	0	0	0	0	1390	945	5	1155	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0					5.0	5.0	4.0	5.0	
Lane Util. Factor		1.00	1.00					1.00	1.00	1.00	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1805	1615					1881	1599	1805	3610	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1805	1615					1881	1599	1805	3610	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	21	0	83	0	0	0	0	1448	984	5	1203	0
RTOR Reduction (vph)	0	0	78	0	0	0	0	0	229	0	0	0
Lane Group Flow (vph)	0	21	5	0	0	0	0	1448	755	5	1203	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		8						6		5	2	
Permitted Phases	8		8						6			
Actuated Green, G (s)		4.6	4.6					50.3	50.3	1.1	55.4	
Effective Green, g (s)		4.6	4.6					50.3	50.3	1.1	55.4	
Actuated g/C Ratio		0.07	0.07					0.72	0.72	0.02	0.79	
Clearance Time (s)		5.0	5.0					5.0	5.0	4.0	5.0	
Vehicle Extension (s)		2.3	2.3					4.7	4.7	2.3	4.7	
Lane Grp Cap (vph)		119	106					1352	1149	28	2857	
v/s Ratio Prot								c0.77		0.00	c0.33	
v/s Ratio Perm		0.01	0.00						0.47			
v/c Ratio		0.18	0.05					1.07	0.66	0.18	0.42	
Uniform Delay, d1		30.9	30.7					9.9	5.2	34.0	2.3	
Progression Factor		1.00	1.00					1.00	1.00	1.27	0.12	
Incremental Delay, d2		0.4	0.1					45.9	2.9	1.2	0.3	
Delay (s)		31.3	30.8					55.8	8.2	44.3	0.6	
Level of Service		C	C					E	A	D	A	
Approach Delay (s)		30.9			0.0			36.5			0.8	
Approach LOS		C			A			D			A	

Intersection Summary			
HCM Average Control Delay	24.8	HCM Level of Service	C
HCM Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	91.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	950	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3610					
Flt Permitted	1.00					
Satd. Flow (perm)	3610					
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1033	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1033	0	0	0	0	0
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%
Turn Type						
Protected Phases	4					
Permitted Phases						
Actuated Green, G (s)	2.5					
Effective Green, g (s)	2.5					
Actuated g/C Ratio	0.14					
Clearance Time (s)	4.5					
Lane Grp Cap (vph)	501					
v/s Ratio Prot	c0.29					
v/s Ratio Perm						
v/c Ratio	2.06					
Uniform Delay, d1	7.8					
Progression Factor	1.00					
Incremental Delay, d2	484.7					
Delay (s)	492.5					
Level of Service	F					
Approach Delay (s)	492.5			0.0	0.0	
Approach LOS	F			A	A	

Intersection Summary			
HCM Average Control Delay	492.5	HCM Level of Service	F
HCM Volume to Capacity ratio	2.06		
Actuated Cycle Length (s)	18.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	30.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	25	0	75	0	0	0	110	2310	0	0	1190	45
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	27	0	80	0	0	0	117	2457	0	0	1266	48
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											227	
pX, platoon unblocked	0.89	0.89	0.89	0.89	0.89		0.89					
vC, conflicting volume	2753	3981	657	3404	4005	1229	1314			2457		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2722	4103	368	3454	4129	1229	1106			2457		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	86	100	100	100	79			100		
cM capacity (veh/h)	8	2	565	2	2	173	569			192		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	106	0	117	1638	819	633	681
Volume Left	27	0	117	0	0	0	0
Volume Right	80	0	0	0	0	0	48
cSH	29	1700	569	1700	1700	192	1700
Volume to Capacity	3.66	0.00	0.21	0.96	0.48	0.00	0.40
Queue Length 95th (ft)	Err	0	19	0	0	0	0
Control Delay (s)	Err	0.0	13.0	0.0	0.0	0.0	0.0
Lane LOS	F	A	B				
Approach Delay (s)	Err	0.0	0.6			0.0	
Approach LOS	F	A					

Intersection Summary				
Average Delay	266.7			
Intersection Capacity Utilization	104.1%	ICU Level of Service	G	
Analysis Period (min)	15			

200: Schaaf Rd & Helvetia Rd Performance by movement

Movement	WBL	NBT	NBR	SBT	All
Total Delay (hr)	0.1	1.0	0.3	0.0	1.5
Delay / Veh (s)	6.3	7.5	5.5	0.4	4.9
Vehicles Entered	38	495	214	331	1078
Vehicles Exited	38	494	214	330	1076
Hourly Exit Rate	30	395	171	264	861
Input Volume	30	471	209	268	978
% of Volume	103	84	82	98	88
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

210: Groveland Dr & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	89.2	4.0	1.9	0.7	0.1	0.5	96.4
Delay / Veh (s)	1305.9	1441.8	9.7	5.0	24.9	4.8	186.9
Vehicles Entered	268	11	699	531	14	356	1879
Vehicles Exited	225	10	702	533	14	353	1837
Hourly Exit Rate	180	8	562	426	11	282	1470
Input Volume	273	10	674	517	10	289	1774
% of Volume	66	78	83	83	110	98	83
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	61	3	0	0	0	0	64

220: US-26 WB Helvetia On-ramp & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	38.4	3.6	4.4	15.0	1.6	0.3	63.4
Delay / Veh (s)	162.9	166.4	57.2	46.8	13.2	6.7	77.4
Vehicles Entered	857	79	281	1159	449	135	2960
Vehicles Exited	840	78	280	1152	448	135	2933
Hourly Exit Rate	672	62	224	922	358	108	2346
Input Volume	727	69	289	1127	433	135	2779
% of Volume	92	90	78	82	83	80	84
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	1.3	0.4	6.8	1.8	0.1	1.2	11.5
Delay / Veh (s)	174.6	13.1	17.3	6.5	39.6	3.3	10.9
Vehicles Entered	26	102	1413	966	5	1294	3806
Vehicles Exited	27	101	1412	967	6	1282	3795
Hourly Exit Rate	22	81	1130	774	5	1026	3036
Input Volume	20	80	1397	942	5	1160	3604
% of Volume	107	101	81	82	96	88	84
Denied Entry Before	0	0	1	1	0	0	2
Denied Entry After	0	0	4	2	0	0	6

231: US-26 EB Helvetia On-ramp & Performance by movement

Movement	EBT	All
Total Delay (hr)	25.6	25.6
Delay / Veh (s)	93.9	93.9
Vehicles Entered	984	984
Vehicles Exited	980	980
Hourly Exit Rate	784	784
Input Volume	958	958
% of Volume	82	82
Denied Entry Before	0	0
Denied Entry After	0	0

240: Meek Rd & Brookwood Pkwy Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	23.3	77.0	5.1	82.0	0.3	0.0	187.8
Delay / Veh (s)	277	133.8	158.8	124.8	0.9	0.4	175.1
Vehicles Entered	1	2	116	2365	1328	51	3863
Vehicles Exited	0	1	115	2364	1328	51	3859
Hourly Exit Rate	0	1	92	1891	1062	41	3087
Input Volume	25	74	110	2300	1192	45	3746
% of Volume	0	1	84	82	89	91	82
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	26	92	0	0	0	0	118

Total Network Performance

Total Delay (hr)	797.0
Delay / Veh (s)	659.8
Vehicles Entered	4509
Vehicles Exited	4191
Hourly Exit Rate	3353
Input Volume	29629
% of Volume	11
Denied Entry Before	3
Denied Entry After	573

Intersection: 200: Schaaf Rd & Helvetia Rd

Movement	WB
Directions Served	LR
Maximum Queue (ft)	38
Average Queue (ft)	17
95th Queue (ft)	40
Link Distance (ft)	1714
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 210: Groveland Dr & Helvetia Rd

Movement	WB	NB	SB
Directions Served	LR	LTR	LTR
Maximum Queue (ft)	1716	31	212
Average Queue (ft)	1503	1	26
95th Queue (ft)	2095	13	110
Link Distance (ft)	1693	218	1385
Upstream Blk Time (%)	59		
Queuing Penalty (veh)	0		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 220: US-26 WB Helvetia On-ramp & Helvetia Rd

Movement	WB	WB	WB	B221	NB	NB	SB	SB
Directions Served	L	LT	R	T	L	T	T	TR
Maximum Queue (ft)	680	680	50	3147	325	632	168	166
Average Queue (ft)	583	593	38	1205	201	612	77	87
95th Queue (ft)	819	825	59	3129	359	691	132	141
Link Distance (ft)	604	604		8100		606	218	218
Upstream Blk Time (%)	23	28				16		0
Queuing Penalty (veh)	0	0				223		0
Storage Bay Dist (ft)			25		150			
Storage Blk Time (%)		75	25		7	32		
Queuing Penalty (veh)		52	90		82	92		

Intersection: 230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy

Movement	EB	EB	NB	NB	SB	SB	SB
Directions Served	LT	R	T	R	L	T	T
Maximum Queue (ft)	133	63	187	135	26	61	62
Average Queue (ft)	41	30	180	5	4	3	5
95th Queue (ft)	100	54	189	59	18	23	30
Link Distance (ft)	1138		168	168		606	606
Upstream Blk Time (%)			20	0			
Queuing Penalty (veh)			237	1			
Storage Bay Dist (ft)		300			175		
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 231: US-26 EB Helvetia On-ramp &

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	603	621
Average Queue (ft)	335	355
95th Queue (ft)	606	626
Link Distance (ft)	991	991
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 240: Meek Rd & Brookwood Pkwy

Movement	EB	NB	NB	NB	B250	B250	B260	B260	B270	B270	SB	SB
Directions Served	LR	L	T	TR	T	T	T	T	T	T	LT	TR
Maximum Queue (ft)	614	200	1989	1993	1213	1211	1105	1111	1372	1369	6	34
Average Queue (ft)	603	72	1971	1957	1125	1115	924	921	1056	1052	0	2
95th Queue (ft)	620	180	2097	2148	1536	1549	1552	1549	1966	1968	4	15
Link Distance (ft)	603		1910	1910	1134	1134	1030	1030	1348	1348	168	168
Upstream Blk Time (%)	98		32	25	30	26	28	27	26	27		
Queuing Penalty (veh)	0		0	0	0	0	0	0	0	0		
Storage Bay Dist (ft)		100										
Storage Blk Time (%)		0	25									
Queuing Penalty (veh)		3	28									

Network Summary

Network wide Queuing Penalty: 808

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2035
Description:	Eastbound Off-ramp to Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2660	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	435	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2660	435		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	700	114		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2856	467	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2856 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2856	4600	No
$v_{FO} = v_F - v_R$	2389	4600	No
v_R	467	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 $v_{12}/2$	No	
If yes, v_{12A} = 2856		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2856	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 15.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.470	
Space mean speed in ramp influence area,	S_R = 51.5	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.5	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2035
Description:	Eastbound Off-ramp to Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2660	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	435	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2660	435		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	700	114		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2856	467	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2856 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2856	4600	No
$v_{FO} = v_F - v_R$	2389	4600	No
v_R	467	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 2856 (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2856	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\ v_R - 0.009\ L_D$ = 15.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.470	
Space mean speed in ramp influence area,	S_R = 51.5	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.5	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2035
Description:	Westbound Off-ramp to Brookwood - No-Build

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3925	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	1890	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3925	1890		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1033	497		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	4214	2029	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 4214 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4214	4600	No
$v_{FO} = v_F - v_R$	2185	4600	No
v_R	2029	2000	Yes
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 $v_{12}/2$	No	

If yes, v_{12A} = 4214 (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4214	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 27.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	D_S = 0.611	
Space mean speed in ramp influence area,	S_R = 49.0	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 49.0	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	AM Peak Period
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2035
Description:	Westbound On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2035	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	90	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2035	90		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	536	24		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2185	97	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 2185 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2282	4600	No
v_3 or v_{av34}	0 pc/h	(Equation 25-4 or 25-5)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 2185		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2185	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_{R} + 0.0078\ v_{12} - 0.00627\ L_A$ = 20.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.331	
Space mean speed in ramp influence area,	S_R = 54.1	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 54.1	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2035
Description:	Eastbound - Off-ramp to Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2975	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	130	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2975	130		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	783	34		v
Trucks and buses	1	1		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.995	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3147	138	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3147 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3147	4600	No
$v_{FO} = v_F - v_R$	3009	4600	No
v_R	138	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 3147		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3147	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 17.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.440	
Space mean speed in ramp influence area,	S_R = 52.1	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 52.1	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	PM Peak Period
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2035
Description: Eastbound	On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2845	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	800	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2845	800		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	749	211		v
Trucks and buses	1	1		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.995	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3010	846	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 3010 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3856	4600	No

v_3 or v_{av34} 0 pc/h (Equation 25-4 or 25-5)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3010 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3010	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_{R} + 0.0078 v_{12} - 0.00627 L_A$ = 32.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, M_S = 0.477

Space mean speed in ramp influence area, S_R = 51.4 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 51.4 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2035
Description:	Westbound Off-ramp to Brookwood - No-build

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3700	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	845	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3700	845		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	974	222		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3914	903	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3914 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3914	4600	No
$v_{FO} = v_F - v_R$	3011	4600	No
v_R	903	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 3914		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3914	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 24.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	D_S = 0.509	
Space mean speed in ramp influence area,	S_R = 50.8	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 50.8	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	PM Peak Period
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2035
Description:	Westbound On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2855	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	425	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2855	425		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	751	112		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3020	454	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 3020 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3474	4600	No

$v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 3020 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3020	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ = 29.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, M_S = 0.418

Space mean speed in ramp influence area, S_R = 52.5 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 52.5 mph

Year 2015 Phase 1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	5	5	175	10	5	365
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	6	194	11	6	406
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	617	200			206	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	617	200			206	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	99			100	
cM capacity (veh/h)	453	843			1372	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	11	206	411
Volume Left	6	0	6
Volume Right	6	11	0
cSH	590	1700	1372
Volume to Capacity	0.02	0.12	0.00
Queue Length 95th (ft)	1	0	0
Control Delay (s)	11.2	0.0	0.1
Lane LOS	B		A
Approach Delay (s)	11.2	0.0	0.1
Approach LOS	B		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	33.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	135	5	180	240	10	360
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	150	6	200	267	11	400
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			937			
pX, platoon unblocked						
vC, conflicting volume	622	200			467	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	622	200			467	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	66	99			99	
cM capacity (veh/h)	447	843			1100	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	156	200	267	411
Volume Left	150	0	0	11
Volume Right	6	0	267	0
cSH	455	1700	1700	1100
Volume to Capacity	0.34	0.12	0.16	0.01
Queue Length 95th (ft)	37	0	0	1
Control Delay (s)	17.0	0.0	0.0	0.3
Lane LOS	C			A
Approach Delay (s)	17.0	0.0		0.3
Approach LOS	C			

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	41.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Lane Configurations									
Volume (vph)	0	1335	35	420	470	0	25	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.0	2.0	2.0	3.0				
Lane Util. Factor		*1.00	1.00	0.95	0.95				
Frt		0.85	1.00	1.00	0.99				
Flt Protected		1.00	0.95	1.00	1.00				
Satd. Flow (prot)		2917	1309	3260	3267				
Flt Permitted		1.00	0.95	1.00	1.00				
Satd. Flow (perm)		2917	1309	3260	3267				
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	1362	36	429	480	0	26	0	0
RTOR Reduction (vph)	0	73	0	0	5	0	0	0	0
Lane Group Flow (vph)	0	1289	36	429	501	0	0	0	0
Heavy Vehicles (%)	2%	2%	27%	2%	1%	2%	1%	0%	0%
Turn Type		custom	Prot						
Protected Phases		8	3	3 6	2				
Permitted Phases									
Actuated Green, G (s)		60.8	61.8	90.0	19.2				
Effective Green, g (s)		62.8	63.8	87.0	21.2				
Actuated g/C Ratio		0.70	0.71	0.97	0.24				
Clearance Time (s)		5.0	4.0		5.0				
Vehicle Extension (s)		5.2	2.3		5.2				
Lane Grp Cap (vph)		2035	928	3151	770				
v/s Ratio Prot		c0.44	0.03	0.13	c0.15				
v/s Ratio Perm									
v/c Ratio		0.63	0.04	0.14	0.65				
Uniform Delay, d1		7.4	3.9	0.1	31.1				
Progression Factor		1.00	0.70	1.00	1.00				
Incremental Delay, d2		1.5	0.0	0.0	2.8				
Delay (s)		8.9	2.8	0.1	33.8				
Level of Service		A	A	A	C				
Approach Delay (s)	8.9			0.3	33.8			0.0	
Approach LOS	A			A	C			A	

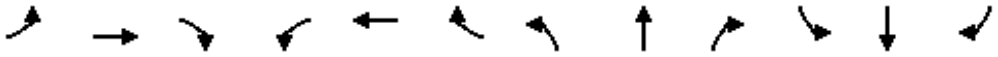
Intersection Summary			
HCM Average Control Delay	12.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	72.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Volume (veh/h)	410	0	0	1805	0	45
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	418	0	0	1842	0	46
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	706			298		
pX, platoon unblocked					0.87	
vC, conflicting volume			418		1339	209
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			418		1092	209
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	94
cM capacity (veh/h)			1152		185	803

Direction, Lane #	NB 1	NB 2	SB 1	SB 2	NW 1
Volume Total	209	209	921	921	46
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	46
cSH	1700	1700	1700	1700	803
Volume to Capacity	0.12	0.12	0.54	0.54	0.06
Queue Length 95th (ft)	0	0	0	0	5
Control Delay (s)	0.0	0.0	0.0	0.0	9.8
Lane LOS					A
Approach Delay (s)	0.0		0.0		9.8
Approach LOS					A

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	68.2%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	65	0	190	0	0	0	0	345	470	40	1765	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.0	3.0					3.0	3.0	2.0	3.0	
Lane Util. Factor		0.95	0.95					0.95	1.00	1.00	0.95	
Frt		0.92	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.98	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1413	1262					3137	1430	1662	3260	
Flt Permitted		0.98	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1413	1262					3137	1430	1662	3260	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	66	0	194	0	0	0	0	352	480	41	1801	0
RTOR Reduction (vph)	0	28	28	0	0	0	0	0	140	0	0	0
Lane Group Flow (vph)	0	106	98	0	0	0	0	352	340	41	1801	0
Heavy Vehicles (%)	0%	0%	12%	0%	0%	0%	0%	6%	4%	0%	2%	0%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		8						6		5	2	
Permitted Phases	8		8						6			
Actuated Green, G (s)		10.4	10.4					61.8	61.8	3.8	69.6	
Effective Green, g (s)		12.4	12.4					63.8	63.8	5.8	71.6	
Actuated g/C Ratio		0.14	0.14					0.71	0.71	0.06	0.80	
Clearance Time (s)		5.0	5.0					5.0	5.0	4.0	5.0	
Vehicle Extension (s)		2.3	2.3					4.7	4.7	2.3	4.7	
Lane Grp Cap (vph)		195	174					2224	1014	107	2594	
v/s Ratio Prot								0.11		0.02	c0.55	
v/s Ratio Perm		0.08	c0.08						0.24			
v/c Ratio		0.55	0.57					0.16	0.34	0.38	0.69	
Uniform Delay, d1		36.2	36.3					4.3	5.0	40.4	4.2	
Progression Factor		1.00	1.00					1.00	1.00	1.08	0.67	
Incremental Delay, d2		2.1	3.0					0.2	0.9	1.0	1.2	
Delay (s)		38.3	39.3					4.4	5.9	44.8	4.0	
Level of Service		D	D					A	A	D	A	
Approach Delay (s)		38.8			0.0			5.3			5.0	
Approach LOS		D			A			A			A	

Intersection Summary			
HCM Average Control Delay	8.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	68.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	510	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3471					
Flt Permitted	1.00					
Satd. Flow (perm)	3471					
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	554	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	554	0	0	0	0	0
Heavy Vehicles (%)	4%	0%	0%	0%	0%	0%
Turn Type						
Protected Phases	2					
Permitted Phases						
Actuated Green, G (s)	2.2					
Effective Green, g (s)	2.2					
Actuated g/C Ratio	0.18					
Clearance Time (s)	2.0					
Vehicle Extension (s)	3.0					
Lane Grp Cap (vph)	636					
v/s Ratio Prot	c0.16					
v/s Ratio Perm						
v/c Ratio	0.87					
Uniform Delay, d1	4.8					
Progression Factor	1.00					
Incremental Delay, d2	12.5					
Delay (s)	17.2					
Level of Service	B					
Approach Delay (s)	17.2			0.0	0.0	
Approach LOS	B			A	A	

Intersection Summary			
HCM Average Control Delay	17.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	12.0	Sum of lost time (s)	9.8
Intersection Capacity Utilization	17.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	20	0	25	0	0	0	10	795	0	0	1950	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	20	0	26	0	0	0	10	811	0	0	1990	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											189	
pX, platoon unblocked	0.73	0.73	0.73	0.73	0.73		0.73					
vC, conflicting volume	2283	2824	997	1852	2827	270	1995			811		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2023	2760	271	1436	2764	270	1630			811		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	18	100	95	100	100	100	97			100		
cM capacity (veh/h)	25	14	538	65	14	734	296			824		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2
Volume Total	46	0	10	324	324	162	995	1000
Volume Left	20	0	10	0	0	0	0	0
Volume Right	26	0	0	0	0	0	0	5
cSH	53	1700	296	1700	1700	1700	824	1700
Volume to Capacity	0.87	0.00	0.03	0.19	0.19	0.10	0.00	0.59
Queue Length 95th (ft)	94	0	3	0	0	0	0	0
Control Delay (s)	209.6	0.0	17.6	0.0	0.0	0.0	0.0	0.0
Lane LOS	F	A	C					
Approach Delay (s)	209.6	0.0	0.2				0.0	
Approach LOS	F	A						

Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	64.1%	ICU Level of Service	C	
Analysis Period (min)	15			

6: Exit Ramp #1 & Performance by movement

Movement	WBT	All
Total Delay (hr)	1.9	1.9
Delay / Veh (s)	5.1	5.1
Vehicles Entered	1324	1324
Vehicles Exited	1324	1324
Hourly Exit Rate	1324	1324
Input Volume	1335	1335
% of Volume	99	99
Denied Entry Before	0	0
Denied Entry After	0	0

200: Schaff Rd & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Delay / Veh (s)	7.1	2.3	0.6	0.1	1.8	0.5	0.6
Vehicles Entered	4	5	179	11	4	375	578
Vehicles Exited	4	5	179	11	4	376	579
Hourly Exit Rate	4	5	179	11	4	376	579
Input Volume	5	5	176	10	5	365	566
% of Volume	76	95	102	107	76	103	102
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

210: Jacobson Rd & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.4	0.0	0.2	0.3	0.0	0.1	0.9
Delay / Veh (s)	10.3	5.2	2.9	4.5	3.2	0.8	3.5
Vehicles Entered	130	6	193	240	12	370	951
Vehicles Exited	130	5	194	239	12	370	950
Hourly Exit Rate	130	5	194	239	12	370	950
Input Volume	135	5	190	240	10	361	941
% of Volume	96	95	102	100	117	102	101
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

215: Loop Ramp #1 & Helvetia Rd Performance by movement

Movement	EBT	EBR	NBL	NBT	SBT	SBR2	All
Total Delay (hr)	0.0	3.1	0.2	1.5	2.7	0.1	7.6
Delay / Veh (s)	0.4	8.5	26.6	12.6	20.0	13.8	11.9
Vehicles Entered	23	1329	30	427	490	20	2319
Vehicles Exited	23	1329	30	428	491	21	2322
Hourly Exit Rate	23	1329	30	428	491	21	2322
Input Volume	22	1335	35	427	481	25	2326
% of Volume	103	100	85	100	102	83	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

220: Helvetia Rd/Brookwood Pkwy #1 & WB-NB Helvetia Performance by movement

Movement	NBT	SBT	NWT	NWR	All
Total Delay (hr)	0.2	0.7	0.0	0.1	0.9
Delay / Veh (s)	1.7	1.4	1.0	4.5	1.5
Vehicles Entered	406	1824	3	48	2281
Vehicles Exited	406	1825	3	49	2283
Hourly Exit Rate	406	1825	3	49	2283
Input Volume	414	1819	2	45	2280
% of Volume	98	100	200	108	100
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

224: Exit Ramp #1 & WB-NB Helvetia Performance by movement

Movement	WBT	WBR	All
Total Delay (hr)	1.6	0.1	1.7
Delay / Veh (s)	4.4	5.0	4.4
Vehicles Entered	1327	48	1375
Vehicles Exited	1324	48	1372
Hourly Exit Rate	1324	48	1372
Input Volume	1335	45	1380
% of Volume	99	106	99
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy #1 Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	1.8	2.4	0.3	0.3	0.7	3.1	8.7
Delay / Veh (s)	107.2	44.5	3.1	2.5	62.9	6.3	10.8
Vehicles Entered	62	197	341	469	40	1790	2899
Vehicles Exited	62	196	342	469	41	1791	2901
Hourly Exit Rate	62	196	342	469	41	1791	2901
Input Volume	65	190	346	470	40	1782	2894
% of Volume	95	103	99	100	102	100	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

231: US-26 EB Helvetia On-ramp & Performance by movement

Movement	EBT	All
Total Delay (hr)	2.1	2.1
Delay / Veh (s)	14.7	14.7
Vehicles Entered	519	519
Vehicles Exited	519	519
Hourly Exit Rate	519	519
Input Volume	520	520
% of Volume	100	100
Denied Entry Before	0	0
Denied Entry After	0	0

240: Meek Rd & Brookwood Pkwy Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	0.7	0.4	0.1	0.9	0.8	0.0	2.8
Delay / Veh (s)	142.2	61.7	29.5	3.9	1.4	3.0	3.6
Vehicles Entered	18	24	10	793	1984	6	2835
Vehicles Exited	18	24	10	792	1984	6	2834
Hourly Exit Rate	18	24	10	792	1984	6	2834
Input Volume	20	25	10	795	1969	5	2825
% of Volume	90	95	100	100	101	120	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

Total Network Performance

Total Delay (hr)	36.9
Delay / Veh (s)	42.4
Vehicles Entered	3127
Vehicles Exited	3128
Hourly Exit Rate	3128
Input Volume	29911
% of Volume	10
Denied Entry Before	0
Denied Entry After	0

Intersection: 6: Exit Ramp #1 &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 200: Schaff Rd & Helvetia Rd

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	37	13
Average Queue (ft)	7	1
95th Queue (ft)	28	10
Link Distance (ft)	549	349
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 210: Jacobson Rd & Helvetia Rd

Movement	WB	NB	SB
Directions Served	LR	R	LT
Maximum Queue (ft)	106	5	110
Average Queue (ft)	53	0	7
95th Queue (ft)	93	4	44
Link Distance (ft)	396	883	410
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 215: Loop Ramp #1 & Helvetia Rd

Movement	EB	EB	NB	NB	NB	SB	SB
Directions Served	R	R	L	T	T	T	T>
Maximum Queue (ft)	222	238	104	183	189	179	186
Average Queue (ft)	136	157	31	79	69	89	104
95th Queue (ft)	202	228	79	150	144	142	161
Link Distance (ft)	926	926		243	243	883	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)			200				415
Storage Blk Time (%)				0			
Queuing Penalty (veh)				0			

Intersection: 220: Helvetia Rd/Brookwood Pkwy #1 & WB-NB Helvetia

Movement	NW
Directions Served	R
Maximum Queue (ft)	45
Average Queue (ft)	26
95th Queue (ft)	47
Link Distance (ft)	1359
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 224: Exit Ramp #1 & WB-NB Helvetia

Movement	WB	WB
Directions Served	T	TR
Maximum Queue (ft)	109	161
Average Queue (ft)	6	11
95th Queue (ft)	53	78
Link Distance (ft)	1944	1944
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy #1

Movement	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	LR	R	T	T	R	L	T	T
Maximum Queue (ft)	242	228	99	99	96	99	265	319
Average Queue (ft)	136	120	27	25	9	39	96	135
95th Queue (ft)	226	204	73	71	64	86	220	284
Link Distance (ft)	1144		133	133	133		638	638
Upstream Blk Time (%)			0	0	0			
Queuing Penalty (veh)			0	0	0			
Storage Bay Dist (ft)		300				175		
Storage Blk Time (%)	0	0					1	
Queuing Penalty (veh)	0	0					0	

Intersection: 231: US-26 EB Helvetia On-ramp &

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	93	118
Average Queue (ft)	42	62
95th Queue (ft)	79	95
Link Distance (ft)	960	960
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 240: Meek Rd & Brookwood Pkwy

Movement	EB	NB	NB	SB
Directions Served	LR	L	TR	TR
Maximum Queue (ft)	134	41	13	7
Average Queue (ft)	53	10	1	0
95th Queue (ft)	122	34	7	5
Link Distance (ft)	603			133
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		100	200	
Storage Blk Time (%)		0		
Queuing Penalty (veh)		0		

Network Summary

Network wide Queuing Penalty: 1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	5	0	480	5	0	150
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	5	0	516	5	0	161
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	680	519			522	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	680	519			522	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	420	561			1055	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	5	522	161
Volume Left	5	0	0
Volume Right	0	5	0
cSH	420	1700	1055
Volume to Capacity	0.01	0.31	0.00
Queue Length 95th (ft)	1	0	0
Control Delay (s)	13.7	0.0	0.0
Lane LOS	B		
Approach Delay (s)	13.7	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	35.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	195	5	480	470	5	150
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	217	6	533	522	6	167
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			937			
pX, platoon unblocked						
vC, conflicting volume	711	533			1056	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	711	533			1056	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	46	99			99	
cM capacity (veh/h)	398	550			667	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	222	533	522	172
Volume Left	217	0	0	6
Volume Right	6	0	522	0
cSH	400	1700	1700	667
Volume to Capacity	0.56	0.31	0.31	0.01
Queue Length 95th (ft)	82	0	0	1
Control Delay (s)	24.6	0.0	0.0	0.4
Lane LOS	C			A
Approach Delay (s)	24.6	0.0		0.4
Approach LOS	C			

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	43.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Lane Configurations									
Volume (vph)	0	640	205	950	260	0	85	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.0	2.0	2.0	3.0				
Lane Util. Factor		*1.00	1.00	0.95	0.95				
Frt		0.85	1.00	1.00	0.96				
Flt Protected		1.00	0.95	1.00	1.00				
Satd. Flow (prot)		2975	1646	3292	3203				
Flt Permitted		1.00	0.95	1.00	1.00				
Satd. Flow (perm)		2975	1646	3292	3203				
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	688	220	1022	280	0	91	0	0
RTOR Reduction (vph)	0	329	0	0	57	0	0	0	0
Lane Group Flow (vph)	0	359	220	1022	314	0	0	0	0
Heavy Vehicles (%)	0%	0%	1%	1%	0%	0%	0%	0%	0%
Turn Type		custom	Prot						
Protected Phases		8	3	3 6	2				
Permitted Phases									
Actuated Green, G (s)		26.7	27.7	55.0	18.3				
Effective Green, g (s)		28.7	29.7	52.0	20.3				
Actuated g/C Ratio		0.52	0.54	0.95	0.37				
Clearance Time (s)		5.0	4.0		5.0				
Vehicle Extension (s)		5.2	2.3		5.2				
Lane Grp Cap (vph)		1552	889	3112	1182				
v/s Ratio Prot		0.12	0.13	c0.31	0.10				
v/s Ratio Perm									
v/c Ratio		0.23	0.25	0.33	0.27				
Uniform Delay, d1		7.2	6.7	0.1	12.1				
Progression Factor		1.00	0.93	1.00	1.00				
Incremental Delay, d2		0.3	0.1	0.0	0.3				
Delay (s)		7.5	6.4	0.2	12.4				
Level of Service		A	A	A	B				
Approach Delay (s)	7.5			1.3	12.4			0.0	
Approach LOS	A			A	B			A	

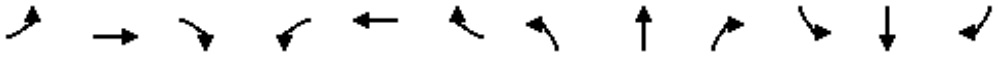
Intersection Summary			
HCM Average Control Delay	4.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	2.0
Intersection Capacity Utilization	41.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Volume (veh/h)	1100	0	0	900	0	55
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	1183	0	0	968	0	59
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	706			298		
pX, platoon unblocked			0.91		0.92	0.91
vC, conflicting volume			1183		1667	591
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1002		1437	352
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	90
cM capacity (veh/h)			636		116	591

Direction, Lane #	NB 1	NB 2	SB 1	SB 2	NW 1
Volume Total	591	591	484	484	59
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	59
cSH	1700	1700	1700	1700	591
Volume to Capacity	0.35	0.35	0.28	0.28	0.10
Queue Length 95th (ft)	0	0	0	0	8
Control Delay (s)	0.0	0.0	0.0	0.0	11.8
Lane LOS					B
Approach Delay (s)	0.0		0.0		11.8
Approach LOS					B

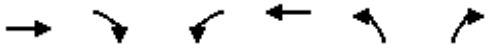
Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	71.9%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	0	65	0	0	0	0	1050	805	10	890	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.0	3.0					3.0	3.0	2.0	3.0	
Lane Util. Factor		0.95	0.95					0.95	1.00	1.00	0.95	
Frt		0.97	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.96	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1555	1413					3292	1473	1662	3325	
Flt Permitted		0.96	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1555	1413					3292	1473	1662	3325	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	52	0	68	0	0	0	0	1094	839	10	927	0
RTOR Reduction (vph)	0	8	52	0	0	0	0	0	162	0	0	0
Lane Group Flow (vph)	0	55	5	0	0	0	0	1094	677	10	927	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		8						6		5	2	
Permitted Phases	8		8						6			
Actuated Green, G (s)		8.5	8.5					86.7	86.7	0.8	91.5	
Effective Green, g (s)		10.5	10.5					88.7	88.7	2.8	93.5	
Actuated g/C Ratio		0.10	0.10					0.81	0.81	0.03	0.85	
Clearance Time (s)		5.0	5.0					5.0	5.0	4.0	5.0	
Vehicle Extension (s)		2.3	2.3					4.7	4.7	2.3	4.7	
Lane Grp Cap (vph)		148	135					2655	1188	42	2826	
v/s Ratio Prot								0.33		0.01	c0.28	
v/s Ratio Perm		0.04	0.00						c0.46			
v/c Ratio		0.37	0.04					0.41	0.57	0.24	0.33	
Uniform Delay, d1		46.7	45.2					3.1	3.8	52.6	1.7	
Progression Factor		1.00	1.00					1.00	1.00	1.01	0.77	
Incremental Delay, d2		0.9	0.1					0.5	2.0	1.6	0.3	
Delay (s)		47.6	45.2					3.6	5.8	54.9	1.6	
Level of Service		D	D					A	A	D	A	
Approach Delay (s)		46.5			0.0			4.5			2.2	
Approach LOS		D			A			A			A	

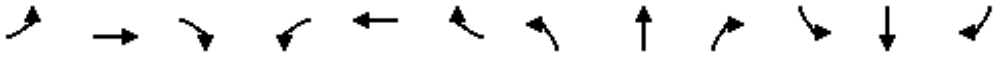
Intersection Summary			
HCM Average Control Delay	5.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	71.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	815	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3471					
Flt Permitted	1.00					
Satd. Flow (perm)	3471					
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	886	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	886	0	0	0	0	0
Heavy Vehicles (%)	4%	0%	0%	0%	0%	0%
Turn Type						
Protected Phases	4					
Permitted Phases						
Actuated Green, G (s)	2.5					
Effective Green, g (s)	2.5					
Actuated g/C Ratio	0.14					
Clearance Time (s)	4.5					
Lane Grp Cap (vph)	482					
v/s Ratio Prot	c0.26					
v/s Ratio Perm						
v/c Ratio	1.84					
Uniform Delay, d1	7.8					
Progression Factor	1.00					
Incremental Delay, d2	385.2					
Delay (s)	392.9					
Level of Service	F					
Approach Delay (s)	392.9			0.0	0.0	
Approach LOS	F			A	A	

Intersection Summary			
HCM Average Control Delay	392.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.84		
Actuated Cycle Length (s)	18.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	26.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	0	20	0	0	0	40	1850	0	0	935	20
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	5	0	21	0	0	0	43	1968	0	0	995	21
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											189	
pX, platoon unblocked	0.94	0.94	0.94	0.94	0.94		0.94					
vC, conflicting volume	1746	3059	508	2572	3069	656	1016			1968		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1671	3062	358	2546	3073	656	897			1968		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	91	100	96	100	100	100	94			100		
cM capacity (veh/h)	58	11	608	12	11	413	722			299		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2
Volume Total	27	0	43	787	787	394	497	519
Volume Left	5	0	43	0	0	0	0	0
Volume Right	21	0	0	0	0	0	0	21
cSH	209	1700	722	1700	1700	1700	299	1700
Volume to Capacity	0.13	0.00	0.06	0.46	0.46	0.23	0.00	0.31
Queue Length 95th (ft)	11	0	5	0	0	0	0	0
Control Delay (s)	24.7	0.0	10.3	0.0	0.0	0.0	0.0	0.0
Lane LOS	C	A	B					
Approach Delay (s)	24.7	0.0	0.2				0.0	
Approach LOS	C	A						

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	45.7%	ICU Level of Service		A
Analysis Period (min)	15			

200: Schaff Rd & Helvetia Rd Performance by movement

Movement	WBL	NBT	NBR	SBT	All
Total Delay (hr)	0.0	0.1	0.0	0.0	0.1
Delay / Veh (s)	6.6	0.6	0.1	0.2	0.6
Vehicles Entered	4	480	5	140	629
Vehicles Exited	5	480	5	140	630
Hourly Exit Rate	5	480	5	140	630
Input Volume	5	484	5	150	644
% of Volume	100	99	100	93	98
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

210: Jacobson Rd & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.8	0.0	0.3	0.8	0.0	0.0	2.0
Delay / Veh (s)	14.6	12.2	2.6	5.8	10.2	0.8	5.4
Vehicles Entered	199	5	484	467	5	142	1302
Vehicles Exited	198	5	484	467	5	141	1300
Hourly Exit Rate	198	5	484	467	5	141	1300
Input Volume	195	5	489	470	5	151	1316
% of Volume	101	95	99	99	95	93	99
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

215: Loop Ramp #1 & Helvetia Rd Performance by movement

Movement	EBT	EBR	NBL	NBT	SBT	SBR2	All
Total Delay (hr)	0.0	0.7	1.0	1.9	1.1	0.2	4.8
Delay / Veh (s)	0.1	3.8	18.5	7.1	14.8	8.9	8.2
Vehicles Entered	12	645	197	940	266	77	2137
Vehicles Exited	12	644	197	940	266	77	2136
Hourly Exit Rate	12	644	197	940	266	77	2136
Input Volume	12	640	205	950	264	85	2157
% of Volume	96	101	96	99	101	91	99
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

220: Helvetia Rd/Brookwood Pkwy #1 & WB-NB Helvetia Performance by movement

Movement	NBT	SBT	NWT	NWR	All
Total Delay (hr)	0.7	0.3	0.0	0.2	1.2
Delay / Veh (s)	2.4	1.2	0.0	10.6	2.1
Vehicles Entered	1089	906	2	54	2051
Vehicles Exited	1091	904	2	54	2051
Hourly Exit Rate	1091	904	2	54	2051
Input Volume	1110	900	1	55	2066
% of Volume	98	100	200	98	99
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

224: Exit Ramp #1 & WB-NB Helvetia Performance by movement

Movement	WBT	WBR	All
Total Delay (hr)	0.3	0.0	0.3
Delay / Veh (s)	1.6	1.5	1.6
Vehicles Entered	644	55	699
Vehicles Exited	645	55	700
Hourly Exit Rate	645	55	700
Input Volume	640	55	694
% of Volume	101	100	101
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy #1 Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.8	0.2	0.6	1.0	0.1	0.5	3.3
Delay / Veh (s)	56.4	8.9	2.1	4.6	48.4	2.0	4.1
Vehicles Entered	52	64	1040	819	10	902	2887
Vehicles Exited	52	65	1037	819	10	901	2884
Hourly Exit Rate	52	65	1037	819	10	901	2884
Input Volume	50	65	1060	805	10	898	2888
% of Volume	105	100	98	102	100	100	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

231: US-26 EB Helvetia On-ramp & Performance by movement

Movement	EBT	All
Total Delay (hr)	44.8	44.8
Delay / Veh (s)	196.5	196.5
Vehicles Entered	843	843
Vehicles Exited	800	800
Hourly Exit Rate	800	800
Input Volume	842	842
% of Volume	95	95
Denied Entry Before	0	0
Denied Entry After	14	14

240: Meek Rd & Brookwood Pkwy Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	0.1	0.1	0.1	4.4	0.2	0.0	4.9
Delay / Veh (s)	75.1	13.7	6.7	8.5	0.7	0.4	6.1
Vehicles Entered	6	21	42	1849	944	23	2885
Vehicles Exited	6	21	43	1843	944	23	2880
Hourly Exit Rate	6	21	43	1843	944	23	2880
Input Volume	5	20	40	1850	940	20	2876
% of Volume	120	104	108	100	100	114	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

Total Network Performance

Total Delay (hr)	70.5
Delay / Veh (s)	80.9
Vehicles Entered	3162
Vehicles Exited	3115
Hourly Exit Rate	3115
Input Volume	27788
% of Volume	11
Denied Entry Before	0
Denied Entry After	14

Intersection: 200: Schaff Rd & Helvetia Rd

Movement	WB
Directions Served	LR
Maximum Queue (ft)	35
Average Queue (ft)	4
95th Queue (ft)	22
Link Distance (ft)	549
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 210: Jacobson Rd & Helvetia Rd

Movement	WB	NB	SB
Directions Served	LR	R	LT
Maximum Queue (ft)	175	16	48
Average Queue (ft)	79	1	5
95th Queue (ft)	146	10	31
Link Distance (ft)	396	883	410
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 215: Loop Ramp #1 & Helvetia Rd

Movement	EB	EB	NB	NB	NB	SB	SB
Directions Served	R	R	L	T	T	T	T>
Maximum Queue (ft)	94	97	217	310	298	102	120
Average Queue (ft)	50	55	103	109	92	51	66
95th Queue (ft)	79	85	192	269	235	90	105
Link Distance (ft)	926	926		243	243	883	
Upstream Blk Time (%)			0	1	0		
Queuing Penalty (veh)			0	5	3		
Storage Bay Dist (ft)			200				415
Storage Blk Time (%)			1	2			
Queuing Penalty (veh)			3	4			

Intersection: 220: Helvetia Rd/Brookwood Pkwy #1 & WB-NB Helvetia

Movement	NB	NB	NW
Directions Served	T	T	R
Maximum Queue (ft)	60	19	66
Average Queue (ft)	2	1	31
95th Queue (ft)	24	15	55
Link Distance (ft)	638	638	1445
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 224: Exit Ramp #1 & WB-NB Helvetia

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy #1

Movement	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	LR	R	T	T	R	L	T	T
Maximum Queue (ft)	125	61	138	126	173	51	81	109
Average Queue (ft)	59	30	49	38	46	10	19	39
95th Queue (ft)	107	56	124	99	173	36	58	91
Link Distance (ft)	1144		133	133	133		638	638
Upstream Blk Time (%)			1	0	5			
Queuing Penalty (veh)			3	1	33			
Storage Bay Dist (ft)		300				175		
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 231: US-26 EB Helvetia On-ramp &

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	873	1033
Average Queue (ft)	613	668
95th Queue (ft)	1012	1148
Link Distance (ft)	960	960
Upstream Blk Time (%)		12
Queuing Penalty (veh)		50
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 240: Meek Rd & Brookwood Pkwy

Movement	EB	NB	NB	NB	NB	B251	B251	B2	B3	SB
Directions Served	LR	L	T	T	TR	T	T	T	T	TR
Maximum Queue (ft)	78	60	322	397	160	60	106	25	12	16
Average Queue (ft)	24	21	44	82	47	5	10	1	1	1
95th Queue (ft)	62	50	274	391	193	60	102	15	10	7
Link Distance (ft)	603		620	620		1281	1281	1111	1032	133
Upstream Blk Time (%)			0	2						
Queuing Penalty (veh)			0	0						
Storage Bay Dist (ft)		100			200					
Storage Blk Time (%)		0	0		6					
Queuing Penalty (veh)		0	0		36					

Network Summary

Network wide Queuing Penalty: 137

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2015
Description:	Eastbound Off-ramp to Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1990	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	210	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1990	210		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	524	55		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2137	225	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2137 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2137	4600	No
$v_{FO} = v_F - v_R$	1912	4600	No
v_R	225	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 2137		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2137	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 9.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	D_S = 0.448	
Space mean speed in ramp influence area,	S_R = 51.9	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.9	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	AM Peak Period
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2015
Description: Eastbound	On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1775	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	490	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1775	490		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	467	129		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1906	526	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 1906 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2432	4600	No

$v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 1906 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1906	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_{R} + 0.0078\ v_{12} - 0.00627\ L_A$ = 21.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.337

Space mean speed in ramp influence area, S_R = 53.9 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.9 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2015
Description:	Westbound 1-lane Off-ramp to Northbound Helvetia

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2515	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	45	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2515	45		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	662	12		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2700	48	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2700 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2700	4600	No
$v_{FO} = v_F - v_R$	2652	4600	No
v_R	48	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 2700		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2700	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 14.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.432	
Space mean speed in ramp influence area,	S_R = 52.2	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 52.2	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2015
Description:	Westbound 1-lane Off-ramp to Southbound Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2515	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	1335	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2515	1335		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	662	351		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2700	1433	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2700 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2700	4600	No
$v_{FO} = v_F - v_R$	1267	4600	No
v_R	1433	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 $v_{12}/2$	No	
If yes, v_{12A}	= 2700	(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2700	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 14.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.557	
Space mean speed in ramp influence area,	S_R = 50.0	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 50.0	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	AM Peak Period
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2015
Description: Westbound	On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1125	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	60	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1125	60		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	296	16		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1208	64	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 1208 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	1272	4600	No

v_3 or v_{av34} 0 pc/h (Equation 25-4 or 25-5)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 1208 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1208	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_{R} + 0.0078\ v_{12} - 0.00627\ L_A =$ 12.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.306	
Space mean speed in ramp influence area,	S_R = 54.5	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 54.5	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2015
Description:	Eastbound Off-ramp to Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1805	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	130	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1805	130		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	475	34		v
Trucks and buses	1	1		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.995	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1910	138	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1910 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	1910	4600	No
$v_{FO} = v_F - v_R$	1772	4600	No
v_R	138	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 1910		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1910	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 7.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	D_S = 0.440	
Space mean speed in ramp influence area,	S_R = 52.1	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 52.1	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	PM Peak Period
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2015
Description: Eastbound	On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1675	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	800	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1675	800		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	441	211		v
Trucks and buses	1	1		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.995	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1772	846	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1772 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2618	4600	No

$v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 1772 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1772	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 22.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.346	
Space mean speed in ramp influence area,	S_R = 53.8	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 53.8	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2015
Description:	Westbound 1-lane Off-ramp to Northbound Helvetia

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2690	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	60	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2690	60		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	708	16		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2846	64	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2846 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2846	4600	No
$v_{FO} = v_F - v_R$	2782	4600	No
v_R	64	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 2846		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2846	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 15.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.434	
Space mean speed in ramp influence area,	S_R = 52.2	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 52.2	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2015
Description:	Westbound 1-lane Off-ramp to Southbound Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2690	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	645	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2690	645		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	708	170		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2846	689	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2846 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2846	4600	No
$v_{FO} = v_F - v_R$	2157	4600	No
v_R	689	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 2846		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2846	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 15.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.490	
Space mean speed in ramp influence area,	S_R = 51.2	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.2	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	PM Peak Period
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2015
Description:	Westbound On-Ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1945	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	300	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1945	300		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	512	79		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2058	321	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2058 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2379	4600	No

$v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 2058 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2058	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_{R} + 0.0078\, v_{12} - 0.00627\, L_A$ = 21.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.334

Space mean speed in ramp influence area, S_R = 54.0 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 54.0 mph

Year 2025 Phase 1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	20	5	210	45	20	385
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	22	6	233	50	22	428
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	731	258			283	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	731	258			283	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	99			98	
cM capacity (veh/h)	384	783			1285	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	28	283	450
Volume Left	22	0	22
Volume Right	6	50	0
cSH	427	1700	1285
Volume to Capacity	0.06	0.17	0.02
Queue Length 95th (ft)	5	0	1
Control Delay (s)	14.0	0.0	0.6
Lane LOS	B		A
Approach Delay (s)	14.0	0.0	0.6
Approach LOS	B		

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	46.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	165	5	250	265	15	390
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	183	6	278	294	17	433
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			937			
pX, platoon unblocked						
vC, conflicting volume	744	278			572	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	744	278			572	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	51	99			98	
cM capacity (veh/h)	377	763			1006	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	189	278	294	450
Volume Left	183	0	0	17
Volume Right	6	0	294	0
cSH	383	1700	1700	1006
Volume to Capacity	0.49	0.16	0.17	0.02
Queue Length 95th (ft)	66	0	0	1
Control Delay (s)	23.2	0.0	0.0	0.5
Lane LOS	C			A
Approach Delay (s)	23.2	0.0		0.5
Approach LOS	C			

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	48.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Lane Configurations									
Volume (vph)	0	1550	45	515	525	0	30	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.0	2.0	2.0	3.0				
Lane Util. Factor		*1.00	1.00	0.95	0.95				
Frt		0.85	1.00	1.00	0.99				
Flt Protected		1.00	0.95	1.00	1.00				
Satd. Flow (prot)		2917	1309	3260	3265				
Flt Permitted		1.00	0.95	1.00	1.00				
Satd. Flow (perm)		2917	1309	3260	3265				
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	1582	46	526	536	0	31	0	0
RTOR Reduction (vph)	0	155	0	0	8	0	0	0	0
Lane Group Flow (vph)	0	1427	46	526	559	0	0	0	0
Heavy Vehicles (%)	2%	2%	27%	2%	1%	2%	1%	0%	0%
Turn Type		custom	Prot						
Protected Phases		8	3	3 6	2				
Permitted Phases									
Actuated Green, G (s)		33.4	34.4	60.0	16.6				
Effective Green, g (s)		35.4	36.4	57.0	18.6				
Actuated g/C Ratio		0.59	0.61	0.95	0.31				
Clearance Time (s)		5.0	4.0		5.0				
Vehicle Extension (s)		5.2	2.3		5.2				
Lane Grp Cap (vph)		1721	794	3097	1012				
v/s Ratio Prot		c0.49	0.04	0.16	c0.17				
v/s Ratio Perm									
v/c Ratio		0.83	0.06	0.17	0.55				
Uniform Delay, d1		9.9	4.8	0.1	17.2				
Progression Factor		1.00	0.80	1.00	1.00				
Incremental Delay, d2		4.8	0.0	0.0	1.2				
Delay (s)		14.7	3.9	0.1	18.4				
Level of Service		B	A	A	B				
Approach Delay (s)	14.7			0.4	18.4			0.0	
Approach LOS	B			A	B			A	

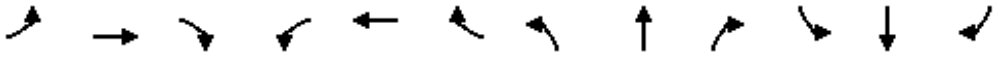
Intersection Summary			
HCM Average Control Delay	12.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Volume (veh/h)	495	0	0	2075	0	65
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	505	0	0	2117	0	66
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	706			298		
pX, platoon unblocked			0.99		0.88	0.99
vC, conflicting volume			505		1564	253
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			482		1313	227
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	91
cM capacity (veh/h)			1081		134	775

Direction, Lane #	NB 1	NB 2	SB 1	SB 2	NW 1
Volume Total	253	253	1059	1059	66
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	66
cSH	1700	1700	1700	1700	775
Volume to Capacity	0.15	0.15	0.62	0.62	0.09
Queue Length 95th (ft)	0	0	0	0	7
Control Delay (s)	0.0	0.0	0.0	0.0	10.1
Lane LOS					B
Approach Delay (s)	0.0		0.0		10.1
Approach LOS					B

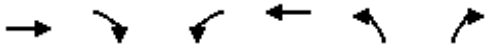
Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	78.2%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	75	0	230	0	0	0	0	420	490	35	2040	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.0	3.0					3.0	3.0	2.0	3.0	
Lane Util. Factor		0.95	0.95					0.95	1.00	1.00	0.95	
Frt		0.92	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.98	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1410	1262					3137	1430	1662	3260	
Flt Permitted		0.98	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1410	1262					3137	1430	1662	3260	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	77	0	235	0	0	0	0	429	500	36	2082	0
RTOR Reduction (vph)	0	22	22	0	0	0	0	0	126	0	0	0
Lane Group Flow (vph)	0	137	131	0	0	0	0	429	374	36	2082	0
Heavy Vehicles (%)	0%	0%	12%	0%	0%	0%	0%	6%	4%	0%	2%	0%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		8						6		5	2	
Permitted Phases	8		8						6			
Actuated Green, G (s)		14.3	14.3					87.7	87.7	4.0	95.7	
Effective Green, g (s)		16.3	16.3					89.7	89.7	6.0	97.7	
Actuated g/C Ratio		0.14	0.14					0.75	0.75	0.05	0.81	
Clearance Time (s)		5.0	5.0					5.0	5.0	4.0	5.0	
Vehicle Extension (s)		2.3	2.3					4.7	4.7	2.3	4.7	
Lane Grp Cap (vph)		192	171					2345	1069	83	2654	
v/s Ratio Prot								0.14		0.02	c0.64	
v/s Ratio Perm		0.10	c0.10						0.26			
v/c Ratio		0.71	0.76					0.18	0.35	0.43	0.78	
Uniform Delay, d1		49.6	50.0					4.4	5.2	55.4	5.7	
Progression Factor		1.00	1.00					1.00	1.00	0.97	0.79	
Incremental Delay, d2		10.5	17.0					0.2	0.9	1.4	1.6	
Delay (s)		60.1	67.0					4.6	6.1	55.2	6.1	
Level of Service		E	E					A	A	E	A	
Approach Delay (s)		63.5			0.0			5.4			6.9	
Approach LOS		E			A			A			A	

Intersection Summary			
HCM Average Control Delay	11.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	78.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	525	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3471					
Flt Permitted	1.00					
Satd. Flow (perm)	3471					
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	571	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	571	0	0	0	0	0
Heavy Vehicles (%)	4%	0%	0%	0%	0%	0%
Turn Type						
Protected Phases	2					
Permitted Phases						
Actuated Green, G (s)	2.2					
Effective Green, g (s)	2.2					
Actuated g/C Ratio	0.18					
Clearance Time (s)	2.0					
Vehicle Extension (s)	3.0					
Lane Grp Cap (vph)	642					
v/s Ratio Prot	c0.16					
v/s Ratio Perm						
v/c Ratio	0.89					
Uniform Delay, d1	4.7					
Progression Factor	1.00					
Incremental Delay, d2	14.2					
Delay (s)	18.9					
Level of Service	B					
Approach Delay (s)	18.9			0.0	0.0	
Approach LOS	B			A	A	

Intersection Summary			
HCM Average Control Delay	18.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	11.9	Sum of lost time (s)	9.7
Intersection Capacity Utilization	17.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	30	0	45	0	0	0	20	880	0	0	2260	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	31	0	46	0	0	0	20	898	0	0	2306	10
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											189	
pX, platoon unblocked	0.19	0.19	0.19	0.19	0.19		0.19					
vC, conflicting volume	2651	3250	1158	2138	3255	299	2316			898		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1211	4282	0	0	4309	299	0			898		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	78	100	100	100	94			100		
cM capacity (veh/h)	26	0	213	150	0	703	319			765		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2
Volume Total	77	0	20	359	359	180	1153	1163
Volume Left	31	0	20	0	0	0	0	0
Volume Right	46	0	0	0	0	0	0	10
cSH	55	1700	319	1700	1700	1700	765	1700
Volume to Capacity	1.39	0.00	0.06	0.21	0.21	0.11	0.00	0.68
Queue Length 95th (ft)	172	0	5	0	0	0	0	0
Control Delay (s)	380.0	0.0	17.1	0.0	0.0	0.0	0.0	0.0
Lane LOS	F	A	C					
Approach Delay (s)	380.0	0.0	0.4				0.0	
Approach LOS	F	A						

Intersection Summary				
Average Delay	8.9			
Intersection Capacity Utilization	73.9%	ICU Level of Service	D	
Analysis Period (min)	15			

6: Exit Ramp #1 & Performance by movement

Movement	WBT	All
Total Delay (hr)	5.2	5.2
Delay / Veh (s)	12.0	12.0
Vehicles Entered	1553	1553
Vehicles Exited	1554	1554
Hourly Exit Rate	1554	1554
Input Volume	1550	1550
% of Volume	100	100
Denied Entry Before	0	0
Denied Entry After	0	0

200: Schaff Rd & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.0	0.1	0.0	0.0	0.1	0.2
Delay / Veh (s)	7.7	3.1	1.3	0.4	2.2	0.8	1.2
Vehicles Entered	20	5	214	49	19	378	685
Vehicles Exited	20	5	214	49	19	379	686
Hourly Exit Rate	20	5	214	49	19	379	686
Input Volume	20	5	211	45	20	385	686
% of Volume	101	95	102	109	96	98	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

210: Jacobson Rd & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.8	0.0	0.2	0.3	0.0	0.1	1.5
Delay / Veh (s)	17.3	11.4	2.6	4.1	6.1	1.3	4.8
Vehicles Entered	163	7	267	254	14	385	1090
Vehicles Exited	164	7	268	255	14	384	1092
Hourly Exit Rate	164	7	268	255	14	384	1092
Input Volume	165	5	262	265	15	390	1102
% of Volume	99	133	102	96	95	98	99
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

215: Loop Ramp #1 & Helvetia Rd Performance by movement

Movement	EBT	EBR	NBL	NBT	SBT	SBR2	All
Total Delay (hr)	0.0	5.0	0.3	1.6	2.8	0.1	9.9
Delay / Veh (s)	0.4	11.7	23.6	11.3	19.2	14.0	13.2
Vehicles Entered	29	1548	42	517	531	31	2698
Vehicles Exited	29	1550	42	516	532	31	2700
Hourly Exit Rate	29	1550	42	516	532	31	2700
Input Volume	26	1550	45	522	538	30	2711
% of Volume	113	100	93	99	99	102	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

220: Helvetia Rd/Brookwood Pkwy #1 & WB-NB Helvetia Performance by movement

Movement	NBT	SBT	NWT	NWR	All
Total Delay (hr)	0.3	0.8	0.0	0.2	1.3
Delay / Veh (s)	1.9	1.4	7.1	8.8	1.7
Vehicles Entered	490	2080	3	64	2637
Vehicles Exited	489	2080	3	64	2636
Hourly Exit Rate	489	2080	3	64	2636
Input Volume	500	2090	2	65	2657
% of Volume	98	100	150	98	99
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

224: Exit Ramp #1 & WB-NB Helvetia Performance by movement

Movement	WBT	WBR	All
Total Delay (hr)	12.7	0.7	13.5
Delay / Veh (s)	29.5	41.6	30.0
Vehicles Entered	1550	64	1614
Vehicles Exited	1553	64	1617
Hourly Exit Rate	1553	64	1617
Input Volume	1550	65	1615
% of Volume	100	98	100
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy #1 Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	1.5	3.0	0.5	0.3	0.6	4.8	10.6
Delay / Veh (s)	74.8	49.6	4.1	2.5	63.3	8.4	11.7
Vehicles Entered	69	216	415	487	34	2054	3275
Vehicles Exited	71	215	415	487	33	2055	3276
Hourly Exit Rate	71	215	415	487	33	2055	3276
Input Volume	75	230	420	490	35	2060	3310
% of Volume	95	94	99	99	94	100	99
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

231: US-26 EB Helvetia On-ramp & Performance by movement

Movement	EBT	All
Total Delay (hr)	2.1	2.1
Delay / Veh (s)	14.5	14.5
Vehicles Entered	529	529
Vehicles Exited	529	529
Hourly Exit Rate	529	529
Input Volume	535	535
% of Volume	99	99
Denied Entry Before	0	0
Denied Entry After	0	0

240: Meek Rd & Brookwood Pkwy Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	11.4	13.0	0.3	1.0	1.1	0.0	26.7
Delay / Veh (s)	1858.6	1730.8	41.6	3.9	1.8	0.5	29.8
Vehicles Entered	26	31	23	885	2264	11	3240
Vehicles Exited	18	23	23	883	2263	11	3221
Hourly Exit Rate	18	23	23	883	2263	11	3221
Input Volume	30	45	20	880	2284	10	3269
% of Volume	60	51	115	100	99	110	99
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	5	12	0	0	0	0	17

Total Network Performance

Total Delay (hr)	84.6
Delay / Veh (s)	85.0
Vehicles Entered	3587
Vehicles Exited	3576
Hourly Exit Rate	3576
Input Volume	34611
% of Volume	10
Denied Entry Before	0
Denied Entry After	17

Intersection: 6: Exit Ramp #1 &

Movement	WB
Directions Served	T
Maximum Queue (ft)	254
Average Queue (ft)	9
95th Queue (ft)	134
Link Distance (ft)	472
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 200: Schaff Rd & Helvetia Rd

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	47	86
Average Queue (ft)	18	7
95th Queue (ft)	44	40
Link Distance (ft)	549	349
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 210: Jacobson Rd & Helvetia Rd

Movement	WB	NB	SB
Directions Served	LR	R	LT
Maximum Queue (ft)	216	16	111
Average Queue (ft)	76	1	13
95th Queue (ft)	150	8	59
Link Distance (ft)	396	883	410
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 215: Loop Ramp #1 & Helvetia Rd

Movement	EB	EB	NB	NB	NB	SB	SB
Directions Served	R	R	L	T	T	T	T>
Maximum Queue (ft)	283	306	110	209	179	189	190
Average Queue (ft)	169	204	40	85	74	92	107
95th Queue (ft)	248	288	91	166	151	147	160
Link Distance (ft)	926	926		243	243	883	
Upstream Blk Time (%)				0	0		
Queuing Penalty (veh)				0	0		
Storage Bay Dist (ft)			200				415
Storage Blk Time (%)				0			
Queuing Penalty (veh)				0			

Intersection: 220: Helvetia Rd/Brookwood Pkwy #1 & WB-NB Helvetia

Movement	NB	NW
Directions Served	T	R
Maximum Queue (ft)	7	49
Average Queue (ft)	0	29
95th Queue (ft)	5	46
Link Distance (ft)	638	1359
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 224: Exit Ramp #1 & WB-NB Helvetia

Movement	WB	WB	B1	B1
Directions Served	T	TR	T	T
Maximum Queue (ft)	686	793	63	63
Average Queue (ft)	189	266	2	2
95th Queue (ft)	557	684	46	46
Link Distance (ft)	1944	1944	297	297
Upstream Blk Time (%)			0	0
Queuing Penalty (veh)			0	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy #1

Movement	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	LR	R	T	T	R	L	T	T
Maximum Queue (ft)	239	220	124	116	30	95	326	378
Average Queue (ft)	137	132	42	38	2	35	133	186
95th Queue (ft)	210	205	96	89	20	82	262	323
Link Distance (ft)	1144		133	133	133		638	638
Upstream Blk Time (%)			0	0				
Queuing Penalty (veh)			0	0				
Storage Bay Dist (ft)		300				175		
Storage Blk Time (%)							2	
Queuing Penalty (veh)							1	

Intersection: 231: US-26 EB Helvetia On-ramp &

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	93	127
Average Queue (ft)	40	62
95th Queue (ft)	75	98
Link Distance (ft)	960	960
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 240: Meek Rd & Brookwood Pkwy

Movement	EB	NB	NB	SB
Directions Served	LR	L	T	TR
Maximum Queue (ft)	622	83	13	13
Average Queue (ft)	525	24	0	1
95th Queue (ft)	743	61	7	8
Link Distance (ft)	603		620	133
Upstream Blk Time (%)	53			
Queuing Penalty (veh)	0			
Storage Bay Dist (ft)		100		
Storage Blk Time (%)		0		
Queuing Penalty (veh)		0		

Network Summary

Network wide Queuing Penalty: 2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	5	0	550	25	0	210
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	5	0	591	27	0	226
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	831	605			618	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	831	605			618	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	100			100	
cM capacity (veh/h)	342	501			972	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	5	618	226
Volume Left	5	0	0
Volume Right	0	27	0
cSH	342	1700	972
Volume to Capacity	0.02	0.36	0.00
Queue Length 95th (ft)	1	0	0
Control Delay (s)	15.7	0.0	0.0
Lane LOS	C		
Approach Delay (s)	15.7	0.0	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	40.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	230	5	570	495	5	210
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	256	6	633	550	6	233
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			937			
pX, platoon unblocked						
vC, conflicting volume	878	633			1183	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	878	633			1183	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	19	99			99	
cM capacity (veh/h)	317	483			597	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	261	633	550	239
Volume Left	256	0	0	6
Volume Right	6	0	550	0
cSH	319	1700	1700	597
Volume to Capacity	0.82	0.37	0.32	0.01
Queue Length 95th (ft)	173	0	0	1
Control Delay (s)	51.7	0.0	0.0	0.4
Lane LOS	F			A
Approach Delay (s)	51.7	0.0		0.4
Approach LOS	F			

Intersection Summary			
Average Delay	8.1		
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Lane Configurations									
Volume (vph)	0	685	245	1065	335	0	105	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.0	2.0	2.0	3.0				
Lane Util. Factor		*1.00	1.00	0.95	0.95				
Frt		0.85	1.00	1.00	0.96				
Flt Protected		1.00	0.95	1.00	1.00				
Satd. Flow (prot)		2975	1646	3292	3206				
Flt Permitted		1.00	0.95	1.00	1.00				
Satd. Flow (perm)		2975	1646	3292	3206				
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	737	263	1145	360	0	113	0	0
RTOR Reduction (vph)	0	382	0	0	61	0	0	0	0
Lane Group Flow (vph)	0	355	263	1145	412	0	0	0	0
Heavy Vehicles (%)	0%	0%	1%	1%	0%	0%	0%	0%	0%
Turn Type		custom	Prot						
Protected Phases		8	3	3 6	2				
Permitted Phases									
Actuated Green, G (s)		24.5	25.5	55.0	20.5				
Effective Green, g (s)		26.5	27.5	52.0	22.5				
Actuated g/C Ratio		0.48	0.50	0.95	0.41				
Clearance Time (s)		5.0	4.0		5.0				
Vehicle Extension (s)		5.2	2.3		5.2				
Lane Grp Cap (vph)		1433	823	3112	1312				
v/s Ratio Prot		0.12	0.16	c0.35	0.13				
v/s Ratio Perm									
v/c Ratio		0.25	0.32	0.37	0.31				
Uniform Delay, d1		8.4	8.2	0.1	11.0				
Progression Factor		1.00	0.97	1.00	1.00				
Incremental Delay, d2		0.4	0.1	0.0	0.3				
Delay (s)		8.8	8.0	0.2	11.3				
Level of Service		A	A	A	B				
Approach Delay (s)	8.8			1.6	11.3			0.0	
Approach LOS	A			A	B			A	

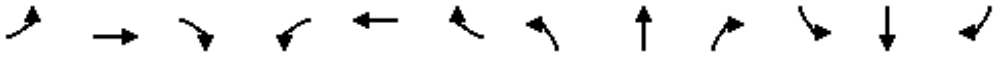
Intersection Summary			
HCM Average Control Delay	5.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	2.0
Intersection Capacity Utilization	46.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Volume (veh/h)	1245	0	0	1020	0	65
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	1339	0	0	1097	0	70
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	706			298		
pX, platoon unblocked			0.88		0.91	0.88
vC, conflicting volume			1339		1887	669
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1122		1540	365
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	88
cM capacity (veh/h)			557		98	564

Direction, Lane #	NB 1	NB 2	SB 1	SB 2	NW 1
Volume Total	669	669	548	548	70
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	70
cSH	1700	1700	1700	1700	564
Volume to Capacity	0.39	0.39	0.32	0.32	0.12
Queue Length 95th (ft)	0	0	0	0	11
Control Delay (s)	0.0	0.0	0.0	0.0	12.3
Lane LOS					B
Approach Delay (s)	0.0		0.0		12.3
Approach LOS					B

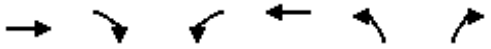
Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	75.2%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	0	70	0	0	0	0	1215	870	10	1010	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.0	3.0					3.0	3.0	2.0	3.0	
Lane Util. Factor		0.95	0.95					0.95	1.00	1.00	0.95	
Frt		0.94	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.97	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1513	1413					3292	1473	1662	3325	
Flt Permitted		0.97	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1513	1413					3292	1473	1662	3325	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	31	0	73	0	0	0	0	1266	906	10	1052	0
RTOR Reduction (vph)	0	21	46	0	0	0	0	0	167	0	0	0
Lane Group Flow (vph)	0	33	4	0	0	0	0	1266	739	10	1052	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		8						6		5	2	
Permitted Phases	8		8						6			
Actuated Green, G (s)		7.5	7.5					87.7	87.7	0.8	92.5	
Effective Green, g (s)		9.5	9.5					89.7	89.7	2.8	94.5	
Actuated g/C Ratio		0.09	0.09					0.82	0.82	0.03	0.86	
Clearance Time (s)		5.0	5.0					5.0	5.0	4.0	5.0	
Vehicle Extension (s)		2.3	2.3					4.7	4.7	2.3	4.7	
Lane Grp Cap (vph)		131	122					2684	1201	42	2856	
v/s Ratio Prot								0.38		0.01	c0.32	
v/s Ratio Perm		0.02	0.00						c0.50			
v/c Ratio		0.25	0.04					0.47	0.62	0.24	0.37	
Uniform Delay, d1		46.9	46.1					3.0	3.8	52.6	1.6	
Progression Factor		1.00	1.00					1.00	1.00	1.03	0.90	
Incremental Delay, d2		0.6	0.1					0.6	2.4	1.6	0.3	
Delay (s)		47.5	46.1					3.6	6.1	55.6	1.8	
Level of Service		D	D					A	A	E	A	
Approach Delay (s)		46.8			0.0			4.7			2.3	
Approach LOS		D			A			A			A	

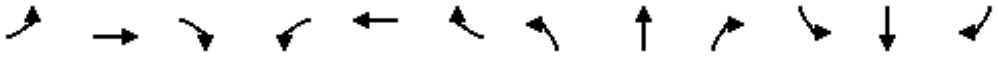
Intersection Summary			
HCM Average Control Delay	5.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	75.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	880	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3471					
Flt Permitted	1.00					
Satd. Flow (perm)	3471					
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	957	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	957	0	0	0	0	0
Heavy Vehicles (%)	4%	0%	0%	0%	0%	0%
Turn Type						
Protected Phases	4					
Permitted Phases						
Actuated Green, G (s)	2.5					
Effective Green, g (s)	2.5					
Actuated g/C Ratio	0.14					
Clearance Time (s)	4.5					
Lane Grp Cap (vph)	482					
v/s Ratio Prot	c0.28					
v/s Ratio Perm						
v/c Ratio	1.99					
Uniform Delay, d1	7.8					
Progression Factor	1.00					
Incremental Delay, d2	450.9					
Delay (s)	458.6					
Level of Service	F					
Approach Delay (s)	458.6			0.0	0.0	
Approach LOS	F			A	A	

Intersection Summary			
HCM Average Control Delay	458.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.99		
Actuated Cycle Length (s)	18.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	28.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	15	0	40	0	0	0	70	2070	0	0	1050	30
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	16	0	43	0	0	0	74	2202	0	0	1117	32
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											189	
pX, platoon unblocked	0.94	0.94	0.94	0.94	0.94		0.94					
vC, conflicting volume	2016	3484	574	2952	3500	734	1149			2202		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1948	3518	407	2949	3535	734	1021			2202		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	53	100	92	100	100	100	88			100		
cM capacity (veh/h)	34	5	561	5	5	367	643			242		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2
Volume Total	59	0	74	881	881	440	559	590
Volume Left	16	0	74	0	0	0	0	0
Volume Right	43	0	0	0	0	0	0	32
cSH	107	1700	643	1700	1700	1700	242	1700
Volume to Capacity	0.55	0.00	0.12	0.52	0.52	0.26	0.00	0.35
Queue Length 95th (ft)	64	0	10	0	0	0	0	0
Control Delay (s)	73.7	0.0	11.3	0.0	0.0	0.0	0.0	0.0
Lane LOS	F	A	B					
Approach Delay (s)	73.7	0.0	0.4				0.0	
Approach LOS	F	A						

Intersection Summary				
Average Delay	1.5			
Intersection Capacity Utilization	68.2%	ICU Level of Service		C
Analysis Period (min)	15			

200: Schaff Rd & Helvetia Rd Performance by movement

Movement	WBL	NBT	NBR	SBT	All
Total Delay (hr)	0.0	0.1	0.0	0.0	0.2
Delay / Veh (s)	11.0	0.9	0.2	0.3	0.8
Vehicles Entered	6	543	23	205	777
Vehicles Exited	6	541	23	206	776
Hourly Exit Rate	6	541	23	206	776
Input Volume	5	555	25	210	795
% of Volume	120	97	93	98	98
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

210: Jacobson Rd & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	1.7	0.0	0.4	0.7	0.0	0.1	2.8
Delay / Veh (s)	26.2	23.6	2.4	4.8	9.0	1.0	6.7
Vehicles Entered	229	6	566	487	5	208	1501
Vehicles Exited	228	6	566	486	5	209	1500
Hourly Exit Rate	228	6	566	486	5	209	1500
Input Volume	230	5	580	495	5	212	1528
% of Volume	99	114	98	98	95	99	98
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

215: Loop Ramp #1 & Helvetia Rd Performance by movement

Movement	EBT	EBR	NBL	NBT	SBT	SBR2	All
Total Delay (hr)	0.0	0.9	1.2	1.4	1.3	0.3	5.0
Delay / Veh (s)	0.1	4.6	17.6	5.0	13.5	9.3	7.5
Vehicles Entered	11	679	237	1042	336	104	2409
Vehicles Exited	11	676	237	1043	338	103	2408
Hourly Exit Rate	11	676	237	1043	338	103	2408
Input Volume	14	685	245	1065	341	105	2454
% of Volume	81	99	97	98	99	98	98
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

220: Helvetia Rd/Brookwood Pkwy #1 & WB-NB Helvetia Performance by movement

Movement	NBT	SBT	NWT	NWR	All
Total Delay (hr)	0.9	0.4	0.0	0.2	1.4
Delay / Veh (s)	2.6	1.3	0.0	11.8	2.3
Vehicles Entered	1224	1009	1	64	2298
Vehicles Exited	1226	1009	1	64	2300
Hourly Exit Rate	1226	1009	1	64	2300
Input Volume	1256	1020	1	65	2342
% of Volume	98	99	100	99	98
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

224: Exit Ramp #1 & WB-NB Helvetia Performance by movement

Movement	WBT	WBR	All
Total Delay (hr)	0.3	0.0	0.4
Delay / Veh (s)	1.8	2.0	1.8
Vehicles Entered	682	64	746
Vehicles Exited	679	65	744
Hourly Exit Rate	679	65	744
Input Volume	685	65	750
% of Volume	99	100	99
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy #1 Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.4	0.2	0.7	1.7	0.1	0.5	3.7
Delay / Veh (s)	58.2	11.7	2.1	7.3	52.2	1.9	4.2
Vehicles Entered	27	68	1198	821	10	1007	3131
Vehicles Exited	27	67	1197	820	10	1009	3130
Hourly Exit Rate	27	67	1197	820	10	1009	3130
Input Volume	30	70	1226	870	10	1019	3226
% of Volume	89	96	98	94	100	99	97
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

231: US-26 EB Helvetia On-ramp & Performance by movement

Movement	EBT	All
Total Delay (hr)	62.2	62.2
Delay / Veh (s)	274.6	274.2
Vehicles Entered	834	834
Vehicles Exited	800	800
Hourly Exit Rate	800	800
Input Volume	909	909
% of Volume	88	88
Denied Entry Before	0	0
Denied Entry After	24	24

240: Meek Rd & Brookwood Pkwy Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	1.7	3.9	0.2	12.7	0.2	0.0	18.7
Delay / Veh (s)	472.0	377.8	9.4	22.8	0.7	0.5	21.1
Vehicles Entered	14	38	69	2013	1045	28	3207
Vehicles Exited	12	36	69	1997	1044	28	3186
Hourly Exit Rate	12	36	69	1997	1044	28	3186
Input Volume	15	40	70	2070	1056	30	3282
% of Volume	79	90	98	96	99	94	97
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	1	0	0	0	0	1

Total Network Performance

Total Delay (hr)	128.6
Delay / Veh (s)	132.7
Vehicles Entered	3548
Vehicles Exited	3434
Hourly Exit Rate	3434
Input Volume	31378
% of Volume	11
Denied Entry Before	1
Denied Entry After	35

Intersection: 200: Schaff Rd & Helvetia Rd

Movement	WB
Directions Served	LR
Maximum Queue (ft)	37
Average Queue (ft)	6
95th Queue (ft)	26
Link Distance (ft)	549
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 210: Jacobson Rd & Helvetia Rd

Movement	WB	NB	SB
Directions Served	LR	R	LT
Maximum Queue (ft)	298	21	88
Average Queue (ft)	113	1	6
95th Queue (ft)	225	10	40
Link Distance (ft)	396	883	410
Upstream Blk Time (%)	0		
Queuing Penalty (veh)	0		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 215: Loop Ramp #1 & Helvetia Rd

Movement	EB	EB	NB	NB	NB	SB	SB
Directions Served	R	R	L	T	T	T	T>
Maximum Queue (ft)	121	141	224	305	274	114	142
Average Queue (ft)	57	63	118	100	79	56	79
95th Queue (ft)	94	104	216	278	219	95	123
Link Distance (ft)	926	926		243	243	883	
Upstream Blk Time (%)			0	2	0		
Queuing Penalty (veh)			0	10	3		
Storage Bay Dist (ft)			200				415
Storage Blk Time (%)			1	2			
Queuing Penalty (veh)			6	4			

Intersection: 220: Helvetia Rd/Brookwood Pkwy #1 & WB-NB Helvetia

Movement	NB	NB	NW
Directions Served	T	T	R
Maximum Queue (ft)	78	32	93
Average Queue (ft)	5	1	35
95th Queue (ft)	42	23	69
Link Distance (ft)	638	638	1445
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 224: Exit Ramp #1 & WB-NB Helvetia

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy #1

Movement	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	LR	R	T	T	R	L	T	T
Maximum Queue (ft)	86	66	135	121	209	38	113	126
Average Queue (ft)	39	30	49	34	118	10	18	35
95th Queue (ft)	80	56	123	95	254	32	68	95
Link Distance (ft)	1144		133	133	133		638	638
Upstream Blk Time (%)			1	0	17			
Queuing Penalty (veh)			4	2	117			
Storage Bay Dist (ft)		300				175		
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 231: US-26 EB Helvetia On-ramp &

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	877	1055
Average Queue (ft)	770	891
95th Queue (ft)	1041	1270
Link Distance (ft)	960	960
Upstream Blk Time (%)		37
Queuing Penalty (veh)		164
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 240: Meek Rd & Brookwood Pkwy

Movement	EB	NB	NB	NB	NB	B251	B251	B2	B2	B3	B3	SB
Directions Served	LR	L	T	T	TR	T	T	T	T	T	T	TR
Maximum Queue (ft)	283	84	622	709	225	1286	1328	610	648	426	248	10
Average Queue (ft)	144	32	105	418	150	473	517	183	199	76	71	0
95th Queue (ft)	455	67	449	963	322	1380	1444	817	844	508	483	5
Link Distance (ft)	603		620	620		1281	1281	1111	1111	1032	1032	133
Upstream Blk Time (%)	11		0	26		1	7	2	3	1	1	
Queuing Penalty (veh)	0		0	0		0	0	0	0	0	0	
Storage Bay Dist (ft)		100			200							
Storage Blk Time (%)		0	0	0	30							
Queuing Penalty (veh)		0	0	1	209							

Network Summary

Network wide Queuing Penalty: 519

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description:	Eastbound Off-ramp to Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2300	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	305	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2300	305		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	605	80		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2469	327	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v - v_F) P_{FD}$ = 2469 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2469	4600	No
$v_{FO} = v - v_F - v_R$	2142	4600	No
v_R	327	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 2469		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2469	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 12.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.457	
Space mean speed in ramp influence area,	S_R = 51.8	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.8	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	AM Peak Period
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description: Eastbound	On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1985	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	530	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1985	530		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	522	139		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2131	569	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 2131 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2700	4600	No

$v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 2131 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2131	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_{R} + 0.0078\ v_{12} - 0.00627\ L_A$ = 23.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.350

Space mean speed in ramp influence area, S_R = 53.7 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.7 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description:	Westbound 1-lane Off-ramp to Northbound Helvetia

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3140	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	65	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3140	65		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	826	17		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3371	70	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3371 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3371	4600	No
$v_{FO} = v_F - v_R$	3301	4600	No
v_R	70	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 $v_{12}/2$	No	
If yes, v_{12A} = 3371		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3371	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 19.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.434	
Space mean speed in ramp influence area,	S_R = 52.2	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 52.2	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description:	Westbound 1-lane Off-ramp to Southbound Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3140	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	1550	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3140	1550		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	826	408		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3371	1664	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3371 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3371	4600	No
$v_{FO} = v_F - v_R$	1707	4600	No
v_R	1664	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 $v_{12}/2$	No	
If yes, v_{12A} = 3371		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3371	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 19.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.578	
Space mean speed in ramp influence area,	S_R = 49.6	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 49.6	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	AM Peak Period
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description: Westbound	On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1515	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	75	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1515	75		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	399	20		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1627	81	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 1627 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	1708	4600	No

$v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 1627 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1627	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_{R} + 0.0078\ v_{12} - 0.00627\ L_A =$ 16.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, M_S = 0.314

Space mean speed in ramp influence area, S_R = 54.4 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 54.4 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description:	Eastbound Off-ramp to Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2320	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	100	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2320	100		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	611	26		v
Trucks and buses	1	1		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.995	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2454	106	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2454 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2454	4600	No
$v_{FO} = v - v_F - v_R$	2348	4600	No
v_R	106	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 2454		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2454	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 11.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.438	
Space mean speed in ramp influence area,	S_R = 52.1	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 52.1	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	PM Peak Period
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description: Eastbound	On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2180	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	800	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2180	800		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	574	211		v
Trucks and buses	1	1		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.995	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2306	846	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 2306 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3152	4600	No

$v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 2306 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2306	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_{R} + 0.0078\ v_{12} - 0.00627\ L_A =$ 27.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.383

Space mean speed in ramp influence area, S_R = 53.1 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.1 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description:	Westbound 1-lane Off-ramp to Northbound Helvetia

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3155	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	65	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3155	65		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	830	17		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3338	69	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3338 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3338	4600	No
$v_{FO} = v_F - v_R$	3269	4600	No
v_R	69	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 3338		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3338	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 19.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.434	
Space mean speed in ramp influence area,	S_R = 52.2	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 52.2	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description:	Westbound 1-lane Off-ramp to Southbound Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2690	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	645	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2690	645		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	708	170		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2846	689	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2846 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2846	4600	No
$v_{FO} = v_F - v_R$	2157	4600	No
v_R	689	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 2846		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2846	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 15.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.490	
Space mean speed in ramp influence area,	S_R = 51.2	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.2	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	PM Peak Period
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description:	Westbound On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2355	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	350	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2355	350		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	620	92		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2491	374	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 2491 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2865	4600	No

$v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 2491 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2491	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_{12} + 0.0078\, v_R - 0.00627\, L_A$ = 25.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.361

Space mean speed in ramp influence area, S_R = 53.5 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.5 mph

Year 2025 Phase 2A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	20	5	210	45	20	385
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	22	6	233	50	22	428
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	731	258			283	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	731	258			283	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	99			98	
cM capacity (veh/h)	384	783			1285	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	28	283	450
Volume Left	22	0	22
Volume Right	6	50	0
cSH	427	1700	1285
Volume to Capacity	0.06	0.17	0.02
Queue Length 95th (ft)	5	0	1
Control Delay (s)	14.0	0.0	0.6
Lane LOS	B		A
Approach Delay (s)	14.0	0.0	0.6
Approach LOS	B		

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	46.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	165	5	250	265	15	390
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	183	6	278	294	17	433
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			937			
pX, platoon unblocked						
vC, conflicting volume	744	278			572	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	744	278			572	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	51	99			98	
cM capacity (veh/h)	377	763			1006	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	189	278	294	450
Volume Left	183	0	0	17
Volume Right	6	0	294	0
cSH	383	1700	1700	1006
Volume to Capacity	0.49	0.16	0.17	0.02
Queue Length 95th (ft)	66	0	0	1
Control Delay (s)	23.2	0.0	0.0	0.5
Lane LOS	C			A
Approach Delay (s)	23.2	0.0		0.5
Approach LOS	C			

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	48.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Lane Configurations									
Volume (vph)	0	1550	45	515	525	0	30	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.0	2.0	2.0	3.0				
Lane Util. Factor		*1.00	1.00	0.95	0.95				
Frt		0.85	1.00	1.00	0.99				
Flt Protected		1.00	0.95	1.00	1.00				
Satd. Flow (prot)		2917	1309	3260	3265				
Flt Permitted		1.00	0.95	1.00	1.00				
Satd. Flow (perm)		2917	1309	3260	3265				
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	1582	46	526	536	0	31	0	0
RTOR Reduction (vph)	0	103	0	0	6	0	0	0	0
Lane Group Flow (vph)	0	1479	46	526	561	0	0	0	0
Heavy Vehicles (%)	2%	2%	27%	2%	1%	2%	1%	0%	0%
Turn Type		custom	Prot						
Protected Phases		8	3	3 6	2				
Permitted Phases									
Actuated Green, G (s)		42.1	43.1	70.0	17.9				
Effective Green, g (s)		44.1	45.1	67.0	19.9				
Actuated g/C Ratio		0.63	0.64	0.96	0.28				
Clearance Time (s)		5.0	4.0		5.0				
Vehicle Extension (s)		5.2	2.3		5.2				
Lane Grp Cap (vph)		1838	843	3120	928				
v/s Ratio Prot		c0.51	0.04	0.16	c0.17				
v/s Ratio Perm									
v/c Ratio		0.80	0.05	0.17	0.60				
Uniform Delay, d1		9.7	4.6	0.1	21.6				
Progression Factor		1.00	0.61	1.00	1.00				
Incremental Delay, d2		3.9	0.0	0.0	1.7				
Delay (s)		13.6	2.8	0.1	23.4				
Level of Service		B	A	A	C				
Approach Delay (s)	13.6			0.3	23.4			0.0	
Approach LOS	B			A	C			A	

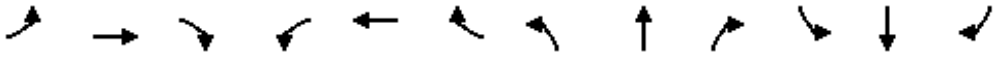
Intersection Summary			
HCM Average Control Delay	12.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Volume (veh/h)	495	0	0	2075	0	65
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	505	0	0	2117	0	66
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	706			298		
pX, platoon unblocked			0.97		0.97	0.97
vC, conflicting volume			505		1211	253
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			415		907	154
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	92
cM capacity (veh/h)			1114		270	841

Direction, Lane #	NB 1	NB 2	SB 1	SB 2	SB 3	NW 1
Volume Total	253	253	706	706	706	66
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	0	66
cSH	1700	1700	1700	1700	1700	841
Volume to Capacity	0.15	0.15	0.42	0.42	0.42	0.08
Queue Length 95th (ft)	0	0	0	0	0	6
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	9.6
Lane LOS						A
Approach Delay (s)	0.0		0.0			9.6
Approach LOS						A

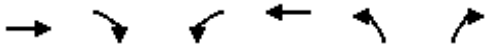
Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	59.8%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	75	0	230	0	0	0	0	420	490	35	2040	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.0	3.0					3.0	3.0	2.0	3.0	
Lane Util. Factor		0.95	0.95					0.95	1.00	1.00	0.91	
Frt		0.92	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.98	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1410	1262					3137	1430	1662	4684	
Flt Permitted		0.98	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1410	1262					3137	1430	1662	4684	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	77	0	235	0	0	0	0	429	500	36	2082	0
RTOR Reduction (vph)	0	7	7	0	0	0	0	0	257	0	0	0
Lane Group Flow (vph)	0	152	146	0	0	0	0	429	243	36	2082	0
Heavy Vehicles (%)	0%	0%	12%	0%	0%	0%	0%	6%	4%	0%	2%	0%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		8						6		5	2	
Permitted Phases	8		8						6			
Actuated Green, G (s)		11.2	11.2					32.0	32.0	12.8	48.8	
Effective Green, g (s)		13.2	13.2					34.0	34.0	14.8	50.8	
Actuated g/C Ratio		0.19	0.19					0.49	0.49	0.21	0.73	
Clearance Time (s)		5.0	5.0					5.0	5.0	4.0	5.0	
Vehicle Extension (s)		2.3	2.3					4.7	4.7	2.3	4.7	
Lane Grp Cap (vph)		266	238					1524	695	351	3399	
v/s Ratio Prot								0.14		0.02	c0.44	
v/s Ratio Perm		0.11	c0.12						0.17			
v/c Ratio		0.57	0.61					0.28	0.35	0.10	0.61	
Uniform Delay, d1		25.8	26.1					10.7	11.1	22.2	4.7	
Progression Factor		1.00	1.00					1.00	1.00	0.95	1.09	
Incremental Delay, d2		2.2	3.7					0.5	1.4	0.4	0.5	
Delay (s)		28.0	29.7					11.2	12.5	21.5	5.7	
Level of Service		C	C					B	B	C	A	
Approach Delay (s)		28.8			0.0			11.9			6.0	
Approach LOS		C			A			B			A	

Intersection Summary			
HCM Average Control Delay	9.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	59.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	525	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3471					
Flt Permitted	1.00					
Satd. Flow (perm)	3471					
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	571	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	571	0	0	0	0	0
Heavy Vehicles (%)	4%	0%	0%	0%	0%	0%
Turn Type						
Protected Phases	4					
Permitted Phases						
Actuated Green, G (s)	2.2					
Effective Green, g (s)	2.2					
Actuated g/C Ratio	0.09					
Clearance Time (s)	5.8					
Lane Grp Cap (vph)	305					
v/s Ratio Prot	c0.16					
v/s Ratio Perm						
v/c Ratio	1.87					
Uniform Delay, d1	11.4					
Progression Factor	1.00					
Incremental Delay, d2	404.7					
Delay (s)	416.1					
Level of Service	F					
Approach Delay (s)	416.1			0.0	0.0	
Approach LOS	F			A	A	

Intersection Summary			
HCM Average Control Delay	416.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.87		
Actuated Cycle Length (s)	25.0	Sum of lost time (s)	22.8
Intersection Capacity Utilization	19.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	30	0	45	0	0	0	20	880	0	0	2260	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	31	0	46	0	0	0	20	898	0	0	2306	10
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											189	
pX, platoon unblocked	0.78	0.78	0.78	0.78	0.78		0.78					
vC, conflicting volume	2651	3250	774	1753	3255	299	2316			898		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2131	2898	0	980	2904	299	1701			898		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	95	100	100	100	93			100		
cM capacity (veh/h)	21	12	851	145	12	703	296			765		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3
Volume Total	77	0	20	359	359	180	577	1153	587
Volume Left	31	0	20	0	0	0	0	0	0
Volume Right	46	0	0	0	0	0	0	0	10
cSH	51	1700	296	1700	1700	1700	765	1700	1700
Volume to Capacity	1.49	0.00	0.07	0.21	0.21	0.11	0.00	0.68	0.35
Queue Length 95th (ft)	179	0	6	0	0	0	0	0	0
Control Delay (s)	429.9	0.0	18.1	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	F	A	C						
Approach Delay (s)	429.9	0.0	0.4				0.0		
Approach LOS	F	A							

Intersection Summary				
Average Delay	10.0			
Intersection Capacity Utilization	55.0%	ICU Level of Service		A
Analysis Period (min)	15			

6: Exit Ramp #1 & Performance by movement

Movement	WBT	All
Total Delay (hr)	4.4	4.4
Delay / Veh (s)	10.3	10.4
Vehicles Entered	1547	1547
Vehicles Exited	1545	1545
Hourly Exit Rate	1545	1545
Input Volume	1550	1550
% of Volume	100	100
Denied Entry Before	0	0
Denied Entry After	0	0

200: Schaff Rd & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.0	0.1	0.0	0.0	0.1	0.2
Delay / Veh (s)	8.3	3.1	1.4	0.4	2.2	0.7	1.2
Vehicles Entered	19	7	203	44	19	377	669
Vehicles Exited	19	7	205	44	19	377	671
Hourly Exit Rate	19	7	205	44	19	377	671
Input Volume	20	5	211	45	20	385	686
% of Volume	96	133	97	98	96	98	98
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

210: Jacobson Rd & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.7	0.0	0.2	0.4	0.0	0.2	1.5
Delay / Veh (s)	14.7	15.6	3.1	5.2	8.0	1.6	4.9
Vehicles Entered	161	5	255	272	14	382	1089
Vehicles Exited	162	5	255	276	14	383	1095
Hourly Exit Rate	162	5	255	276	14	383	1095
Input Volume	165	5	262	265	15	390	1102
% of Volume	98	95	98	104	95	98	99
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

215: Loop Ramp #1 & Helvetia Rd Performance by movement

Movement	EBT	EBR	NBL	NBT	SBT	SBR2	All
Total Delay (hr)	0.0	2.6	0.3	1.9	3.5	0.1	8.5
Delay / Veh (s)	0.4	6.0	24.0	13.2	23.9	17.1	11.3
Vehicles Entered	28	1549	49	531	529	27	2713
Vehicles Exited	28	1549	48	525	526	27	2703
Hourly Exit Rate	28	1549	48	525	526	27	2703
Input Volume	26	1550	45	522	538	30	2711
% of Volume	109	100	106	100	98	89	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

220: Helvetia Rd/Brookwood Pkwy #1 & WB-NB Helvetia Performance by movement

Movement	NBT	SBT	NWT	NWR	All
Total Delay (hr)	0.5	0.7	0.0	0.2	1.3
Delay / Veh (s)	3.3	1.2	5.8	10.1	1.8
Vehicles Entered	522	2078	2	55	2657
Vehicles Exited	523	2079	2	55	2659
Hourly Exit Rate	523	2079	2	55	2659
Input Volume	500	2090	2	65	2657
% of Volume	105	99	100	84	100
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

224: Exit Ramp #1 & WB-NB Helvetia Performance by movement

Movement	WBT	WBR	All
Total Delay (hr)	21.9	1.3	23.2
Delay / Veh (s)	50.5	82.0	51.6
Vehicles Entered	1571	58	1629
Vehicles Exited	1547	56	1603
Hourly Exit Rate	1547	56	1603
Input Volume	1550	65	1615
% of Volume	100	86	99
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy #1 Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	1.0	1.7	1.2	0.3	0.2	2.8	7.2
Delay / Veh (s)	44.9	27.0	9.9	2.5	24.0	4.9	7.9
Vehicles Entered	77	227	442	474	35	2050	3305
Vehicles Exited	76	228	441	474	34	2046	3299
Hourly Exit Rate	76	228	441	474	34	2046	3299
Input Volume	75	230	420	490	35	2060	3310
% of Volume	102	99	105	97	96	99	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

231: US-26 EB Helvetia On-ramp & Performance by movement

Movement	EBT	All
Total Delay (hr)	12.9	12.9
Delay / Veh (s)	90.0	90.2
Vehicles Entered	518	518
Vehicles Exited	513	513
Hourly Exit Rate	513	513
Input Volume	535	535
% of Volume	96	96
Denied Entry Before	0	0
Denied Entry After	0	0

240: Meek Rd & Brookwood Pkwy Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	4.7	5.7	0.1	0.9	0.8	0.0	12.2
Delay / Veh (s)	608.1	513.6	23.9	3.6	1.2	0.4	13.5
Vehicles Entered	30	43	18	888	2270	9	3258
Vehicles Exited	27	37	18	888	2271	9	3250
Hourly Exit Rate	27	37	18	888	2271	9	3250
Input Volume	30	45	20	880	2284	10	3269
% of Volume	89	82	90	101	99	90	99
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

Total Network Performance

Total Delay (hr)	82.5
Delay / Veh (s)	82.2
Vehicles Entered	3635
Vehicles Exited	3587
Hourly Exit Rate	3587
Input Volume	34611
% of Volume	10
Denied Entry Before	0
Denied Entry After	0

Intersection: 6: Exit Ramp #1 &

Movement	WB
Directions Served	T
Maximum Queue (ft)	368
Average Queue (ft)	13
95th Queue (ft)	157
Link Distance (ft)	381
Upstream Blk Time (%)	0
Queuing Penalty (veh)	1
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 200: Schaff Rd & Helvetia Rd

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	46	60
Average Queue (ft)	18	5
95th Queue (ft)	45	30
Link Distance (ft)	549	349
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 210: Jacobson Rd & Helvetia Rd

Movement	WB	NB	SB
Directions Served	LR	R	LT
Maximum Queue (ft)	203	22	162
Average Queue (ft)	68	1	16
95th Queue (ft)	137	12	86
Link Distance (ft)	396	883	410
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 215: Loop Ramp #1 & Helvetia Rd

Movement	EB	EB	NB	NB	NB	SB	SB
Directions Served	R	R	L	T	T	T	T>
Maximum Queue (ft)	211	170	153	268	222	196	207
Average Queue (ft)	115	78	47	121	104	118	125
95th Queue (ft)	179	124	113	223	192	180	185
Link Distance (ft)	914	914		244	244	883	
Upstream Blk Time (%)				0	0		
Queuing Penalty (veh)				1	0		
Storage Bay Dist (ft)			200				415
Storage Blk Time (%)			0	1			
Queuing Penalty (veh)			0	0			

Intersection: 220: Helvetia Rd/Brookwood Pkwy #1 & WB-NB Helvetia

Movement	NB	NW
Directions Served	T	R
Maximum Queue (ft)	10	60
Average Queue (ft)	1	30
95th Queue (ft)	9	52
Link Distance (ft)	633	1359
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 224: Exit Ramp #1 & WB-NB Helvetia

Movement	WB	WB	B1	B1
Directions Served	T	TR	T	T
Maximum Queue (ft)	974	1081	123	120
Average Queue (ft)	379	529	4	4
95th Queue (ft)	981	1145	63	62
Link Distance (ft)	1944	1944	297	297
Upstream Blk Time (%)			0	0
Queuing Penalty (veh)			0	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy #1

Movement	EB	EB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LR	R	T	T	R	L	T	T	T
Maximum Queue (ft)	188	188	151	140	71	79	130	157	189
Average Queue (ft)	104	98	79	68	3	22	45	73	111
95th Queue (ft)	168	164	133	115	34	57	100	141	181
Link Distance (ft)	1130		136	136	136		633	633	633
Upstream Blk Time (%)			1	0	0				
Queuing Penalty (veh)			3	1	0				
Storage Bay Dist (ft)		300				175			
Storage Blk Time (%)							0		
Queuing Penalty (veh)							0		

Intersection: 231: US-26 EB Helvetia On-ramp &

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	402	421
Average Queue (ft)	220	236
95th Queue (ft)	464	474
Link Distance (ft)	960	960
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 240: Meek Rd & Brookwood Pkwy

Movement	EB	NB	NB	NB	NB	SB
Directions Served	LR	L	T	T	TR	T
Maximum Queue (ft)	462	57	54	17	6	11
Average Queue (ft)	307	15	2	1	0	0
95th Queue (ft)	623	45	23	8	4	8
Link Distance (ft)	591		620	620		136
Upstream Blk Time (%)	7					
Queuing Penalty (veh)	0					
Storage Bay Dist (ft)		100			600	
Storage Blk Time (%)			0			
Queuing Penalty (veh)			0			

Network Summary

Network wide Queuing Penalty: 7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	5	0	550	25	0	210
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	5	0	591	27	0	226
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	831	605			618	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	831	605			618	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	100			100	
cM capacity (veh/h)	342	501			972	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	5	618	226
Volume Left	5	0	0
Volume Right	0	27	0
cSH	342	1700	972
Volume to Capacity	0.02	0.36	0.00
Queue Length 95th (ft)	1	0	0
Control Delay (s)	15.7	0.0	0.0
Lane LOS	C		
Approach Delay (s)	15.7	0.0	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	40.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	230	5	570	495	5	210
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	256	6	633	550	6	233
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			937			
pX, platoon unblocked						
vC, conflicting volume	878	633			1183	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	878	633			1183	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	19	99			99	
cM capacity (veh/h)	317	483			597	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	261	633	550	239
Volume Left	256	0	0	6
Volume Right	6	0	550	0
cSH	319	1700	1700	597
Volume to Capacity	0.82	0.37	0.32	0.01
Queue Length 95th (ft)	173	0	0	1
Control Delay (s)	51.7	0.0	0.0	0.4
Lane LOS	F			A
Approach Delay (s)	51.7	0.0		0.4
Approach LOS	F			

Intersection Summary			
Average Delay	8.1		
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Lane Configurations									
Volume (vph)	0	685	245	1065	335	0	105	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.0	2.0	2.0	3.0				
Lane Util. Factor		*1.00	1.00	0.95	0.95				
Frt		0.85	1.00	1.00	0.96				
Flt Protected		1.00	0.95	1.00	1.00				
Satd. Flow (prot)		2975	1646	3292	3206				
Flt Permitted		1.00	0.95	1.00	1.00				
Satd. Flow (perm)		2975	1646	3292	3206				
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	737	263	1145	360	0	113	0	0
RTOR Reduction (vph)	0	382	0	0	61	0	0	0	0
Lane Group Flow (vph)	0	355	263	1145	412	0	0	0	0
Heavy Vehicles (%)	0%	0%	1%	1%	0%	0%	0%	0%	0%
Turn Type		custom	Prot						
Protected Phases		8	3	3 6	2				
Permitted Phases									
Actuated Green, G (s)		24.5	25.5	55.0	20.5				
Effective Green, g (s)		26.5	27.5	52.0	22.5				
Actuated g/C Ratio		0.48	0.50	0.95	0.41				
Clearance Time (s)		5.0	4.0		5.0				
Vehicle Extension (s)		5.2	2.3		5.2				
Lane Grp Cap (vph)		1433	823	3112	1312				
v/s Ratio Prot		0.12	0.16	c0.35	0.13				
v/s Ratio Perm									
v/c Ratio		0.25	0.32	0.37	0.31				
Uniform Delay, d1		8.4	8.2	0.1	11.0				
Progression Factor		1.00	1.01	1.00	1.00				
Incremental Delay, d2		0.4	0.1	0.0	0.3				
Delay (s)		8.8	8.4	0.2	11.3				
Level of Service		A	A	A	B				
Approach Delay (s)	8.8			1.7	11.3			0.0	
Approach LOS	A			A	B			A	

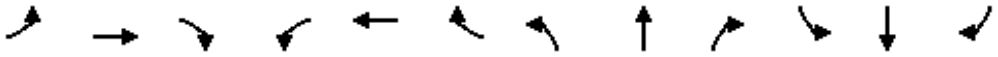
Intersection Summary			
HCM Average Control Delay	5.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	2.0
Intersection Capacity Utilization	46.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Volume (veh/h)	1245	0	0	1020	0	65
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	1339	0	0	1097	0	70
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	706			298		
pX, platoon unblocked			0.88		0.88	0.88
vC, conflicting volume			1339		1704	669
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1122		1535	365
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	88
cM capacity (veh/h)			557		96	564

Direction, Lane #	NB 1	NB 2	SB 1	SB 2	SB 3	NW 1
Volume Total	669	669	366	366	366	70
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	0	70
cSH	1700	1700	1700	1700	1700	564
Volume to Capacity	0.39	0.39	0.22	0.22	0.22	0.12
Queue Length 95th (ft)	0	0	0	0	0	11
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	12.3
Lane LOS						B
Approach Delay (s)	0.0		0.0			12.3
Approach LOS						B

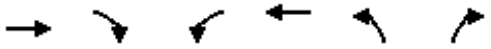
Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	75.2%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	0	70	0	0	0	0	1215	870	10	1010	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.0	3.0					3.0	3.0	2.0	3.0	
Lane Util. Factor		0.95	0.95					0.95	1.00	1.00	0.91	
Frt		0.94	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.97	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1513	1413					3292	1473	1662	4778	
Flt Permitted		0.97	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1513	1413					3292	1473	1662	4778	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	31	0	73	0	0	0	0	1266	906	10	1052	0
RTOR Reduction (vph)	0	21	46	0	0	0	0	0	167	0	0	0
Lane Group Flow (vph)	0	33	4	0	0	0	0	1266	739	10	1052	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		8						6		5	2	
Permitted Phases	8		8						6			
Actuated Green, G (s)		7.5	7.5					87.7	87.7	0.8	92.5	
Effective Green, g (s)		9.5	9.5					89.7	89.7	2.8	94.5	
Actuated g/C Ratio		0.09	0.09					0.82	0.82	0.03	0.86	
Clearance Time (s)		5.0	5.0					5.0	5.0	4.0	5.0	
Vehicle Extension (s)		2.3	2.3					4.7	4.7	2.3	4.7	
Lane Grp Cap (vph)		131	122					2684	1201	42	4105	
v/s Ratio Prot								0.38		0.01	c0.22	
v/s Ratio Perm		0.02	0.00						c0.50			
v/c Ratio		0.25	0.04					0.47	0.62	0.24	0.26	
Uniform Delay, d1		46.9	46.1					3.0	3.8	52.6	1.4	
Progression Factor		1.00	1.00					1.00	1.00	1.01	0.92	
Incremental Delay, d2		0.6	0.1					0.6	2.4	1.6	0.1	
Delay (s)		47.5	46.1					3.6	6.1	54.7	1.4	
Level of Service		D	D					A	A	D	A	
Approach Delay (s)		46.8			0.0			4.7			1.9	
Approach LOS		D			A			A			A	

Intersection Summary			
HCM Average Control Delay	5.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	75.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	880	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3471					
Flt Permitted	1.00					
Satd. Flow (perm)	3471					
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	957	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	957	0	0	0	0	0
Heavy Vehicles (%)	4%	0%	0%	0%	0%	0%
Turn Type						
Protected Phases	4					
Permitted Phases						
Actuated Green, G (s)	2.5					
Effective Green, g (s)	2.5					
Actuated g/C Ratio	0.14					
Clearance Time (s)	4.5					
Lane Grp Cap (vph)	482					
v/s Ratio Prot	c0.28					
v/s Ratio Perm						
v/c Ratio	1.99					
Uniform Delay, d1	7.8					
Progression Factor	1.00					
Incremental Delay, d2	450.9					
Delay (s)	458.6					
Level of Service	F					
Approach Delay (s)	458.6			0.0	0.0	
Approach LOS	F			A	A	

Intersection Summary			
HCM Average Control Delay	458.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.99		
Actuated Cycle Length (s)	18.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	28.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	15	0	40	0	0	0	70	2070	0	0	1050	30
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	16	0	43	0	0	0	74	2202	0	0	1117	32
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											189	
pX, platoon unblocked	0.96	0.96	0.96	0.96	0.96		0.96					
vC, conflicting volume	2016	3484	388	2766	3500	734	1149			2202		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1924	3446	236	2702	3463	734	1025			2202		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	56	100	94	100	100	100	89			100		
cM capacity (veh/h)	36	6	744	9	6	367	661			242		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3
Volume Total	59	0	74	881	881	440	279	559	311
Volume Left	16	0	74	0	0	0	0	0	0
Volume Right	43	0	0	0	0	0	0	0	32
cSH	118	1700	661	1700	1700	1700	242	1700	1700
Volume to Capacity	0.50	0.00	0.11	0.52	0.52	0.26	0.00	0.33	0.18
Queue Length 95th (ft)	57	0	9	0	0	0	0	0	0
Control Delay (s)	62.3	0.0	11.1	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	F	A	B						
Approach Delay (s)	62.3	0.0	0.4				0.0		
Approach LOS	F	A							

Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	68.2%	ICU Level of Service	C	
Analysis Period (min)	15			

200: Schaff Rd & Helvetia Rd Performance by movement

Movement	WBL	NBT	NBR	SBT	All
Total Delay (hr)	0.0	0.2	0.0	0.0	0.2
Delay / Veh (s)	9.3	1.0	0.1	0.3	0.8
Vehicles Entered	4	578	24	209	815
Vehicles Exited	4	578	24	209	815
Hourly Exit Rate	4	578	24	209	815
Input Volume	5	555	25	210	795
% of Volume	80	104	97	99	103
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

210: Jacobson Rd & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	2.4	0.1	0.3	0.5	0.0	0.0	3.4
Delay / Veh (s)	36.5	45.6	2.1	4.0	12.6	0.8	7.9
Vehicles Entered	236	5	599	486	3	212	1541
Vehicles Exited	233	5	600	487	3	211	1539
Hourly Exit Rate	233	5	600	487	3	211	1539
Input Volume	230	5	580	495	5	212	1528
% of Volume	101	95	103	98	57	100	101
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

215: Loop Ramp #1 & Helvetia Rd Performance by movement

Movement	EBT	EBR	NBL	NBT	SBT	SBR2	All
Total Delay (hr)	0.0	0.7	1.1	1.1	1.1	0.2	4.3
Delay / Veh (s)	0.1	3.6	16.9	3.8	11.9	8.6	6.3
Vehicles Entered	15	693	240	1071	346	102	2467
Vehicles Exited	15	693	240	1075	345	103	2471
Hourly Exit Rate	15	693	240	1075	345	103	2471
Input Volume	14	685	245	1065	341	105	2454
% of Volume	111	101	98	101	101	98	101
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

220: Helvetia Rd/Brookwood Pkwy #1 & WB-NB Helvetia Performance by movement

Movement	NBT	SBT	NWT	NWR	All
Total Delay (hr)	1.0	0.3	0.0	0.2	1.5
Delay / Veh (s)	2.7	1.2	0.0	10.4	2.2
Vehicles Entered	1259	1034	1	61	2355
Vehicles Exited	1261	1035	1	61	2358
Hourly Exit Rate	1261	1035	1	61	2358
Input Volume	1256	1020	1	65	2342
% of Volume	100	101	100	94	101
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

224: Exit Ramp #1 & WB-NB Helvetia Performance by movement

Movement	WBT	WBR	All
Total Delay (hr)	0.4	0.0	0.4
Delay / Veh (s)	1.8	1.8	1.8
Vehicles Entered	695	62	757
Vehicles Exited	695	62	757
Hourly Exit Rate	695	62	757
Input Volume	685	65	750
% of Volume	101	95	101
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy #1 Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.5	0.2	0.7	1.6	0.1	0.5	3.6
Delay / Veh (s)	51.6	10.3	2.2	6.8	41.3	1.8	4.1
Vehicles Entered	32	70	1229	819	12	1032	3194
Vehicles Exited	32	71	1227	818	12	1031	3191
Hourly Exit Rate	32	71	1227	818	12	1031	3191
Input Volume	30	70	1226	870	10	1019	3226
% of Volume	106	101	100	94	120	101	99
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

231: US-26 EB Helvetia On-ramp & Performance by movement

Movement	EBT	All
Total Delay (hr)	58.8	58.8
Delay / Veh (s)	259.0	259.0
Vehicles Entered	833	833
Vehicles Exited	802	802
Hourly Exit Rate	802	802
Input Volume	909	909
% of Volume	88	88
Denied Entry Before	1	1
Denied Entry After	24	24

240: Meek Rd & Brookwood Pkwy Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	0.4	0.5	0.2	11.0	0.2	0.0	12.3
Delay / Veh (s)	106.9	37.9	10.7	19.5	0.7	0.4	13.6
Vehicles Entered	15	44	71	2040	1068	30	3268
Vehicles Exited	15	45	72	2022	1067	30	3251
Hourly Exit Rate	15	45	72	2022	1067	30	3251
Input Volume	15	40	70	2070	1056	30	3282
% of Volume	98	112	102	98	101	101	99
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

Total Network Performance

Total Delay (hr)	105.1
Delay / Veh (s)	106.5
Vehicles Entered	3591
Vehicles Exited	3519
Hourly Exit Rate	3519
Input Volume	31378
% of Volume	11
Denied Entry Before	1
Denied Entry After	24

Intersection: 200: Schaff Rd & Helvetia Rd

Movement	WB
Directions Served	LR
Maximum Queue (ft)	32
Average Queue (ft)	4
95th Queue (ft)	21
Link Distance (ft)	549
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 210: Jacobson Rd & Helvetia Rd

Movement	WB	B211	NB	SB
Directions Served	LR	T	R	LT
Maximum Queue (ft)	336	28	10	71
Average Queue (ft)	139	2	0	4
95th Queue (ft)	285	30	5	35
Link Distance (ft)	396	948	883	410
Upstream Blk Time (%)	2			
Queuing Penalty (veh)	0			
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 215: Loop Ramp #1 & Helvetia Rd

Movement	EB	EB	NB	NB	NB	SB	SB
Directions Served	R	R	L	T	T	T	T>
Maximum Queue (ft)	83	66	223	274	248	120	151
Average Queue (ft)	43	46	116	74	57	54	73
95th Queue (ft)	71	68	210	224	183	97	123
Link Distance (ft)	914	914		244	244	883	
Upstream Blk Time (%)			0	1	0		
Queuing Penalty (veh)			0	4	1		
Storage Bay Dist (ft)			200				415
Storage Blk Time (%)			1	1			
Queuing Penalty (veh)			4	2			

Intersection: 220: Helvetia Rd/Brookwood Pkwy #1 & WB-NB Helvetia

Movement	NB	NB	NW
Directions Served	T	T	R
Maximum Queue (ft)	59	36	98
Average Queue (ft)	2	1	35
95th Queue (ft)	33	26	70
Link Distance (ft)	633	633	1445
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 224: Exit Ramp #1 & WB-NB Helvetia

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy #1

Movement	EB	EB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LR	R	T	T	R	L	T	T	T
Maximum Queue (ft)	116	66	165	149	210	51	52	102	110
Average Queue (ft)	42	31	52	41	110	10	5	16	30
95th Queue (ft)	90	56	129	108	257	32	27	56	79
Link Distance (ft)	1130		136	136	136		633	633	633
Upstream Blk Time (%)			1	0	14				
Queuing Penalty (veh)			5	2	98				
Storage Bay Dist (ft)		300				175			
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 231: US-26 EB Helvetia On-ramp &

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	878	1060
Average Queue (ft)	753	862
95th Queue (ft)	1044	1263
Link Distance (ft)	960	960
Upstream Blk Time (%)		34
Queuing Penalty (veh)		147
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 240: Meek Rd & Brookwood Pkwy

Movement	EB	NB	NB	NB	NB	B251	B251	B2	B2	B3	B3	SB
Directions Served	LR	L	T	T	TR	T	T	T	T	T	T	TR
Maximum Queue (ft)	177	90	150	707	612	1149	1187	149	193	11	23	26
Average Queue (ft)	56	33	9	350	337	356	400	26	38	1	2	1
95th Queue (ft)	127	71	95	921	822	1137	1217	173	209	8	17	11
Link Distance (ft)	591		620	620		1281	1281	1111	1111	1032	1032	136
Upstream Blk Time (%)			0	17	9	0	3					
Queuing Penalty (veh)			0	0	0	0	0					
Storage Bay Dist (ft)		100			600							
Storage Blk Time (%)		0		4	21							
Queuing Penalty (veh)		1		28	145							

Network Summary

Network wide Queuing Penalty: 437

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description:	Eastbound Off-ramp to Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2300	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	305	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2300	305		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	605	80		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2469	327	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2469 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2469	4600	No
$v_{FO} = v_F - v_R$	2142	4600	No
v_R	327	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 2469		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2469	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 12.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.457	
Space mean speed in ramp influence area,	S_R = 51.8	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.8	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	AM Peak Period
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description: Eastbound	On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1985	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	530	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1985	530		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	522	139		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2131	569	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2131 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2700	4600	No

$v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 2131 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2131	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_{R} + 0.0078 v_{12} - 0.00627 L_A$ = 23.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.350

Space mean speed in ramp influence area, S_R = 53.7 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.7 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description:	Westbound 1-lane Off-ramp to Northbound Helvetia

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3140	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	65	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3140	65		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	826	17		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3371	70	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3371 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3371	4600	No
$v_{FO} = v_F - v_R$	3301	4600	No
v_R	70	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 $v_{12}/2$	No	
If yes, v_{12A} = 3371		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3371	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 19.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.434	
Space mean speed in ramp influence area,	S_R = 52.2	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 52.2	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description:	Westbound 1-lane Off-ramp to Southbound Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3140	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	1550	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3140	1550		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	826	408		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3371	1664	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3371 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3371	4600	No
$v_{FO} = v_F - v_R$	1707	4600	No
v_R	1664	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 $v_{12}/2$	No	
If yes, v_{12A} = 3371		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3371	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 19.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.578	
Space mean speed in ramp influence area,	S_R = 49.6	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 49.6	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	AM Peak Period
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description:	Westbound On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1515	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	75	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1515	75		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	399	20		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1627	81	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 1627 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	1708	4600	No

v_3 or v_{av34} 0 pc/h (Equation 25-4 or 25-5)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 1627 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1627	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_{R} + 0.0078\ v_{12} - 0.00627\ L_A =$ 16.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.314	
Space mean speed in ramp influence area,	S_R = 54.4	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 54.4	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description:	Eastbound Off-ramp to Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2320	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	100	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2320	100		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	611	26		v
Trucks and buses	1	1		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.995	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2454	106	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2454 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2454	4600	No
$v_{FO} = v - v_F - v_R$	2348	4600	No
v_R	106	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 2454		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2454	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 11.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.438	
Space mean speed in ramp influence area,	S_R = 52.1	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 52.1	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	PM Peak Period
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description: Eastbound	On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2180	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	800	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2180	800		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	574	211		v
Trucks and buses	1	1		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.995	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2306	846	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 2306 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3152	4600	No

$v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 2306 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2306	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_{R} + 0.0078\ v_{12} - 0.00627\ L_A =$ 27.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.383

Space mean speed in ramp influence area, S_R = 53.1 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.1 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description:	Westbound 1-lane Off-ramp to Northbound Helvetia

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3155	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	65	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3155	65		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	830	17		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3338	69	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3338 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3338	4600	No
$v_{FO} = v_F - v_R$	3269	4600	No
v_R	69	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 $v_{12}/2$	No	
If yes, v_{12A} = 3338		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3338	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 19.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.434	
Space mean speed in ramp influence area,	S_R = 52.2	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 52.2	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description:	Westbound 1-lane Off-ramp to Southbound Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2690	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	645	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2690	645		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	708	170		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2846	689	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2846 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2846	4600	No
$v_{FO} = v_F - v_R$	2157	4600	No
v_R	689	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 2846		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2846	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 15.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.490	
Space mean speed in ramp influence area,	S_R = 51.2	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.2	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	PM Peak Period
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description: Westbound	On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2355	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	350	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2355	350		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	620	92		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2491	374	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 2491 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2865	4600	No

$v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 2491 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2491	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_{12} + 0.0078\, v_R - 0.00627\, L_A$ = 25.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.361

Space mean speed in ramp influence area, S_R = 53.5 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.5 mph

Year 2025 Phase 2B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	20	5	210	45	20	385
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	22	6	233	50	22	428
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	731	258			283	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	731	258			283	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	99			98	
cM capacity (veh/h)	384	783			1285	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	28	283	450
Volume Left	22	0	22
Volume Right	6	50	0
cSH	427	1700	1285
Volume to Capacity	0.06	0.17	0.02
Queue Length 95th (ft)	5	0	1
Control Delay (s)	14.0	0.0	0.6
Lane LOS	B		A
Approach Delay (s)	14.0	0.0	0.6
Approach LOS	B		

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	46.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	165	5	250	265	15	390
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	183	6	278	294	17	433
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			937			
pX, platoon unblocked						
vC, conflicting volume	744	278			572	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	744	278			572	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	51	99			98	
cM capacity (veh/h)	377	763			1006	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	189	278	294	450
Volume Left	183	0	0	17
Volume Right	6	0	294	0
cSH	383	1700	1700	1006
Volume to Capacity	0.49	0.16	0.17	0.02
Queue Length 95th (ft)	66	0	0	1
Control Delay (s)	23.2	0.0	0.0	0.5
Lane LOS	C			A
Approach Delay (s)	23.2	0.0		0.5
Approach LOS	C			

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	48.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Lane Configurations									
Volume (vph)	0	1550	45	515	525	0	30	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.0	2.0	2.0	3.0				
Lane Util. Factor		*1.00	1.00	0.95	0.95				
Frt		0.85	1.00	1.00	0.99				
Flt Protected		1.00	0.95	1.00	1.00				
Satd. Flow (prot)		2917	1309	3260	3265				
Flt Permitted		1.00	0.95	1.00	1.00				
Satd. Flow (perm)		2917	1309	3260	3265				
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	1582	46	526	536	0	31	0	0
RTOR Reduction (vph)	0	155	0	0	8	0	0	0	0
Lane Group Flow (vph)	0	1427	46	526	559	0	0	0	0
Heavy Vehicles (%)	2%	2%	27%	2%	1%	2%	1%	0%	0%
Turn Type		custom	Prot						
Protected Phases		8	3	3 6	2				
Permitted Phases									
Actuated Green, G (s)		33.4	34.4	60.0	16.6				
Effective Green, g (s)		35.4	36.4	57.0	18.6				
Actuated g/C Ratio		0.59	0.61	0.95	0.31				
Clearance Time (s)		5.0	4.0		5.0				
Vehicle Extension (s)		5.2	2.3		5.2				
Lane Grp Cap (vph)		1721	794	3097	1012				
v/s Ratio Prot		c0.49	0.04	0.16	c0.17				
v/s Ratio Perm									
v/c Ratio		0.83	0.06	0.17	0.55				
Uniform Delay, d1		9.9	4.8	0.1	17.2				
Progression Factor		1.00	0.80	1.00	1.00				
Incremental Delay, d2		4.8	0.0	0.0	1.2				
Delay (s)		14.7	3.9	0.1	18.4				
Level of Service		B	A	A	B				
Approach Delay (s)	14.7			0.4	18.4			0.0	
Approach LOS	B			A	B			A	

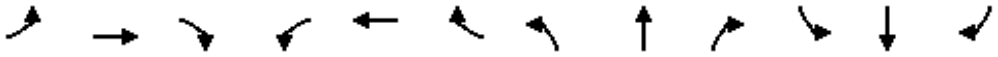
Intersection Summary			
HCM Average Control Delay	12.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Volume (veh/h)	495	0	0	2075	0	65
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	505	0	0	2117	0	66
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	706			298		
pX, platoon unblocked			0.99		0.88	0.99
vC, conflicting volume			505		1564	253
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			482		1313	227
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	91
cM capacity (veh/h)			1081		134	775

Direction, Lane #	NB 1	NB 2	SB 1	SB 2	NW 1
Volume Total	253	253	1059	1059	66
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	66
cSH	1700	1700	1700	1700	775
Volume to Capacity	0.15	0.15	0.62	0.62	0.09
Queue Length 95th (ft)	0	0	0	0	7
Control Delay (s)	0.0	0.0	0.0	0.0	10.1
Lane LOS					B
Approach Delay (s)	0.0		0.0		10.1
Approach LOS					B

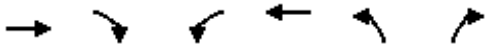
Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	78.2%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	75	0	230	0	0	0	0	420	490	35	2040	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.0	3.0					3.0	3.0	2.0	3.0	
Lane Util. Factor		0.95	0.95					0.95	1.00	1.00	0.95	
Frt		0.92	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.98	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1410	1262					3137	1430	1662	3260	
Flt Permitted		0.98	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1410	1262					3137	1430	1662	3260	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	77	0	235	0	0	0	0	429	500	36	2082	0
RTOR Reduction (vph)	0	22	22	0	0	0	0	0	126	0	0	0
Lane Group Flow (vph)	0	137	131	0	0	0	0	429	374	36	2082	0
Heavy Vehicles (%)	0%	0%	12%	0%	0%	0%	0%	6%	4%	0%	2%	0%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		8						6		5	2	
Permitted Phases	8		8						6			
Actuated Green, G (s)		14.3	14.3					87.7	87.7	4.0	95.7	
Effective Green, g (s)		16.3	16.3					89.7	89.7	6.0	97.7	
Actuated g/C Ratio		0.14	0.14					0.75	0.75	0.05	0.81	
Clearance Time (s)		5.0	5.0					5.0	5.0	4.0	5.0	
Vehicle Extension (s)		2.3	2.3					4.7	4.7	2.3	4.7	
Lane Grp Cap (vph)		192	171					2345	1069	83	2654	
v/s Ratio Prot								0.14		0.02	c0.64	
v/s Ratio Perm		0.10	c0.10						0.26			
v/c Ratio		0.71	0.76					0.18	0.35	0.43	0.78	
Uniform Delay, d1		49.6	50.0					4.4	5.2	55.4	5.7	
Progression Factor		1.00	1.00					1.00	1.00	0.97	0.79	
Incremental Delay, d2		10.5	17.0					0.2	0.9	1.4	1.6	
Delay (s)		60.1	67.0					4.6	6.1	55.2	6.1	
Level of Service		E	E					A	A	E	A	
Approach Delay (s)		63.5			0.0			5.4			6.9	
Approach LOS		E			A			A			A	

Intersection Summary			
HCM Average Control Delay	11.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	78.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	525	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3471					
Flt Permitted	1.00					
Satd. Flow (perm)	3471					
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	571	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	571	0	0	0	0	0
Heavy Vehicles (%)	4%	0%	0%	0%	0%	0%
Turn Type						
Protected Phases	2					
Permitted Phases						
Actuated Green, G (s)	2.2					
Effective Green, g (s)	2.2					
Actuated g/C Ratio	0.18					
Clearance Time (s)	2.0					
Vehicle Extension (s)	3.0					
Lane Grp Cap (vph)	642					
v/s Ratio Prot	c0.16					
v/s Ratio Perm						
v/c Ratio	0.89					
Uniform Delay, d1	4.7					
Progression Factor	1.00					
Incremental Delay, d2	14.2					
Delay (s)	18.9					
Level of Service	B					
Approach Delay (s)	18.9			0.0	0.0	
Approach LOS	B			A	A	

Intersection Summary			
HCM Average Control Delay	18.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	11.9	Sum of lost time (s)	9.7
Intersection Capacity Utilization	17.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	30	0	45	0	0	0	20	880	0	0	2260	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	31	0	46	0	0	0	20	898	0	0	2306	10
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											189	
pX, platoon unblocked	0.19	0.19	0.19	0.19	0.19		0.19					
vC, conflicting volume	2651	3250	1158	2138	3255	299	2316			898		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1211	4282	0	0	4309	299	0			898		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	78	100	100	100	94			100		
cM capacity (veh/h)	26	0	213	150	0	703	319			765		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2
Volume Total	77	0	20	359	359	180	1153	1163
Volume Left	31	0	20	0	0	0	0	0
Volume Right	46	0	0	0	0	0	0	10
cSH	55	1700	319	1700	1700	1700	765	1700
Volume to Capacity	1.39	0.00	0.06	0.21	0.21	0.11	0.00	0.68
Queue Length 95th (ft)	172	0	5	0	0	0	0	0
Control Delay (s)	380.0	0.0	17.1	0.0	0.0	0.0	0.0	0.0
Lane LOS	F	A	C					
Approach Delay (s)	380.0	0.0	0.4				0.0	
Approach LOS	F	A						

Intersection Summary				
Average Delay	8.9			
Intersection Capacity Utilization	73.9%	ICU Level of Service	D	
Analysis Period (min)	15			

200: Schaff Rd & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.0	0.1	0.0	0.0	0.1	0.2
Delay / Veh (s)	8.0	2.5	1.2	0.3	2.2	0.8	1.2
Vehicles Entered	21	6	204	40	19	392	682
Vehicles Exited	21	6	203	39	19	392	680
Hourly Exit Rate	21	6	203	39	19	392	680
Input Volume	20	5	211	45	20	385	686
% of Volume	106	114	96	87	96	102	99
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

210: Jacobson Rd & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.6	0.0	0.2	0.3	0.0	0.1	1.3
Delay / Veh (s)	13.6	9.2	2.8	4.6	5.4	1.0	4.2
Vehicles Entered	163	6	248	266	10	403	1096
Vehicles Exited	162	6	247	268	10	403	1096
Hourly Exit Rate	162	6	247	268	10	403	1096
Input Volume	165	5	262	265	15	390	1102
% of Volume	98	114	94	101	68	103	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

215: Loop Ramp #1 & Helvetia Rd Performance by movement

Movement	EBT	EBR	NBL	NBT	SBT	SBR2	All
Total Delay (hr)	0.0	6.4	0.3	1.7	2.9	0.1	11.4
Delay / Veh (s)	1.1	14.9	26.1	11.9	18.8	14.1	15.1
Vehicles Entered	23	1562	41	509	548	30	2713
Vehicles Exited	23	1561	41	510	549	31	2715
Hourly Exit Rate	23	1561	41	510	549	31	2715
Input Volume	26	1550	45	522	538	30	2711
% of Volume	89	101	91	98	102	102	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

220: Helvetia Rd/Brookwood Pkwy #1 & WB-NB Helvetia Performance by movement

Movement	NBT	SBT	NWT	NWR	All
Total Delay (hr)	0.3	0.9	0.0	0.1	1.3
Delay / Veh (s)	2.0	1.6	0.1	4.3	1.7
Vehicles Entered	484	2112	3	63	2662
Vehicles Exited	484	2112	3	64	2663
Hourly Exit Rate	484	2112	3	64	2663
Input Volume	500	2090	2	65	2657
% of Volume	97	101	150	98	100
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

224: Exit Ramp #1 & WB-NB Helvetia Performance by movement

Movement	WBT	WBR	All
Total Delay (hr)	0.8	0.1	0.9
Delay / Veh (s)	1.9	3.1	2.0
Vehicles Entered	1559	65	1624
Vehicles Exited	1559	64	1623
Hourly Exit Rate	1559	64	1623
Input Volume	1550	65	1615
% of Volume	101	98	100
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy #1 Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	1.5	3.5	0.5	0.3	0.6	6.0	12.5
Delay / Veh (s)	74.5	52.9	4.7	2.5	66.4	10.4	13.5
Vehicles Entered	70	236	407	486	33	2085	3317
Vehicles Exited	72	235	407	486	34	2084	3318
Hourly Exit Rate	72	235	407	486	34	2084	3318
Input Volume	75	230	420	490	35	2060	3310
% of Volume	96	102	97	99	96	101	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

231: US-26 EB Helvetia On-ramp & Performance by movement

Movement	EBT	All
Total Delay (hr)	2.2	2.2
Delay / Veh (s)	14.7	14.7
Vehicles Entered	532	532
Vehicles Exited	533	533
Hourly Exit Rate	533	533
Input Volume	535	535
% of Volume	100	100
Denied Entry Before	0	0
Denied Entry After	0	0

240: Meek Rd & Brookwood Pkwy Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	11.0	14.6	0.2	0.9	1.3	0.0	28.0
Delay / Veh (s)	1805.4	1806.3	45.8	3.9	2.0	0.6	30.9
Vehicles Entered	26	33	16	874	2311	12	3272
Vehicles Exited	19	26	16	874	2312	12	3259
Hourly Exit Rate	19	26	16	874	2312	12	3259
Input Volume	30	45	20	880	2284	10	3269
% of Volume	63	57	80	99	101	120	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	6	8	0	0	1	0	15

Total Network Performance

Total Delay (hr)	70.5
Delay / Veh (s)	70.1
Vehicles Entered	3625
Vehicles Exited	3613
Hourly Exit Rate	3613
Input Volume	34611
% of Volume	10
Denied Entry Before	0
Denied Entry After	15

Intersection: 200: Schaff Rd & Helvetia Rd

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	62	57
Average Queue (ft)	21	3
95th Queue (ft)	51	27
Link Distance (ft)	549	349
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 210: Jacobson Rd & Helvetia Rd

Movement	WB	NB	SB
Directions Served	LR	R	LT
Maximum Queue (ft)	149	21	64
Average Queue (ft)	67	1	8
95th Queue (ft)	115	13	45
Link Distance (ft)	396	883	410
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 215: Loop Ramp #1 & Helvetia Rd

Movement	EB	EB	NB	NB	NB	SB	SB
Directions Served	R	R	L	T	T	T	T>
Maximum Queue (ft)	432	448	118	221	210	163	182
Average Queue (ft)	217	259	39	89	81	97	113
95th Queue (ft)	361	393	86	178	175	151	167
Link Distance (ft)	926	926		243	243	883	
Upstream Blk Time (%)				0	0		
Queuing Penalty (veh)				0	0		
Storage Bay Dist (ft)			200				415
Storage Blk Time (%)			0	0			
Queuing Penalty (veh)			0	0			

Intersection: 220: Helvetia Rd/Brookwood Pkwy #1 & WB-NB Helvetia

Movement	NW
Directions Served	R
Maximum Queue (ft)	60
Average Queue (ft)	30
95th Queue (ft)	47
Link Distance (ft)	1346
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 224: Exit Ramp #1 & WB-NB Helvetia

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy #1

Movement	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	LR	R	T	T	R	L	T	T
Maximum Queue (ft)	270	259	110	124	86	91	440	480
Average Queue (ft)	157	147	48	44	4	35	163	220
95th Queue (ft)	230	227	102	97	38	74	339	402
Link Distance (ft)	1144		133	133	133		638	638
Upstream Blk Time (%)			0	0	0			0
Queuing Penalty (veh)			0	0	0			0
Storage Bay Dist (ft)		300				175		
Storage Blk Time (%)	0	0					3	
Queuing Penalty (veh)	0	0					1	

Intersection: 231: US-26 EB Helvetia On-ramp &

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	79	101
Average Queue (ft)	42	60
95th Queue (ft)	72	89
Link Distance (ft)	960	960
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 240: Meek Rd & Brookwood Pkwy

Movement	EB	NB	NB	NB	NB	SB	SB
Directions Served	LR	L	T	T	TR	LT	TR
Maximum Queue (ft)	622	59	23	18	6	7	10
Average Queue (ft)	546	17	1	1	0	0	0
95th Queue (ft)	756	47	21	8	5	5	4
Link Distance (ft)	603		620	620		133	133
Upstream Blk Time (%)	61						
Queuing Penalty (veh)	0						
Storage Bay Dist (ft)		100			200		
Storage Blk Time (%)		0	0				
Queuing Penalty (veh)		0	0				

Network Summary

Network wide Queuing Penalty: 3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	5	0	550	25	0	210
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	5	0	591	27	0	226
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	831	605			618	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	831	605			618	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	100			100	
cM capacity (veh/h)	342	501			972	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	5	618	226
Volume Left	5	0	0
Volume Right	0	27	0
cSH	342	1700	972
Volume to Capacity	0.02	0.36	0.00
Queue Length 95th (ft)	1	0	0
Control Delay (s)	15.7	0.0	0.0
Lane LOS	C		
Approach Delay (s)	15.7	0.0	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	40.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	230	5	570	495	5	210
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	256	6	633	550	6	233
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			937			
pX, platoon unblocked						
vC, conflicting volume	878	633			1183	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	878	633			1183	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	19	99			99	
cM capacity (veh/h)	317	483			597	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	261	633	550	239
Volume Left	256	0	0	6
Volume Right	6	0	550	0
cSH	319	1700	1700	597
Volume to Capacity	0.82	0.37	0.32	0.01
Queue Length 95th (ft)	173	0	0	1
Control Delay (s)	51.7	0.0	0.0	0.4
Lane LOS	F			A
Approach Delay (s)	51.7	0.0		0.4
Approach LOS	F			

Intersection Summary			
Average Delay	8.1		
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Lane Configurations									
Volume (vph)	0	685	245	1065	335	0	105	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.0	2.0	2.0	3.0				
Lane Util. Factor		*1.00	1.00	0.95	0.95				
Frt		0.85	1.00	1.00	0.96				
Flt Protected		1.00	0.95	1.00	1.00				
Satd. Flow (prot)		2975	1646	3292	3206				
Flt Permitted		1.00	0.95	1.00	1.00				
Satd. Flow (perm)		2975	1646	3292	3206				
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	737	263	1145	360	0	113	0	0
RTOR Reduction (vph)	0	382	0	0	61	0	0	0	0
Lane Group Flow (vph)	0	355	263	1145	412	0	0	0	0
Heavy Vehicles (%)	0%	0%	1%	1%	0%	0%	0%	0%	0%
Turn Type		custom	Prot						
Protected Phases		8	3	3 6	2				
Permitted Phases									
Actuated Green, G (s)		24.5	25.5	55.0	20.5				
Effective Green, g (s)		26.5	27.5	52.0	22.5				
Actuated g/C Ratio		0.48	0.50	0.95	0.41				
Clearance Time (s)		5.0	4.0		5.0				
Vehicle Extension (s)		5.2	2.3		5.2				
Lane Grp Cap (vph)		1433	823	3112	1312				
v/s Ratio Prot		0.12	0.16	c0.35	0.13				
v/s Ratio Perm									
v/c Ratio		0.25	0.32	0.37	0.31				
Uniform Delay, d1		8.4	8.2	0.1	11.0				
Progression Factor		1.00	0.97	1.00	1.00				
Incremental Delay, d2		0.4	0.1	0.0	0.3				
Delay (s)		8.8	8.0	0.2	11.3				
Level of Service		A	A	A	B				
Approach Delay (s)	8.8			1.6	11.3			0.0	
Approach LOS	A			A	B			A	

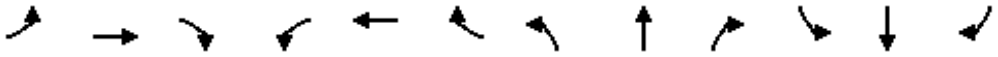
Intersection Summary			
HCM Average Control Delay	5.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	2.0
Intersection Capacity Utilization	46.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Volume (veh/h)	1245	0	0	1020	0	65
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	1339	0	0	1097	0	70
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	706			298		
pX, platoon unblocked			0.88		0.91	0.88
vC, conflicting volume			1339		1887	669
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1122		1540	365
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	88
cM capacity (veh/h)			557		98	564

Direction, Lane #	NB 1	NB 2	SB 1	SB 2	NW 1
Volume Total	669	669	548	548	70
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	70
cSH	1700	1700	1700	1700	564
Volume to Capacity	0.39	0.39	0.32	0.32	0.12
Queue Length 95th (ft)	0	0	0	0	11
Control Delay (s)	0.0	0.0	0.0	0.0	12.3
Lane LOS					B
Approach Delay (s)	0.0		0.0		12.3
Approach LOS					B

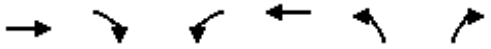
Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	75.2%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	0	70	0	0	0	0	1215	870	10	1010	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.0	3.0					3.0	3.0	2.0	3.0	
Lane Util. Factor		0.95	0.95					0.95	1.00	1.00	0.95	
Frt		0.94	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.97	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1513	1413					3292	1473	1662	3325	
Flt Permitted		0.97	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1513	1413					3292	1473	1662	3325	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	31	0	73	0	0	0	0	1266	906	10	1052	0
RTOR Reduction (vph)	0	21	46	0	0	0	0	0	167	0	0	0
Lane Group Flow (vph)	0	33	4	0	0	0	0	1266	739	10	1052	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		8						6		5	2	
Permitted Phases	8		8						6			
Actuated Green, G (s)		7.5	7.5					87.7	87.7	0.8	92.5	
Effective Green, g (s)		9.5	9.5					89.7	89.7	2.8	94.5	
Actuated g/C Ratio		0.09	0.09					0.82	0.82	0.03	0.86	
Clearance Time (s)		5.0	5.0					5.0	5.0	4.0	5.0	
Vehicle Extension (s)		2.3	2.3					4.7	4.7	2.3	4.7	
Lane Grp Cap (vph)		131	122					2684	1201	42	2856	
v/s Ratio Prot								0.38		0.01	c0.32	
v/s Ratio Perm		0.02	0.00						c0.50			
v/c Ratio		0.25	0.04					0.47	0.62	0.24	0.37	
Uniform Delay, d1		46.9	46.1					3.0	3.8	52.6	1.6	
Progression Factor		1.00	1.00					1.00	1.00	1.03	0.90	
Incremental Delay, d2		0.6	0.1					0.6	2.4	1.6	0.3	
Delay (s)		47.5	46.1					3.6	6.1	55.6	1.8	
Level of Service		D	D					A	A	E	A	
Approach Delay (s)		46.8			0.0			4.7			2.3	
Approach LOS		D			A			A			A	

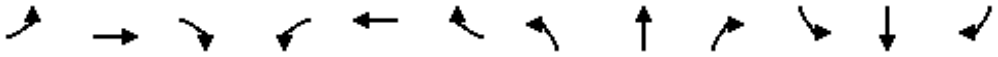
Intersection Summary			
HCM Average Control Delay	5.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	75.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	880	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3471					
Flt Permitted	1.00					
Satd. Flow (perm)	3471					
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	957	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	957	0	0	0	0	0
Heavy Vehicles (%)	4%	0%	0%	0%	0%	0%
Turn Type						
Protected Phases	4					
Permitted Phases						
Actuated Green, G (s)	2.5					
Effective Green, g (s)	2.5					
Actuated g/C Ratio	0.14					
Clearance Time (s)	4.5					
Lane Grp Cap (vph)	482					
v/s Ratio Prot	c0.28					
v/s Ratio Perm						
v/c Ratio	1.99					
Uniform Delay, d1	7.8					
Progression Factor	1.00					
Incremental Delay, d2	450.9					
Delay (s)	458.6					
Level of Service	F					
Approach Delay (s)	458.6			0.0	0.0	
Approach LOS	F			A	A	

Intersection Summary			
HCM Average Control Delay	458.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.99		
Actuated Cycle Length (s)	18.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	28.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	15	0	40	0	0	0	70	2070	0	0	1050	30
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	16	0	43	0	0	0	74	2202	0	0	1117	32
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											189	
pX, platoon unblocked	0.94	0.94	0.94	0.94	0.94		0.94					
vC, conflicting volume	2016	3484	574	2952	3500	734	1149			2202		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1948	3518	407	2949	3535	734	1021			2202		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	53	100	92	100	100	100	88			100		
cM capacity (veh/h)	34	5	561	5	5	367	643			242		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2
Volume Total	59	0	74	881	881	440	559	590
Volume Left	16	0	74	0	0	0	0	0
Volume Right	43	0	0	0	0	0	0	32
cSH	107	1700	643	1700	1700	1700	242	1700
Volume to Capacity	0.55	0.00	0.12	0.52	0.52	0.26	0.00	0.35
Queue Length 95th (ft)	64	0	10	0	0	0	0	0
Control Delay (s)	73.7	0.0	11.3	0.0	0.0	0.0	0.0	0.0
Lane LOS	F	A	B					
Approach Delay (s)	73.7	0.0	0.4				0.0	
Approach LOS	F	A						

Intersection Summary				
Average Delay	1.5			
Intersection Capacity Utilization	68.2%	ICU Level of Service	C	
Analysis Period (min)	15			

200: Schaff Rd & Helvetia Rd Performance by movement

Movement	WBL	NBT	NBR	SBT	All
Total Delay (hr)	0.0	0.1	0.0	0.0	0.2
Delay / Veh (s)	8.8	0.9	0.3	0.3	0.8
Vehicles Entered	7	536	23	214	780
Vehicles Exited	7	534	23	214	778
Hourly Exit Rate	7	534	23	214	778
Input Volume	5	555	25	210	795
% of Volume	140	96	93	102	98
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

210: Jacobson Rd & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	1.8	0.0	0.3	0.6	0.0	0.1	2.8
Delay / Veh (s)	28.3	14.0	2.2	4.4	17.4	1.1	6.9
Vehicles Entered	232	5	564	469	4	220	1494
Vehicles Exited	230	5	562	466	4	220	1487
Hourly Exit Rate	230	5	562	466	4	220	1487
Input Volume	230	5	580	495	5	212	1528
% of Volume	100	95	97	94	76	104	97
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

215: Loop Ramp #1 & Helvetia Rd Performance by movement

Movement	EBT	EBR	NBL	NBT	SBT	SBR2	All
Total Delay (hr)	0.0	0.9	1.1	1.4	1.3	0.3	5.1
Delay / Veh (s)	0.1	4.8	17.2	4.8	13.8	10.1	7.5
Vehicles Entered	13	698	236	1022	342	112	2423
Vehicles Exited	13	698	237	1023	343	112	2426
Hourly Exit Rate	13	698	237	1023	343	112	2426
Input Volume	14	685	245	1065	341	105	2454
% of Volume	96	102	97	96	101	107	99
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

220: Helvetia Rd/Brookwood Pkwy #1 & WB-NB Helvetia Performance by movement

Movement	NBT	SBT	NWT	NWR	All
Total Delay (hr)	0.8	0.4	0.0	0.2	1.4
Delay / Veh (s)	2.5	1.3	0.3	12.1	2.2
Vehicles Entered	1201	1036	1	64	2302
Vehicles Exited	1204	1034	1	64	2303
Hourly Exit Rate	1204	1034	1	64	2303
Input Volume	1256	1020	1	65	2342
% of Volume	96	101	100	99	98
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

224: Exit Ramp #1 & WB-NB Helvetia Performance by movement

Movement	WBT	WBR	All
Total Delay (hr)	0.1	0.0	0.2
Delay / Veh (s)	0.7	1.5	0.8
Vehicles Entered	696	64	760
Vehicles Exited	695	65	760
Hourly Exit Rate	695	65	760
Input Volume	685	65	750
% of Volume	101	100	101
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy #1 Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.5	0.2	0.7	1.7	0.2	0.6	3.9
Delay / Veh (s)	60.9	11.9	2.1	7.3	51.5	2.2	4.5
Vehicles Entered	30	73	1177	826	12	1029	3147
Vehicles Exited	30	73	1174	825	12	1028	3142
Hourly Exit Rate	30	73	1174	825	12	1028	3142
Input Volume	30	70	1226	870	10	1019	3226
% of Volume	99	104	96	95	120	101	97
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

231: US-26 EB Helvetia On-ramp & Performance by movement

Movement	EBT	All
Total Delay (hr)	56.7	56.7
Delay / Veh (s)	248.3	248.6
Vehicles Entered	842	842
Vehicles Exited	802	802
Hourly Exit Rate	802	802
Input Volume	909	909
% of Volume	88	88
Denied Entry Before	0	0
Denied Entry After	21	21

240: Meek Rd & Brookwood Pkwy Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	0.7	1.1	0.2	12.4	0.2	0.0	14.6
Delay / Veh (s)	227.8	104.9	9.0	22.3	0.8	0.3	16.4
Vehicles Entered	11	40	70	1999	1068	31	3219
Vehicles Exited	11	39	70	1983	1066	31	3200
Hourly Exit Rate	11	39	70	1983	1066	31	3200
Input Volume	15	40	70	2070	1056	30	3282
% of Volume	72	98	100	96	101	104	98
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

Total Network Performance

Total Delay (hr)	110.2
Delay / Veh (s)	113.1
Vehicles Entered	3568
Vehicles Exited	3451
Hourly Exit Rate	3451
Input Volume	31378
% of Volume	11
Denied Entry Before	0
Denied Entry After	21

Intersection: 200: Schaff Rd & Helvetia Rd

Movement	WB
Directions Served	LR
Maximum Queue (ft)	32
Average Queue (ft)	6
95th Queue (ft)	26
Link Distance (ft)	549
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 210: Jacobson Rd & Helvetia Rd

Movement	WB	NB	SB
Directions Served	LR	R	LT
Maximum Queue (ft)	312	21	102
Average Queue (ft)	121	1	8
95th Queue (ft)	238	9	47
Link Distance (ft)	396	883	410
Upstream Blk Time (%)	0		
Queuing Penalty (veh)	0		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 215: Loop Ramp #1 & Helvetia Rd

Movement	EB	EB	NB	NB	NB	SB	SB
Directions Served	R	R	L	T	T	T	T>
Maximum Queue (ft)	126	143	223	303	228	117	141
Average Queue (ft)	58	69	114	85	67	58	84
95th Queue (ft)	99	112	203	253	197	97	130
Link Distance (ft)	926	926		243	243	883	
Upstream Blk Time (%)			0	1	0		
Queuing Penalty (veh)			0	7	0		
Storage Bay Dist (ft)			200				415
Storage Blk Time (%)			1	1			
Queuing Penalty (veh)			3	3			

Intersection: 220: Helvetia Rd/Brookwood Pkwy #1 & WB-NB Helvetia

Movement	NB	NW
Directions Served	T	R
Maximum Queue (ft)	48	84
Average Queue (ft)	4	35
95th Queue (ft)	30	65
Link Distance (ft)	638	1346
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 224: Exit Ramp #1 & WB-NB Helvetia

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy #1

Movement	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	LR	R	T	T	R	L	T	T
Maximum Queue (ft)	97	70	147	128	208	54	117	121
Average Queue (ft)	42	34	51	36	118	11	22	38
95th Queue (ft)	84	59	128	98	258	39	70	96
Link Distance (ft)	1144		133	133	133		638	638
Upstream Blk Time (%)			1	0	16			
Queuing Penalty (veh)			6	1	113			
Storage Bay Dist (ft)		300				175		
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 231: US-26 EB Helvetia On-ramp &

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	898	1067
Average Queue (ft)	750	867
95th Queue (ft)	1107	1327
Link Distance (ft)	960	960
Upstream Blk Time (%)		36
Queuing Penalty (veh)		159
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 240: Meek Rd & Brookwood Pkwy

Movement	EB	NB	NB	NB	NB	B251	B251	B2	B2	B3	B3	SB
Directions Served	LR	L	T	T	TR	T	T	T	T	T	T	TR
Maximum Queue (ft)	216	79	616	703	225	1127	1180	607	624	177	197	10
Average Queue (ft)	78	31	109	404	146	409	445	99	115	11	13	0
95th Queue (ft)	200	63	462	943	318	1273	1329	547	602	137	146	5
Link Distance (ft)	603		620	620		1281	1281	1111	1111	1032	1032	133
Upstream Blk Time (%)			0	24		1	5	0	1			
Queuing Penalty (veh)			0	0		0	0	0	0			
Storage Bay Dist (ft)		100			200							
Storage Blk Time (%)		0	0	0	30							
Queuing Penalty (veh)		0	0	0	205							

Network Summary

Network wide Queuing Penalty: 498

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description:	Eastbound Off-ramp to Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2300	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	305	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2300	305		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	605	80		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2469	327	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v - v_F) P_{FD} = 2469$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2469	4600	No
$v_{FO} = v - v_F - v_R$	2142	4600	No
v_R	327	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 2469 (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2469	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 12.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.457	
Space mean speed in ramp influence area,	S_R = 51.8	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.8	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	AM Peak Period
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description: Eastbound	On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1985	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	530	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1985	530		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	522	139		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2131	569	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2131 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2700	4600	No

$v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 2131 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2131	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_{R} + 0.0078 v_{12} - 0.00627 L_A$ = 23.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.350	
Space mean speed in ramp influence area,	S_R = 53.7	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 53.7	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description:	Westbound 1-lane Off-ramp to Northbound Helvetia

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3140	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	65	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3140	65		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	826	17		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3371	70	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3371 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3371	4600	No
$v_{FO} = v_F - v_R$	3301	4600	No
v_R	70	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 $v_{12}/2$	No	
If yes, v_{12A} = 3371		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3371	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 19.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.434	
Space mean speed in ramp influence area,	S_R = 52.2	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 52.2	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description:	Westbound 2-lane Off-ramp to Southbound Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3140	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	1550	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane	0	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3140	1550		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	826	408		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3371	1664	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3371 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3371	4600	No
$v_{FO} = v_F - v_R$	1707	4600	No
v_R	1664	3800	No
$v_{3 \text{ or } av34}$	0 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34} > 2700$ pc/h?		No	
Is $v_{3 \text{ or } av34} > 1.5\, v_{12}/2$		No	
If yes, v_{12A} = 3371		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3371	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 6.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	D_S = 0.578	
Space mean speed in ramp influence area,	S_R = 49.6	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 49.6	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	AM Peak Period
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description:	Westbound On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	1515	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	75	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1515	75		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	399	20		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1627	81	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 1627 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	1708	4600	No

v_3 or v_{av34} 0 pc/h (Equation 25-4 or 25-5)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 1627 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1627	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_{R} + 0.0078\ v_{12} - 0.00627\ L_A =$ 16.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.314	
Space mean speed in ramp influence area,	S_R = 54.4	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 54.4	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description:	Eastbound Off-ramp to Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2320	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	100	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2320	100		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	611	26		v
Trucks and buses	1	1		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.995	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2454	106	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2454 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2454	4600	No
$v_{FO} = v - v_F - v_R$	2348	4600	No
v_R	106	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 2454 (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2454	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 11.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.438	
Space mean speed in ramp influence area,	S_R = 52.1	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 52.1	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	PM Peak Period
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description: Eastbound	On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2180	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	800	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2180	800		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	574	211		v
Trucks and buses	1	1		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.995	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2306	846	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 2306 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3152	4600	No

$v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 2306 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2306	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_{R} + 0.0078\, v_{12} - 0.00627\, L_A =$ 27.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.383

Space mean speed in ramp influence area, S_R = 53.1 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.1 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description:	Westbound 1-lane Off-ramp to Northbound Helvetia

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3155	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	65	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3155	65		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	830	17		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3338	69	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3338 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3338	4600	No
$v_{FO} = v_F - v_R$	3269	4600	No
v_R	69	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 $v_{12}/2$	No	
If yes, v_{12A} = 3338		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3338	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 19.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.434	
Space mean speed in ramp influence area,	S_R = 52.2	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 52.2	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description:	Westbound 2-lane Off-ramp to Southbound Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3155	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	685	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane	0	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3155	685		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	830	180		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3338	732	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3338 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3338	4600	No
$v_{FO} = v_F - v_R$	2606	4600	No
v_R	732	3800	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 3338		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3338	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 6.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	D_S = 0.494	
Space mean speed in ramp influence area,	S_R = 51.1	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.1	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	PM Peak Period
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2025
Description: Westbound	On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2355	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	350	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2355	350		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	620	92		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2491	374	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 2491 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2865	4600	No

$v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 2491 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2491	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_{12} + 0.0078\, v_R - 0.00627\, L_A$ = 25.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.361	
Space mean speed in ramp influence area,	S_R = 53.5	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 53.5	mph

Year 2035 Phase 2B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	45	10	165	205	45	410
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	50	11	183	228	50	456
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	853	297			411	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	853	297			411	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	84	99			96	
cM capacity (veh/h)	317	745			1153	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	61	411	506
Volume Left	50	0	50
Volume Right	11	228	0
cSH	354	1700	1153
Volume to Capacity	0.17	0.24	0.04
Queue Length 95th (ft)	15	0	3
Control Delay (s)	17.3	0.0	1.3
Lane LOS	C		A
Approach Delay (s)	17.3	0.0	1.3
Approach LOS	C		

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	155	5	365	275	15	440
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	172	6	406	306	17	489
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			937			
pX, platoon unblocked						
vC, conflicting volume	928	406			711	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	928	406			711	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	41	99			98	
cM capacity (veh/h)	293	647			893	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	178	406	306	506
Volume Left	172	0	0	17
Volume Right	6	0	306	0
cSH	298	1700	1700	893
Volume to Capacity	0.60	0.24	0.18	0.02
Queue Length 95th (ft)	89	0	0	1
Control Delay (s)	33.4	0.0	0.0	0.5
Lane LOS	D			A
Approach Delay (s)	33.4	0.0		0.5
Approach LOS	D			

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	50.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Lane Configurations									
Volume (vph)	0	1795	60	640	565	0	30	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.0	2.0	2.0	3.0				
Lane Util. Factor		*1.00	1.00	0.95	0.95				
Frt		0.85	1.00	1.00	0.99				
Flt Protected		1.00	0.95	1.00	1.00				
Satd. Flow (prot)		2917	1309	3260	3267				
Flt Permitted		1.00	0.95	1.00	1.00				
Satd. Flow (perm)		2917	1309	3260	3267				
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	1832	61	653	577	0	31	0	0
RTOR Reduction (vph)	0	138	0	0	7	0	0	0	0
Lane Group Flow (vph)	0	1694	61	653	601	0	0	0	0
Heavy Vehicles (%)	2%	2%	27%	2%	1%	2%	1%	0%	0%
Turn Type		custom	Prot						
Protected Phases		8	3	3 6	2				
Permitted Phases									
Actuated Green, G (s)		32.7	33.7	60.0	17.3				
Effective Green, g (s)		34.7	35.7	57.0	19.3				
Actuated g/C Ratio		0.58	0.60	0.95	0.32				
Clearance Time (s)		5.0	4.0		5.0				
Vehicle Extension (s)		5.2	2.3		5.2				
Lane Grp Cap (vph)		1687	779	3097	1051				
v/s Ratio Prot		c0.58	0.05	0.20	c0.18				
v/s Ratio Perm									
v/c Ratio		1.00	0.08	0.21	0.57				
Uniform Delay, d1		12.6	5.2	0.1	16.9				
Progression Factor		1.00	0.73	1.00	1.00				
Incremental Delay, d2		22.9	0.0	0.0	1.3				
Delay (s)		35.5	3.8	0.1	18.2				
Level of Service		D	A	A	B				
Approach Delay (s)	35.5			0.4	18.2			0.0	
Approach LOS	D			A	B			A	

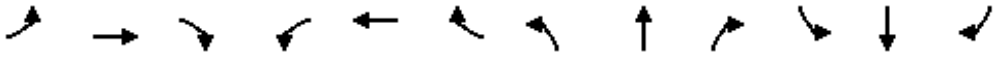
Intersection Summary			
HCM Average Control Delay	24.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	92.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Volume (veh/h)	600	0	0	2360	0	100
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	612	0	0	2408	0	102
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	706			298		
pX, platoon unblocked			0.96		0.88	0.96
vC, conflicting volume			612		1816	306
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			508		1443	188
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	87
cM capacity (veh/h)			1023		111	793

Direction, Lane #	NB 1	NB 2	SB 1	SB 2	NW 1
Volume Total	306	306	1204	1204	102
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	102
cSH	1700	1700	1700	1700	793
Volume to Capacity	0.18	0.18	0.71	0.71	0.13
Queue Length 95th (ft)	0	0	0	0	11
Control Delay (s)	0.0	0.0	0.0	0.0	10.2
Lane LOS					B
Approach Delay (s)	0.0		0.0		10.2
Approach LOS					B

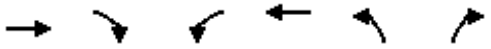
Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	88.8%	ICU Level of Service	E
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	85	0	275	0	0	0	0	515	505	35	2325	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.0	3.0					3.0	3.0	2.0	3.0	
Lane Util. Factor		0.95	0.95					0.95	1.00	1.00	0.95	
Frt		0.92	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.98	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1403	1262					3137	1430	1662	3260	
Flt Permitted		0.98	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1403	1262					3137	1430	1662	3260	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	87	0	281	0	0	0	0	526	515	36	2372	0
RTOR Reduction (vph)	0	13	13	0	0	0	0	0	163	0	0	0
Lane Group Flow (vph)	0	175	167	0	0	0	0	526	352	36	2372	0
Heavy Vehicles (%)	0%	0%	12%	0%	0%	0%	0%	6%	4%	0%	2%	0%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		8						6		5	2	
Permitted Phases	8		8						6			
Actuated Green, G (s)		17.6	17.6					80.0	80.0	8.4	92.4	
Effective Green, g (s)		19.6	19.6					82.0	82.0	10.4	94.4	
Actuated g/C Ratio		0.16	0.16					0.68	0.68	0.09	0.79	
Clearance Time (s)		5.0	5.0					5.0	5.0	4.0	5.0	
Vehicle Extension (s)		2.3	2.3					4.7	4.7	2.3	4.7	
Lane Grp Cap (vph)		229	206					2144	977	144	2565	
v/s Ratio Prot								0.17		0.02	c0.73	
v/s Ratio Perm		0.13	c0.13						0.25			
v/c Ratio		0.77	0.81					0.25	0.36	0.25	0.92	
Uniform Delay, d1		48.0	48.4					7.2	8.0	51.2	10.0	
Progression Factor		1.00	1.00					1.00	1.00	0.99	0.78	
Incremental Delay, d2		13.3	20.5					0.3	1.0	1.9	3.6	
Delay (s)		61.3	68.9					7.5	9.0	52.4	11.4	
Level of Service		E	E					A	A	D	B	
Approach Delay (s)		65.0			0.0			8.2			12.0	
Approach LOS		E			A			A			B	

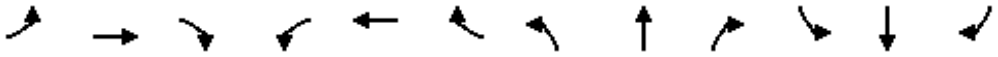
Intersection Summary			
HCM Average Control Delay	16.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	88.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	540	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3471					
Flt Permitted	1.00					
Satd. Flow (perm)	3471					
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	587	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	587	0	0	0	0	0
Heavy Vehicles (%)	4%	0%	0%	0%	0%	0%
Turn Type						
Protected Phases	4					
Permitted Phases						
Actuated Green, G (s)	2.2					
Effective Green, g (s)	2.2					
Actuated g/C Ratio	0.09					
Clearance Time (s)	5.8					
Lane Grp Cap (vph)	305					
v/s Ratio Prot	c0.17					
v/s Ratio Perm						
v/c Ratio	1.92					
Uniform Delay, d1	11.4					
Progression Factor	1.00					
Incremental Delay, d2	428.0					
Delay (s)	439.4					
Level of Service	F					
Approach Delay (s)	439.4			0.0	0.0	
Approach LOS	F			A	A	

Intersection Summary			
HCM Average Control Delay	439.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.92		
Actuated Cycle Length (s)	25.0	Sum of lost time (s)	22.8
Intersection Capacity Utilization	19.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	50	0	80	0	0	0	35	970	0	0	2580	20
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	51	0	82	0	0	0	36	990	0	0	2633	20
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											189	
pX, platoon unblocked	0.22	0.22	0.22	0.22	0.22		0.22					
vC, conflicting volume	3044	3704	1327	2459	3714	330	2653			990		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	3200	6184	0	554	6230	330	1431			990		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	66	100	100	100	66			100		
cM capacity (veh/h)	1	0	241	45	0	672	106			706		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2
Volume Total	133	0	36	396	396	198	1316	1337
Volume Left	51	0	36	0	0	0	0	0
Volume Right	82	0	0	0	0	0	0	20
cSH	2	1700	106	1700	1700	1700	706	1700
Volume to Capacity	73.54	0.00	0.34	0.23	0.23	0.12	0.00	0.79
Queue Length 95th (ft)	Err	0	33	0	0	0	0	0
Control Delay (s)	Err	0.0	55.1	0.0	0.0	0.0	0.0	0.0
Lane LOS	F	A	F					
Approach Delay (s)	Err	0.0	1.9				0.0	
Approach LOS	F	A						

Intersection Summary				
Average Delay	348.5			
Intersection Capacity Utilization	86.3%	ICU Level of Service		E
Analysis Period (min)	15			

200: Schaff Rd & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.2	0.0	0.2	0.1	0.1	0.2	0.8
Delay / Veh (s)	12.9	4.2	4.4	1.9	6.4	2.2	3.4
Vehicles Entered	45	10	165	201	47	403	871
Vehicles Exited	45	9	165	201	47	403	870
Hourly Exit Rate	45	9	165	201	47	403	870
Input Volume	45	10	166	205	45	410	880
% of Volume	101	88	100	98	105	98	99
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

210: Jacobson Rd & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.9	0.0	0.4	0.3	0.0	0.2	1.9
Delay / Veh (s)	21.5	14.8	3.7	4.5	9.2	1.8	5.5
Vehicles Entered	153	6	371	272	11	437	1250
Vehicles Exited	154	6	374	270	11	436	1251
Hourly Exit Rate	154	6	374	270	11	436	1251
Input Volume	155	5	380	275	15	440	1270
% of Volume	100	114	98	98	75	99	98
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

215: Loop Ramp #1 & Helvetia Rd Performance by movement

Movement	EBT	EBR	NBL	NBT	SBT	SBR2	All
Total Delay (hr)	0.1	17.6	0.4	2.4	3.0	0.1	23.6
Delay / Veh (s)	6.9	35.6	24.6	13.5	19.1	15.8	27.3
Vehicles Entered	30	1776	62	637	570	31	3106
Vehicles Exited	30	1784	63	638	571	31	3117
Hourly Exit Rate	30	1784	63	638	571	31	3117
Input Volume	30	1795	60	648	578	30	3141
% of Volume	101	99	105	99	99	102	99
Denied Entry Before	0	4	0	0	0	0	4
Denied Entry After	0	0	0	0	0	0	0

220: Helvetia Rd/Brookwood Pkwy #1 & WB-NB Helvetia Performance by movement

Movement	NBT	SBT	NWT	NWR	All
Total Delay (hr)	0.5	1.4	0.0	0.2	2.0
Delay / Veh (s)	2.8	2.1	0.0	5.8	2.4
Vehicles Entered	588	2356	2	105	3051
Vehicles Exited	590	2357	2	106	3055
Hourly Exit Rate	590	2357	2	106	3055
Input Volume	604	2379	3	100	3086
% of Volume	98	99	62	106	99
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

224: Exit Ramp #1 & WB-NB Helvetia Performance by movement

Movement	WBT	WBR	All
Total Delay (hr)	1.4	0.1	1.5
Delay / Veh (s)	2.8	3.9	2.9
Vehicles Entered	1769	104	1873
Vehicles Exited	1767	105	1872
Hourly Exit Rate	1767	105	1872
Input Volume	1795	100	1895
% of Volume	98	105	99
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy #1 Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	1.7	4.5	0.9	0.3	0.7	12.0	20.0
Delay / Veh (s)	68.1	57.3	6.4	2.4	68.4	18.5	19.4
Vehicles Entered	90	281	499	489	38	2324	3721
Vehicles Exited	88	279	499	489	38	2323	3716
Hourly Exit Rate	88	279	499	489	38	2323	3716
Input Volume	85	275	518	505	35	2348	3766
% of Volume	104	101	96	97	108	99	99
Denied Entry Before	0	0	0	0	0	2	2
Denied Entry After	0	0	0	0	0	2	2

231: US-26 EB Helvetia On-ramp & Performance by movement

Movement	EBT	All
Total Delay (hr)	23.0	23.0
Delay / Veh (s)	155.1	155.1
Vehicles Entered	541	541
Vehicles Exited	525	525
Hourly Exit Rate	525	525
Input Volume	550	550
% of Volume	95	95
Denied Entry Before	0	0
Denied Entry After	1	1

240: Meek Rd & Brookwood Pkwy Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	30.8	48.5	1.1	0.9	1.9	0.0	83.2
Delay / Veh (s)	22148.2	19398.2	118.9	3.4	2.6	1.1	82.4
Vehicles Entered	5	9	34	980	2588	20	3636
Vehicles Exited	5	9	34	980	2588	20	3636
Hourly Exit Rate	5	9	34	980	2588	20	3636
Input Volume	50	80	35	970	2608	20	3763
% of Volume	10	11	96	101	99	100	97
Denied Entry Before	0	3	0	0	1	0	4
Denied Entry After	47	70	0	0	0	0	117

Total Network Performance

Total Delay (hr)	173.3
Delay / Veh (s)	152.2
Vehicles Entered	4107
Vehicles Exited	4092
Hourly Exit Rate	4092
Input Volume	37995
% of Volume	11
Denied Entry Before	10
Denied Entry After	120

Intersection: 200: Schaff Rd & Helvetia Rd

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	69	22	238
Average Queue (ft)	32	1	38
95th Queue (ft)	58	11	137
Link Distance (ft)	549	410	349
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 210: Jacobson Rd & Helvetia Rd

Movement	WB	NB	SB
Directions Served	LR	R	LT
Maximum Queue (ft)	182	21	181
Average Queue (ft)	78	1	13
95th Queue (ft)	147	8	87
Link Distance (ft)	396	883	410
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 215: Loop Ramp #1 & Helvetia Rd

Movement	EB	EB	B223	B223	NB	NB	NB	SB	SB
Directions Served	R	R	T	T	L	T	T	T	T>
Maximum Queue (ft)	909	942	50	64	187	294	252	171	212
Average Queue (ft)	450	509	2	2	58	127	99	98	120
95th Queue (ft)	782	830	26	30	131	250	208	155	183
Link Distance (ft)	926	926	1406	1406		243	243	883	
Upstream Blk Time (%)	0	0			0	1	0		
Queuing Penalty (veh)	2	4			0	4	1		
Storage Bay Dist (ft)					200				415
Storage Blk Time (%)					0	2			
Queuing Penalty (veh)					0	1			

Intersection: 220: Helvetia Rd/Brookwood Pkwy #1 & WB-NB Helvetia

Movement	NB	SB	SB	NW
Directions Served	T	T	T	R
Maximum Queue (ft)	22	36	68	65
Average Queue (ft)	1	2	3	36
95th Queue (ft)	11	24	33	58
Link Distance (ft)	638	243	243	1346
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 224: Exit Ramp #1 & WB-NB Helvetia

Movement	B1	B1
Directions Served	T	T
Maximum Queue (ft)	63	62
Average Queue (ft)	2	2
95th Queue (ft)	45	45
Link Distance (ft)	297	297
Upstream Blk Time (%)	0	0
Queuing Penalty (veh)	0	0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy #1

Movement	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	LR	R	T	T	R	L	T	T
Maximum Queue (ft)	315	278	145	126	21	252	638	651
Average Queue (ft)	188	179	69	59	1	46	309	368
95th Queue (ft)	272	257	132	118	15	133	582	617
Link Distance (ft)	1144		133	133	133		638	638
Upstream Blk Time (%)			1	0			0	0
Queuing Penalty (veh)			4	2			5	5
Storage Bay Dist (ft)		300				175		
Storage Blk Time (%)	0	0				0	8	
Queuing Penalty (veh)	0	0				2	3	

Intersection: 231: US-26 EB Helvetia On-ramp &

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	613	614
Average Queue (ft)	364	380
95th Queue (ft)	709	722
Link Distance (ft)	956	956
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 240: Meek Rd & Brookwood Pkwy

Movement	EB	NB	NB	NB	SB	SB
Directions Served	LR	L	T	T	LT	TR
Maximum Queue (ft)	616	130	47	18	32	39
Average Queue (ft)	603	55	3	1	2	4
95th Queue (ft)	622	133	23	13	14	25
Link Distance (ft)	603		620	620	133	133
Upstream Blk Time (%)	98					
Queuing Penalty (veh)	0					
Storage Bay Dist (ft)		100				
Storage Blk Time (%)		11				
Queuing Penalty (veh)		34				

Network Summary

Network wide Queuing Penalty: 67

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	30	0	470	210	0	270
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	32	0	505	226	0	290
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	909	618			731	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	909	618			731	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	90	100			100	
cM capacity (veh/h)	308	493			882	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	32	731	290
Volume Left	32	0	0
Volume Right	0	226	0
cSH	308	1700	882
Volume to Capacity	0.10	0.43	0.00
Queue Length 95th (ft)	9	0	0
Control Delay (s)	18.1	0.0	0.0
Lane LOS	C		
Approach Delay (s)	18.1	0.0	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	275	10	670	520	10	290
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	306	11	744	578	11	322
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			937			
pX, platoon unblocked						
vC, conflicting volume	1089	744			1322	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1089	744			1322	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	97			98	
cM capacity (veh/h)	235	418			529	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	317	744	578	333
Volume Left	306	0	0	11
Volume Right	11	0	578	0
cSH	238	1700	1700	529
Volume to Capacity	1.33	0.44	0.34	0.02
Queue Length 95th (ft)	421	0	0	2
Control Delay (s)	214.9	0.0	0.0	0.7
Lane LOS	F			A
Approach Delay (s)	214.9	0.0		0.7
Approach LOS	F			

Intersection Summary			
Average Delay	34.6		
Intersection Capacity Utilization	57.8%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Lane Configurations									
Volume (vph)	0	730	290	1190	430	0	135	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.0	2.0	2.0	3.0				
Lane Util. Factor		*1.00	1.00	0.95	0.95				
Frt		0.85	1.00	1.00	0.96				
Flt Protected		1.00	0.95	1.00	1.00				
Satd. Flow (prot)		2975	1646	3292	3206				
Flt Permitted		1.00	0.95	1.00	1.00				
Satd. Flow (perm)		2975	1646	3292	3206				
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	785	312	1280	462	0	145	0	0
RTOR Reduction (vph)	0	294	0	0	54	0	0	0	0
Lane Group Flow (vph)	0	491	312	1280	553	0	0	0	0
Heavy Vehicles (%)	0%	0%	1%	1%	0%	0%	0%	0%	0%
Turn Type		custom	Prot						
Protected Phases		8	3	3 6	2				
Permitted Phases									
Actuated Green, G (s)		27.3	28.3	60.0	22.7				
Effective Green, g (s)		29.3	30.3	57.0	24.7				
Actuated g/C Ratio		0.49	0.51	0.95	0.41				
Clearance Time (s)		5.0	4.0		5.0				
Vehicle Extension (s)		5.2	2.3		5.2				
Lane Grp Cap (vph)		1453	831	3127	1320				
v/s Ratio Prot		0.17	0.19	c0.39	0.17				
v/s Ratio Perm									
v/c Ratio		0.34	0.38	0.41	0.42				
Uniform Delay, d1		9.4	9.1	0.1	12.6				
Progression Factor		1.00	1.06	1.00	1.00				
Incremental Delay, d2		0.6	0.1	0.0	0.5				
Delay (s)		10.0	9.7	0.2	13.0				
Level of Service		B	A	A	B				
Approach Delay (s)	10.0			2.0	13.0			0.0	
Approach LOS	B			A	B			A	

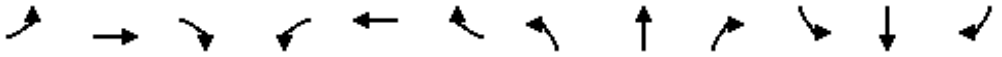
Intersection Summary			
HCM Average Control Delay	6.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	2.0
Intersection Capacity Utilization	52.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Volume (veh/h)	1410	0	0	1160	0	70
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	1516	0	0	1247	0	75
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	706			298		
pX, platoon unblocked			0.86		0.91	0.86
vC, conflicting volume			1516		2140	758
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1276		1607	395
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	86
cM capacity (veh/h)			474		89	525

Direction, Lane #	NB 1	NB 2	SB 1	SB 2	NW 1
Volume Total	758	758	624	624	75
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	75
cSH	1700	1700	1700	1700	525
Volume to Capacity	0.45	0.45	0.37	0.37	0.14
Queue Length 95th (ft)	0	0	0	0	12
Control Delay (s)	0.0	0.0	0.0	0.0	13.0
Lane LOS					B
Approach Delay (s)	0.0		0.0		13.0
Approach LOS					B

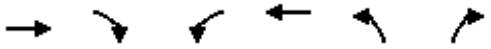
Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	80.2%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	0	80	0	0	0	0	1390	945	5	1155	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.0	3.0					3.0	3.0	2.0	3.0	
Lane Util. Factor		0.95	0.95					0.95	1.00	1.00	0.95	
Frt		0.91	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.98	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1483	1413					3292	1473	1662	3325	
Flt Permitted		0.98	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1483	1413					3292	1473	1662	3325	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	21	0	83	0	0	0	0	1448	984	5	1203	0
RTOR Reduction (vph)	0	30	47	0	0	0	0	0	165	0	0	0
Lane Group Flow (vph)	0	23	4	0	0	0	0	1448	819	5	1203	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		8						6		5	2	
Permitted Phases	8		8						6			
Actuated Green, G (s)		7.3	7.3					97.9	97.9	0.8	102.7	
Effective Green, g (s)		9.3	9.3					99.9	99.9	2.8	104.7	
Actuated g/C Ratio		0.08	0.08					0.83	0.83	0.02	0.87	
Clearance Time (s)		5.0	5.0					5.0	5.0	4.0	5.0	
Vehicle Extension (s)		2.3	2.3					4.7	4.7	2.3	4.7	
Lane Grp Cap (vph)		115	110					2741	1226	39	2901	
v/s Ratio Prot								0.44		0.00	c0.36	
v/s Ratio Perm		0.02	0.00						c0.56			
v/c Ratio		0.20	0.04					0.53	0.67	0.13	0.41	
Uniform Delay, d1		51.9	51.2					3.0	3.8	57.4	1.5	
Progression Factor		1.00	1.00					1.00	1.00	0.99	1.07	
Incremental Delay, d2		0.5	0.1					0.7	2.9	0.8	0.4	
Delay (s)		52.4	51.3					3.7	6.7	57.5	2.0	
Level of Service		D	D					A	A	E	A	
Approach Delay (s)		51.8			0.0			4.9			2.3	
Approach LOS		D			A			A			A	

Intersection Summary			
HCM Average Control Delay	5.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	80.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	950	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3471					
Flt Permitted	1.00					
Satd. Flow (perm)	3471					
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1033	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1033	0	0	0	0	0
Heavy Vehicles (%)	4%	0%	0%	0%	0%	0%
Turn Type						
Protected Phases	4					
Permitted Phases						
Actuated Green, G (s)	2.5					
Effective Green, g (s)	2.5					
Actuated g/C Ratio	0.14					
Clearance Time (s)	4.5					
Lane Grp Cap (vph)	482					
v/s Ratio Prot	c0.30					
v/s Ratio Perm						
v/c Ratio	2.14					
Uniform Delay, d1	7.8					
Progression Factor	1.00					
Incremental Delay, d2	521.3					
Delay (s)	529.1					
Level of Service	F					
Approach Delay (s)	529.1			0.0	0.0	
Approach LOS	F			A	A	

Intersection Summary			
HCM Average Control Delay	529.1	HCM Level of Service	F
HCM Volume to Capacity ratio	2.14		
Actuated Cycle Length (s)	18.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	30.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	25	0	75	0	0	0	110	2310	0	0	1190	45
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	27	0	80	0	0	0	117	2457	0	0	1266	48
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											189	
pX, platoon unblocked	0.93	0.93	0.93	0.93	0.93		0.93					
vC, conflicting volume	2343	3981	657	3404	4005	819	1314			2457		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2291	4059	473	3436	4084	819	1181			2457		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	84	100	100	100	79			100		
cM capacity (veh/h)	17	2	504	2	2	323	555			192		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2
Volume Total	106	0	117	983	983	491	633	681
Volume Left	27	0	117	0	0	0	0	0
Volume Right	80	0	0	0	0	0	0	48
cSH	61	1700	555	1700	1700	1700	192	1700
Volume to Capacity	1.74	0.00	0.21	0.58	0.58	0.29	0.00	0.40
Queue Length 95th (ft)	243	0	20	0	0	0	0	0
Control Delay (s)	500.6	0.0	13.2	0.0	0.0	0.0	0.0	0.0
Lane LOS	F	A	B					
Approach Delay (s)	500.6	0.0	0.6				0.0	
Approach LOS	F	A						

Intersection Summary				
Average Delay	13.7			
Intersection Capacity Utilization	95.0%	ICU Level of Service		F
Analysis Period (min)	15			

200: Schaff Rd & Helvetia Rd Performance by movement

Movement	WBL	NBT	NBR	SBT	All
Total Delay (hr)	0.1	0.5	0.1	0.0	0.7
Delay / Veh (s)	10.6	4.1	1.5	0.3	2.7
HC Emissions (g)	0	7	1	11	19
CO Emissions (g)	20	395	55	890	1360
NOx Emissions (g)	2	35	5	38	79
Vehicles Entered	33	464	201	278	976
Vehicles Exited	33	462	201	278	974
Hourly Exit Rate	33	462	201	278	974
Input Volume	30	476	210	270	986
% of Volume	111	97	96	103	99
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

210: Jacobson Rd & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	11.4	0.4	0.5	0.5	0.1	0.2	12.9
Delay / Veh (s)	143.0	116.9	2.5	3.7	18.0	2.2	26.5
HC Emissions (g)	5	0	34	18	0	7	63
CO Emissions (g)	269	8	1979	741	7	391	3395
NOx Emissions (g)	23	1	151	62	1	35	274
Vehicles Entered	289	11	659	486	11	303	1759
Vehicles Exited	283	11	658	485	11	302	1750
Hourly Exit Rate	283	11	658	485	11	302	1750
Input Volume	275	10	682	520	10	292	1790
% of Volume	103	107	96	93	107	103	98
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

215: Loop Ramp #1 & Helvetia Rd Performance by movement

Movement	EBT	EBR	NBL	NBT	SBT	SBR2	All
Total Delay (hr)	0.0	1.0	1.1	1.2	1.8	0.4	5.5
Delay / Veh (s)	0.1	4.9	15.1	3.7	14.4	10.4	7.2
HC Emissions (g)	8	13	3	29	35	8	96
CO Emissions (g)	118	279	83	1735	2300	597	5112
NOx Emissions (g)	21	41	10	118	129	32	351
Vehicles Entered	13	733	269	1134	452	137	2738
Vehicles Exited	13	734	271	1135	454	139	2746
Hourly Exit Rate	13	734	271	1135	454	139	2746
Input Volume	14	730	290	1191	437	135	2798
% of Volume	90	101	93	95	104	103	98
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

220: Helvetia Rd/Brookwood Pkwy #1 & WB-NB Helvetia Performance by movement

Movement	NBT	SBT	NWT	NWR	All
Total Delay (hr)	0.9	0.5	0.0	0.2	1.6
Delay / Veh (s)	2.5	1.4	0.0	10.5	2.2
HC Emissions (g)	58	69	1	2	131
CO Emissions (g)	2758	5410	22	81	8271
NOx Emissions (g)	236	254	4	14	507
Vehicles Entered	1340	1180	2	71	2593
Vehicles Exited	1341	1181	2	70	2594
Hourly Exit Rate	1341	1181	2	70	2594
Input Volume	1422	1160	1	70	2653
% of Volume	94	102	160	100	98
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

224: Exit Ramp #1 & WB-NB Helvetia Performance by movement

Movement	WBT	WBR	All
Total Delay (hr)	0.1	0.0	0.2
Delay / Veh (s)	0.7	1.6	0.8
HC Emissions (g)	210	18	228
CO Emissions (g)	11567	1006	12573
NOx Emissions (g)	731	65	796
Vehicles Entered	732	71	803
Vehicles Exited	731	71	802
Hourly Exit Rate	731	71	802
Input Volume	730	70	800
% of Volume	100	101	100
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy #1 Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.2	0.3	0.6	1.8	0.0	0.7	3.6
Delay / Veh (s)	42.1	11.2	1.7	7.5	44.4	2.0	3.7
HC Emissions (g)	1	3	16	3	0	48	71
CO Emissions (g)	27	141	759	104	11	3532	4575
NOx Emissions (g)	2	12	56	13	1	214	298
Vehicles Entered	18	85	1323	847	4	1187	3464
Vehicles Exited	18	85	1323	847	4	1187	3464
Hourly Exit Rate	18	85	1323	847	4	1187	3464
Input Volume	20	80	1403	945	5	1165	3618
% of Volume	89	106	94	90	80	102	96
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

231: US-26 EB Helvetia On-ramp & Performance by movement

Movement	EBT	All
Total Delay (hr)	73.6	73.6
Delay / Veh (s)	316.6	316.6
HC Emissions (g)	400	400
CO Emissions (g)	6499	6499
NOx Emissions (g)	492	492
Vehicles Entered	855	855
Vehicles Exited	819	819
Hourly Exit Rate	819	819
Input Volume	982	982
% of Volume	83	83
Denied Entry Before	0	0
Denied Entry After	30	30

240: Meek Rd & Brookwood Pkwy Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	5.6	15.8	0.5	14.1	0.3	0.0	36.3
Delay / Veh (s)	1006.6	836.9	13.4	23.7	0.9	0.5	36.1
HC Emissions (g)	1	2	5	159	28	0	195
CO Emissions (g)	93	276	402	10367	2216	8	13363
NOx Emissions (g)	3	10	20	551	112	1	698
Vehicles Entered	22	75	123	2153	1220	48	3641
Vehicles Exited	18	62	121	2138	1219	48	3606
Hourly Exit Rate	18	62	121	2138	1219	48	3606
Input Volume	25	75	110	2310	1197	45	3762
% of Volume	73	83	110	93	102	107	96
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	3	7	0	0	0	0	10

Total Network Performance

Total Delay (hr)	191.7
Delay / Veh (s)	172.5
HC Emissions (g)	2073
CO Emissions (g)	90432
NOx Emissions (g)	6568
Vehicles Entered	4091
Vehicles Exited	3905
Hourly Exit Rate	3905
Input Volume	35613
% of Volume	11
Denied Entry Before	1
Denied Entry After	70

Intersection: 200: Schaff Rd & Helvetia Rd

Movement	WB
Directions Served	LR
Maximum Queue (ft)	61
Average Queue (ft)	20
95th Queue (ft)	46
Link Distance (ft)	549
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 210: Jacobson Rd & Helvetia Rd

Movement	WB	B211	NB	SB
Directions Served	LR	T	R	LT
Maximum Queue (ft)	445	568	18	122
Average Queue (ft)	339	218	1	20
95th Queue (ft)	571	682	9	80
Link Distance (ft)	396	948	883	410
Upstream Blk Time (%)	44	1		
Queuing Penalty (veh)	0	0		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 215: Loop Ramp #1 & Helvetia Rd

Movement	EB	EB	NB	NB	NB	SB	SB
Directions Served	R	R	L	T	T	T	T>
Maximum Queue (ft)	105	112	219	281	231	125	156
Average Queue (ft)	54	61	100	60	46	66	85
95th Queue (ft)	87	96	189	207	160	101	128
Link Distance (ft)	926	926		243	243	883	
Upstream Blk Time (%)			0	1	0		
Queuing Penalty (veh)			0	5	1		
Storage Bay Dist (ft)			200				415
Storage Blk Time (%)			1	1			
Queuing Penalty (veh)			5	3			

Intersection: 220: Helvetia Rd/Brookwood Pkwy #1 & WB-NB Helvetia

Movement	NB	NB	NW
Directions Served	T	T	R
Maximum Queue (ft)	44	28	73
Average Queue (ft)	2	1	32
95th Queue (ft)	27	16	58
Link Distance (ft)	638	638	1346
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 224: Exit Ramp #1 & WB-NB Helvetia

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy #1

Movement	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	LR	R	T	T	R	L	T	T
Maximum Queue (ft)	61	53	142	129	204	22	81	103
Average Queue (ft)	29	29	40	24	119	3	11	25
95th Queue (ft)	55	52	104	79	247	15	43	69
Link Distance (ft)	1144		133	133	133		638	638
Upstream Blk Time (%)			0	0	18			
Queuing Penalty (veh)			2	2	143			
Storage Bay Dist (ft)		300				175		
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 231: US-26 EB Helvetia On-ramp &

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	877	1050
Average Queue (ft)	786	915
95th Queue (ft)	1085	1302
Link Distance (ft)	956	956
Upstream Blk Time (%)		46
Queuing Penalty (veh)		217
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 240: Meek Rd & Brookwood Pkwy

Movement	EB	NB	NB	NB	NB	B251	B251	B2	B2	B3	B3	SB
Directions Served	LR	L	T	T	TR	T	T	T	T	T	T	TR
Maximum Queue (ft)	544	100	177	707	613	1369	1345	1105	1113	920	923	22
Average Queue (ft)	401	47	2	382	387	629	646	280	298	131	135	2
95th Queue (ft)	775	84	20	947	845	1653	1681	1031	1055	660	669	11
Link Distance (ft)	603		620	620		1281	1281	1111	1111	1032	1032	133
Upstream Blk Time (%)	43			25	11	3	12	4	6	3	3	
Queuing Penalty (veh)	0			0	0	0	0	0	0	0	0	
Storage Bay Dist (ft)		100			600							
Storage Blk Time (%)		1	0	3	29							
Queuing Penalty (veh)		6	0	24	216							

Network Summary

Network wide Queuing Penalty: 624

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2035
Description:	Eastbound Off-ramp to Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2660	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	435	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2660	435		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	700	114		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2856	467	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2856 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2856	4600	No
$v_{FO} = v_F - v_R$	2389	4600	No
v_R	467	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 2856		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2856	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 15.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.470	
Space mean speed in ramp influence area,	S_R = 51.5	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.5	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2035
Description:	Eastbound Off-ramp to Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2660	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	435	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2660	435		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	700	114		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2856	467	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2856 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2856	4600	No
$v_{FO} = v_F - v_R$	2389	4600	No
v_R	467	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 2856		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2856	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 15.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.470	
Space mean speed in ramp influence area,	S_R = 51.5	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.5	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2035
Description:	Eastbound Off-ramp to Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2660	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	435	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2660	435		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	700	114		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2856	467	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2856 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2856	4600	No
$v_{FO} = v_F - v_R$	2389	4600	No
v_R	467	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 $v_{12}/2$	No	
If yes, v_{12A} = 2856		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2856	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 15.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.470	
Space mean speed in ramp influence area,	S_R = 51.5	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.5	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2035
Description:	Westbound 2-lane Off-ramp to Southbound Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3925	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	1795	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane	0	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3925	1795		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1033	472		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	4214	1927	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 4214 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4214	4600	No
$v_{FO} = v_F - v_R$	2287	4600	No
v_R	1927	3800	No
$v_{3 \text{ or } av34}$	0 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34} > 2700$ pc/h?		No	
Is $v_{3 \text{ or } av34} > 1.5\, v_{12}/2$		No	
If yes, v_{12A} = 4214		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4214	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 13.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.601	
Space mean speed in ramp influence area,	S_R = 49.2	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 49.2	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	AM Peak Period
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2035
Description: Westbound	On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2035	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	90	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2035	90		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	536	24		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2185	97	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 2185 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2282	4600	No
v_3 or v_{av34}	0 pc/h	(Equation 25-4 or 25-5)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 2185		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2185	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_{R} + 0.0078\ v_{12} - 0.00627\ L_A$ = 20.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.331	
Space mean speed in ramp influence area,	S_R = 54.1	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 54.1	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2035
Description:	Eastbound - Off-ramp to Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2975	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	130	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2975	130		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	783	34		v
Trucks and buses	1	1		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.995	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3147	138	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3147 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3147	4600	No
$v_{FO} = v_F - v_R$	3009	4600	No
v_R	138	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 3147		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3147	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 17.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.440	
Space mean speed in ramp influence area,	S_R = 52.1	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 52.1	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	PM Peak Period
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2035
Description: Eastbound	On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2845	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	800	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2845	800		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	749	211		v
Trucks and buses	1	1		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.995	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3010	846	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 3010 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3856	4600	No

$v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 3010 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3010	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_{R} + 0.0078\, v_{12} - 0.00627\, L_A$ = 32.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.477	
Space mean speed in ramp influence area,	S_R = 51.4	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.4	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2035
Description:	Westbound 1-lane Off-ramp to Northbound Helvetia

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3700	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	100	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3700	100		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	974	26		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3914	107	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3914 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3914	4600	No
$v_{FO} = v_F - v_R$	3807	4600	No
v_R	107	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 3914		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3914	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 24.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	D_S = 0.438	
Space mean speed in ramp influence area,	S_R = 52.1	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 52.1	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2035
Description:	Westbound 2-lane Off-ramp to Southbound Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3600	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	745	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane	0	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3600	745		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	947	196		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3808	796	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3808 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3808	4600	No
$v_{FO} = v_F - v_R$	3012	4600	No
v_R	796	3800	No
$v_{3 \text{ or } av34}$	0 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34}$	$v_{3 \text{ or } av34}$ > 2700 pc/h?	No	
Is $v_{3 \text{ or } av34}$	$v_{3 \text{ or } av34}$ > 1.5 v_{12} /2	No	
If yes, v_{12A} = 3808		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3808	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 10.0+ pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.500	
Space mean speed in ramp influence area,	S_R = 51.0	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.0	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	PM Peak Period
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2035
Description: Westbound	On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2855	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	425	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2855	425		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	751	112		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3020	454	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 3020 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3474	4600	No

$v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 3020 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3020	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_{R} + 0.0078 v_{12} - 0.00627 L_A =$ 29.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, M_S = 0.418

Space mean speed in ramp influence area, S_R = 52.5 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 52.5 mph

Year 2035 Phase 3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	45	10	165	205	45	410
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	50	11	183	228	50	456
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	853	297			411	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	853	297			411	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	84	99			96	
cM capacity (veh/h)	317	745			1153	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	61	411	506
Volume Left	50	0	50
Volume Right	11	228	0
cSH	354	1700	1153
Volume to Capacity	0.17	0.24	0.04
Queue Length 95th (ft)	15	0	3
Control Delay (s)	17.3	0.0	1.3
Lane LOS	C		A
Approach Delay (s)	17.3	0.0	1.3
Approach LOS	C		

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	155	5	365	275	15	440
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	172	6	406	306	17	489
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			937			
pX, platoon unblocked						
vC, conflicting volume	928	406			711	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	928	406			711	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	41	99			98	
cM capacity (veh/h)	293	647			893	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	178	406	306	506
Volume Left	172	0	0	17
Volume Right	6	0	306	0
cSH	298	1700	1700	893
Volume to Capacity	0.60	0.24	0.18	0.02
Queue Length 95th (ft)	89	0	0	1
Control Delay (s)	33.4	0.0	0.0	0.5
Lane LOS	D			A
Approach Delay (s)	33.4	0.0		0.5
Approach LOS	D			

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	50.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Lane Configurations									
Volume (vph)	0	1795	60	640	565	0	30	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.0	2.0	2.0	3.0				
Lane Util. Factor		*1.00	1.00	0.95	0.95				
Frt		0.85	1.00	1.00	0.99				
Flt Protected		1.00	0.95	1.00	1.00				
Satd. Flow (prot)		2917	1309	3260	3267				
Flt Permitted		1.00	0.95	1.00	1.00				
Satd. Flow (perm)		2917	1309	3260	3267				
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	1832	61	653	577	0	31	0	0
RTOR Reduction (vph)	0	58	0	0	5	0	0	0	0
Lane Group Flow (vph)	0	1774	61	653	603	0	0	0	0
Heavy Vehicles (%)	2%	2%	27%	2%	1%	2%	1%	0%	0%
Turn Type		custom	Prot						
Protected Phases		8	3	3 6	2				
Permitted Phases									
Actuated Green, G (s)		50.4	51.4	80.0	19.6				
Effective Green, g (s)		52.4	53.4	77.0	21.6				
Actuated g/C Ratio		0.65	0.67	0.96	0.27				
Clearance Time (s)		5.0	4.0		5.0				
Vehicle Extension (s)		5.2	2.3		5.2				
Lane Grp Cap (vph)		1911	874	3138	882				
v/s Ratio Prot		c0.61	0.05	0.20	c0.18				
v/s Ratio Perm									
v/c Ratio		0.93	0.07	0.21	0.68				
Uniform Delay, d1		12.1	4.6	0.1	26.1				
Progression Factor		1.00	0.60	1.00	1.00				
Incremental Delay, d2		9.4	0.0	0.0	2.9				
Delay (s)		21.6	2.8	0.1	29.1				
Level of Service		C	A	A	C				
Approach Delay (s)	21.6			0.3	29.1			0.0	
Approach LOS	C			A	C			A	

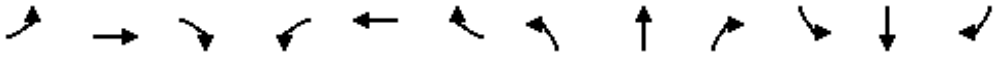
Intersection Summary			
HCM Average Control Delay	18.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	92.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Volume (veh/h)	600	0	0	2360	0	100
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	612	0	0	2408	0	102
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	706			298		
pX, platoon unblocked			0.94		0.94	0.94
vC, conflicting volume			612		1415	306
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			469		920	144
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	88
cM capacity (veh/h)			1041		259	833

Direction, Lane #	NB 1	NB 2	SB 1	SB 2	SB 3	NW 1
Volume Total	306	306	803	803	803	102
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	0	102
cSH	1700	1700	1700	1700	1700	833
Volume to Capacity	0.18	0.18	0.47	0.47	0.47	0.12
Queue Length 95th (ft)	0	0	0	0	0	10
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	9.9
Lane LOS						A
Approach Delay (s)	0.0		0.0			9.9
Approach LOS						A

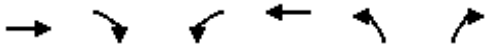
Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	85	0	275	0	0	0	0	515	505	35	2325	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.0	3.0					3.0	3.0	2.0	3.0	
Lane Util. Factor		0.95	0.95					0.95	1.00	1.00	0.91	
Frt		0.92	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.98	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1403	1262					3137	1430	1662	4684	
Flt Permitted		0.98	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1403	1262					3137	1430	1662	4684	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	87	0	281	0	0	0	0	526	515	36	2372	0
RTOR Reduction (vph)	0	6	6	0	0	0	0	0	232	0	0	0
Lane Group Flow (vph)	0	182	174	0	0	0	0	526	283	36	2372	0
Heavy Vehicles (%)	0%	0%	12%	0%	0%	0%	0%	6%	4%	0%	2%	0%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		8						6		5	2	
Permitted Phases	8		8						6			
Actuated Green, G (s)		14.3	14.3					42.0	42.0	9.7	55.7	
Effective Green, g (s)		16.3	16.3					44.0	44.0	11.7	57.7	
Actuated g/C Ratio		0.20	0.20					0.55	0.55	0.15	0.72	
Clearance Time (s)		5.0	5.0					5.0	5.0	4.0	5.0	
Vehicle Extension (s)		2.3	2.3					4.7	4.7	2.3	4.7	
Lane Grp Cap (vph)		286	257					1725	787	243	3378	
v/s Ratio Prot								0.17		0.02	c0.51	
v/s Ratio Perm		0.13	c0.14						0.20			
v/c Ratio		0.64	0.68					0.30	0.36	0.15	0.70	
Uniform Delay, d1		29.1	29.4					9.7	10.1	29.8	6.3	
Progression Factor		1.00	1.00					1.00	1.00	0.96	1.06	
Incremental Delay, d2		3.8	6.0					0.5	1.3	0.6	0.6	
Delay (s)		32.9	35.4					10.2	11.4	29.1	7.3	
Level of Service		C	D					B	B	C	A	
Approach Delay (s)		34.2			0.0			10.8			7.6	
Approach LOS		C			A			B			A	

Intersection Summary			
HCM Average Control Delay	11.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	540	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3471					
Flt Permitted	1.00					
Satd. Flow (perm)	3471					
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	587	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	587	0	0	0	0	0
Heavy Vehicles (%)	4%	0%	0%	0%	0%	0%
Turn Type						
Protected Phases	4					
Permitted Phases						
Actuated Green, G (s)	2.2					
Effective Green, g (s)	2.2					
Actuated g/C Ratio	0.09					
Clearance Time (s)	5.8					
Lane Grp Cap (vph)	305					
v/s Ratio Prot	c0.17					
v/s Ratio Perm						
v/c Ratio	1.92					
Uniform Delay, d1	11.4					
Progression Factor	1.00					
Incremental Delay, d2	428.0					
Delay (s)	439.4					
Level of Service	F					
Approach Delay (s)	439.4			0.0	0.0	
Approach LOS	F			A	A	

Intersection Summary			
HCM Average Control Delay	439.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.92		
Actuated Cycle Length (s)	25.0	Sum of lost time (s)	22.8
Intersection Capacity Utilization	19.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	50	0	80	0	0	0	35	970	0	0	2580	20
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	51	0	82	0	0	0	36	990	0	0	2633	20
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											189	
pX, platoon unblocked	0.71	0.71	0.71	0.71	0.71		0.71					
vC, conflicting volume	3044	3704	888	2020	3714	330	2653			990		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2449	3379	0	1007	3393	330	1898			990		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	89	100	100	100	84			100		
cM capacity (veh/h)	10	5	774	110	5	672	226			706		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3
Volume Total	133	0	36	396	396	198	658	1316	679
Volume Left	51	0	36	0	0	0	0	0	0
Volume Right	82	0	0	0	0	0	0	0	20
cSH	26	1700	226	1700	1700	1700	706	1700	1700
Volume to Capacity	5.09	0.00	0.16	0.23	0.23	0.12	0.00	0.77	0.40
Queue Length 95th (ft)	Err	0	14	0	0	0	0	0	0
Control Delay (s)	Err	0.0	23.9	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	F	A	C						
Approach Delay (s)	Err	0.0	0.8				0.0		
Approach LOS	F	A							

Intersection Summary				
Average Delay	348.2			
Intersection Capacity Utilization	64.6%	ICU Level of Service		C
Analysis Period (min)	15			

200: Schaff Rd & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.2	0.0	0.2	0.1	0.1	0.2	0.8
Delay / Veh (s)	13.5	3.3	4.8	1.8	6.1	1.9	3.2
Vehicles Entered	42	12	169	199	47	410	879
Vehicles Exited	42	12	169	199	47	410	879
Hourly Exit Rate	42	12	169	199	47	410	879
Input Volume	45	10	166	205	45	410	880
% of Volume	94	117	102	97	105	100	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

210: Jacobson Rd & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	1.1	0.0	0.4	0.4	0.0	0.2	2.1
Delay / Veh (s)	25.8	19.0	3.8	4.7	7.7	1.8	6.0
Vehicles Entered	150	5	378	273	14	438	1258
Vehicles Exited	149	5	378	273	14	437	1256
Hourly Exit Rate	149	5	378	273	14	437	1256
Input Volume	155	5	380	275	15	440	1270
% of Volume	96	95	100	99	95	99	99
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

215: Loop Ramp #1 & Helvetia Rd Performance by movement

Movement	EBT	EBR	NBL	NBT	SBT	SBR2	All
Total Delay (hr)	0.0	5.0	0.4	2.9	5.1	0.2	13.7
Delay / Veh (s)	1.3	10.0	25.9	16.4	32.0	24.8	15.7
Vehicles Entered	29	1798	60	641	570	30	3128
Vehicles Exited	29	1802	59	642	571	30	3133
Hourly Exit Rate	29	1802	59	642	571	30	3133
Input Volume	30	1795	60	648	578	30	3141
% of Volume	97	100	98	99	99	99	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

220: Helvetia Rd/Brookwood Pkwy #1 & WB-NB Helvetia Performance by movement

Movement	NBT	SBT	NWT	NWR	All
Total Delay (hr)	0.6	0.9	0.0	0.2	1.6
Delay / Veh (s)	3.5	1.3	0.1	6.0	1.9
Vehicles Entered	587	2376	2	110	3075
Vehicles Exited	588	2377	2	110	3077
Hourly Exit Rate	588	2377	2	110	3077
Input Volume	604	2379	3	100	3086
% of Volume	97	100	62	110	100
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

224: Exit Ramp #1 & WB-NB Helvetia Performance by movement

Movement	WBT	WBR	All
Total Delay (hr)	1.5	0.1	1.6
Delay / Veh (s)	3.0	4.5	3.0
Vehicles Entered	1795	107	1902
Vehicles Exited	1792	107	1899
Hourly Exit Rate	1792	107	1899
Input Volume	1795	100	1895
% of Volume	100	107	100
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy #1 Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.8	2.3	1.2	0.3	0.3	4.4	9.4
Delay / Veh (s)	37.0	31.2	8.4	2.5	31.6	6.7	9.1
Vehicles Entered	82	270	505	486	36	2343	3722
Vehicles Exited	82	269	503	487	36	2345	3722
Hourly Exit Rate	82	269	503	487	36	2345	3722
Input Volume	85	275	518	505	35	2348	3766
% of Volume	97	98	97	96	102	100	99
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

231: US-26 EB Helvetia On-ramp & Performance by movement

Movement	EBT	All
Total Delay (hr)	16.0	16.0
Delay / Veh (s)	109.0	109.0
Vehicles Entered	534	534
Vehicles Exited	525	525
Hourly Exit Rate	525	525
Input Volume	550	550
% of Volume	95	95
Denied Entry Before	0	0
Denied Entry After	0	0

240: Meek Rd & Brookwood Pkwy Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	21.9	34.1	0.3	0.9	1.1	0.0	58.4
Delay / Veh (s)	3936.5	3841.1	37.0	3.5	1.6	0.7	57.3
Vehicles Entered	21	36	33	967	2597	21	3675
Vehicles Exited	19	29	33	969	2597	21	3668
Hourly Exit Rate	19	29	33	969	2597	21	3668
Input Volume	50	80	35	970	2608	20	3763
% of Volume	38	36	94	100	100	105	97
Denied Entry Before	0	1	0	0	0	0	1
Denied Entry After	28	43	0	0	0	0	71

Total Network Performance

Total Delay (hr)	116.5
Delay / Veh (s)	101.7
Vehicles Entered	4133
Vehicles Exited	4114
Hourly Exit Rate	4114
Input Volume	37995
% of Volume	11
Denied Entry Before	2
Denied Entry After	72

Intersection: 200: Schaff Rd & Helvetia Rd

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	72	21	208
Average Queue (ft)	30	1	36
95th Queue (ft)	59	10	136
Link Distance (ft)	549	410	349
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 210: Jacobson Rd & Helvetia Rd

Movement	WB	NB	SB
Directions Served	LR	R	LT
Maximum Queue (ft)	223	10	165
Average Queue (ft)	82	0	15
95th Queue (ft)	170	5	86
Link Distance (ft)	396	883	410
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 215: Loop Ramp #1 & Helvetia Rd

Movement	EB	EB	NB	NB	NB	SB	SB
Directions Served	R	R	L	T	T	T	T>
Maximum Queue (ft)	376	351	203	305	266	287	304
Average Queue (ft)	191	157	60	161	134	152	161
95th Queue (ft)	315	283	145	283	246	242	256
Link Distance (ft)	914	914		244	244	883	
Upstream Blk Time (%)			0	2	1		
Queuing Penalty (veh)			0	7	2		
Storage Bay Dist (ft)			200				415
Storage Blk Time (%)			0	5			
Queuing Penalty (veh)			0	3			

Intersection: 220: Helvetia Rd/Brookwood Pkwy #1 & WB-NB Helvetia

Movement	NB	NW
Directions Served	T	R
Maximum Queue (ft)	40	89
Average Queue (ft)	2	39
95th Queue (ft)	18	67
Link Distance (ft)	633	1346
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 224: Exit Ramp #1 & WB-NB Helvetia

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy #1

Movement	EB	EB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LR	R	T	T	R	L	T	T	T
Maximum Queue (ft)	210	198	146	137	61	81	136	214	274
Average Queue (ft)	119	113	83	67	3	23	60	105	157
95th Queue (ft)	182	174	142	125	31	57	117	193	245
Link Distance (ft)	1130		136	136	136		633	633	633
Upstream Blk Time (%)			1	0	0				
Queuing Penalty (veh)			3	1	0				
Storage Bay Dist (ft)		300				175			
Storage Blk Time (%)							0		
Queuing Penalty (veh)							0		

Intersection: 231: US-26 EB Helvetia On-ramp &

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	464	475
Average Queue (ft)	265	283
95th Queue (ft)	501	517
Link Distance (ft)	956	956
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 240: Meek Rd & Brookwood Pkwy

Movement	EB	NB	NB	NB	SB	SB	SB
Directions Served	LR	L	T	T	LT	T	TR
Maximum Queue (ft)	610	93	54	18	6	21	26
Average Queue (ft)	591	29	2	1	0	1	2
95th Queue (ft)	692	71	22	10	4	10	13
Link Distance (ft)	591		620	620	136	136	136
Upstream Blk Time (%)	90						
Queuing Penalty (veh)	0						
Storage Bay Dist (ft)		100					
Storage Blk Time (%)		1	0				
Queuing Penalty (veh)		3	0				

Network Summary

Network wide Queuing Penalty: 19

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	30	0	470	210	0	270
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	32	0	505	226	0	290
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	909	618			731	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	909	618			731	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	90	100			100	
cM capacity (veh/h)	308	493			882	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	32	731	290
Volume Left	32	0	0
Volume Right	0	226	0
cSH	308	1700	882
Volume to Capacity	0.10	0.43	0.00
Queue Length 95th (ft)	9	0	0
Control Delay (s)	18.1	0.0	0.0
Lane LOS	C		
Approach Delay (s)	18.1	0.0	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	275	10	670	520	10	290
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	306	11	744	578	11	322
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			937			
pX, platoon unblocked						
vC, conflicting volume	1089	744			1322	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1089	744			1322	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	97			98	
cM capacity (veh/h)	235	418			529	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	317	744	578	333
Volume Left	306	0	0	11
Volume Right	11	0	578	0
cSH	238	1700	1700	529
Volume to Capacity	1.33	0.44	0.34	0.02
Queue Length 95th (ft)	421	0	0	2
Control Delay (s)	214.9	0.0	0.0	0.7
Lane LOS	F			A
Approach Delay (s)	214.9	0.0		0.7
Approach LOS	F			

Intersection Summary			
Average Delay	34.6		
Intersection Capacity Utilization	57.8%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Lane Configurations									
Volume (vph)	0	730	290	1190	430	0	135	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.0	2.0	2.0	3.0				
Lane Util. Factor		*1.00	1.00	0.95	0.95				
Frt		0.85	1.00	1.00	0.96				
Flt Protected		1.00	0.95	1.00	1.00				
Satd. Flow (prot)		2975	1646	3292	3206				
Flt Permitted		1.00	0.95	1.00	1.00				
Satd. Flow (perm)		2975	1646	3292	3206				
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	785	312	1280	462	0	145	0	0
RTOR Reduction (vph)	0	294	0	0	54	0	0	0	0
Lane Group Flow (vph)	0	491	312	1280	553	0	0	0	0
Heavy Vehicles (%)	0%	0%	1%	1%	0%	0%	0%	0%	0%
Turn Type		custom	Prot						
Protected Phases		8	3	3 6	2				
Permitted Phases									
Actuated Green, G (s)		27.3	28.3	60.0	22.7				
Effective Green, g (s)		29.3	30.3	57.0	24.7				
Actuated g/C Ratio		0.49	0.51	0.95	0.41				
Clearance Time (s)		5.0	4.0		5.0				
Vehicle Extension (s)		5.2	2.3		5.2				
Lane Grp Cap (vph)		1453	831	3127	1320				
v/s Ratio Prot		0.17	0.19	c0.39	0.17				
v/s Ratio Perm									
v/c Ratio		0.34	0.38	0.41	0.42				
Uniform Delay, d1		9.4	9.1	0.1	12.6				
Progression Factor		1.00	1.06	1.00	1.00				
Incremental Delay, d2		0.6	0.1	0.0	0.5				
Delay (s)		10.0	9.7	0.2	13.0				
Level of Service		B	A	A	B				
Approach Delay (s)	10.0			2.0	13.0			0.0	
Approach LOS	B			A	B			A	

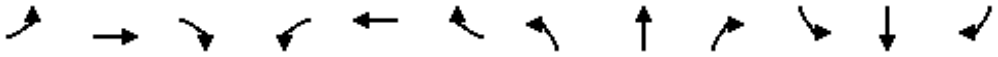
Intersection Summary			
HCM Average Control Delay	6.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	2.0
Intersection Capacity Utilization	52.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Volume (veh/h)	1410	0	0	1160	0	70
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	1516	0	0	1247	0	75
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	706			298		
pX, platoon unblocked			0.86		0.86	0.86
vC, conflicting volume			1516		1932	758
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1276		1759	395
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	86
cM capacity (veh/h)			474		67	525

Direction, Lane #	NB 1	NB 2	SB 1	SB 2	SB 3	NW 1
Volume Total	758	758	416	416	416	75
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	0	75
cSH	1700	1700	1700	1700	1700	525
Volume to Capacity	0.45	0.45	0.24	0.24	0.24	0.14
Queue Length 95th (ft)	0	0	0	0	0	12
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	13.0
Lane LOS						B
Approach Delay (s)	0.0		0.0			13.0
Approach LOS						B

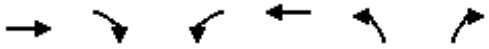
Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	80.2%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	0	80	0	0	0	0	1390	945	5	1155	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.0	3.0					3.0	3.0	2.0	3.0	
Lane Util. Factor		0.95	0.95					0.95	1.00	1.00	0.91	
Frt		0.91	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.98	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1483	1413					3292	1473	1662	4778	
Flt Permitted		0.98	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1483	1413					3292	1473	1662	4778	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	21	0	83	0	0	0	0	1448	984	5	1203	0
RTOR Reduction (vph)	0	30	47	0	0	0	0	0	165	0	0	0
Lane Group Flow (vph)	0	23	4	0	0	0	0	1448	819	5	1203	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
Turn Type	Perm		Perm						Perm	Prot		
Protected Phases		8						6		5	2	
Permitted Phases	8		8						6			
Actuated Green, G (s)		7.3	7.3					97.9	97.9	0.8	102.7	
Effective Green, g (s)		9.3	9.3					99.9	99.9	2.8	104.7	
Actuated g/C Ratio		0.08	0.08					0.83	0.83	0.02	0.87	
Clearance Time (s)		5.0	5.0					5.0	5.0	4.0	5.0	
Vehicle Extension (s)		2.3	2.3					4.7	4.7	2.3	4.7	
Lane Grp Cap (vph)		115	110					2741	1226	39	4169	
v/s Ratio Prot								0.44		0.00	c0.25	
v/s Ratio Perm		0.02	0.00						c0.56			
v/c Ratio		0.20	0.04					0.53	0.67	0.13	0.29	
Uniform Delay, d1		51.9	51.2					3.0	3.8	57.4	1.3	
Progression Factor		1.00	1.00					1.00	1.00	0.99	1.05	
Incremental Delay, d2		0.5	0.1					0.7	2.9	0.8	0.2	
Delay (s)		52.4	51.3					3.7	6.7	57.5	1.5	
Level of Service		D	D					A	A	E	A	
Approach Delay (s)		51.8			0.0			4.9			1.8	
Approach LOS		D			A			A			A	

Intersection Summary			
HCM Average Control Delay	5.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	80.2%	ICU Level of Service	D
Analysis Period (min)	15		

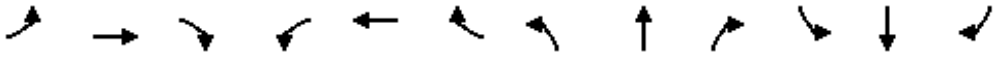
c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	950	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5					
Lane Util. Factor	0.95					
Frt	1.00					
Flt Protected	1.00					
Satd. Flow (prot)	3471					
Flt Permitted	1.00					
Satd. Flow (perm)	3471					
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1033	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1033	0	0	0	0	0
Heavy Vehicles (%)	4%	0%	0%	0%	0%	0%
Turn Type						
Protected Phases	4					
Permitted Phases						
Actuated Green, G (s)	2.5					
Effective Green, g (s)	2.5					
Actuated g/C Ratio	0.07					
Clearance Time (s)	4.5					
Vehicle Extension (s)	3.0					
Lane Grp Cap (vph)	248					
v/s Ratio Prot	c0.30					
v/s Ratio Perm						
v/c Ratio	4.17					
Uniform Delay, d1	16.2					
Progression Factor	1.00					
Incremental Delay, d2	1433.9					
Delay (s)	1450.1					
Level of Service	F					
Approach Delay (s)	1450.1			0.0	0.0	
Approach LOS	F			A	A	

Intersection Summary			
HCM Average Control Delay	1450.1	HCM Level of Service	F
HCM Volume to Capacity ratio	4.17		
Actuated Cycle Length (s)	35.0	Sum of lost time (s)	32.5
Intersection Capacity Utilization	30.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	25	0	75	0	0	0	110	2310	0	0	1190	45
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	27	0	80	0	0	0	117	2457	0	0	1266	48
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											189	
pX, platoon unblocked	0.96	0.96	0.96	0.96	0.96		0.96					
vC, conflicting volume	2343	3981	446	3193	4005	819	1314			2457		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2254	3960	278	3139	3985	819	1182			2457		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	89	100	100	100	80			100		
cM capacity (veh/h)	19	2	696	3	2	323	574			192		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3
Volume Total	106	0	117	983	983	491	316	633	364
Volume Left	27	0	117	0	0	0	0	0	0
Volume Right	80	0	0	0	0	0	0	0	48
cSH	69	1700	574	1700	1700	1700	192	1700	1700
Volume to Capacity	1.53	0.00	0.20	0.58	0.58	0.29	0.00	0.37	0.21
Queue Length 95th (ft)	226	0	19	0	0	0	0	0	0
Control Delay (s)	400.0	0.0	12.9	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	F	A	B						
Approach Delay (s)	400.0	0.0	0.6				0.0		
Approach LOS	F	A							

Intersection Summary				
Average Delay	11.0			
Intersection Capacity Utilization	84.6%	ICU Level of Service	E	
Analysis Period (min)	15			

200: Schaff Rd & Helvetia Rd Performance by movement

Movement	WBL	NBT	NBR	SBT	All
Total Delay (hr)	0.1	0.5	0.1	0.0	0.7
Delay / Veh (s)	12.8	3.9	1.5	0.4	2.7
Vehicles Entered	27	448	187	268	930
Vehicles Exited	28	449	187	268	932
Hourly Exit Rate	28	449	187	268	932
Input Volume	30	476	210	270	986
% of Volume	94	94	89	99	95
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

210: Jacobson Rd & Helvetia Rd Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	10.5	0.4	0.4	0.5	0.0	0.1	12.0
Delay / Veh (s)	141.3	157.3	2.3	3.9	12.3	1.6	25.8
Vehicles Entered	272	10	629	472	10	287	1680
Vehicles Exited	265	10	630	474	10	288	1677
Hourly Exit Rate	265	10	630	474	10	288	1677
Input Volume	275	10	682	520	10	292	1790
% of Volume	96	98	92	91	98	99	94
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

215: Loop Ramp #1 & Helvetia Rd Performance by movement

Movement	EBT	EBR	NBL	NBT	SBT	SBR2	All
Total Delay (hr)	0.0	0.7	1.2	1.1	1.6	0.4	5.0
Delay / Veh (s)	0.1	3.7	16.5	3.6	13.3	11.0	6.8
Vehicles Entered	12	714	264	1094	425	132	2641
Vehicles Exited	12	714	264	1093	426	131	2640
Hourly Exit Rate	12	714	264	1093	426	131	2640
Input Volume	14	730	290	1191	437	135	2798
% of Volume	83	98	91	92	97	97	94
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

220: Helvetia Rd/Brookwood Pkwy #1 & WB-NB Helvetia Performance by movement

Movement	NBT	SBT	NWT	NWR	All
Total Delay (hr)	1.0	0.4	0.0	0.3	1.7
Delay / Veh (s)	2.8	1.3	0.0	13.7	2.5
Vehicles Entered	1287	1132	1	78	2498
Vehicles Exited	1289	1133	1	78	2501
Hourly Exit Rate	1289	1133	1	78	2501
Input Volume	1422	1160	1	70	2653
% of Volume	91	98	80	112	94
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

224: Exit Ramp #1 & WB-NB Helvetia Performance by movement

Movement	WBT	WBR	All
Total Delay (hr)	0.1	0.0	0.2
Delay / Veh (s)	0.7	1.4	0.7
Vehicles Entered	715	77	792
Vehicles Exited	715	78	793
Hourly Exit Rate	715	78	793
Input Volume	730	70	800
% of Volume	98	111	99
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy #1 Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.3	0.3	0.7	1.9	0.1	0.6	3.7
Delay / Veh (s)	50.5	11.4	1.9	8.3	49.8	1.9	4.1
Vehicles Entered	17	82	1267	824	5	1135	3330
Vehicles Exited	18	82	1267	823	4	1135	3329
Hourly Exit Rate	18	82	1267	823	4	1135	3329
Input Volume	20	80	1403	945	5	1165	3618
% of Volume	89	102	90	87	80	97	92
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

231: US-26 EB Helvetia On-ramp & Performance by movement

Movement	EBT	All
Total Delay (hr)	69.4	69.4
Delay / Veh (s)	305.9	306.3
Vehicles Entered	829	829
Vehicles Exited	805	805
Hourly Exit Rate	805	805
Input Volume	982	982
% of Volume	82	82
Denied Entry Before	0	0
Denied Entry After	29	29

240: Meek Rd & Brookwood Pkwy Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	5.4	16.6	0.3	14.6	0.3	0.0	37.2
Delay / Veh (s)	970.7	878.3	12.0	25.5	0.8	0.4	38.7
Vehicles Entered	21	72	92	2069	1174	43	3471
Vehicles Exited	20	64	92	2057	1174	43	3450
Hourly Exit Rate	20	64	92	2057	1174	43	3450
Input Volume	25	75	110	2310	1197	45	3762
% of Volume	81	86	83	89	98	96	92
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	1	3	0	0	0	0	4

Total Network Performance

Total Delay (hr)	238.5
Delay / Veh (s)	223.6
Vehicles Entered	3921
Vehicles Exited	3761
Hourly Exit Rate	3761
Input Volume	35613
% of Volume	11
Denied Entry Before	0
Denied Entry After	177

Intersection: 200: Schaff Rd & Helvetia Rd

Movement	WB
Directions Served	LR
Maximum Queue (ft)	57
Average Queue (ft)	21
95th Queue (ft)	49
Link Distance (ft)	549
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 210: Jacobson Rd & Helvetia Rd

Movement	WB	B211	NB	SB
Directions Served	LR	T	R	LT
Maximum Queue (ft)	480	591	21	126
Average Queue (ft)	371	187	1	15
95th Queue (ft)	585	609	10	68
Link Distance (ft)	396	948	883	410
Upstream Blk Time (%)	48	0		
Queuing Penalty (veh)	0	0		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 215: Loop Ramp #1 & Helvetia Rd

Movement	EB	EB	NB	NB	NB	SB	SB
Directions Served	R	R	L	T	T	T	T>
Maximum Queue (ft)	88	68	224	305	282	141	156
Average Queue (ft)	44	47	117	65	49	69	90
95th Queue (ft)	76	70	211	235	185	115	143
Link Distance (ft)	914	914		244	244	883	
Upstream Blk Time (%)			0	1	1		
Queuing Penalty (veh)			0	10	5		
Storage Bay Dist (ft)			200				415
Storage Blk Time (%)			2	2			
Queuing Penalty (veh)			9	5			

Intersection: 220: Helvetia Rd/Brookwood Pkwy #1 & WB-NB Helvetia

Movement	NB	NB	NW
Directions Served	T	T	R
Maximum Queue (ft)	141	41	94
Average Queue (ft)	9	2	41
95th Queue (ft)	68	20	80
Link Distance (ft)	633	633	1346
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 224: Exit Ramp #1 & WB-NB Helvetia

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 230: US-26 EB Helvetia Off-ramp & Helvetia Rd/Brookwood Pkwy #1

Movement	EB	EB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LR	R	T	T	R	L	T	T	T
Maximum Queue (ft)	75	71	150	142	214	27	62	66	109
Average Queue (ft)	34	34	48	34	151	4	8	12	32
95th Queue (ft)	66	60	118	96	269	17	37	42	85
Link Distance (ft)	1130		136	136	136		633	633	633
Upstream Blk Time (%)			0	0	21				
Queuing Penalty (veh)			3	2	161				
Storage Bay Dist (ft)		300				175			
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 231: US-26 EB Helvetia On-ramp &

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	875	1069
Average Queue (ft)	837	981
95th Queue (ft)	968	1201
Link Distance (ft)	956	956
Upstream Blk Time (%)		47
Queuing Penalty (veh)		224
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 240: Meek Rd & Brookwood Pkwy

Movement	EB	NB	NB	NB	NB	B251	B251	B2	B2	B3	B3	SB
Directions Served	LR	L	T	T	TR	T	T	T	T	T	T	LT
Maximum Queue (ft)	610	90	175	709	612	1352	1361	1183	1183	1064	1057	7
Average Queue (ft)	476	42	3	488	469	821	849	574	594	427	445	0
95th Queue (ft)	750	77	27	1009	870	1826	1857	1515	1519	1252	1276	5
Link Distance (ft)	591		620	620		1281	1281	1111	1111	1032	1032	136
Upstream Blk Time (%)	48		0	29	13	4	16	10	13	10	12	
Queuing Penalty (veh)	0		0	0	0	0	0	0	0	0	0	
Storage Bay Dist (ft)		100			600							
Storage Blk Time (%)		0	0	8	31							
Queuing Penalty (veh)		0	0	63	242							

Intersection: 240: Meek Rd & Brookwood Pkwy

Movement	SB
Directions Served	TR
Maximum Queue (ft)	22
Average Queue (ft)	2
95th Queue (ft)	12
Link Distance (ft)	136
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 723

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2035
Description:	Eastbound Off-ramp to Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2660	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	435	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2660	435		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	700	114		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2856	467	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2856 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2856	4600	No
$v_{FO} = v_F - v_R$	2389	4600	No
v_R	467	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 $v_{12}/2$	No	
If yes, v_{12A} = 2856		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2856	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 15.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.470	
Space mean speed in ramp influence area,	S_R = 51.5	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.5	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2035
Description:	Eastbound Off-ramp to Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2660	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	435	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2660	435		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	700	114		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2856	467	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2856 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2856	4600	No
$v_{FO} = v_F - v_R$	2389	4600	No
v_R	467	2000	No
$v_{3 \text{ or } av34}$	0 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34}$	v_{av34} > 2700 pc/h?	No	
Is $v_{3 \text{ or } av34}$	v_{av34} > 1.5 v_{12} /2	No	
If yes, v_{12A}	= 2856	(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2856	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 15.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.470	
Space mean speed in ramp influence area,	S_R = 51.5	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.5	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2035
Description:	Eastbound Off-ramp to Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2660	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	435	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2660	435		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	700	114		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2856	467	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2856 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2856	4600	No
$v_{FO} = v_F - v_R$	2389	4600	No
v_R	467	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 2856		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2856	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 15.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.470	
Space mean speed in ramp influence area,	S_R = 51.5	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.5	mph

Phone: Fax:
E-mail:

Diverge Analysis

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Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2035
Description:	Westbound 2-lane Off-ramp to Southbound Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3925	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	1795	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane	0	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3925	1795		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1033	472		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	4214	1927	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 4214 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4214	4600	No
$v_{FO} = v_F - v_R$	2287	4600	No
v_R	1927	3800	No
$v_{3 \text{ or } av34}$	0 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34} > 2700$ pc/h?		No	
Is $v_{3 \text{ or } av34} > 1.5\, v_{12}/2$		No	
If yes, v_{12A} = 4214		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4214	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 13.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.601	
Space mean speed in ramp influence area,	S_R = 49.2	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 49.2	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	AM Peak Period
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2035
Description: Westbound	On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2035	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	90	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2035	90		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	536	24		v
Trucks and buses	4	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.980	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2185	97	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 2185 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2282	4600	No

$v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 2185 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2185	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_{12} + 0.0078\ v_R - 0.00627\ L_A$ = 20.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.331

Space mean speed in ramp influence area, S_R = 54.1 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 54.1 mph

Phone: Fax:
E-mail:

Diverge Analysis

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Date performed:	10/13/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2035
Description:	Eastbound - Off-ramp to Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2975	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	130	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2975	130		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	783	34		v
Trucks and buses	1	1		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.995	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3147	138	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3147 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3147	4600	No
$v_{FO} = v_F - v_R$	3009	4600	No
v_R	138	2000	No
$v_{3 \text{ or } av34}$	0 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34}$	v_{av34} > 2700 pc/h?	No	
Is $v_{3 \text{ or } av34}$	v_{av34} > 1.5 v_{12} /2	No	
If yes, v_{12A} = 3147		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3147	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 17.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.440	
Space mean speed in ramp influence area,	S_R = 52.1	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 52.1	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	PM Peak Period
Freeway/Dir of Travel:	US 26 Eastbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2035
Description: Eastbound	On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2845	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	800	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2845	800		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	749	211		v
Trucks and buses	1	1		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.995	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3010	846	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 3010 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3856	4600	No

$v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 3010 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3010	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_{R} + 0.0078\, v_{12} - 0.00627\, L_A =$ 32.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, M_S = 0.477

Space mean speed in ramp influence area, S_R = 51.4 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 51.4 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/13/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2035
Description:	Westbound 1-lane Off-ramp to Northbound Helvetia

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3700	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	100	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3700	100		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	974	26		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3914	107	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3914 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3914	4600	No
$v_{FO} = v_F - v_R$	3807	4600	No
v_R	107	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 $v_{12}/2$	No	
If yes, v_{12A} = 3914		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3914	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 24.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	D_S = 0.438	
Space mean speed in ramp influence area,	S_R = 52.1	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 52.1	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Josh Anderson
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Date performed:	10/13/2011
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2035
Description:	Westbound 2-lane Off-ramp to Southbound Brookwood

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3600	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	745	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane	0	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3600	745		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	947	196		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3808	796	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3808 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3808	4600	No
$v_{FO} = v_F - v_R$	3012	4600	No
v_R	796	3800	No
$v_{3 \text{ or } av34}$	0 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34} > 2700$ pc/h?		No	
Is $v_{3 \text{ or } av34} > 1.5\, v_{12}/2$		No	
If yes, v_{12A} = 3808		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3808	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 10.0+ pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.500	
Space mean speed in ramp influence area,	S_R = 51.0	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.0	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Josh Anderson
Agency/Co.:	David Evans & Associates, Inc.
Date performed:	10/14/2011
Analysis time period:	PM Peak Period
Freeway/Dir of Travel:	US 26 Westbound
Junction:	Brookwood Interchange
Jurisdiction:	ODOT
Analysis Year:	2035
Description:	Westbound On-ramp from Brookwood

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2855	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	425	vph
Length of first accel/decel lane	410	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2855	425		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	751	112		v
Trucks and buses	1	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.995	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3020	454	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 3020 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3474	4600	No

$v_{3 \text{ or } av34}$ = 0 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? No

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 3020 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3020	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_{R} + 0.0078\, v_{12} - 0.00627\, L_A =$ 29.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, M_S = 0.418

Space mean speed in ramp influence area, S_R = 52.5 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 52.5 mph

Appendix D:
Raw Crash Data

US-26 SPIS Sites
July 22, 2011
Brookwood Boulevard IAMP - JTA specific analysis

Route	Start_MP	End_MP	ADT	Total_Crashes	Fatal	Inj A	Inj B	Inj C	PDO	City	County	Percentile	SPIS_Score	Hwy	Rdwy	SPIS_Group
US-26	59.43	59.52	42100	3	0	0	1	0	2		WASHINGTON	0	9.67	47	1	443900
US-26	59.44	59.53	42100	3	0	0	1	0	2		WASHINGTON	0	9.67	47	1	443900
US-26	59.45	59.54	42100	3	0	0	1	0	2		WASHINGTON	0	9.67	47	1	443900
US-26	59.46	59.55	42100	3	0	0	1	0	2		WASHINGTON	0	9.67	47	1	443900
US-26	59.47	59.56	42100	3	0	0	1	0	2		WASHINGTON	0	9.67	47	1	443900
US-26	59.79	59.88	42100	3	0	0	1	0	2		WASHINGTON	0	9.67	47	1	443901
US-26	59.80	59.89	42100	3	0	0	1	0	2		WASHINGTON	0	9.67	47	1	443901
US-26	59.81	59.90	42100	3	0	0	1	0	2		WASHINGTON	0	9.67	47	1	443901
US-26	59.82	59.91	42100	3	0	0	1	0	2		WASHINGTON	0	9.67	47	1	443901
US-26	59.83	59.92	42100	3	0	0	1	0	2		WASHINGTON	0	9.67	47	1	443901
US-26	60.76	60.85	42100	3	0	0	1	2	0		WASHINGTON	15	12.67	47	1	443902
US-26	60.77	60.86	42100	3	0	0	1	2	0		WASHINGTON	15	12.67	47	1	443902
US-26	61.83	62.00	55000	3	0	0	1	0	2		WASHINGTON	25	14.43	47	1	443985
US-26	61.84	62.01	55000	3	0	0	1	0	2		WASHINGTON	25	14.43	47	1	443985
US-26	61.85	62.02	55000	3	0	0	1	0	2		WASHINGTON	25	14.43	47	1	443985
US-26	61.94	62.03	55000	3	0	0	1	0	2		WASHINGTON	25	14.43	47	1	443985
US-26	61.95	62.04	55000	3	0	0	1	0	2		WASHINGTON	25	14.43	47	1	443985
US-26	61.96	62.05	55000	3	0	0	1	0	2		WASHINGTON	25	14.43	47	1	443985
US-26	61.97	62.06	55000	3	0	0	1	0	2		WASHINGTON	25	14.43	47	1	443985
US-26	61.98	62.07	55000	3	0	0	1	0	2		WASHINGTON	25	14.43	47	1	443985
US-26	61.99	62.08	55000	3	0	0	1	0	2		WASHINGTON	30	14.95	47	1	443985
US-26	62.01	62.10	55000	3	0	0	0	2	1		WASHINGTON	5	10.99	47	1	443903
US-26	62.02	62.11	55000	3	0	0	0	2	1		WASHINGTON	5	10.99	47	1	443903
US-26	62.03	62.12	55000	4	0	0	0	2	2		WASHINGTON	15	12.46	47	1	443903
US-26	62.04	62.13	55000	4	0	0	0	2	2		WASHINGTON	15	12.46	47	1	443903
US-26	62.05	62.14	55000	4	0	0	0	2	2		WASHINGTON	15	12.46	47	1	443903
US-26	62.06	62.15	55000	4	0	0	0	2	2		WASHINGTON	15	12.46	47	1	443903
US-26	62.07	62.16	55000	4	0	0	0	2	2		WASHINGTON	15	12.46	47	1	443903
US-26	62.08	62.17	55000	4	0	0	0	2	2		WASHINGTON	15	12.46	47	1	443903
US-26	62.09	62.18	55000	3	0	0	0	1	2		WASHINGTON	0	9.49	47	1	443903
US-26	62.10	62.19	55000	3	0	0	0	1	2		WASHINGTON	0	9.49	47	1	443903
US-26	62.35	62.44	55000	3	0	0	0	1	2		WASHINGTON	0	9.49	47	1	443904
US-26	62.36	62.45	55000	5	0	0	0	3	2		WASHINGTON	30	15.22	47	1	443904
US-26	62.37	62.46	55000	5	0	0	0	3	2		WASHINGTON	30	15.22	47	1	443904
US-26	62.38	62.47	55000	6	0	0	0	3	3		WASHINGTON	35	16.34	47	1	443904
US-26	62.39	62.48	55000	8	0	1	0	4	3		WASHINGTON	85	36.28	47	1	443904
US-26	62.40	62.49	55000	8	0	1	0	4	3		WASHINGTON	85	36.28	47	1	443904
US-26	62.41	62.50	55000	8	0	1	0	4	3		WASHINGTON	85	36.28	47	1	443904
US-26	62.42	62.51	55000	9	0	1	0	4	4		WASHINGTON	85	37.14	47	1	443904
US-26	62.43	62.52	55000	9	0	1	0	4	4		WASHINGTON	85	37.14	47	1	443904
US-26	62.44	62.53	55000	9	0	1	0	4	4		WASHINGTON	85	37.14	47	1	443904
US-26	62.45	62.54	55000	6	0	1	0	3	2		WASHINGTON	80	32.84	47	1	443904
US-26	62.46	62.55	55000	5	0	1	1	1	2		WASHINGTON	75	30.22	47	1	443904
US-26	62.47	62.56	74500	5	0	1	1	1	2		WASHINGTON	75	29.98	47	1	443904
US-26	62.48	62.57	74500	4	0	1	1	1	1		WASHINGTON	70	28.77	47	1	443904
US-26	62.66	62.75	74500	3	0	0	0	1	2		WASHINGTON	0	9.34	47	1	443905
US-26	62.67	62.76	74500	3	0	0	0	1	2		WASHINGTON	0	9.34	47	1	443905
US-26	62.68	62.77	74500	3	0	0	0	1	2		WASHINGTON	0	9.34	47	1	443905
US-26	62.69	62.78	74500	3	0	0	0	1	2		WASHINGTON	0	9.34	47	1	443905
US-26	62.70	62.79	74500	3	0	0	0	1	2		WASHINGTON	0	9.34	47	1	443905
US-26	62.71	62.80	74500	3	0	0	0	1	2		WASHINGTON	0	9.34	47	1	443905
US-26	62.88	62.97	74500	1	1	0	0	0	0		WASHINGTON	50	20.27	47	1	443906
US-26	62.89	62.98	74500	1	1	0	0	0	0		WASHINGTON	50	20.27	47	1	443906
US-26	62.90	62.99	74500	1	1	0	0	0	0		WASHINGTON	50	20.27	47	1	443906
US-26	62.91	63.00	74500	2	1	0	0	0	1		WASHINGTON	55	22.59	47	1	443906
US-26	62.92	63.01	74500	3	1	0	1	0	1		WASHINGTON	65	25.84	47	1	443906
US-26	62.93	63.02	74500	3	1	0	1	0	1		WASHINGTON	65	25.84	47	1	443906
US-26	62.94	63.03	74500	3	1	0	1	0	1		WASHINGTON	65	25.84	47	1	443906
US-26	62.95	63.04	74500	3	1	0	1	0	1		WASHINGTON	65	25.84	47	1	443906
US-26	62.96	63.05	74500	3	1	0	1	0	1		WASHINGTON	65	25.84	47	1	443906
US-26	62.97	63.06	74500	3	1	0	1	0	1		WASHINGTON	65	25.84	47	1	443906

TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT

CRASH SUMMARIES BY YEAR BY COLLISION TYPE

Sunset Hwy Mainline MP 60 to MP 62 + Entire Interchange of Helvetia Road & Shute Road/ AKA 242nd Ave (Request #110408)

January 1, 2005 Through December 31, 2009

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2009														
FIXED / OTHER OBJECT	0	1	0	1	0	1	0	0	1	1	0	0	0	1
REAR-END	0	2	0	2	0	4	0	2	0	1	1	1	0	0
TURNING MOVEMENTS	0	0	1	1	0	0	0	0	1	1	0	1	0	0
2009 TOTAL	0	3	1	4	0	5	0	2	2	3	1	2	0	1
YEAR: 2008														
FIXED / OTHER OBJECT	0	2	1	3	0	2	0	1	2	2	1	2	0	3
NON-COLLISION	0	1	0	1	0	1	0	1	0	1	0	1	0	0
REAR-END	0	3	1	4	0	3	0	4	0	4	0	1	0	0
2008 TOTAL	0	6	2	8	0	6	0	6	2	7	1	4	0	3
YEAR: 2007														
FIXED / OTHER OBJECT	0	1	0	1	0	1	0	0	1	0	1	0	0	1
REAR-END	0	1	2	3	0	1	0	2	1	1	2	0	0	0
SIDESWIPE - OVERTAKING	0	0	1	1	0	0	1	1	0	1	0	0	0	0
TURNING MOVEMENTS	0	0	1	1	0	0	0	0	1	1	0	1	0	0
2007 TOTAL	0	2	4	6	0	2	1	3	3	3	3	1	0	1
YEAR: 2006														
FIXED / OTHER OBJECT	0	0	1	1	0	0	0	0	1	0	1	0	0	1
REAR-END	0	4	4	8	0	8	0	6	2	6	2	2	0	0
SIDESWIPE - OVERTAKING	0	1	0	1	0	1	1	1	0	1	0	0	0	0
TURNING MOVEMENTS	0	0	2	2	0	0	0	2	0	2	0	2	0	0
2006 TOTAL	0	5	7	12	0	9	1	9	3	9	3	4	0	1
YEAR: 2005														
FIXED / OTHER OBJECT	0	0	2	2	0	0	1	1	1	1	1	0	0	1
REAR-END	0	5	3	8	0	10	0	7	1	7	1	1	0	0
SIDESWIPE - OVERTAKING	0	1	0	1	0	1	0	0	1	0	1	0	0	0
2005 TOTAL	0	6	5	11	0	11	1	8	3	8	3	1	0	1
FINAL TOTAL	0	22	19	41	0	33	3	28	13	30	11	12	0	7

Note: Legislative changes to DMV's vehicle crash reporting requirements, effective 01/01/2004, may result in fewer property damage only crashes being eligible for inclusion in the Statewide Crash Data File.

047 SUNSET Sunset Hwy Mainline MP 60 to MP 62 + Entire Interchange of Helvetia Road & Shute Road/ AKA 242nd Ave (Request #110408)
January 1, 2005 Through December 31, 2009

SER# / INVEST	SPEED	ALC	DRUG	SCHL	WORK	DATE / DAY / TIME	COUNTY / CITY / URBAN AREA	RD# / COMPNT / MLG / MILEPNT	FC / TYP	CONN # / FIRST STREET / SECOND STREET	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CNTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
06432	N	N	N			10/27/2006	WASHINGTON	1	02		STRGHT		N	N	CLR	S-STRGHT	01	NONE 9	STRGHT										012	13
NO RPT						Fri		0 0			UN	(DIVMD)	ONE-WAY	N	DRY	REAR		PRVTE	W E									000		00
						3P		60.06			03			N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	F	OR-Y		042	025		16
												(04)													OR>25					
																	02	NONE 1	STRGHT											
																		PRVTE	W E									000	012	00
																		PSNGR CAR		01	DRVR	NONE	34	M	OR-Y		000	000		00
																									OR<25					
01303	Y	N	N	N	N	03/04/2006	WASHINGTON	2	02		STRGHT		N	N	RAIN	S-STRGHT	01	NONE 0	STRGHT											27,07,01
CITY						Sat		0 0			W	(DIVMD)	ONE-WAY	N	WET	REAR		PRVTE	SE NW									000		00
						11P		60.06			03			N	DARK	INJ		PSNGR CAR		01	DRVR	NONE	27	M	OR-Y		042,043,047	038		27
												(04)													OR<25					
																	02	NONE 0	STRGHT											
																		PRVTE	SE NW									006		00
																		PSNGR CAR		01	DRVR	INJC	26	M	OR-Y		000	000		00
																									OR>25					
06089	N	N	N			10/07/2005	WASHINGTON	1	02		STRGHT		N	N	UNK	S-1STOP	01	UNKN 9	STRGHT											07
NO RPT						Fri		0 0			UN	(DIVMD)	ONE-WAY	N	WET	REAR		UNKN	NW SE									000		00
						6A		60.56			04			N	DARK	PDO		PSNGR CAR		01	DRVR	NONE	00	M	UNK		026	000		07
												(04)													UNK					
																	02	NONE 0	STOP											
																		PRVTE	NW SE									011		00
																		PSNGR CAR		01	DRVR	NONE	52	M	OR-Y		000	000		00
																									OR<25					
02965	Y	N	N	N	N	05/30/2005	WASHINGTON	1	02		STRGHT		N	N	CLD	S-STRGHT	01	NONE 0	STRGHT										010	01,07
STATE						Mon		0 0			W	(DIVMD)	ONE-WAY	N	DRY	REAR		PRVTE	E W									000		00
						10A		60.61			04			N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	42	F	OR-Y		042,052,043	025		01,07
												(04)													OR<25					
																	02	NONE 1	STRGHT											
																		PRVTE	E W									000	010	00
																		PSNGR CAR		01	DRVR	INJC	17	M	OR-Y		000	000		00
																									OR<25					
																				02	PSNG	INJC	17	M			000	000		00
04936	N	N	N			08/19/2005	WASHINGTON	2	02		STRGHT		N	N	CLR	S-1STOP	01	NONE	STRGHT											07
NONE						Fri		0 0			UN	(DIVMD)	UNKNOWN	N	DRY	REAR		PRVTE	E W									000		00
						3P		60.67			03			N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	M	OTH-Y		026	000		07
												(04)													N-RES					
																	02	NONE	STOP											
																		PRVTE	E W									011		00
																		PSNGR CAR		01	DRVR	NONE	47	M	OR-Y		000	000		00
																									OR<25					

047 SUNSET Sunset Hwy Mainline MP 60 to MP 62 + Entire Interchange of Helvetia Road & Shute Road/ AKA 242nd Ave (Request #110408)
January 1, 2005 Through December 31, 2009

SER# / INVEST	SPEED	ALC	DRUGS	SCHL	WORK	DATE / DAY / TIME	COUNTY / CITY / URBAN AREA	RD# / COMPNT / MLG / MILEPNT	FC / TYP	CONN # / FIRST STREET / SECOND STREET	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF-CNTL	OFFRD RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / VEH TYPE	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
01514	Y	N	N	N	N	03/19/2008	WASHINGTON	1	02		STRGHT		N	Y	CLD	FIX OBJ	01	NONE 0	STRGHT										079,010,093	27,30
COUNTY						Wed		0	0		UN	(DIVMD)	ONE-WAY	N	DRY	FIX		PRVTE	W E									000	079,010	00
						3P		60.77			01	(04)		N	DAY	INJ		PSNGR CAR		01	DRVR	INJB	41	M	OR-Y OR<25		016,050,081	038		27,30
04208	N	N	N			08/28/2009	WASHINGTON	2	02		STRGHT		N	Y	RAIN	FIX OBJ	01	NONE 0	STRGHT										079,092	26
NO RPT						Fri		0	0		UN	(DIVMD)	ONE-WAY	N	WET	FIX		PRVTE	E W									007	079,092	26
						4P		60.81			03	(04)		N	DAY	INJ		PSNGR CAR		01	DRVR	INJC	22	M	OTH-Y N-RES		080,081,083	088		26
02200	N	N	N			04/20/2009	WASHINGTON	1	02		STRGHT		N	N	CLR	S-1STOP	01	NONE 0	STRGHT										013	07
NO RPT						Mon		0	0		UN	(DIVMD)	ONE-WAY	N	DRY	REAR		PRVTE	W E									000		00
						4P		60.85			04	(04)		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	65	M	OR-Y OR<25		026	000		07
																	02	NONE 0	STOP									011	013	00
																		PRVTE	W E									000		00
																		PSNGR CAR		01	DRVR	INJC	58	M	OR-Y OR<25		000	000		00
																	03	NONE 0	STOP									022		00
																		PRVTE	W E									000		00
																		PSNGR CAR		01	DRVR	NONE	26	M	OR-Y OR<25		000	000		00
03366	N	N	N			06/19/2005	WASHINGTON	1	02		STRGHT		N	N	CLR	S-STRGHT	01	NONE 0	STRGHT										012	07
NONE						Sun		0	0		W	(DIVMD)	ONE-WAY	N	DRY	REAR		RENTL	W E									000		00
						3P		60.85			03	(04)		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	27	M	OTH-Y N-RES		042	000		07
																	02	NONE 1	STRGHT									000	012	00
																		PRVTE	W E									000		00
																		PSNGR CAR		01	DRVR	NONE	54	M	OR-Y OR<25		000	000		00
08111	Y	N	N			12/26/2007	WASHINGTON	2	02		STRGHT		N	Y	CLR	FIX OBJ	01	NONE 0	STRGHT										079,124	01
NO RPT						Wed		0	0		UN	(DIVMD)	ONE-WAY	N	ICE	FIX		PRVTE	E W									000	079,124	00
						5A		61.00			06	(04)		N	DARK	INJ		PSNGR CAR		01	DRVR	INJB	33	M	OTH-Y N-RES		047,080	017		01
04196	N	N	N		Y	07/22/2005	WASHINGTON	2	02		STRGHT		N	N	CLD	S-1STOP	01	NONE 0	STRGHT											07
STATE						Fri		0	0		E	(DIVMD)	ONE-WAY	N	DRY	REAR		PRVTE	SE NW									000		00
						2P		61.02			03	(04)		N	DAY	INJ		PSNGR CAR		01	DRVR	INJA	75	F	OR-Y OR>25		026	000		07
																	02	NONE 0	STOP									011		00
																		PRVTE	SE NW									000		00
																		PSNGR CAR		01	DRVR	INJC	48	M	OR-Y OR<25		000	000		00
																				02	PSNG	INJC	45	F			000	000		00

047 SUNSET Sunset Hwy Mainline MP 60 to MP 62 + Entire Interchange of Helvetia Road & Shute Road/ AKA 242nd Ave (Request #110408)
January 1, 2005 Through December 31, 2009

SER# / INVEST	SPEED	ALC	DRUG	SCHL	WORK	DATE / DAY / TIME	COUNTY / CITY / URBAN AREA	RD# / COMPNT / MLG / MILEPNT	FC / TYP	CONN # / FIRST STREET / SECOND STREET	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CNTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / VEH TYPE	MOVE / FROM / TO	P#	PRTC TYP	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
04756	N	N	N		Y	08/15/2005	WASHINGTON	2 02			STRGHT		N	N	CLR	S-1STOP	01	NONE 0	STRGHT											27
STATE						Mon		0 0			E	(DIVMD)	ONE-WAY	N	DRY	REAR		PRVTE	SE NW									000		00
						11A		61.04			04			N	DAY	INJ		PSNGR CAR		01	DRVR	INJB	39	F	OR-Y		026,016	038		27
												(04)													OR>25					
																	02	NONE 0	STOP											
																		PRVTE	SE NW									011		00
																		PSNGR CAR		01	DRVR	INJC	49	M	OTH-Y		000	000		00
																									N-RES					
04534	N	N	N	N	N	08/06/2007	WASHINGTON	2 12			STRGHT		N	N	CLD	S-STRGHT	01	NONE 0	STRGHT											13
CITY						Mon	HILLSBORO	0 0		SUNSET HY	E	(DIVMD)	ONE-WAY	N	DRY	SS-O		PRVTE	E W									000		00
						9A	PORTLAND UA	61.29		WB EX SHUTE RD C4	04			N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	59	M	OTH-Y		045	000		13
												(05)													N-RES					
																	02	NONE 0	STRGHT											
																		PRVTE	E W									000		00
																		TRUCK		01	DRVR	NONE	34	F	OR-Y		000	000		00
																									OR>25					
02939	N	Y	N	N	N	05/21/2006	WASHINGTON	1 12			STRGHT		N	N	RAIN	S-STRGHT	01	NONE 0	STRGHT										079,058	07,33
STATE						Sun	HILLSBORO	0 0		SUNSET HY	UN	(DIVMD)	ONE-WAY	N	WET	REAR		PRVTE	W E									001	079,058	00
						4P	PORTLAND UA	61.55		EB EF 242ND AVE C3	03			N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	55	F	OTH-Y		051,042	088		07,33
												(04)													N-RES					
																	02	NONE 0	STRGHT											
																		PRVTE	W E									006		00
																		PSNGR CAR		01	DRVR	INJC	17	F	OR-Y		000	000		00
																									OR<25					
																				02	PSNG	INJC	41	F			000	000		00
																				03	PSNG	INJC	18	M			000	000		00
02358	N	N	N			04/29/2005	WASHINGTON	1 12			STRGHT		N	N	CLR	S-1STOP	01	NONE 0	STRGHT										013	07
NONE						Fri	HILLSBORO	0 0		SUNSET HY	E	(DIVMD)	L-GRN-SIG	N	DRY	REAR		PRVTE	W E									000		00
						3P	PORTLAND UA	61.97		EB EX 185TH AVE C1	06			N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	37	M	OTH-Y		026	000		07
												(04)													N-RES					
																	02	NONE 0	STOP											
																		PRVTE	W E									011	013	00
																		PSNGR CAR		01	DRVR	INJC	45	F	OR-Y		000	000		00
																									OR<25					
																				02	PSNG	INJC	10	F			000	000		00
																	03	NONE 0	STOP											
																		PRVTE	W E									011		00
																		PSNGR CAR		01	DRVR	NONE	41	M	OR-Y		000	000		00
																									OR<25					
02438	N	N	N			04/28/2006	WASHINGTON	1 12			STRGHT		N	N	CLR	S-STRGHT	01	NONE 1	STRGHT										079	13
NO RPT						Fri	HILLSBORO	0 0		SUNSET HY	W	(DIVMD)	ONE-WAY	N	DRY	SS-O		PRVTE	W E									000		00
						2P	PORTLAND UA	62.00		WB EF CORNLS PAS C5	04			N	DAY	INJ		SEMI TOW		01	DRVR	NONE	49	M	OR-Y		045	000		13
												(04)													OR>25					

047 SUNSET Sunset Hwy Mainline MP 60 to MP 62 + Entire Interchange of Helvetia Road & Shute Road/ AKA 242nd Ave (Request #110408)
January 1, 2005 Through December 31, 2009

SER# / INVEST	SPEED	ALC	DRUGS	SCHL	WORK	DATE / DAY / TIME	COUNTY / CITY / URBAN AREA	RD# / COMPNT / MLG / MILEPNT	FC / TYP	CONN # / FIRST STREET / SECOND STREET	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CNTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / VEH TYPE	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
																	02	NONE 0 / PRVTE / PSNGR CAR	STRGHT / W E	01	DRVR	INJC	35	F	OR-Y / OR<25		000	000	079	00 00
05059	N	N	N			08/31/2006 / Thu / 6P	WASHINGTON / HILLSBORO / PORTLAND UA	1 12 / 0 0 / 62.00		SUNSET HY / EB EX CORNLS PASS	STRGHT / NW / 03	(DIVMD) (04)	N / ONE-WAY	N	CLR / DRY / DAY	S-STRGHT / REAR / PDO	01	NONE 9 / RENTL / PSNGR CAR	STRGHT / NW SE	01	DRVR	NONE	00	M	OTH-Y / N-RES		042	000		07 00 07
																	02	NONE 0 / RENTL / PSNGR CAR	STRGHT / NW SE	01	DRVR	NONE	56	M	OR-Y / OR<25		000	000		00 00
02321	Y	N	N			04/21/2006 / Fri / 3A	WASHINGTON	1 09 / 6 0 / 60.85		1 /	STRGHT / UN / 01	(NONE) (02)	N / ONE-WAY	Y	CLD / WET / DARK	FIX OBJ / FIX / PDO	01	NONE / PRVTE / PSNGR CAR	STRGHT / W E	01	DRVR	NONE	27	M	OR-Y / OR<25		047,081	000 017	046 045	01 00 01
02203	N	N	N			04/21/2005 / Thu / 6P	WASHINGTON	1 09 / 6 0 / 60.90		1 /	STRGHT / UN / 03	(NONE) (02)	N / L-GRN-SIG	N	CLR / DRY / DAY	OTH OBJ / FIX / PDO	01	NONE 1 / UNKN / SEMI TOW	STRGHT / NW SE	01	DRVR	NONE	00	U	UNK / UNK		017	000	028 028	10 00 10
																	02	NONE 0 / PRVTE / PSNGR CAR	STRGHT / NW SE	01	DRVR	NONE	36	F	OR-Y / OR<25		000	000		00 00
02400	N	N	N	N	N	05/06/2008 / Tue / 8A	WASHINGTON	1 09 / 6 0 / 60.90		1 /	STRGHT / UN / 03	(NONE) (01)	N / ONE-WAY	N	CLD / DRY / DAY	S-1STOP / REAR / INJ	01	NONE 0 / PRVTE / PSNGR CAR	STRGHT / W E	01	DRVR	INJB	32	M	OR-Y / OR<25		043,026	001 000		07 00 07
																	02	NONE 0 / PRVTE / PSNGR CAR	STOP / W E	01	DRVR	NONE	62	M	OTH-Y / N-RES		000	011 000		00 00
07447	N	N	N	N	N	12/06/2007 / Thu / 5P	WASHINGTON / PORTLAND UA	1 16 / 6 0 / 61.04		2 /	STRGHT / UN / 03	(NONE) (04)	N / NONE	N	CLD / WET / DLIT	S-1STOP / REAR / INJ	01	NONE 0 / PRVTE / PSNGR CAR	STRGHT / S N	01	DRVR	NONE	34	F	OR-Y / OR<25		026	000 000		07 00 07
																	02	NONE 0 / PRVTE / PSNGR CAR	STOP / S N	01	DRVR	INJC	52	F	OR-Y / OR<25		000	011 000		00 00
03260	N	N	N	N	N	06/06/2006 / Tue / 5P	WASHINGTON / HILLSBORO / PORTLAND UA	1 16 / 6 0 / 61.05		2 / NW 242ND AVE / EB EF 242ND AVE C3	GRADE / S / 03	(RSDMD) (04)	N / ONE-WAY	N	CLR / DRY / DAY	S-1STOP / REAR / PDO	01	NONE 0 / RENTL / PSNGR CAR	STRGHT / S N	01	DRVR	NONE	66	F	OTH-Y / N-RES		026,043	001 000	013	07 00 07

047 SUNSET Sunset Hwy Mainline MP 60 to MP 62 + Entire Interchange of Helvetia Road & Shute Road/ AKA 242nd Ave (Request #110408)
January 1, 2005 Through December 31, 2009

SER# / INVEST	SPEED	ALC	DRUG	SCHL	WORK	DATE / DAY / TIME	COUNTY / CITY / URBAN AREA	RD# / COMPNT / MLG / MILEPNT	FC / TYP	CONN # / FIRST STREET / SECOND STREET	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS / (#LANES)	INT-REL / TRAF- / CNTL	OFFRD / RNDBT / DRVWY	WTHR / LIGHT	SURF	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / VEH TYPE	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
																		02	NONE / 0 / PRVTE / PSNGR CAR	STOP / S / N	01	DRVR	NONE	25	M	OR-Y / OR<25		000	011 / 000	013	00 / 00
																		03	NONE / 0 / PRVTE / PSNGR CAR	STOP / S / N	01	DRVR	NONE	40	M	OR-Y / OR<25		000	022 / 000		00 / 00
06958	N	N	N	N	N	11/13/2007	WASHINGTON	1 / 6	16 / 0	2	GRADE	N	N	N	CLR	S-1STOP	01	NONE / 0 / PRVTE / PSNGR CAR	STRGHT / S / N	01	DRVR	NONE	25	M	OR-Y / OR<25		016,026,052	000 / 038	013	27,32 / 27,32
CITY						Tue / 5P	HILLSBORO / PORTLAND UA	61.06		NW 242ND AVE / NW MEEK RD	N / 03	(NONE) / (02)	NONE		DRY / DLIT	REAR / PDO																
																		02	NONE / 0 / PRVTE / PSNGR CAR	STOP / S / N	01	DRVR	NONE	37	M	OR-Y / OR<25		000	011 / 000	013	00 / 00
																		03	NONE / 0 / PRVTE / PSNGR CAR	STOP / S / N	01	DRVR	NONE	34	M	OTH-Y / OR<25		000	022 / 000	013	00 / 00
																		04	UNKN / 9 / UNKN / PSNGR CAR	STOP / S / N	01	DRVR	NONE	00	M	UNK / UNK		000	022 / 000		00 / 00
03611	N	N	N			07/08/2008	WASHINGTON	1 / 6	16 / 0	2	STRGHT	N	N	N	CLR	S-1STOP	01	NONE / 0 / PRVTE / PSNGR CAR	STRGHT / S / N	01	DRVR	NONE	36	F	OR-Y / OR<25		026	000 / 000		07 / 00 / 07
NO RPT						Tue / 8A	HILLSBORO / PORTLAND UA	61.07		NW 242ND AVE / NW MEEK RD	N / 03	(NONE) / (02)	UNKNOWN		DRY / DAY	REAR / PDO																
																		02	NONE / 0 / PRVTE / PSNGR CAR	STOP / S / N	01	DRVR	NONE	49	M	OR-Y / OR<25		000	011 / 000		00 / 00
03414	N	N	N	N	N	06/29/2008	WASHINGTON	1 / 6	19 / 0	3	INTER	CROSS	N	Y	CLD	FIX OBJ	01	NONE / 0 / PRVTE / PSNGR CAR	TURN-R / S / E	01	DRVR	NONE	17	M	OR-Y / OR<25		080,081	007 / 017	043,092,040 / 043,040,092	26 / 26 / 26
CITY						Sun / 8P	HILLSBORO / PORTLAND UA	61.08		NW SHUTE RD / EB EF SHUTE RD C3	E / 06	YIELD / 2		N	WET / DUSK	FIX / PDO																
01342	N	N	N			03/14/2005	WASHINGTON	1 / 6	12 / 0	1	INTER	CROSS	N	N	CLR	S-1TURN	01	NONE / 0 / PRVTE / PSNGR CAR	TURN-L / NW / N	01	DRVR	INJC	49	F	OR-Y / OR<25		042	000 / 000	092	07 / 00 / 07
NONE						Mon / 9A	HILLSBORO / PORTLAND UA	61.09		NW 242ND AVE / EB EX 242ND AVE C1	CN / 02	STOP SIGN / 1			DRY / DAY	REAR / INJ																
																		02	NONE / 0 / PRVTE / PSNGR CAR	TURN-L / NW / N	01	DRVR	NONE	37	M	OR-Y / OR>25		000	013 / 000	092	00 / 00

047 SUNSET Sunset Hwy Mainline MP 60 to MP 62 + Entire Interchange of Helvetia Road & Shute Road/ AKA 242nd Ave (Request #110408)
January 1, 2005 Through December 31, 2009

SER# / INVEST	SPEED	ALC	DRUG	SCHL	WORK	DATE / DAY / TIME	COUNTY / CITY / URBAN AREA	RD# / COMPNT / MLG / MILEPNT	FC / TYP	CONN # / FIRST STREET / SECOND STREET	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CNTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / VEH TYPE	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
01716	N	N	N			03/27/2006	WASHINGTON	1 16	2	INTER	CROSS	N	N	CLR	S-STRGHT	01	NONE 0	STRGHT											013	27
NO RPT						Mon	HILLSBORO	6 0	NW 242ND AVE	CN		TRF SIGNAL	N	DRY	REAR		PRVTE	N S										000		00
						7A	PORTLAND UA	61.09	EB EX 242ND AVE C1	06	1		N	DAY	INJ		PSNGR CAR		01	DRVR	INJB	21	F	OR-Y OR<25		042	038		27
																	02	NONE 0	STRGHT									006	013	00
																		PRVTE	N S									000		00
																		PSNGR CAR		01	DRVR	INJB	54	M	OR-Y OR<25		000	000		00
																	03	NONE 0	STRGHT									022		00
																		PRVTE	N S									000		00
																		PSNGR CAR		01	DRVR	NONE	40	M	OR-Y OR<25		000	000		00
03986	Y	N	N	N	N	07/30/2008	WASHINGTON	1 19	3	INTER	CROSS	N	N	CLD	OVERTURN	01	NONE 0	TURN-R											124	01
CITY						Wed	HILLSBORO	6 0	NW SHUTE RD	E		ONE-WAY	N	DRY	NCOL		PRVTE	S E										000	124	00
						9A	PORTLAND UA	61.09	EB EF SHUTE RD C3	05	1		N	DAY	INJ		MTRCYCLE		01	DRVR	INJB	25	M	OR-Y OR<25		047,080	017		01
06449	N	N	N	N	N	11/24/2008	WASHINGTON	1 16	2	GRADE		N	N	CLR	S-1STOP	01	NONE 0	STRGHT											013	07
COUNTY						Mon	HILLSBORO	6 0	NW SHUTE RD	N	(NONE)	NONE	N	DRY	REAR		PRVTE	N S										001		00
						8A	PORTLAND UA	61.10	EB EX SHUTE RD C1	05	(03)		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	46	M	OR-Y OR<25		026	000		07
																	02	NONE 0	STOP									011	013	00
																		PRVTE	N S									000		00
																		PSNGR CAR		01	DRVR	NONE	36	F	OR-Y OR<25		000	000		00
																	03	NONE 0	STOP									022		00
																		PRVTE	N S									000		00
																		PSNGR CAR		01	DRVR	INJC	18	F	OR-Y OR<25		000	000		00
05486	Y	N	N	N	N	09/19/2007	WASHINGTON	1 19	3	STRGHT		N	N	CLR	S-1STOP	01	NONE	STRGHT												01
CITY						Wed	HILLSBORO	6 0	EB EF SHUTE RD C3	NE	(NONE)	ONE-WAY	N	DRY	REAR		PRVTE	SW NE										000		00
						7A	PORTLAND UA	61.15	SUNSET HY	04	(02)		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	23	F	OR-Y OR<25		026,047	026		01
																	02	NONE	STOP									011		00
																		PRVTE	SW NE									000		00
																		PSNGR CAR		01	DRVR	NONE	20	M	OR-Y OR<25		000	000		00
05360	Y	N	N	Y	Y	09/12/2006	WASHINGTON	1 19	2	INTER	CROSS	N	N	CLR	S-1STOP	01	NONE	STRGHT												01
NO RPT						Tue	HILLSBORO	6 0	NW 242ND AVE	N		TRF SIGNAL	N	DRY	REAR		PRVTE	N S										001		00
						7A	PORTLAND UA	61.21	WB EF 242ND AVE C5	06	2		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	17	M	OR-Y OR<25		026,047	000		01
																	02	NONE	STOP									011		00
																		PRVTE	N S									000		00
																		PSNGR CAR		01	DRVR	NONE	49	M	OR-Y OR<25		000	000		00

047 SUNSET Sunset Hwy Mainline MP 60 to MP 62 + Entire Interchange of Helvetia Road & Shute Road/ AKA 242nd Ave (Request #110408)
January 1, 2005 Through December 31, 2009

SER# / INVEST	SPEED	ALCHL	DRUGS	SCHL	WORK	DATE / DAY / TIME	COUNTY / CITY / URBAN AREA	RD# / COMPNT / MLG / MILEPNT	FC / TYP	CONN # / FIRST STREET / SECOND STREET	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CNTL	OFFRD / RNDBT / DRVWY	WTHR	SURF	LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / VEH TYPE	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
02777	N	N	N			05/20/2007	WASHINGTON	1	16	2	INTER	CROSS	N		N	RAIN		O-1TURN	01	NONE 0	TURN-L											02
NONE						Sun	HILLSBORO	6	0	NW 242ND AVE	CN		TRF SIGNAL		N	WET		TURN		PRVTE	S W									000		00
						9A	PORTLAND UA	61.21		WB EF SHUTE RD C5	01	2			N	DAY		PDO		PSNGR CAR		01	DRVR	NONE	25	M	OR-Y OR<25		004,028	000		02
																			02	NONE 0	STRGHT											
																				PRVTE	N S									000		00
																				PSNGR CAR		01	DRVR	NONE	55	M	OR-Y OR<25		000	000		00
92754	Y	N	N	N	N	05/23/2008	WASHINGTON	1	16	2	INTER	CROSS	N		Y	RAIN		FIX OBJ	01	NONE 0	TURN-L											01,08
COUNTY						Fri	HILLSBORO	6	0	NW SHUTE RD	S		TRF SIGNAL		N	WET		FIX		PRVTE	SE S									000	047	00
						12P	PORTLAND UA	61.22		WB EX SHUTE RD C4	05	2			N	DAY		INJ		PSNGR CAR		01	DRVR	INJB	62	F	OR-Y OR<25		047,001	017		01,08
04903	N	N	N	N	N	09/14/2008	WASHINGTON	1	16	2	INTER	CROSS	N		N	CLR		S-1STOP	01	NONE 0	STRGHT											27
COUNTY						Sun	HILLSBORO	6	0	NW SHUTE RD	S		TRF SIGNAL		N	DRY		REAR		PRVTE	S N									000		00
						2P	PORTLAND UA	61.22		WB EX SHUTE RD C4	06	2			N	DAY		INJ		PSNGR CAR		01	DRVR	NONE	24	M	OR-Y OR<25		016,026	038		27
																			02	NONE 0	STOP											
																				PRVTE	S N									011		00
																				PSNGR CAR		01	DRVR	INJB	23	F	OR-Y OR>25		000	000		00
																						02	PSNG	NO<5	01	M			000	000		00
00260	N	N	N	N	N	01/14/2009	WASHINGTON	1	16	2	INTER	CROSS	N		N	CLR		S-1STOP	01	NONE 0	STRGHT											07
COUNTY						Wed	HILLSBORO	6	0	NW SHUTE RD	S		TRF SIGNAL		N	DRY		REAR		PRVTE	S N									000		00
						5P	PORTLAND UA	61.22		WB EX SHUTE RD C4	06	1			N	DLIT		INJ		PSNGR CAR		01	DRVR	INJC	51	M	OR-Y OR<25		026	000		07
																			02	NONE 0	STOP											
																				PRVTE	S N									011	013	00
																				PSNGR CAR		01	DRVR	NONE	30	F	OR-Y OR<25		000	000		00
																			03	NONE 0	STOP											
																				PRVTE	S N									022	013	00
																				PSNGR CAR		01	DRVR	INJC	40	F	OR-Y OR<25		000	000		00
																			04	NONE 0	STOP											
																				PRVTE	S N									022		00
																				PSNGR CAR		01	DRVR	INJC	44	M	OR-Y OR<25		000	000		00
07041	N	N	N	Y	Y	11/16/2006	WASHINGTON	1	16	2	INTER	CROSS	N		N	CLR		ANGL-OTH	01	NONE	STRGHT											04
NO RPT						Thu	BEAVERTON	6	0	05242 UNKNOWN NAME	CN		TRF SIGNAL		N	DRY		TURN		PRVTE	S N									000		00
						1P	PORTLAND UA	61.22		WB EXTO CEDAR HILLS	02	2			N	DAY		PDO		PSNGR CAR		01	DRVR	NONE	34	M	OR-Y OR<25		097	000		00

047 SUNSET Sunset Hwy Mainline MP 60 to MP 62 + Entire Interchange of Helvetia Road & Shute Road/ AKA 242nd Ave (Request #110408)
January 1, 2005 Through December 31, 2009

SER# / INVEST	SPEED	ALCS	DRUG	SCHL	WORK	DATE / DAY / TIME	COUNTY / CITY / URBAN AREA	RD# / COMPNT / MLG / MILEPNT	FC / TYP	CONN # / FIRST STREET / SECOND STREET	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CNTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / VEH TYPE	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT		CAUSE
																	02	NONE / PRVTE / PSNGR CAR	TURN-L / SE S									000		00
																				01	DRVR	NONE	30	M	OR-Y / OR<25		000	000		00
06045	N	N	N	Y	Y	10/11/2006	WASHINGTON	1 / 16		2	INTER	CROSS	N	N	CLR	S-1TURN	01	NONE / PRVTE / PSNGR CAR	STRGHT / SE NW									000		14
NONE						Wed	HILLSBORO	6 / 0		NW 242ND AVE	CN		ONE-WAY		DRY	TURN												000		00
						9A	PORTLAND UA	61.22		WB EX 242ND AVE C4	03	2			DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	M	OR-Y / OR<25		003	000		14
																	02	NONE / PRVTE / PSNGR CAR	TURN-L / SE S									000		00
																				01	DRVR	NONE	69	M	OR-Y / OR<25		000	000		00
01303	N	N	N	N	N	03/17/2009	WASHINGTON	1 / 16		2	INTER	CROSS	N	N	RAIN	S-1TURN	01	NONE / PRVTE / PSNGR CAR	0 STRGHT / SE NW									000		14
STATE						Tue	HILLSBORO	6 / 0		NW SHUTE RD	CN		L-GRN-SIG		WET	TURN												000		00
						11A	PORTLAND UA	61.22		WB EX SHUTE RD C4	03	1			DAY	PDO		PSNGR CAR		01	DRVR	NONE	33	M	OR-Y / OR<25		003	000		14
																	02	NONE / PRVTE / PSNGR CAR	0 TURN-L / SE S									000		00
																				01	DRVR	NONE	23	F	OTH-Y / OR<25		000	000		00
01308	N	N	N			03/04/2006	WASHINGTON	1 / 19		4	STRGHT		N	N	CLR	S-STRGHT	01	NONE / PRVTE / PSNGR CAR	0 STRGHT / SE NW									000	010	27
NO RPT						Sat	HILLSBORO	6 / 0		WB EX 242ND AVE C4	N	(NONE)	ONE-WAY		DRY	REAR												000		00
						10P	PORTLAND UA	61.24		SUNSET HY	03	(02)			DLIT	INJ		PSNGR CAR		01	DRVR	NONE	27	M	OR-Y / OR<25		042,016	038		27
																				02	PSNG	NO<5	04	F			000	000		00
																	02	NONE / PRVTE / PSNGR CAR	0 STRGHT / SE NW									006	010	00
																				01	DRVR	INJB	41	M	OR-Y / OR<25		000	000		00
																				02	PSNG	INJB	41	F			000	000		00
07814	N	N	N			12/13/2005	WASHINGTON	2 / 19		4	STRGHT		N	N	RAIN	S-STRGHT	01	NONE / PRVTE / PSNGR CAR	0 STRGHT / SE NW									031		13
NONE						Tue	HILLSBORO	6 / 0		WB EX 242ND AVE C4	W	(NONE)	ONE-WAY		WET	SS-O												088		00
						6A	PORTLAND UA	61.25		SUNSET HY	04	(02)			DARK	INJ		PSNGR CAR		01	DRVR	NONE	44	M	OTH-Y / N-RES		045			13
																	02	NONE / PRVTE / PSNGR CAR	0 STRGHT / SE NW									000		00
																				01	DRVR	INJC	60	M	OR-Y / OR<25		000	000		00
00329	Y	N	N			01/15/2005	WASHINGTON	1 / 19		3	STRGHT		N	Y	SLT	FIX OBJ	01	NONE / PRVTE / PSNGR CAR	STRGHT / SW NE									000	054	01
NONE						Sat	HILLSBORO	6 / 0		EB EF 242ND AVE C3	SW	(NONE)	ONE-WAY		WET	FIX												000	054	00
						7A	PORTLAND UA	61.33		SUNSET HY	01	(02)			DAWN	PDO		PSNGR CAR		01	DRVR	NONE	18	F	OR-Y / OR<25		047,081	017		01

TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT

CRASH SUMMARIES BY YEAR BY COLLISION TYPE

Brookwood Pky/Helvetia Rd (AKA 242nd) Bet Schaff Rd & Huffman Rd + 265' @ All Intersections (Request #110408)

January 1, 2005 Through December 31, 2009

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2009														
ANGLE	0	1	0	1	0	1	0	0	1	1	0	1	0	0
REAR-END	0	1	0	1	0	3	0	1	0	0	1	1	0	0
TURNING MOVEMENTS	0	0	1	1	0	0	0	0	1	1	0	1	0	0
2009 TOTAL	0	2	1	3	0	4	0	1	2	2	1	3	0	0
YEAR: 2008														
FIXED / OTHER OBJECT	0	1	1	2	0	1	0	0	2	1	1	2	0	2
NON-COLLISION	0	1	0	1	0	1	0	1	0	1	0	1	0	0
REAR-END	0	2	1	3	0	2	0	3	0	3	0	1	0	0
2008 TOTAL	0	4	2	6	0	4	0	4	2	5	1	4	0	2
YEAR: 2007														
REAR-END	0	2	2	4	0	2	0	3	1	1	3	1	0	0
TURNING MOVEMENTS	0	0	1	1	0	0	0	0	1	1	0	1	0	0
2007 TOTAL	0	2	3	5	0	2	0	3	2	2	3	2	0	0
YEAR: 2006														
REAR-END	0	2	2	4	0	3	0	3	1	3	1	3	0	0
TURNING MOVEMENTS	0	1	3	4	0	1	0	3	1	2	2	4	0	0
2006 TOTAL	0	3	5	8	0	4	0	6	2	5	3	7	0	0
YEAR: 2005														
MISCELLANEOUS	0	1	0	1	0	1	0	1	0	1	0	0	0	0
2005 TOTAL	0	1	0	1	0	1	0	1	0	1	0	0	0	0
FINAL TOTAL	0	12	11	23	0	15	0	15	8	15	8	16	0	2

Note: Legislative changes to DMV's vehicle crash reporting requirements, effective 01/01/2004, may result in fewer property damage only crashes being eligible for inclusion in the Statewide Crash Data File.

047 SUNSET Brookwood Pky/Helvetia Rd (AKA 242nd) Bet Schaff Rd & Huffman Rd + 265' @ All Intersections (Request #110408)
January 1, 2005 Through December 31, 2009

SER# / INVEST	SPEED	ALC	DRUGS	SCHL	WORK	DATE / DAY / TIME	COUNTY / CITY / URBAN AREA	RD# / COMPNT / MLG / MILEPNT	FC / TYP	CONN # / FIRST STREET / SECOND STREET	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CNTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER	VEH TYPE	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
07447	N	N	N	N	N	12/06/2007	WASHINGTON	1 16	2		STRGHT		N	N	CLD	S-1STOP	01	NONE 0	NONE	STRGHT											07
CITY						Thu		6 0			UN	(NONE)	NONE	N	WET	REAR		PRVTE		S N									000		00
						5P	PORTLAND UA	61.04			03			N	DLIT	INJ		PSNGR CAR			01	DRVR	NONE	34	F	OR-Y		026	000		07
												(04)														OR<25					
																	02	NONE 0		STOP											
																		PRVTE		S N									011		00
																		PSNGR CAR			01	DRVR	INJC	52	F	OR-Y		000	000		00
																										OR<25					
03260	N	N	N	N	N	06/06/2006	WASHINGTON	1 16	2		GRADE		N	N	CLR	S-1STOP	01	NONE 0		STRGHT										013	07
CITY						Tue	HILLSBORO	6 0		NW 242ND AVE	S	(RSDMD)	ONE-WAY	N	DRY	REAR		RENTL		S N									001		00
						5P	PORTLAND UA	61.05		EB EF 242ND AVE C3	03			N	DAY	PDO		PSNGR CAR			01	DRVR	NONE	66	F	OTH-Y		026,043	000		07
												(04)														N-RES					
																	02	NONE 0		STOP											
																		PRVTE		S N									011	013	00
																		PSNGR CAR			01	DRVR	NONE	25	M	OR-Y		000	000		00
																										OR<25					
																	03	NONE 0		STOP											
																		PRVTE		S N									022		00
																		PSNGR CAR			01	DRVR	NONE	40	M	OR-Y		000	000		00
																										OR<25					
06958	N	N	N	N	N	11/13/2007	WASHINGTON	1 16	2		GRADE		N	N	CLR	S-1STOP	01	NONE 0		STRGHT										013	27,32
CITY						Tue	HILLSBORO	6 0		NW 242ND AVE	N	(NONE)	NONE	N	DRY	REAR		PRVTE		S N									000		00
						5P	PORTLAND UA	61.06		NW MEEK RD	03			N	DLIT	PDO		PSNGR CAR			01	DRVR	NONE	25	M	OR-Y		016,026,052	038		27,32
												(02)														OR<25					
																	02	NONE 0		STOP											
																		PRVTE		S N									011	013	00
																		PSNGR CAR			01	DRVR	NONE	37	M	OR-Y		000	000		00
																										OR<25					
																	03	NONE 0		STOP											
																		PRVTE		S N									022	013	00
																		PSNGR CAR			01	DRVR	NONE	34	M	OTH-Y		000	000		00
																										OR<25					
																	04	UNKN 9		STOP											
																		UNKN		S N									022		00
																		PSNGR CAR			01	DRVR	NONE	00	M	UNK		000	000		00
																										UNK					
03611	N	N	N			07/08/2008	WASHINGTON	1 16	2		STRGHT		N	N	CLR	S-1STOP	01	NONE 0		STRGHT											07
NO RPT						Tue	HILLSBORO	6 0		NW 242ND AVE	N	(NONE)	UNKNOWN	N	DRY	REAR		PRVTE		S N									000		00
						8A	PORTLAND UA	61.07		NW MEEK RD	03			N	DAY	PDO		PSNGR CAR			01	DRVR	NONE	36	F	OR-Y		026	000		07
												(02)														OR<25					
																	02	NONE 0		STOP											
																		PRVTE		S N									011		00
																		PSNGR CAR			01	DRVR	NONE	49	M	OR-Y		000	000		00
																										OR<25					

047 SUNSET Brookwood Pky/Helvetia Rd (AKA 242nd) Bet Schaff Rd & Huffman Rd + 265' @ All Intersections (Request #110408)
January 1, 2005 Through December 31, 2009

SER# / INVEST	SPEED	ALCS	DRUGS	SCHL	WORK	DATE / DAY / TIME	COUNTY / CITY / URBAN AREA	RD# / COMPNT / MILEPNT	FC / TYP	CONN # / FIRST STREET / SECOND STREET	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF-CNTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / VEH TYPE	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
03414	N	N	N	N	N	06/29/2008	WASHINGTON	1 19	3		INTER	CROSS	N	Y	CLD	FIX OBJ	01	NONE 0	TURN-R										043,092,040	26
CITY						Sun	HILLSBORO	6 0		NW SHUTE RD	E		YIELD	N	WET	FIX		PRVTE	S E									007	043,040,092	26
						8P	PORTLAND UA	61.08		EB EF SHUTE RD C3	06	2		N	DUSK	PDO		PSNGR CAR		01	DRVR	NONE	17	M	OR-Y OR<25		080,081	017		26
01716	N	N	N			03/27/2006	WASHINGTON	1 16	2		INTER	CROSS	N	N	CLR	S-STRGHT	01	NONE 0	STRGHT										013	27
NO RPT						Mon	HILLSBORO	6 0		NW 242ND AVE	CN		TRF SIGNAL	N	DRY	REAR		PRVTE	N S									000		00
						7A	PORTLAND UA	61.09		EB EX 242ND AVE C1	06	1		N	DAY	INJ		PSNGR CAR		01	DRVR	INJB	21	F	OR-Y OR<25		042	038		27
																	02	NONE 0	STRGHT											
																		PRVTE	N S									006	013	00
																		PSNGR CAR		01	DRVR	INJB	54	M	OR-Y OR<25		000	000		00
																	03	NONE 0	STRGHT											
																		PRVTE	N S									022		00
																		PSNGR CAR		01	DRVR	NONE	40	M	OR-Y OR<25		000	000		00
03986	Y	N	N	N	N	07/30/2008	WASHINGTON	1 19	3		INTER	CROSS	N	N	CLD	OVERTURN	01	NONE 0	TURN-R										124	01
CITY						Wed	HILLSBORO	6 0		NW SHUTE RD	E		ONE-WAY	N	DRY	NCOL		PRVTE	S E									000	124	00
						9A	PORTLAND UA	61.09		EB EF SHUTE RD C3	05	1		N	DAY	INJ		MTRCYCLE		01	DRVR	INJB	25	M	OR-Y OR<25		047,080	017		01
06449	N	N	N	N	N	11/24/2008	WASHINGTON	1 16	2		GRADE		N	N	CLR	S-1STOP	01	NONE 0	STRGHT										013	07
COUNTY						Mon	HILLSBORO	6 0		NW SHUTE RD	N	(NONE)	NONE	N	DRY	REAR		PRVTE	N S									001		00
						8A	PORTLAND UA	61.10		EB EX SHUTE RD C1	05	(03)		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	46	M	OR-Y OR<25		026	000		07
																	02	NONE 0	STOP											
																		PRVTE	N S									011	013	00
																		PSNGR CAR		01	DRVR	NONE	36	F	OR-Y OR<25		000	000		00
																	03	NONE 0	STOP											
																		PRVTE	N S									022		00
																		PSNGR CAR		01	DRVR	INJC	18	F	OR-Y OR<25		000	000		00
05360	Y	N	N	Y	Y	09/12/2006	WASHINGTON	1 19	2		INTER	CROSS	N	N	CLR	S-1STOP	01	NONE	STRGHT											01
NO RPT						Tue	HILLSBORO	6 0		NW 242ND AVE	N		TRF SIGNAL	N	DRY	REAR		PRVTE	N S									001		00
						7A	PORTLAND UA	61.21		WB EF 242ND AVE C5	06	2		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	17	M	OR-Y OR<25		026,047	000		01
																	02	NONE	STOP											
																		PRVTE	N S									011		00
																		PSNGR CAR		01	DRVR	NONE	49	M	OR-Y OR<25		000	000		00
02777	N	N	N			05/20/2007	WASHINGTON	1 16	2		INTER	CROSS	N	N	RAIN	O-1TURN	01	NONE 0	TURN-L											02
NONE						Sun	HILLSBORO	6 0		NW 242ND AVE	CN		TRF SIGNAL	N	WET	TURN		PRVTE	S W									000		00
						9A	PORTLAND UA	61.21		WB EF SHUTE RD C5	01	2		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	25	M	OR-Y OR<25		004,028	000		02

047 SUNSET Brookwood Pky/Helvetia Rd (AKA 242nd) Bet Schaff Rd & Huffman Rd + 265' @ All Intersections (Request #110408)
January 1, 2005 Through December 31, 2009

SER# / INVEST	SPEED	ALCS	DRUGS	SCHL	WORK	DATE / DAY / TIME	COUNTY / CITY / URBAN AREA	RD# COMPNT / MLG / MILEPNT	FC / TYP	CONN # / FIRST STREET / SECOND STREET	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF-CNTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / VEH TYPE	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
																	02	NONE 0 / PRVTE / PSNGR CAR	STRGHT / N S									000		00
																				01	DRVR	NONE	55	M	OR-Y OR<25		000	000		00
92754	Y	N	N	N	N	05/23/2008	WASHINGTON	1 16	2		INTER	CROSS	N	Y	RAIN	FIX OBJ	01	NONE 0	TURN-L										047	
COUNTY						Fri	HILLSBORO	6 0		NW SHUTE RD	S		TRF SIGNAL	N	WET	FIX		PRVTE	SE S									000	047	00
						12P	PORTLAND UA	61.22		WB EX SHUTE RD C4	05	2		N	DAY	INJ		PSNGR CAR		01	DRVR	INJB	62	F	OR-Y OR<25		047,001	017		01,08
04903	N	N	N	N	N	09/14/2008	WASHINGTON	1 16	2		INTER	CROSS	N	N	CLR	S-1STOP	01	NONE 0	STRGHT											27
COUNTY						Sun	HILLSBORO	6 0		NW SHUTE RD	S		TRF SIGNAL	N	DRY	REAR		PRVTE	S N									000		00
						2P	PORTLAND UA	61.22		WB EX SHUTE RD C4	06	2		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	24	M	OR-Y OR<25		016,026	038		27
																	02	NONE 0 / PRVTE / PSNGR CAR	STOP / S N									011		00
																				01	DRVR	INJB	23	F	OR-Y OR>25		000	000		00
																				02	PSNG	NO<5	01	M			000	000		00
00260	N	N	N	N	N	01/14/2009	WASHINGTON	1 16	2		INTER	CROSS	N	N	CLR	S-1STOP	01	NONE 0	STRGHT										013	07
COUNTY						Wed	HILLSBORO	6 0		NW SHUTE RD	S		TRF SIGNAL	N	DRY	REAR		PRVTE	S N									000		00
						5P	PORTLAND UA	61.22		WB EX SHUTE RD C4	06	1		N	DLIT	INJ		PSNGR CAR		01	DRVR	INJC	51	M	OR-Y OR<25		026	000		07
																	02	NONE 0 / PRVTE / PSNGR CAR	STOP / S N									011	013	00
																				01	DRVR	NONE	30	F	OR-Y OR<25		000	000		00
																	03	NONE 0 / PRVTE / PSNGR CAR	STOP / S N									022	013	00
																				01	DRVR	INJC	40	F	OR-Y OR<25		000	000		00
																	04	NONE 0 / PRVTE / PSNGR CAR	STOP / S N									022		00
																				01	DRVR	INJC	44	M	OR-Y OR<25		000	000		00
07041	N	N	N	Y	Y	11/16/2006	WASHINGTON	1 16	2		INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE	STRGHT											04
NO RPT						Thu	BEAVERTON	6 0		05242 UNKNOWN NAME	CN		TRF SIGNAL	N	DRY	TURN		PRVTE	S N									000		00
						1P	PORTLAND UA	61.22		WB EXTO CEDAR HILLS	02	2		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	34	M	OR-Y OR<25		097	000		00
																	02	NONE / PRVTE / PSNGR CAR	TURN-L / SE S									000		00
																				01	DRVR	NONE	30	M	OR-Y OR<25		000	000		00

047 SUNSET Brookwood Pky/Helvetia Rd (AKA 242nd) Bet Schaff Rd & Huffman Rd + 265' @ All Intersections (Request #110408)
January 1, 2005 Through December 31, 2009

SER# / INVEST	SPEED	ALC	DRUG	SCHL	WORK	DATE / DAY / TIME	COUNTY / CITY / URBAN AREA	RD# / COMPNT / MLG / MILEPNT	FC / TYP	CONN # / FIRST STREET / SECOND STREET	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CNTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / VEH TYPE	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN EVENT	CAUSE
06045	N	N	N	Y	Y	10/11/2006	WASHINGTON	1 16	2	INTER	CROSS	N	N	CLR	S-1TURN	01	NONE	STRGHT										14
NONE						Wed	HILLSBORO	6 0	NW 242ND AVE	CN		ONE-WAY	N	DRY	TURN		PRVTE	SE NW										000	00
						9A	PORTLAND UA	61.22	WB EX 242ND AVE C4	03	2		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	M	OR-Y OR<25		003	000	14
																	02	NONE	TURN-L										
																		PRVTE	SE S									000	00
																		PSNGR CAR		01	DRVR	NONE	69	M	OR-Y OR<25		000	000	00
01303	N	N	N	N	N	03/17/2009	WASHINGTON	1 16	2	INTER	CROSS	N	N	RAIN	S-1TURN	01	NONE 0	STRGHT										14
STATE						Tue	HILLSBORO	6 0	NW SHUTE RD	CN		L-GRN-SIG	N	WET	TURN		PRVTE	SE NW										000	00
						11A	PORTLAND UA	61.22	WB EX SHUTE RD C4	03	1		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	33	M	OR-Y OR<25		003	000	14
																	02	NONE 0	TURN-L										
																		PRVTE	SE S									000	00
																		PSNGR CAR		01	DRVR	NONE	23	F	OTH-Y OR<25		000	000	00
04568	N	N	N			08/09/2007	WASHINGTON	1 19	4	STRGHT		N	N	CLR	S-1STOP	01	NONE 0	STRGHT										07
NONE						Thu	HILLSBORO	6 0	WB EX SHUTE RD C4	SE	(NONE)	ONE-WAY	N	DRY	REAR		PRVTE	SE NW										000	00
						4P	PORTLAND UA	61.49	NW 242ND AVE	04	(02)		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	25	F	OR-Y OR<25		026	000	07
																	02	NONE 0	STOP										
																		PRVTE	SE NW									011	00
																		PSNGR CAR		01	DRVR	NONE	19	M	OR-Y OR>25		000	000	00
00758	N	N	N			02/04/2007	WASHINGTON	1 19	4	INTER	CROSS	N	N	CLR	S-1STOP	01	NONE 0	STRGHT										07
NONE						Sun	HILLSBORO	6 0	NW 242ND AVE	SE		ONE-WAY	N	DRY	REAR		PRVTE	SE NW										000	00
						8P	PORTLAND UA	61.50	WB EX SHUTE RD C4	05	2		N	DLIT	INJ		PSNGR CAR		01	DRVR	NONE	45	M	OR-Y OR<25		026	000	07
																	02	NONE 0	STOP										
																		PRVTE	SE NW									012	00
																		PSNGR CAR		01	DRVR	INJC	57	F	OR-Y OR<25		000	000	00
00303	N	N	N			01/13/2006	WASHINGTON	1 19	4	INTER	CROSS	N	N	RAIN	S-1STOP	01	NONE 0	STRGHT										07
NO RPT						Fri	HILLSBORO	6 0	NW 242ND AVE	CN		TRF SIGNAL	N	WET	REAR		PRVTE	SE NW										001	00
						7A	PORTLAND UA	61.50	WB EX 242ND AVE C4	06	2		N	DAWN	INJ		PSNGR CAR		01	DRVR	INJC	59	F	OR-Y OR<25		026	000	07
																	02	NONE 0	STOP										
																		PRVTE	SE NW									011	00
																		PSNGR CAR		01	DRVR	NONE	30	M	OR-Y OR<25		000	000	00

WASHINGTON COUNTY

Brookwood Pky/Helvetia Rd (AKA 242nd) Bet Schaff Rd & Huffman Rd + 265' @ All Intersections (Request #110408)

January 1, 2005 Through December 31, 2009

SER# / INVEST	SPEC	ALC	DRUG	SCHL	SWORK	DATE / DAY / TIME	MILEPNT / DIST FROM / INTERSECT	COUNTY ROADS FIRST / SECOND STREET	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS / (#LANES)	INT-REL / TRAF- / CONTL	OFF-RD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / VEH TYPE	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
00510	N	N	N			1/25/2006		NW HELVETIA RD	INTER	CROSS	N	N	RAIN	ANGL-OTH	01	NONE 0	STRGHT											02
NO RPT						Wed	0	NW JACOBSON RD	CN		STOP SIGN	N	WET	TURN		PRVTE	S N										000		00
						5P			02	0		N	DARK	PDO		PSNGR CAR		01	DRVR	NONE	20	F	OR-Y		000	000		00
																							OR<25					
															02	NONE 0	TURN-L											
																PRVTE	E S									015		00
																PSNGR CAR		01	DRVR	NONE	21	M	OR-Y		028,014	088		02
																							OR<25					
05386	N	N	N	N	N	9/11/2006		NW HELVETIA RD	INTER	3-LEG	N	N	CLR	ANGL-OTH	01	NONE	STRGHT											02
CITY						Mon	0	NW JACOBSON RD	CN		STOP SIGN	N	DRY	TURN		PRVTE	S N										000		00
						9P			02	0		N	DLIT	INJ		MTRCYCLE		01	DRVR	INJA	45	M	OR-Y		000	000		00
																							OR<25					
															02	NONE	TURN-L											
																PRVTE	E S									015		00
																PSNGR CAR		01	DRVR	NONE	63	F	OR-Y		028	000		02
																							OR<25					
05878	N	N	N	N	N	11/20/2009		NW HELVETIA RD	INTER	3-LEG	N	N	CLR	ANGL-OTH	01	NONE 0	STRGHT											02
COUNTY						Fri	0	NW JACOBSON RD	CN		STOP SIGN	N	WET	ANGL		PRVTE	S N										000		00
						4P			02	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	45	M	OR-Y		000	000		00
																							OR<25					
															02	NONE	STRGHT											
																PRVTE	E W									000		00
																PSNGR CAR		01	DRVR	NONE	18	M	UNK		028	000		02
																							OR>25					
																		02	PSNG	INJC	51	F			000	000		00
89102	N	N	N	N	N	8/15/2005		NW HELVETIA RD	STRGHT		N	N	CLR	ANIMAL	01	NONE 0	STRGHT										034		12
COUNTY						Mon	1	NW SCHAFF RD	S	(NONE)	UNKNOWN	N	DRY	OTH		PRVTE	N S										088	034	00
						8A			03			N	DAY	INJ		MTRCYCLE		01	DRVR	INJB	56	M	OR-Y		080	017		12
										(02)													OR<25					

Appendix F

JTA Project Environmental Baseline Report

August 2012

Environmental Baseline Report

SHUTE ROAD INTERCHANGE IMPROVEMENT PROJECT

Key Number K16842 Washington County, Oregon

Township 1 North, Range 2 West Sections 15, 16, 22, and 23
Hillsboro USGS Quad

Prepared for:

OREGON DEPARTMENT OF TRANSPORTATION

ODOT Region 1
123 Flanders Street
Portland, Oregon 97213

Prepared by:

MB&G
Mason, Bruce & Girard, Inc.
707 SW Washington Street, Suite 1300
Portland, Oregon 97205
(503) 224-3445

March 15, 2010

MB&G Project No. 1581

Environmental Baseline Report
Shute Road Interchange Improvement Project
Washington County, Oregon
Key Number 16842

March 2010

Report Prepared by:

	Alexis Casey	Project Manager / MB&G
Signature	Printed Name	Title / Organization

Report Reviewed by:

Signature	Printed Name	Title / Organization

Signature	Printed Name	Title / Organization

Report Approved by:

Signature	Printed Name	Title / Organization

Environmental Area	Author(s)	Title / Organization
Air Quality	Melissa Hogan	Region Environmental Coordinator / ODOT
Archaeological Resources	Kurt Roedel	Archaeologist / ODOT
Biological Resources	Alexis Casey	Biologist / MB&G
Hazardous Materials	Melissa Hogan	Region Environmental Coordinator / ODOT
Historic Resources	Bob Hadlow	Senior Historian / ODOT
Land Use	Andy Johnson	Principal Planner / ODOT
Section 4(f)/6(f)	Melissa Hogan	Region Environmental Coordinator / ODOT
Noise	Melissa Hogan	Region Environmental Coordinator / ODOT
Socioeconomics	Jeff Buckland	Senior Environmental Project Manager / ODOT
Visual Resources	Melissa Hogan	Region Environmental Coordinator / ODOT
Water Quality (including Floodplain and Floodway)	Jonathon Belmont	Biologist / MB&G
Wetland and Other Waters of the U.S. and State	Kristen Currens	Wetland Biologist / MB&G

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1.0 INTRODUCTION

This Environmental Baseline Report (EBR) summarizes available baseline data and describes environmental permits and clearances that may be necessary for the Shute Road Interchange Improvement Project (Project) along Highway 26 in Washington County, Oregon. While additional data collection may be necessary, existing baseline data will be used to thoroughly characterize environmental features for this project and to help the design team develop alternatives that avoid and/or minimize environmental impacts associated with the interchange improvement project. This EBR will also be used to determine the appropriate level of environmental review for the proposed project.

1.1 Purpose

The Oregon Department of Transportation (ODOT) proposes to improve the interchange at Shute Road located between Mile Post (MP) 60.6 and MP 62.8 on Highway 26 (Figure 1). The growing population in Washington County has begun to strain the existing transportation infrastructure in the county. The purpose of this project is to alleviate congestion by increasing the traffic capacity at this interchange and consequently, improve access to and from Highway 26.

1.2 Project Description

The proposed project would reconstruct the Shute Road/Helvetia Road Interchange. The project would include the addition of a westbound-to-southbound loop ramp, reconstructing the westbound exit and entrance loop ramps, and adding a second right turn lane to the eastbound entrance ramp.

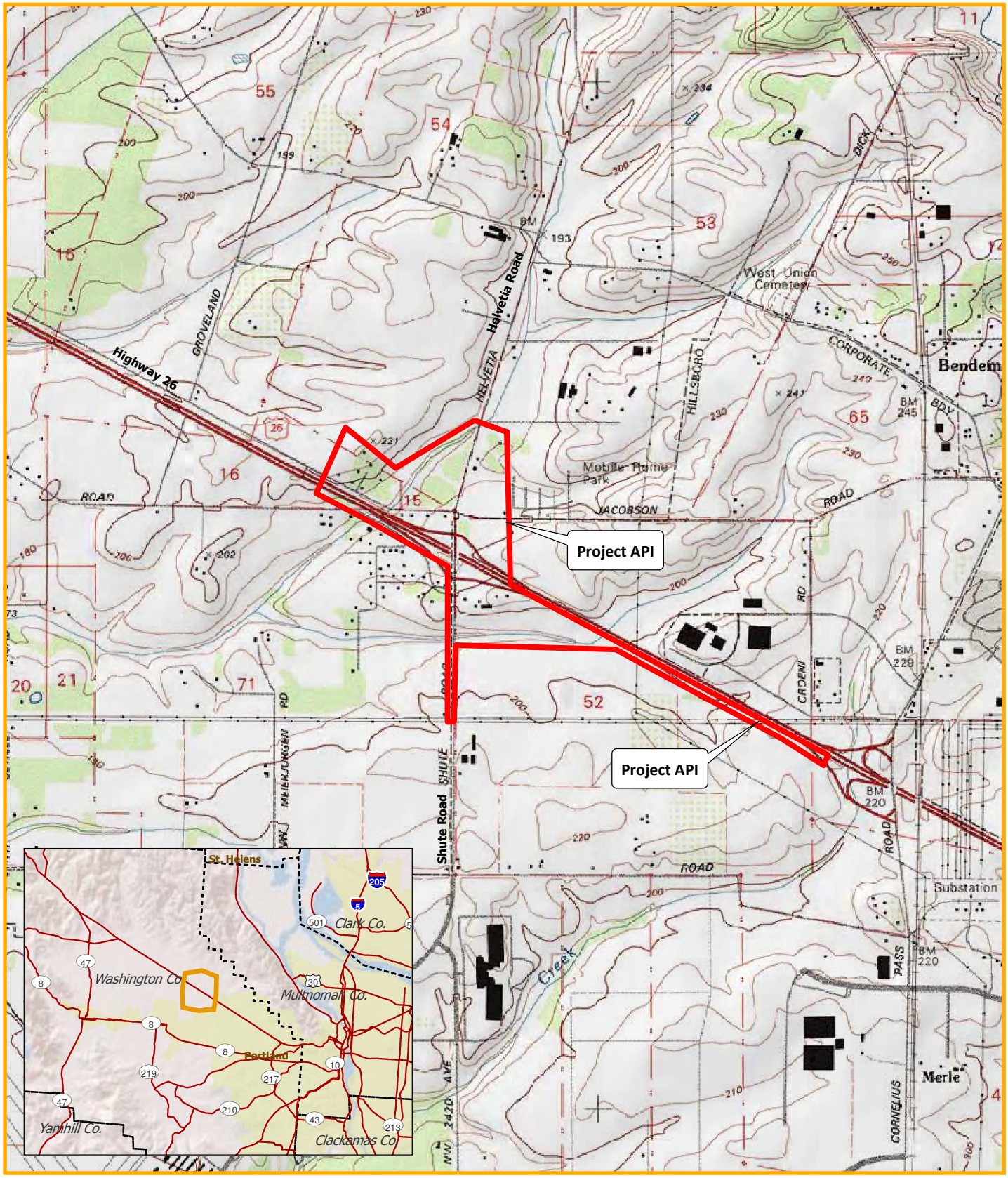
1.3 Area of Potential Impact (API)

The Area of Potential Impact (API) is located along Highway 26 at the Shute Road Interchange in Washington County, Oregon. From the center of the interchange, the API extends approximately 2,000 feet to the north, south and west. This area encompasses proposed interchange access improvements. In addition, the API extends approximately 1.25 miles east towards the NW Cornelius Pass Road Interchange. This area encompasses proposed improvements to the pavement along Highway 26. The eastern portion of the API is located within the City of Hillsboro, while the western portion of the API is located in unincorporated Washington County. Figure 1 shows the general location of the API.

Topography within the API is generally flat with an approximate elevation of 200 feet above mean sea level (msl) (USGS 1986). The majority of the API has experienced alterations to the natural landscape as the result of the construction of Highway 26, construction of the elevated Shute Road overcrossing, construction of multiple secondary roadways, agriculture, and residential/commercial development. The majority of the native vegetation has been removed within the API. There are two creeks within the API, both unnamed tributaries of McKay Creek, that have been channelized and now receive greater volumes of water due to the increase in impervious surface within the API.

Right-of-way (ROW) acquisition from adjacent properties would be needed for the proposed project. Approximately 40 parcels are within the API and up to 30 parcels may be affected by

ROW needs with most of the impacts related to partial acquisitions of property from these parcels.



N

Miles
0 0.25 0.5

Kilometers
0 0.25 0.5 0.75

Figure 1.

Project Location and Vicinity Map
Shute Road Interchange Improvement Project
Washington County, Oregon

MB&G
Mason, Bruce & Girard, Inc.
Natural Resource Consultants since 1921

Data Source: TOPO! USGS 7.5 min., 24K Digital Topographic Data, Oregon. This product is for information purposes only and may not be suitable for legal, engineering or surveying purposes. This information or data is provided with the understanding that conclusions drawn from such information are the responsibility of the user.

Figure1.pdf Creation Date: Feb 9, 2010.

2.0 EXISTING ENVIRONMENTAL CONDITION

The following sections of this environmental baseline report summarize the major environmental resources and issues identified in existing database information, during discussions with staff at the regulatory agencies and local jurisdictions, and during site investigations conducted by ODOT and Mason, Bruce, and Girard, Inc. (MB&G). During the site investigation, the API was examined and photographed (Appendix A). Individual technical reports for each of the disciplines are included in Appendix B.

2.1 Air Quality

The API is located in part within an air quality attainment area and a maintenance area for carbon monoxide. The division between the two areas is Metro's Urban Growth Boundary (UGB) (Figure 2). In general, areas within the API east of the interchange are within the UGB and areas west are outside the UGB.

The proposed project involves adding lanes and increasing capacity on the overcrossing, channelization at on/off ramps, and/or alignment changes. The inclusion of any of these elements into the proposed project may impact air quality and necessitate the preparation of an Air Quality Technical Report.

The project is listed in the 2010-2013 State Transportation Improvement Program (STIP) and the 2004 Regional Transportation Plan (RTP) project list (#3149). In addition, the project is identified on Metro's Air Quality Conformity Determination Report (2008) list of projects.

2.2 Archaeology

The archaeological resources and issues discussed in this report were identified based upon a review of maps of previous cultural resources studies on file at the Oregon State Historic Preservation Office (SHPO), a field investigation conducted by ODOT on February 11, 2010, ODOT consultation with local tribes, and historic maps and aerial photographs. These resources identified both precontact and historic sites within close proximity to the API.

SHPO maps were reviewed for the purpose of determining whether previous cultural resources studies have been conducted in the vicinity of the API and if archaeological resources have been recorded in the vicinity of the API. Ten previous cultural resources studies have been conducted in the vicinity of the API; however, most of the API has not been examined for archaeological resources and no archaeological resources were identified in these reports documenting resource studies within the API (Armitage 1988; CH_2M Hill Northwest, Inc. 1996; Clark 1984; Ellis 2003, 2004; Ellis and O'Brien 2003; Hart et al. 2008; Helzer 2004; Hibbs 1988; Pettigrew 1984) (Figure 3).

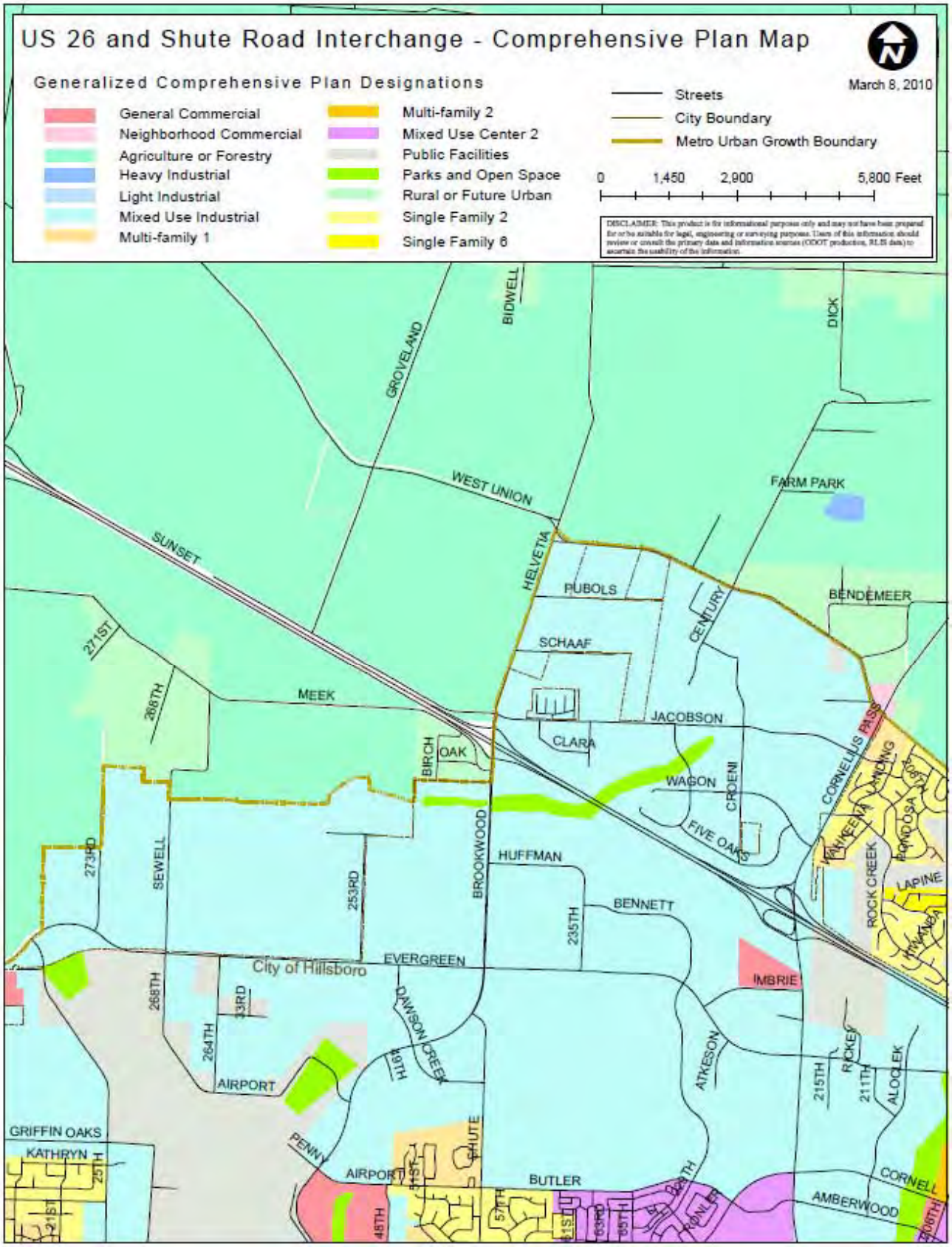


Figure 2. US26 and Shute Road Interchange – Comprehensive Plan Map.

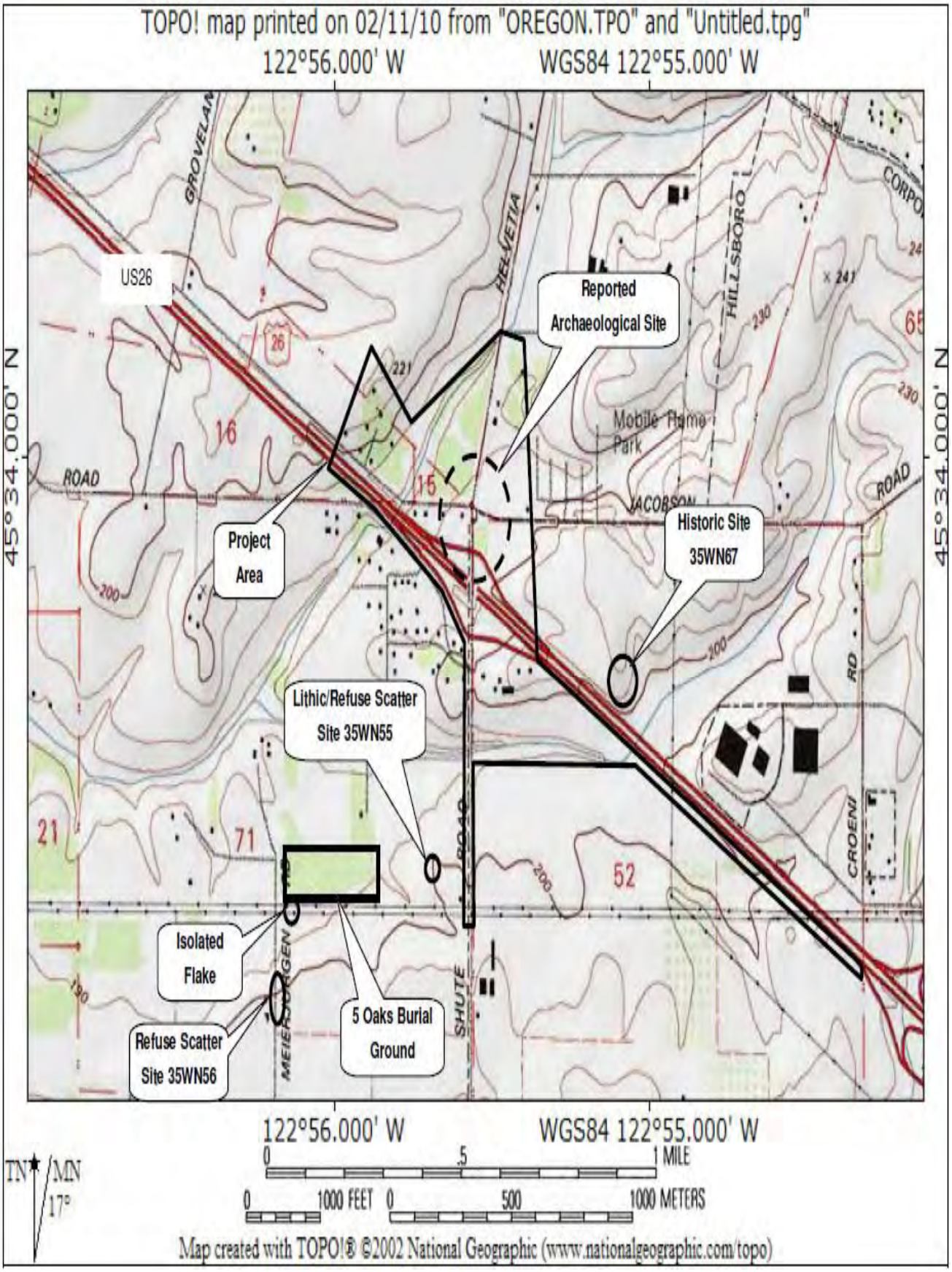


Figure 3. Approximate Location of Previous Archaeological Resource Studies and Reported and Recorded Cultural Resources in the Project Vicinity

The ODOT field investigation conducted on February 11, 2010 identified no archaeological resources within the API.

ODOT consulted local representatives from the Confederated Tribes of the Warm Springs, the Confederated Tribes of the Siletz Indians, and the Confederated Tribes of the Grand Ronde regarding the proposed project. The representative from the Grand Ronde tribes informed ODOT that there is a known archaeological site located on private property in the northern portion of the API, although the exact location is unknown (Thorsgard pers. comm. 2010) (Figure 3). Historic maps and aerial photographs suggest additional archaeological resources may be present near the interchange (two buildings and/or structures, the Edward Constable homestead, and an unnamed wagon road) and near the east end of the API (Alexander Zachary stable) (Figure 4).

2.3 Biology

The biological resources and issues within the API were identified based upon a review of existing database information, discussions with regulatory agency staff, and a field investigation conducted by MB&G on February 3, 2010. At the time of the field investigation, ODOT did not have right-of-entry for areas outside of public rights-of-way. As such, areas outside of public rights-of-way were visually inspected from the road or highway.

The field investigation was conducted to evaluate the baseline conditions for natural resources (i.e., aquatic/riparian conditions, presence of wetlands, habitat conditions, and noxious weed presence) within the project API. During the field investigation, the API was examined and photographed (Appendix A).

Prior to conducting the field investigation on February 3, 2010, MB&G obtained data regarding threatened and endangered species within the API from U.S. Fish and Wildlife Service (USFWS), StreamNet, and the Oregon Natural Heritage Information Center (ORNHIC). MB&G also contacted the Oregon Department of Fish and Wildlife (ODFW) to confirm current or historical native migratory fish presence within the API (Brick pers. comm. 2010).

2.3.1 Botanical Resources

The API addressed in this EBR contains three general vegetation communities: riparian forest/wetland fringe, oak woodland, and disturbed/maintained grassland/highway ROW. The riparian forest/wetland vegetation community is located adjacent to both unnamed tributaries to McKay Creek within the API. The oak woodland vegetation community is located adjacent to NW Helvetia Road in the northern part of API. The disturbed/maintained grassland/highway ROW vegetation community is located on both sides of Highway 26 and in the vicinity of the highway on- and off-ramps.

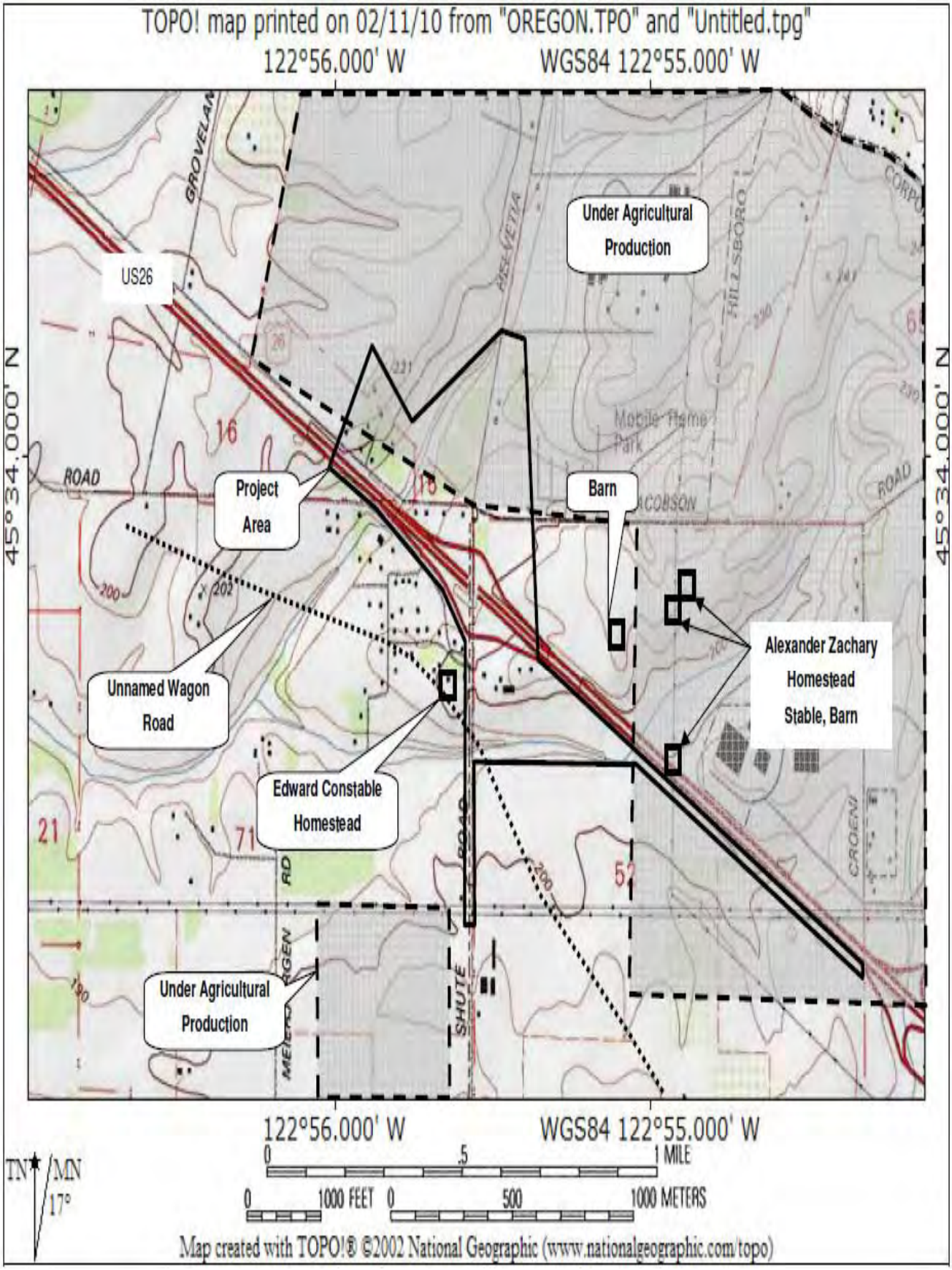


Figure 4. Approximate Location of Historic Period Activity (United States Surveyor General 1852, 1862) in the Project Vicinity.

Threatened and Endangered Species

Data from the USFWS and ORNHIC within a 2-mile radius of the proposed API indicates that several federal and state listed threatened and endangered plant species have the potential to occur within the API (USFWS 2010a, ORNHIC 2010). A listing of these species including their federal and state listing status, whether critical habitat is designated, blooming period, and habitat requirements is shown in Table 1.

Table 1. Rare Botanical Species with the Potential to Inhabit the API

Scientific Name	Common Name	Federal Status	State Status	Critical Habitat (Y/N)	Blooming Period	Habitat
Lupinus sulphureus ssp. *kincaidii*	Kincaid's lupine	T	T	Yes*	April-July	Upland prairie grasslands, oak savanna, and woodland edges
Sidalcea nelsoniana	Nelson's sidalcea	T	T	No	May-September	Open areas on damp soil, in meadows, wet prairie remnants, fencerows, roadsides, deciduous forest edges, and occasionally Oregon ash wetlands
Aster curtus	White-topped aster	SOC	T	No	July – August	Low elevation, moist native prairies, on well-drained upland soils in oak savannas
Castilleja levisecta	Golden Indian paintbrush	T	E	No	May-June	Moist or wet meadows and native prairies at low elevations
Delphinium leucophaeum	White rock larkspur	SOC	E	No	May - August	Dry roadside ditches, cliffs, rocky slopes and lowland meadows, at cliff bases, and basaltic ledges
Delphinium pavonaceum	Peacock larkspur	SOC	E	No	April – mid July	Well drained areas of native prairie, roadsides with no development
Erigeron decumbens var. *decumbens*	Willamette daisy	E	E	No	May-mid August	Native wetland and upland prairie, oak savanna, heavier soils, restricted to native prairie grassland

E= Endangered; T=Threatened; SOC=Species of Concern
*The designated Critical Habitat for Kincaid's lupine is not located within the vicinity of the API.

The API contains potentially suitable habitat for all the species listed in Table 1. In particular, suitable habitat is located within the open grass fields, fencerows, and oak groves of the API.

Noxious Weeds

During the February 3, 2010 field investigation, MB&G biologists also observed Oregon Department of Agriculture (ODA)-listed noxious weed species throughout the API (ODA 2009). Due to the timing of the field investigation outside the optimal blooming period for noxious weeds, not all weed populations may have been recorded. Table 2 provides a listing of the identified weed populations, the ODA rating of the species observed, and the location of the infestations within the API.

Table 2. ODA-listed Noxious Weed Populations within API

Scientific Name	Common Name	ODA Rating[1]	Quadrant of API	Location Description
Rubus armeniacus	Himalayan blackberry	B	NE	Open field west of Five Oaks Business Park
Rubus armeniacus	Himalayan blackberry	B	NE	North side of NW Jacobson Road
Rubus armeniacus	Himalayan blackberry	B	NE	Understory of oak grove located between westbound highway off-ramp and NW Jacobson Road
Rubus armeniacus	Himalayan blackberry	B	NE	Riparian area adjacent to northern unnamed tributary to McKay Creek at crossing with NW Helvetia Road
Rubus armeniacus	Himalayan blackberry	B	NW	Understory of oak grove located west of NW Helvetia Road
Rubus armeniacus *Phalaris arundinacea*	Himalayan blackberry Reed canarygrass	B N/A	NW	Wetland fringe along northern unnamed tributary to McKay Creek, north of NW Groveland Road
Rubus armeniacus *Cytisus scoparius*	Himalayan blackberry Scotch broom	B B	NW	Understory of forested area located north of NW Groveland Road at the west end of API
Rubus armeniacus	Himalayan blackberry	B	SW	Understory of oak grove located south of Highway 26 at the west end of API
Rubus armeniacus	Himalayan blackberry	B	SW	Fill slope located south of eastbound highway off-ramp

[1] Source ODA Noxious Weed List (ODA 2009)

2.3.2 Terrestrial Wildlife Resources

Review of data available from the USFWS and ORNHIC data within a 2-mile radius of the proposed API indicates that three federal and state listed terrestrial wildlife species have the potential to occur within the API (USFWS 2010a, ORNHIC 2010). A listing of these species, as well as their federal and state listing status, whether critical habitat is designated, and habitat requirements is shown in Table 3.

Table 3. Terrestrial Wildlife Species with the Potential to Inhabit the API

Scientific Name	Common Name	Federal Status	State Status	Critical Habitat (Y/N)	Habitat
Strix occidentalis caurina	Northern spotted owl	T	T	Yes	Inhabits forests characterized by dense canopy closure of mature and old-growth trees, abundant logs, standing snags, and live trees with broken tops
Brachyramphus marmoratus	Marbled murrelet	T	T	Yes	Nests in forest stands with old growth forest characteristics; forests are generally characterized by large trees with large branches or deformities for use as nest platforms
Eremophila alpestris strigata	Streaked horned lark	C	N/A	No	Associated with bare ground or sparsely vegetated habitats; nests in grass seed fields, pastures, fallow fields and wetland mudflats

E= Endangered; T=Threatened; C=Candidate

The forested areas within the API, which predominantly consist of small oak groves, do not have the habitat characteristics required by either the northern spotted owl or the marbled murrelet. Although critical habitat has been designated for both species, the closest occurrence of critical habitat for both species is located in the Coast Range more than 5 miles to the west of the API. Similarly, the API does not contain suitable habitat for the streaked horned lark which utilizes bare ground or sparsely vegetated habitats. No such habitats are present within the API.

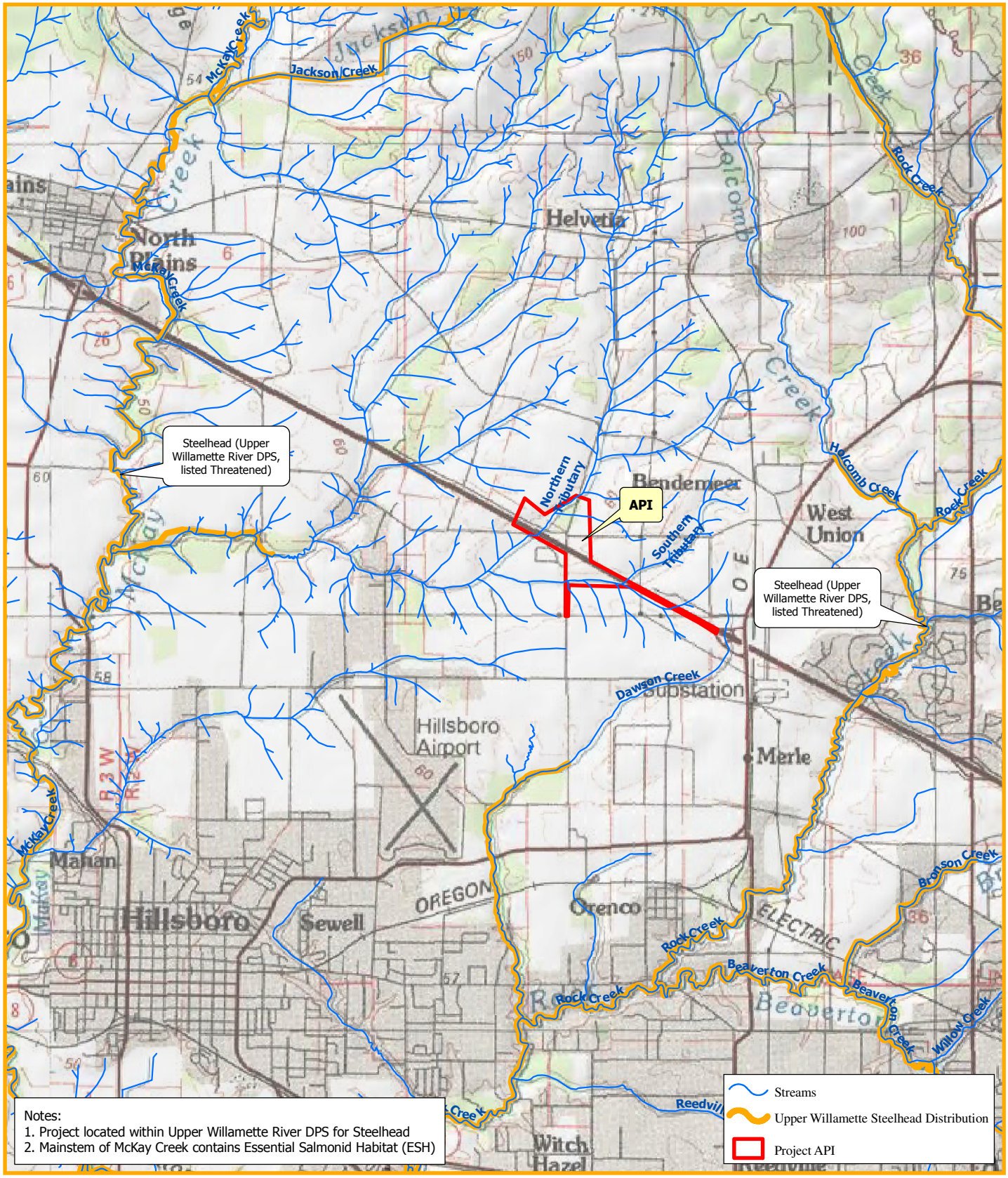
The API does contain potential habitat for nesting migratory birds since they may utilize trees and shrubs located throughout the API.

2.3.3 Fish and Aquatic Resources

The API is located within the Lower McKay Creek (170900100107) 6th Field Hydrologic Unit Code (HUC). Two unnamed tributaries to McKay Creek are located within the proposed API; the northern unnamed tributary and the southern unnamed tributary. The unnamed tributaries' confluence with the mainstem of McKay Creek is located approximately 1.5 miles downstream (southwest) of the API. Approximately 5 miles downstream from this confluence, McKay Creek flows into Dairy Creek which then flows into the Tualatin River within 2 miles of the McKay/Dairy Creek confluence.

Review of data available from StreamNet and ORNHIC within a 2-mile radius of the proposed API indicates that steelhead of the Upper Willamette River (UWR) Distinct Population Segment (DPS) has the potential to occur within the proposed API (StreamNet 2010, ORNHIC 2010). This species is federally listed as Threatened and state listed as Sensitive Vulnerable.

UWR DPS steelhead utilize McKay Creek for rearing and migration (StreamNet 2010). The upstream extent of steelhead distribution is located approximately 1 mile downstream (southwest) of the proposed API (Figure 5). The unnamed tributaries to McKay Creek do not currently provide rearing and migration habitat for UWR steelhead. The habitat within these unnamed tributaries is considered low quality because of the following factors: the streambed is



N

0 0.5 1 Miles

0 0.5 1 1.5 2 Kilometers

Figure2.pdf Creation Date: Feb 9, 2010.

Figure 5.

Aquatic Resources Map
Shute Road Interchange Improvement Project
Washington County, Oregon

MB&G

Mason, Bruce & Girard, Inc.
Natural Resource Consultants since 1921

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largely comprised of silt and sand, there is minimal riparian vegetation, and there is a general lack of channel complexity. McKay Creek is mapped as Essential Salmonid Habitat (ESH) according to the Oregon Department of State Lands (DSL). However, the ESH designation does not extend into the two unnamed tributaries of McKay Creek located within the API (DSL 2001).

Although steelhead and other native migratory fish do not currently utilize the tributaries within the API, it is likely that steelhead and native migratory fish used these tributaries historically. This determination is based on an investigation of accessible portions of the two unnamed tributaries to McKay Creek within the API on February 3, 2010 and a review of U.S. Geological Survey topographic maps (USGS 1986) for the area. In particular, the size of each unnamed tributary suggests that this system historically supported fish in its upper reaches. Although man-made barriers (i.e., culverts) to fish passage may have been constructed recently, there are no natural barriers to upstream fish passage within McKay Creek or its tributaries. Lack of current use by native migratory fish is likely due to degradation of stream habitat as a result of development of the surrounding areas.

The ODFW has determined that there was historical use of these streams by native migratory fish. This determination was based upon the physical attributes of the tributaries, the lack of natural barriers downstream, and the size of the drainage basins (J. Brick pers. comm. 2010).

2.4 Floodplain / Floodway

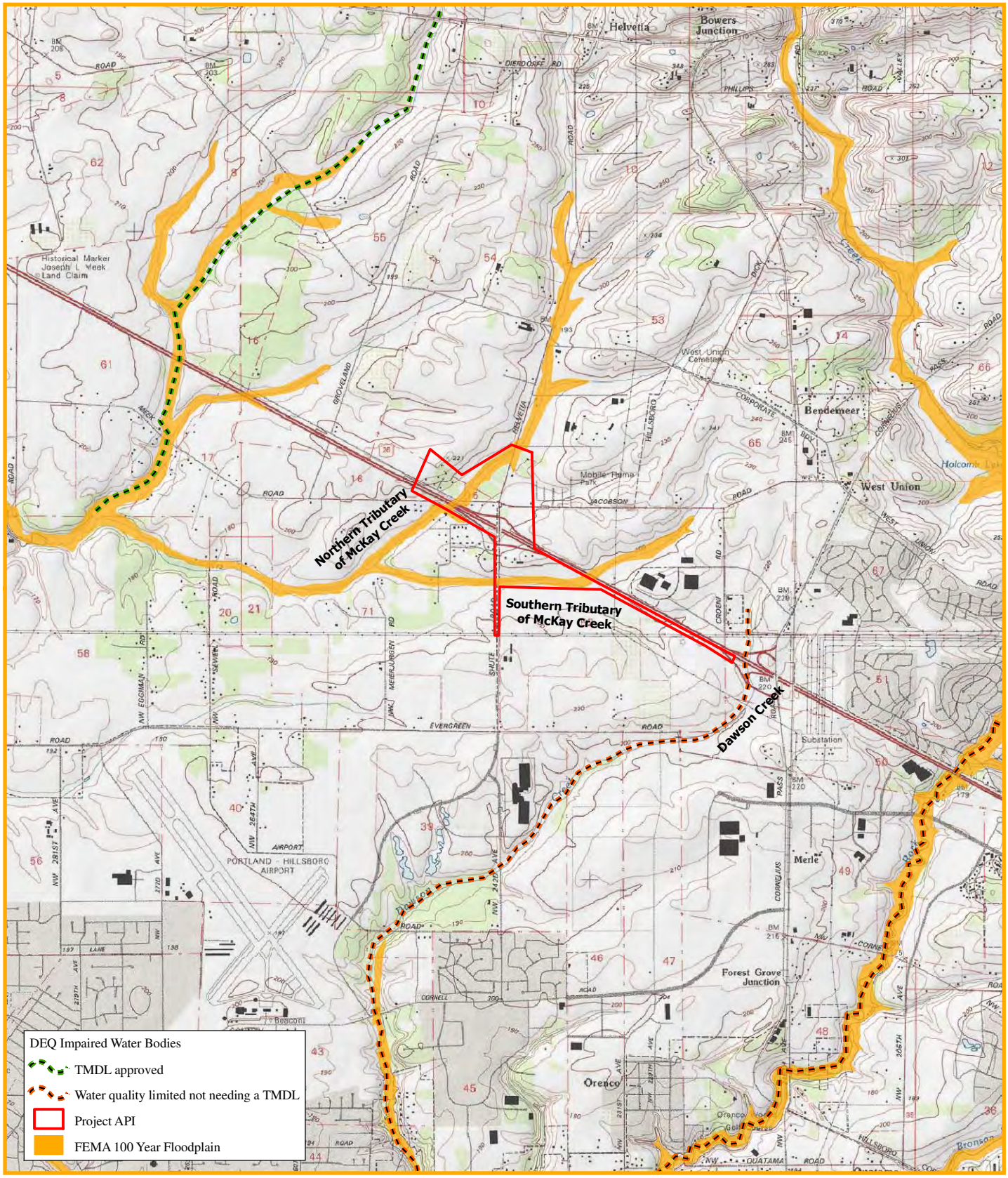
MB&G obtained information from the Federal Emergency Management Agency (FEMA) and Washington County in regard to floodplain designations within the API. Areas within the API have been designated within the 100-year floodplain area for the unnamed tributaries to McKay Creek (Figure 6). The API does not contain areas that have been designated within the 500-year floodplain area (FEMA 2010, S. Roberts pers. comm. 2010).

2.5 Land Use

The area surrounding the API is on the edge of the Metro UGB. The northeast, southeast and the majority of the southwest quadrants are currently in the UGB; the northwest quadrant is outside of the UGB (Figure 2). The area to the north of the interchange is primarily rural in character, but has also seen growth in industrial properties.

This project will not require a goal exception to statewide planning goals. The recently adopted Urban-Rural Reserves solidified the future of this area as a major industrial cluster in the region with significant planned growth in industrial land uses. The area to the NW of the interchange, with the exception of the area in the API, is planned to remain EFU (Exclusive Farm Use) land and should be protected as rural.

The NW quadrant of the API is currently primarily undeveloped with the exception of three single family houses and an auto repair shop immediately to the north of the westbound entrance ramp in the API. NW Groveland Drive continues westbound within the API, and turns northbound outside the API after providing access to an additional four homes. NW Groveland Drive currently intersects with NW Helvetia Road approximately 250 to 300 feet north of the ramp terminals. Areas outside the API include a large area to the north of NW Groveland Drive which is currently in agricultural use.



N

0 0.25 0.5 Miles

0 0.25 0.5 0.75 1 Kilometers

Figure3.pdf Creation Date: Feb 9, 2010.

Figure 6.

Water Quality and Flood Plain Map
Shute Road Interchange Improvement Project
Washington County, Oregon

MB&G

Mason, Bruce & Girard, Inc.
Natural Resource Consultants since 1921

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The NW quadrant of the interchange, with the exception of the area in the API, is currently under Washington County planning and zoning authority and is planned to remain zoned as EFU (Exclusive Farm Use) land. A statewide goal exception is needed for removal of agricultural use from EFU land. The area within the API in the NW quadrant is planned for Urban Reserve, which would include transportation facilities; therefore a statewide goal exception would not be required for the proposed project.

The NE quadrant of the API is currently developed as light industrial land and the area north of NW Jacobson Road is currently vacant. Areas outside the API include several new industrial developments currently accessing NW Clara Lane, as well as multiple commercial businesses and the Country Haven Mobile Home Park. NW Jacobson Road currently intersects NW Helvetia Road 250 to 300 feet from the intersection ramp terminals. The NE quadrant of the interchange is planned for industrial use. Land use in the area from NW Jacobsen Road to West Union Road is addressed in the Helvetia Concept Plan, which created a special district, the Helvetia Area Special Industrial District (HSID). This zoning designation limits use to certain industrial categories and has large minimum lot sizes (10 acres). The intent is to develop this area primarily as industrial land aimed at creating jobs. Some of this concept plan area has not yet been re-zoned and is still classified as FD-20 (Future Development) under the County Zoning Code. The FD-20 classification is intended to hold land until such time UGB expansions are requested and urban zoning is applied for from the affected City.

The area to the SE of the interchange in the API is currently a farm in operation and an agricultural field. Outside of the API, additional fields exist, in addition to several recent industrial developments. The large field to the south of the operating farm is a Nike Foundation site that is a certified industrial site. The area to the SE of the interchange is planned and zoned as Industrial by the City of Hillsboro.

The API is tight to the existing Highway 26 and NW Meek Road ROWs in the SW quadrant. The area outside of the API southwest of the interchange includes a small, residential area consisting of approximately 20 single family houses on large lots immediately south of NW Meek Road. The area to the south of this small residential area is a large field in agricultural use. NW Meek Road currently intersects NE Brookwood Parkway approximately 200 feet south of the ramp terminals. The area immediately to the SW of the interchange is planned and zoned as AF-5 (Agriculture or Forestry) and is under Washington County jurisdiction. This area is identified as Urban Reserve through Metro's recent Urban-Rural Reserves process. The area to the south of the AF-5 land, east of 253rd Avenue, and West of Brookwood Parkway is all planned as Industrial under the City of Hillsboro Comprehensive Plan. The City of Hillsboro zoning is Shute Road Special Industrial District Overlay which requires large lots for industrial use. Land use in the area to the west of 253rd Avenue is addressed in the *Evergreen Concept Plan.* This plan applies Evergreen Special Industrial District Zoning to properties that are annexed into the City of Hillsboro. The provisions are similar to the other Special Industrial Districts that require large lot sizes for industrial and employment use. This *Evergreen Concept Plan* area is currently under county zoning of FD-20.

Contact with the local agencies (Washington County and the City of Hillsboro) indicates Washington County will require a Type III (public hearing) development review process for the

proposed project. The City of Hillsboro will not require a development review process for the proposed project.

2.6 Hazardous Materials

The review of available information revealed that hazardous materials are known to be present within project API (DEQ 2010). Table 4 includes information about the known hazardous material sites within the API. No evidence of environmental impacts from hazardous materials was observed during the initial site investigation. The site consists of rural or agricultural land with limited residential and undeveloped land usage.

Note: No Registered Geologist or other Hazardous Materials professional participated in the preparation or review of this baseline overview of Hazardous Materials for the proposed project. It is for internal ODOT use only and may not be relied upon by any other entity without written permission from an authorized ODOT representative. No environmental assessment can wholly eliminate uncertainty regarding the potential for environmental conditions in connection with a Project.

Table 4. Known Hazardous Material Sites within the Shute Road Interchange API

Facility	Address	General Location	DEQ Program
Berger Farms	5888 NW Shute Road Hillsboro, 97124	Southeast of Shute Road Interchange on Hwy 26	Leaking Underground Storage Tank
Berger Farms Hot	5870 NW 242nd Avenue Hillsboro, 97124	South side of Hwy 26 on NW Shute Road near the on-ramp	Leaking Underground Storage Tank
Baxter, B Hot	27700 NW Meek Road Hillsboro, 97124	West of Shute Road Interchange on Hwy 26	Leaking Underground Storage Tank
Genentech Inc.	4625 NW Shute Road Hillsboro, 97124-9332	At corner of NW Shute Road and Huffman Road	Air Discharge Permit Hazardous Waste
Five Oaks Lot 7	NW Casper At NW Clara Lane Hillsboro, 97124	Northeast of the eastbound off-ramp to NW Shute Road	Water Discharge Permit

Source: DEQ Hazardous Materials Database (2010).

In addition, mercury vapor lamps and treated timbers may be present within the API and would require special handling if they require removal or replacement.

2.7 Historic

Identification of newly-discovered and previously-documented historic resources within the API was based on a review of SHPO databases for historic sites and for National Register properties, a review of the Washington County Cultural Resource Inventory, and a February 27 and March 1, 2010 reconnaissance level (windshield) survey of the API by ODOT.

Review of the SHPO statewide inventory resulted in the identification of one previously-recorded historic resource in the API: the James and Mary Chambers House. The Washington

County Cultural Resources Survey and Inventory also noted several "inventoried properties" in the API including the James and Mary Chambers House and Five Oaks Meeting Place.

The API was surveyed on February 27 and March 1, 2010 by ODOT to identify any properties that were 45 years old or older. Thirteen historic properties were photographed and the addresses noted (Table 5). The built properties span over a century, from an 1865 farmhouse to a 1963 ranch-style house. In addition, a historic site in the API, the Five Oaks Meeting Place, has strong association with local Indians and Oregon pioneers. The majority of the properties listed in Table 5 are located within the API. However, several additional properties outside of the API were included due to their close proximity to the API.

Table 5. Historic properties identified within the Shute Road Interchange API

Map ID	Property Name	National Register Status
A	House 24250 NW Groveland Dr., Hillsboro, OR	Not eligible.
B	House 24380 NW Groveland Dr., Hillsboro, OR	Not eligible.
C	House 24500 NW Groveland Dr., Hillsboro, OR	Not eligible.
D	James and Mary Chambers House 24665 NW Groveland Dr. Hillsboro, OR	Likely eligible. Listed in Washington County Cultural Resources Inventory
E	House 5830 NW Shute Rd. Hillsboro, OR	Possibly eligible. Additional research is needed.
F	House 5870 NW Shute Rd. Hillsboro, OR	Possibly eligible. Additional research is needed.
G	Five Oaks Meeting Place Corner of NW Caspar Pl. & NW Clara Pl. Hillsboro, OR	Likely eligible. Listed in Washington County Cultural Resources Inventory.
H	House 24215 NW Meek Rd. Hillsboro, OR	Not eligible.
I	House 24640 NW Meek Rd. Hillsboro, OR	Not eligible.
J	House 24680 NW Meek Rd. Hillsboro, OR	Not eligible.
K	Lin Tara Sunset Kennel 24810 NW Meek Rd. Hillsboro, OR	Not eligible.
L	House 6160 NW Birch Ave. Hillsboro, OR	Possibly eligible. Additional research is needed.
M	House 24385 NW Oak Dr. Hillsboro, OR	Not eligible.

2.8 Section 4(f)/6(f)

U.S. Geological Survey topographic maps (USGS 1986), city maps, and county maps were reviewed to identify potential Section 4(f) or Section 6(f) resources. No wildlife and waterfowl refuges are located within the API. In addition, contact with local planning representatives at Washington County and City of Hillsboro indicated that there are no parks or recreation areas within the project API. There are also no properties encumbered with Section 6(f) Land and Water Funds (Lippincott pers. comm. 2010) within the API.

Cultural Resources Baseline Technical Reports (historic and archaeology) prepared for the proposed project indicate that historic resources may be present within the API. If the presence of an historical resource is verified, Section 4(f) documentation may be needed to address potential impacts on historic properties/structures.

2.9 Noise

A Sensitive Noise Receptor (SNR) is defined as a use that may be impacted by increased noise and/or vibration caused by increased traffic volumes or speeds, or by a reconfigured existing roadway directing traffic in a manner that increases noise or vibration. ODOT identified one type of SNR within the API: single-family homes and mobile homes that constitute a residential use. Other types of SNRs that were not identified within the API include senior/care residential facilities, motels/hotels, hospitals, schools or play grounds, libraries, places of worship, parks, campgrounds, and recreational facilities. Within 200 feet of the proposed ROW, there are approximately 12 single family residential homes, three agricultural out-buildings, and four commercial/office buildings. In addition, a mobile home park is also adjacent to the API.

Although the proposed project would likely not include an increase in the number of through travel lanes, shifts in the horizontal and vertical alignment are proposed for the Highway 26 on- and off-ramps. This shift in the alignment has the potential to result in noise impacts which should be addressed in a Noise Study for the future project. In addition, potential noise impacts may occur as a result of the roadway being proposed on a new alignment as part of access management in the northeast quadrant of the interchange. However, the proposed project will not remove topographical features which currently shield receptors. Additionally, there are no known noise issues that have been raised within the API or for the proposed project (Gordon and Craig pers. comm. 2010).

2.10 Socioeconomic

The proposed project is located at the western edge of Hillsboro and adjacent land is in both the City of Hillsboro and unincorporated Washington County. The Shute Road Interchange is near the western boundary of the *West Union Community Plan* area of Washington County, and immediately south of the *Helvetia Plan* area in the City of Hillsboro. The API includes low-density, rural residential uses, and agricultural land. Adjacent land uses are a mix of low-density residential uses, industrial uses, and commercial land uses east of the interchange near both sides of Highway 26. Much of the property adjacent to the northern and western sides of the API is undeveloped farmland. Adjacent property to the south includes rural residential uses and agricultural land (City of Hillsboro 2008, Washington County 2008).

2.10.1 Population and Housing

The portion of the City of Hillsboro and Washington County within the API is lightly populated and primarily composed of rural residences. However, the population in the City of Hillsboro has been growing, as has that of Washington County. Increasing numbers of housing units in the city and county also reflect these recent growth rates. Table 6 provides population and housing data for the City of Hillsboro and Washington County.

Table 6. Population and Housing Characteristics

	2000	2008	Percent Change
City of Hillsboro			
Population	70,186	85,453	+ 21.75%
Total Housing Units	27,211	32,448	+ 19.24.13%
Washington County			
Population	445,342	519,979	+ 16.75%
Total Housing Units	178,913	204,328	+ 14.20%

Source: US Census 2000, Census Fact Sheet 2006-2008

2.10.2 Economic Resources

The City of Hillsboro and Washington County are part of the greater Portland metropolitan area. Because of the proximity to this metropolitan area, the City of Hillsboro and Washington County contain some of the largest Portland metropolitan area employers. Core economic industries in the City of Hillsboro area include high-tech electronics companies, solar companies, and biotechnology companies that represent emergent industries. Nearly 66% of the state's employment in computer and electronic manufacturing is located in Washington County (Johnson Reid 2009). Other retail, commercial, and industrial businesses are also present in the region.

Washington County also includes large areas of rural farm and forest land. In 2009, Washington County ranked sixth among state counties in total agricultural production, with over $230 million in gross farm and ranch sales. Overall, due to the recent economic downturn, total agricultural sales have declined by approximately 15% statewide in 2009 (OSU 2010a).

2.10.3 Protected Populations and Environmental Justice

Census data (U. S. Census Bureau 2000) was reviewed for the presence of minority and low income groups in the API. Block data for the twelve blocks adjacent to the API was also reviewed for racial characteristics and block group data was reviewed for information on low income populations. For nearly all racial groups, percentages of minority groups reflected by block groups in the API are lower than City of Hillsboro and Washington County percentages. American Indian/Alaskan Native, Native Hawaiian/Pacific Islander, and White ethnicities were the only groups where API averages were higher than City and County averages.

The Census block group data indicates that approximately 6.3% of the population within these groups was below the 1999 poverty level. City and County percentages for low income individuals range between 7.3% and 9.0%, thus census block groups near the API have a lower percentage of low income individuals than the percentages reported for the local jurisdictions. Block group data covers a larger area than the API and field observations have confirmed that most residential properties are located at a distance from the highway. Census information is provided in Table 7.

Table 7. Census Tract Demographic Information

Race/Ethnicity	Local Census Blocks[1]	City of Hillsboro[2]	Washington County[2]	State of Oregon[2]
Total Population	382	70,186	445,342	3,421,399
White	88.2%	77.4%	82.1%	86.5%
Black or African American	0.5%	1.2%	1.1%	1.6%
American Indian and Alaskan Native	1.5%	0.8%	0.6%	1.3%
Asian	0.5%	6.5%	6.6%	2.9%
Native Hawaiian and Other Pacific Islander	0.5%	0.2%	0.2%	0.2%
Some Other Race	4.9%	10.3%	5.8%	4.2%
Two or More Races	3.1%	3.2%	3.1%	3.0%
Hispanic Origin	11.2%	18.8%	11.1%	8.0%
Individuals below poverty level*	6.3%	9.0%	7.3%	11.6%

[1]U.S. Census Block and Block Group Data, 2000
[2]Census Bureau, 2006-2008 Fact Sheets
*Note: Based on Census Tract Block Groups (Block data unavailable)

Although not within the proposed project's API, the Country Haven Mobile Home Park is located immediately adjacent to the northeast boundary of the API with access from NW Jacobson Road. Mobile home parks are frequently considered sources of affordable housing and may contain minority or low income population group members.

2.10.4 Social and Recreational Resources

Local services available to residents within the API are primarily located in the City of Hillsboro. Hillsboro Fire and Rescue provides firefighting and Emergency Medical Services for the API. Station 3 is located approximately 0.75 miles east of the Shute Road Interchange at NW 229th Avenue. The Hillsboro Police Department precinct office is located approximately 1.25 miles east of the API near NE Cornell Road. Unincorporated areas are served by the Washington County Sheriff's Office and Tualatin Valley Fire and Rescue. TriMet Transit provides bus service in the City of Hillsboro; however, public transit service is not available within the *West Union Plan* area (Washington County 2008).

The schools closest to the API are Hillsboro Elementary and Liberty High School. These facilities are located at NW West Union Road approximately 1 mile north of the API and on NW Wagon Way approximately 2.25 miles northeast of the API, respectively. The nearest churches are the Chinese Evangelical Church and the Community of Christ Church which are both located on NW Five Oaks Drive approximately 2.25 miles east of the API. In addition, the West Union Baptist Church is located on West Union Road approximately 2 miles north of the API.

The API consists primarily of rural farm land and associated residences, as well as a few nearby commercial and industrial buildings. A small residential area is clustered adjacent to the southwest boundary of the API, and a mobile home park is located near the northeast boundary of the API. For both of these residential areas, the Shute Road Interchange is the primary access point for east-west travel on Highway 26. The intersection is also a key access point for travel to locations north and south of the highway, both for local residents and emergency service

vehicles. Additionally, it provides a primary access point from Highway 26 for travel to Hillsboro Elementary School and the West Union Baptist Church.

There are no parks, recreational areas or wildlife refuges in or adjacent to the API. The closest City of Hillsboro park facility to the API is the Gordon Faber Recreation Complex and Hillsboro Stadium at the NW Cornelius Pass Road/Highway 26 intersection which is approximately 1.25 miles east of the API. These facilities provide outdoor recreation opportunities for softball, soccer, football, baseball, and lacrosse. The stadium also provides a state-of-the-art facility for these events.

2.11 Visual

The visual resources and associated permits for the project were identified during a review of existing maps and relevant regulations, as well as discussions with ODOT and local jurisdiction staff. USGS Quad maps, city maps, and county maps were reviewed to identify Federal Scenic Highways or Tour Routes. Review of these resources indicated that none of the following designations apply within the API: National Scenic Byway, All-American Road, Oregon Scenic Byway, Oregon Tour Route, Oregon Memorial Drive, Oregon Scenic Waterways, National Wild and Scenic Rivers, Federal, State or local parks and recreation, and conservation lands (including National Historic and Scenic Trails, wildlife sanctuaries, refuges and preserves, and 'beach land'). There are also no U.S. Forest Service (USFS) or Bureau of Land Management (BLM) properties within the API.

Consideration of visual resource impacts may occur for forest properties under the Oregon Forest Practices Act. The Oregon Forest Practices Act would not apply to the proposed project because there are no forest properties located within the API. The proposed project includes major cuts and fills in order to reconstruct the on- and off-ramps of Highway 26 which may impact visual components of the landscape. In addition, the proposed project will likely include the construction of a bridge over an unnamed tributary of McKay Creek. As a result of the bridge construction, large retaining walls would be anticipated in order to avoid and/or minimize impacts to wetlands associated with the unnamed tributary and may impact visual components of the landscape.

2.12 Wetlands and Waters of the U.S. and State

The wetland/waters resources and permit requirements for the proposed project were identified during a pre-field review of available information and a field investigation of the API conducted by MB&G wetland biologists on February 3, 2010. Potential wetlands and waters were identified prior to the field investigation using aerial photographs (NAIP 2009), USGS topographic maps (USGS 1986), USFWS National Wetlands Inventory (NWI) mapping (USFWS 2010b), Local Wetland Inventory (LWI) mapping records for the City of Hillsboro [east of the Shute Road/Highway 26 intersection only] (Fishman Environmental Services 2001), Oregon Wetland Assessment Protocol (ORWAP) mapping (OSU 2010b), Oregon Department of Forestry (ODF) stream mapping (ODF 2003), and the Soil Survey of Washington County, Oregon (Green 1982, NRCS 1999).

The field investigation was conducted to evaluate the environmental baseline conditions of the API, including the potential presence of jurisdictional wetlands and waters. During the field

investigation, the API was examined and photographed from public roadways because access onto private property was not permitted (Appendix A). Accordingly, biologists conducted a visual inspection of private properties from public roadways. Therefore, the boundaries of wetland/waters features are approximate and subject to change after an on-site wetland/waters delineation has been conducted. Based on available access, all potential wetlands and waters features identified during the pre-field review were inspected during the field investigation.

Twelve jurisdictional wetlands and waters features were identified during the field investigation on February 3, 2010 (Figure 7). The approximate acreage of each feature within the API is provided in Table 8.

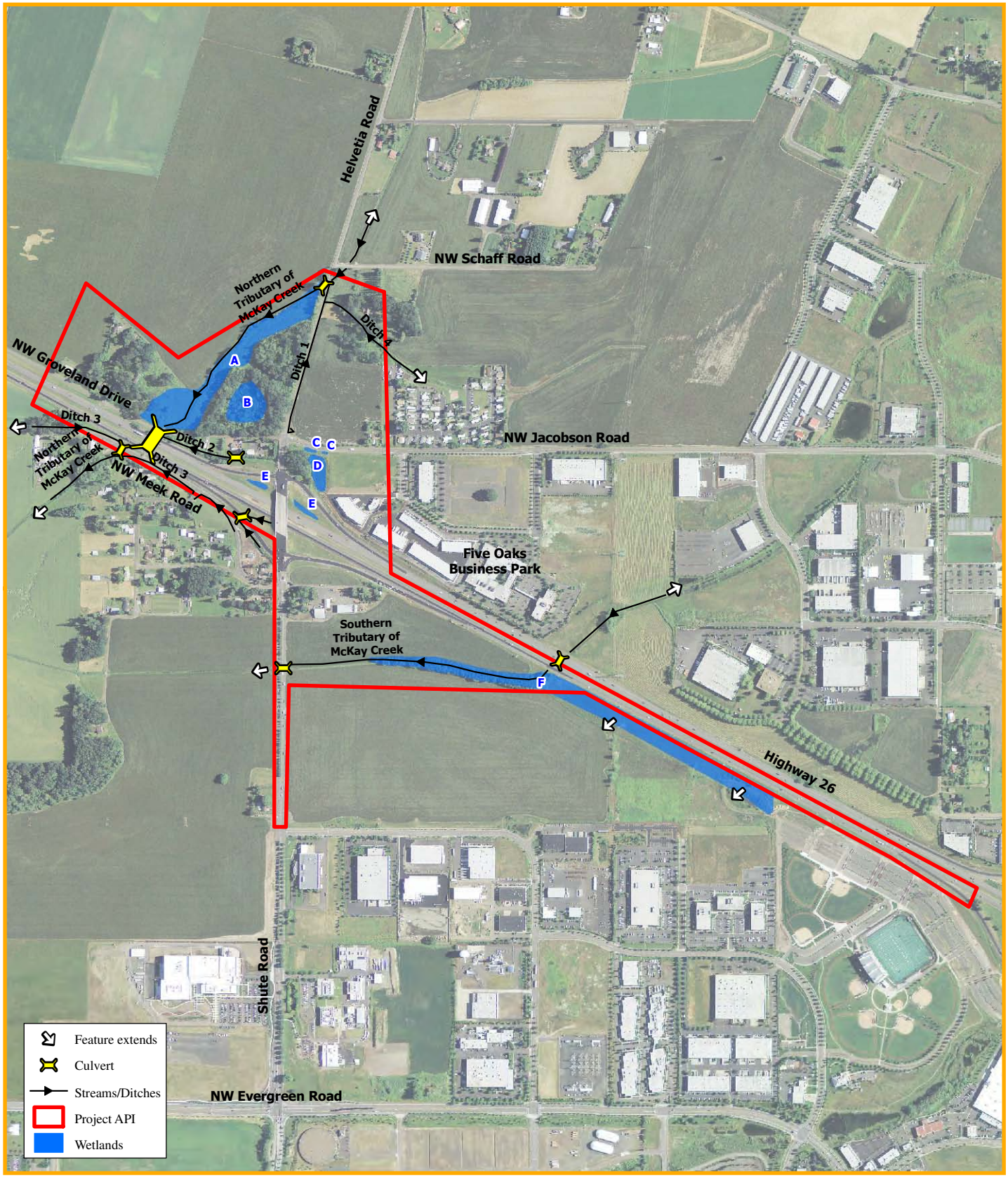
Note: As access was not provided beyond public ROW, feature presence, location, boundaries, and acreage are approximate and should be used for preliminary planning purposes only.

Table 8. Wetland/Waters Identified within the API.

Feature	Approximate Acreage
Wetland A	6.9
Wetland B	1.8
Wetland C	0.1
Wetland D	0.6
Wetland E	0.3
Wetland F	4.5
Total Wetland Acreage	***14.2***
Northern Unnamed Tributary of McKay Creek	0.2
Southern Unnamed Tributary of McKay Creek	0.8
Ditch 1	0.1
Ditch 2	0.1
Ditch 3	0.1
Ditch 4	0.1
Total Waters Acreage	***1.4***

2.13 Water Quality / Stormwater Management

The water quality resources and permit requirements for the proposed project were identified during a review of existing database information, discussions with regulatory agency staff, and a field investigation conducted by MB&G on February 3, 2010. At the time of the field investigation, ODOT did not have right-of-entry for areas outside of public rights-of-way.



N

0 500 1,000 Feet

0 100 200 300 Meters

Figure3.pdf Creation Date: Feb 9, 2010.

Figure 7.

Wetlands and Waters Map
Shute Road Interchange Improvement Project
Washington County, Oregon

MB&G

Mason, Bruce & Girard, Inc.
Natural Resource Consultants since 1921

Data Source: NAIP 2009 imagery. This product is for information purposes only and may not be suitable for legal, engineering or surveying purposes. This information or data is provided with the understanding that conclusions drawn from such information are the responsibility of the user.

As such, areas outside of public ROW were visually inspected from the adjacent roadway. The field investigation was conducted to evaluate the baseline water quality conditions of aquatic resources (i.e., aquatic/riparian conditions, presence of wetlands, aquatic habitat conditions) within the Project API.

The Oregon Department of Environmental Quality (DEQ) has listed the mainstem of McKay Creek, located west of the API, as having water quality impairments that may warrant special protection measures (Figure 6). In 1998, DEQ added the mainstem of McKay Creek to the Section 303(d) list for water quality violations including ammonia and phosphorus. Since 1998, water quality in the mainstem of McKay Creek has further degraded and in 2002, DEQ added *E. coli* and temperature violations to the creek's water quality impairments (DEQ 2006). A Total Maximum Daily Load (TMDL) plan has been approved for this creek. The northern and southern unnamed tributaries of McKay Creek located within the API are not specifically identified by DEQ as having water quality impairments.

Dawson Creek is located approximately 700 feet east of the southeastern corner of the API (Figure 5). DEQ has identified Dawson Creek as water quality limited (biological criteria), although a TMDL is not currently warranted. Due to its proximity to the API, stormwater from the API may flow into this creek. The amount of existing impervious surface area within the API is approximately 30 acres (20%).

The City of Hillsboro does not use the northern or southern unnamed tributaries of McKay Creek for drinking water (Steele pers. comm. 2010). It is unknown if the unincorporated portions of Washington County use the northern or southern unnamed tributaries of McKay Creek for drinking water.

3.0 CONCLUSIONS

3.1 Air Quality

The proposed project involves adding lanes at the Shute Road over-crossing and is partly within the Air Quality Management Area. As a result, air quality conformance will be required as part of the proposed project. However, the proposed project will likely reduce congestion in the area which is anticipated to improve local air quality.

3.2 Archaeology

Based on a literature review, a field investigation on February 11, 2010, and discussions with tribal representatives, ODOT has identified multiple archaeological resources near the Shute Road Interchange.

To avoid impacts to archaeological resources, a pedestrian survey should be conducted in the API. Surveys should be focused in areas that may include the Tribe-reported archaeological site, two buildings and/or structures, the Edward Constable homestead, an unnamed wagon road, and the Alexander Zachary stable. If an archaeological site is identified that may be eligible for listing in the National Register of Historic Places (NRHP) and cannot be avoided, subsurface exploration and/or testing/evaluation of the site would be required and efforts should be made to minimize impacts to the resource.

In order to document the results of additional background research and field investigations, an Archeology Technical Report meeting SHPO guidelines should be prepared. In addition, Determinations of Eligibility (DOE) and Findings of Effect (FOE) would be required for all archaeological sites identified and all archeological sites that may be affected, respectively. All DOE's and FOE's should be submitted to SHPO for approval.

Water quality facilities, staging areas, disposal areas, and material sources should be identified during the design phase, if possible, and cleared for archaeological resources early in the planning process to avoid impacts to archeological resources. If ODOT does not provide the contractor with the location of archeological resources prior to bid let, the contractor would be responsible for hiring an archaeological consultant to examine these areas after bid let and prior to construction. A qualified archaeological monitor and/or Tribal monitor may be retained to monitor ground disturbing activities during construction. In the event that archaeological resources or human remains are inadvertently discovered during ground disturbing activities, these activities shall be halted immediately and an ODOT archaeologist shall be contacted immediately for further instructions.

3.3 Biology

3.3.1 Botanical Resources

Based on the February 3, 2010 field investigation and the review of available information, there is suitable habitat for listed botanical species within the API. As a result, botanical clearance surveys will need to be conducted during the appropriate blooming period for the species listed in Table 1. The API also contains noxious weed species (Table 2). A follow-up weed survey

should also be conducted during the blooming period to ensure all noxious weed populations are documented.

In order to capture both early and late blooming botanical species as well as noxious weeds, two site visits are recommended. The results of the botanical clearance and noxious weed surveys should be documented in a Botanical Clearance Report. If listed plant species are observed within the API, the ODOT Biologist should coordinate with the Project Team to avoid impacting these species. If listed species cannot be avoided by the project, a Biological Assessment (BA) should be prepared and submitted to USFWS and/or ODA.

All noxious weed control efforts will follow ODOT standards. Noxious weed populations located within the API should be included on project plans and be removed prior to construction of the proposed project. In addition, inspection and cleaning of construction equipment prior to entry into the construction site should be required. Weed seeds can easily become trapped in the tread of tires or within the crevices of heavy machinery, and spread across the API during the construction phase of the project. Weed control should also be required during the one year post-construction maintenance period to prevent the spread of noxious weeds.

3.3.2 Terrestrial Wildlife Resources

The API does not contain suitable habitat for any state or federally-listed terrestrial wildlife species. A No Effect Memorandum should be prepared to document these findings.

Nesting migratory birds have the potential to occupy a significant portion of the API due to the suitable habitat afforded by the trees and shrubs that were observed during the February 3, 2010 field investigation. The Migratory Bird Treaty Act (MBTA) prevents the take of adult migratory birds, their young, eggs, and all body parts. Take permits are not widely available so preventative measures are recommended to avoid violations of the law. Under this law, adult migratory birds can be deterred from nesting and empty nests can be removed or disturbed, but active nests and attending adults are not to be harassed. Incidental take of migratory birds is generally avoided by activity timing restrictions as well as preventive measures. The only proposed project activity that has the potential to conflict with the MBTA is the clearing of trees that may provide nesting habitat for migratory birds. The timing of vegetation removal (clearing and grubbing) should occur between September 1 and March 1 so as to occur outside the nesting period for migratory birds.

3.3.3 Fish and Aquatic Resources

The API does not contain suitable habitat for any state or federally-listed fish or aquatic species. However, the upstream extent of steelhead distribution is located approximately 1 mile downstream (southwest) of the API. Although direct impacts to listed salmonids are not expected as a result of the proposed project, indirect impacts are possible. If the project includes work in, over, or adjacent to the two unnamed tributaries to McKay Creek, indirect impacts may include temporary increases in turbidity as a result of construction. In addition, the proposed project will include increases in impervious surface which may cause indirect stormwater impacts to steelhead downstream.

Due to these anticipated indirect effects to listed species, a BA or Standard Local Operating Procedure for Endangered Species (SLOPES IV) Compliance Report must be prepared to provide Endangered Species Act (ESA) clearance. Upon submittal of this document to the regulatory agencies, ODOT can expect a maximum review timeline of 135 business days for a BA with a Likely to Adversely Affect (LAA) effect determination. Minimizing or avoiding impacts on the natural resources described within the API may shorten the review timeline.

There is evidence that native migratory fish historically utilized the two unnamed tributaries to McKay Creek within the API. As such, all new or improved stream crossings would need to be designed to provide fish passage in accordance with the Oregon Fish Passage Law. As the proposed project design is refined, the ODOT Biologist will need to ensure that any activities within these tributaries (i.e., culvert extensions or replacements) meet ODFW's requirements. In addition, an ODFW Fish Passage Plan may need to be prepared depending on the scope of the proposed project.

If the proposed project does include activities within the two unnamed tributaries to McKay Creek, these activities should be scheduled during ODFW-approved In-Water Work Window for the Tualatin River and its tributaries (July 15 through September 30) (ODFW 2008).

3.4 Floodplain / Floodway

Areas within the API are located within the 100-year floodplain. Activities located within the FEMA Floodplain/floodway are regulated by Washington County. Project activities within the floodplain need to be authorized by Washington County via the Washington County Land Use Application process (Brown pers. comm. 2010). In addition, a Washington County Flood Plain/Drainage Hazard Determination form will be required.

3.5 Land Use

The area surrounding the project is planned for industrial and employment uses in three of the four quadrants. This project is not likely to result in significant changes to the planned land uses and is consistent with planned uses. No statewide goal exceptions are anticipated for the proposed project.

3.6 Hazardous Materials

There are multiple listings for hazardous materials located within the API. These listings include, but are not limited to, leaking underground storage tanks, solid (hazardous) waste, and air and water discharge permits. In particular, three leaking underground storage tanks that could have contaminated soil and groundwater were identified within to the API. In addition, mercury vapor lamps and treated timbers may be present within the API and would require special handling if they require removal or replacement. Air and water discharge permits may also have ultimately resulted in contaminated soil and groundwater within the proposed API.

A Hazardous Materials Level 1 Analysis is recommended for the proposed project. In addition, depending on the results of the Level 1 Hazardous Materials Analysis, a Level 2 Hazardous Materials Analysis may also be required for the proposed project.

If the proposed project requires the acquisition of adjacent ROW, it appears that these acquisition(s) will not include gas stations, repair facilities, industrial sites, landfills or any other

non-residential facilities that may have used or stored hazardous materials. Agriculture fields are located within and adjacent to the API and may have high levels of pesticides. Agriculture fields affected by the proposed project should be tested to determine if the soil can be handled as clean fill (Schwarz pers. comm. 2010).

3.7 Historic

ODOT identified 13 properties within the API that were 45 years old or older during a February 27 and March 1, 2010 field investigation (Table 5). ODOT concluded that eight properties lacked original integrity of one or more of the following aspects: design, materials, workmanship, or feeling. ODOT concluded that these eight properties were not eligible for the National Register of Historic Places. A Programmatic Agreement (PA) memo should be prepared that documents these conclusions.

Five properties were identified that will require additional evaluation. A house on NW Birch Avenue (Property L) requires additional evaluation for integrity and significance. The two houses and associated outbuildings on NW Shute Road (Properties E and F), the James and Mary Chambers house on NW Groveland Drive (Property D), and the Five Oaks Meeting Place (Property G) are all likely eligible for the National Register of Historic Places.

Depending on the results of additional research into Properties D, E, F, G, and L, the proposed project may have an effect on significant historic resources within the API. In addition, Determinations of Eligibility (DOE) and Findings of Effect (FOE) would be required for all historic sites identified and all historic sites that may be affected, respectively. All DOE's and FOE's should be submitted to SHPO for approval.

3.8 Parks - 4(f) 6(f)

Based on a review of available data, it appears that Section 4(f) resources (historic) may be present within the API. If additional research confirms the presence of historic resources, the project will require Section 4(f) documentation. There are no properties encumbered with Section 6(f) Land and Water Funds within the API. As a result, no Section 6(f) impacts are anticipated.

3.9 Noise

Based on review of available data, it is anticipated that a Noise Study will need to be prepared to address potential noise impacts as a result of the proposed project. In particular, new lanes and/or shifts in alignment of on- and off-ramps have the potential to result in noise impacts and therefore, warrant a project Noise Study per ODOT's Noise Manual. In addition, if work occurs outside of normal working hours, a noise variance from Washington County and/or the City of Hillsboro will also be necessary. Because threatened or endangered birds are not nesting in or within one mile of the API, ambient noise studies or construction noise monitoring will not be required to address ESA compliance.

3.10 Socioeconomic

Based on review of available data, the proposed project is not anticipated to have socioeconomic impacts. In addition, the proposed project is not expected to result in disproportionate adverse impacts on environmental justice population groups. Because Census data was the primary

source of information used to consider local population groups, it is recommended that interaction and communication with minority and low income population groups be documented as part of future public involvement and community outreach efforts for the proposed project.

Local businesses, residences and farmland are located in the vicinity of API and are accessible via the existing roadway network. ROW acquisition from adjacent properties would be needed for the proposed project. Approximately 40 parcels are within the API and up to 30 parcels could be affected by ROW needs with most of the impacts related to partial acquisitions of property from these parcels. In addition, there are approximately 10 residences that could be affected with the potential that four homes could be displaced by ROW acquisition.

3.11 Visual

Based on review of available data, the proposed project is not anticipated to result in negative impacts to visual resources. Care should be taken to minimize impacts to adjacent wetlands, waterways and farmland which constitute visual components of this rural interchange.

3.12 Wetlands and Waters of the U.S. and State

As impacts to wetlands and waters are likely for the proposed Project, Section 404 of the Clean Water Act, administered by the U.S. Army Corps of Engineers (ACOE); the Removal Fill Law, administered by the DSL; and Water Quality Sensitive Areas and Vegetated Corridors, administered by Washington County Clean Water Services (CWS) will apply to the proposed Project. If proposed impacts are less than 0.5 acre, then the Project may qualify for the ACOE Nationwide Permit (NWP) #14, Linear Transportation Projects and the DSL General Authorization (GA) for Certain Transportation-Related Structures. If the project requires greater than 0.5 acre of impacts, an Individual Permit (IP) will be required from the ACOE and DSL. A wetland/waters delineation and report will be required for the proposed project to determine accurate wetland/waters locations and dimensions.

Impacts to wetlands/waters of the U.S. and State will require compensatory mitigation for both the ACOE and DSL. Currently, the wetland mitigation banks within the service area of the API (Fernhill and Tualatin Valley) do not have credits available. However, as credits become available at these banks in the future, mitigation at these banks may be an option for compensatory wetland mitigation for this Project. If bank credits are unavailable during the permitting process, alternative forms of mitigation will need to be considered, including payment-in-lieu (for DSL-jurisdictional impacts only), fee-in-lieu (if fee-in-lieu sites have been approved for release of credits by the DSL and ACOE in the Project area), or on- or off-site wetland creation, enhancement, or restoration. Minimal on-site locations for wetland creation are available within the API, as areas adjacent to the ROW are privately owned and would require property acquisition. If on- or off-site mitigation is proposed, the DSL and ACOE will require a compensatory wetland mitigation plan.

A vegetated corridor analysis and Natural Resource Assessment report will be required for the Project in order to receive a Service Provider Letter (project approval) from CWS. Impacts to parcels that contain vegetated corridors will require vegetated corridor enhancement by CWS. In addition, impacts to vegetated corridors will require mitigation. CWS enhancement consists of

removing noxious weeds and planting native trees and shrubs within the vegetated corridor. Enhancement and/or mitigation plans will be required if impacts are proposed for the Project.

3.13 Water Quality / Stormwater Management

DEQ's 401 Water Quality Certification (WQC) process will be triggered if a 404 permit is required from the ACOE. If this process is triggered, a stormwater management plan (SWMP) will be required and need to be approved by DEQ.

The SWMP will need to quantify the Project's Contributing Impervious Area (CIA) in order to calculate treatment requirements. The CIA will have to be treated to meet ODOT, National Marine Fisheries Service (NMFS), and DEQ requirements. These requirements, as outlined in SLOPES IV, mandate that all stormwater quality treatment practices and facilities must be designed to treat stormwater originating from 50% of the cumulative rainfall from the 2-year, 24-hour storm for that site.

Treatment facilities for the proposed project may be located within the existing interchange in the vicinity of the on- and off-ramp loops. Treatment options could include vegetated swales, ditches, and planting within the ROW. If onsite areas do not offer sufficient space for proposed treatment facilities, additional ROW may need to be acquired.

Project construction activities are anticipated to disturb more than one acre of land which will trigger Section 402 of the CWA and will require a National Pollutant Discharge (NPDES) 1200-C permit. This permit requires that the holder prepare an Erosion and Sediment Control Plan (ESCP) which utilizes approved Best Management Practices (BMPs) to prevent erosion and control sediment runoff from the construction site. In addition, the permit requires the applicant to inspect and maintain erosion controls to ensure they are working properly. ODOT Region 1 currently holds a NPDES 1200-C permit.

There are no 303(d) listed waters located within the API. However, Dawson Creek, which is located approximately 700 feet east of the southeastern corner of the API, is water quality limited, but not needing a TMDL. Due to its proximity to the API, stormwater from within the API may flow into Dawson Creek. Consequently, Project engineers should develop plans to prevent untreated stormwater from within the API from being discharged into Dawson Creek. Additionally, in order to minimize potential direct water resource impacts during Project construction, the Project would require the preparation and implementation of an ESCP and associated BMPs for erosion and sediment control.

3.14 Summary

Table 9 provides information regarding requirements for further study for the proposed project. Table 10 provides details regarding the applicable permits, approvals, and clearances needed for the proposed Shute Road Interchange Improvement Project. Table 11 provides details regarding recommendations for resource avoidance, minimization and mitigation for the Shute Road Interchange Improvement Project.

Table 9. Requirements for Further Study for the Shute Road Interchange Improvement Project

Resource	Requires Further Study		
	Yes	No	Explanation
Air Quality	X		• The proposed project involves adding lanes and increasing capacity on the over-crossing, channelization at on/off ramps, and/or alignment changes. The inclusion of any of these elements may require an Air Quality Technical Report. • This project involves adding lanes (NW Shute Rd. over-crossing) and is partly within the Air Quality Management Area. Air Quality Conformance will be needed as part of the project.
Archaeology	X		• A pedestrian survey should be conducted in the project area. • If an archaeological site is identified that may be eligible for NHRP-listing and cannot be avoided, subsurface exploration and/or testing/evaluation of the site would be required. • If an archaeological site eligible for NRHP-listing cannot be avoided, efforts should be made to minimize impacts. • Results of background research and fieldwork should be documented in a technical report meeting SHPO guidelines. • A DOE would be required for all archaeological sites identified. • An ODOT archaeologist should complete Tribal consultation, draft an FOE, and submit final reports to SHPO.
Biology	X		Botanical Resources • Botanical clearance surveys will be needed during the appropriate blooming period for the species listed in Table 1. Suggest two visits to capture early and late season blooming periods. • If listed plant species are observed within the API, the ODOT Biologist should coordinate with the Project Team to avoid impacting these species. If listed species cannot be avoided, a BA should be prepared and submitted to USFWS and/or ODA. • If no impacts to listed botanical species are anticipated, a No Effect Memorandum should be prepared. • A follow-up noxious weed survey should also be conducted during the blooming period. • The results of the botanical clearance and noxious weed surveys should be documented in a Botanical Clearance Report. • Noxious weeds will need to be removed as part of the proposed project according to State law. Best Management Practices will need to be implemented to prevent the spread of noxious weeds. Terrestrial Resources • Nesting migratory birds have the potential to occupy the API (shrubs and trees). Clearing and grubbing within the API may conflict with the MBTA. The timing of vegetation removal should occur between September 1 and March 1 so as to occur outside the nesting period for migratory birds. • If no impacts to listed terrestrial species are anticipated, a No Effect Memorandum should be prepared

Table 9. Requirements for Further Study for the Shute Road Interchange Improvement Project (Continued)

Resource	Requires Further Study		
	Yes	No	Explanation
			Fish and Aquatic Resources • Although direct impacts to listed steelhead are not expected, indirect impacts are possible (construction related turbidity and increases in stormwater runoff). Due to these anticipated indirect effects to listed species, a BA or SLOPES IV Compliance Report must be prepared to provide ESA clearance. • ODFW has confirmed historic native migratory fish presence within the northern and southern unnamed tributaries to McKay Creek. All new or improved crossings of these streams would need to be designed to provide fish passage. An ODFW Fish Passage Plan may need to be prepared. • All in-water work should be scheduled during the ODFW In-Water-Work-Window: July 15 through September 30.
Floodplain/Floodway	X		• Areas within the API reside within the 100-year floodplain areas associated with the northern and southern unnamed tributaries to McKay Creek. • Project activities within the floodplain need to be authorized by Washington County via the Washington County Land Use Application process.
Land Use		X	• This project will not require a goal exception. This project is not likely to result in significant changes to the planned land uses and is consistent with planned uses.
Hazardous Materials	X		• A Level 1 Hazardous Materials Analysis is recommended for the proposed project. Depending on the results of the Level 1 Hazardous Materials Analysis, a Level 2 Hazardous Materials Analysis may also be required for the proposed project. • Agriculture fields are located within and adjacent to the API and may contain pesticides. Agriculture fields affected by the proposed project should be tested to determine if the soil can be handled as clean fill.
Historic	X		• There are five potentially historically significant properties within the API: a house on NW Birch Avenue (Property L), two houses and associated outbuildings on NW Shute Road (Properties E and F), the Classic Revival house on NW Groveland Drive (Property D), and the Five Oaks Meeting Place (Property G) are all likely eligible for the National Register. Additional research is required on all of these properties. • If additional research reveals that the properties are eligible for the National Register, impacts to these properties will need to be avoided if feasible, per State and Federal Historic Laws. • DOE and FOE would be required for all historic sites identified and all historic sites that may be affected, respectively. All DOE's and FOE's should be submitted to SHPO for approval.

Table 9. Requirements for Further Study for the Shute Road Interchange Improvement Project (Continued)

Resource	Requires Further Study		
	Yes	No	Explanation
Section 4(f)/6(f)	X		• Based on a review of available data, it appears that Section 4(f) resources (historic) may be present within the API. If additional research confirms the presence of historic resources and these resources may be affected, the project will require Section 4(f) documentation. • There are no properties encumbered with Section 6(f) Land and Water Funds within the API. As a result, no Section 6(f) impacts are anticipated.
Noise	X		• A Noise Study will need to be prepared to address potential noise impacts as a result of the proposed project (new lanes and/or shifts in alignment of on- or off-ramps).
Socioeconomic	X		• Recommend outreach with minority and low income population groups within the API. Results of outreach within the API should be documented as part of future public involvement and community outreach efforts for the proposed project.
Visual		X	• No negative visual impacts are anticipated as a result of the proposed project. • Care should be taken to minimize impacts to adjacent wetlands, waterways and farmland which constitute visual components of this rural interchange.
Water Quality / Stormwater	X		• Due to the addition of impervious surface, a stormwater management plan will be required. • Stormwater from the proposed project will need to be treated to meet ODOT, NMFS and DEQ standards. • The CIA should be determined for the proposed project. A CIA determination will be used to calculate the amount of stormwater treatment needed for the proposed project.
Wetlands	X		• Eight jurisdictional wetlands were identified within the API during the field investigation (Figure 6). The wetlands occupy approximately 14.2 acres within the API. • A formal wetland delineation should be conducted when right-of-entry has been obtained throughout the API. • A compensatory mitigation strategy for the ACOE will be required if impacts to wetlands and waters cannot be avoided. • A CWS vegetated corridor assessment will be required.
Waters of U.S. and State	X		• Four ditches and two tributaries to McKay Creek were identified during the field investigation. These water features occupy 1.4 acres within the API. • A CWS vegetated corridor assessment will be required.

Table 10. Summary of Applicable Permits, Approvals, and Clearances Needed for the Shute Road Interchange Improvement Project

Resource	Type of Permit / Approval/ Clearance	Issuing Agency	Permit / Approval / Clearance	Estimated Timeline (after submittal)
Archaeology	SHPO Clearance for Archaeological Resources	SHPO	Determination of Eligibility (DOE) Finding of Effect (FOE) – Section 106	30 days
Historic	SHPO Clearance for Historic Resources	SHPO	Programmatic Agreement (Section 106)	N/A
Hazardous Materials	Level 1/Level 2 Hazardous Materials Clearance	ODOT	Letter to File	N/A
Biology	ESA Consultation for listed fish species: SLOPES IV Compliance Report or Biological Assessment	NMFS	SLOPES Approval or Biological Opinion	30 days (SLOPES) 45 days (NLAA) 135 days (LAA)
Biology	Botanical Clearance	ODOT	Botanical Clearance Report	N/A
Biology	Noxious Weed Clearance	ODOT	Botanical Clearance Report	N/A
Biology	ESA Clearance for listed plants and wildlife	ODOT	No Effect Memorandum	N/A
Biology	ODFW Fish Passage Plan	ODFW	Fish Passage Plan Approval	30 days
Biology	Migratory Bird Treaty Act Compliance for tree clearing	ODOT / APHIS	None (if trees and shrubs are removed outside MBTA nesting window March 1 – September 1) MBTA Clearance	N/A N/A
Water Quality	Section 401 Water Quality Certification	DEQ	SWMP	Concurrent with JPA
Water Quality	Section 404 Clean Water Act permit	ACOE	Joint Permit Application approval	NWP: 45-75 days IP: 120 days
Wetlands / Waters	Letter of Concurrence	DSL	Wetland/Waters Delineation Report approval	120 days
Wetlands / Waters	Jurisdictional Determination	ACOE	Wetland/Waters Delineation Report approval	60 days
Wetlands / Waters	Removal/Fill Permit	DSL	Joint Permit Application approval	GA: 40 days after Wetland/Waters Delineation Report concurrence IP: 120 days

Table 10. Summary of Applicable Permits, Approvals, and Clearances Needed for the Shute Road Interchange Improvement Project (continued)

Resource	Type of Permit / Approval/ Clearance	Issuing Agency	Permit / Approval / Clearance	Estimated Timeline (after submittal)
Wetlands / Waters	Vegetation Corridor Assessment Report and Enhancement/Mitigation Plan Approval	CWS	Service Provider Letter	15 days
Noise	Noise Clearance (if construction occurs outside of normal working hours)	Washington County / City of Hillsboro	Noise Variance	Project dependent
Local Permits	Washington County Land Use Application-Community Development	Washington County Land Use and Transportation	Public Notice, Public Hearing, Application Review	Project dependent
Local Permits	Washington County Right-of-Way Permit	Washington County Land Use and Transportation	Washington County Right-of-Way Permit	Project dependent
Local Permits	Washington County Land Use Permits	Washington County	No Rise Certificate	Project dependent
Floodplain/Floodway	Washington County Floodplain Permit	Washington County Land Use and Transportation	Flood Plain/Drainage Hazard Determination form	Project dependent

Table 11. Summary of Recommendations for Resource Avoidance, Minimization and Mitigation for the Shute Road Interchange Improvement Project

Resource	Resource Avoidance, Minimization and Mitigation Required		
	Yes	No	Recommendations
Air Quality		X	n/a
Archaeology	X		• Establish No Work Zones based on the outcome of archaeological surveys. • Ground disturbing activities should be identified during the design phase, if possible, and cleared for archaeological resources early. If ODOT does not provide the contractor with these locations prior to bid let, the contractor would be responsible for hiring an archaeological consultant to examine these areas after bid let. • A qualified archaeological monitor and/or Tribal monitor may be retained to monitor ground disturbing activities. • If archaeological resources or human remains are discovered during ground disturbing activities, these activities shall be halted and an ODOT archaeologist shall be contacted for further instructions.
Biology	X		• The timing of vegetation removal should occur between September 1 and March 1 so as to occur outside the nesting period for migratory birds.
Floodplain/Floodway	X		• Avoid impacts to the floodway/floodplain surrounding the northern and southern unnamed tributaries to McKay Creek.
Land Use		X	n/a
Hazardous Materials		X	n/a
Historic	X		• Avoid impacts to five potentially historically significant properties (D, E, F, G, and L).
Section 4(f)/6(f)	X		• Avoid impacts to five potentially historically significant properties (D, E, F, G, and L).
Noise		X	n/a
Socioeconomic		X	n/a
Visual	X		• Avoid impacts to wetlands, waterways, and farmland as these constitute visual components of this rural interchange.
Water Quality / Stormwater	X		• Stormwater treatment will be required due to increases in impervious surface area within the API.
Wetlands	X		• Impacts to wetlands/waters of the U.S. and State will require compensatory mitigation for both the ACOE and DSL. Currently, the wetland mitigation banks within the service area of the API (Fernhill and Tualatin Valley) do not have credits available. However, as credits become available at these banks, mitigation at these banks may be an option for compensatory wetland mitigation for this Project. • If bank credits are unavailable during the permitting process, alternative forms of mitigation will need to be considered, including payment-in-lieu (for DSL-jurisdictional impacts only), fee-in-lieu (if fee-in-lieu sites have been approved for release of credits by the DSL and ACOE in the Project area), or on- or off-site wetland creation, enhancement, or restoration. If on- or off-site mitigation is proposed, the DSL and ACOE will require a compensatory wetland mitigation plan.
Waterways and other waters of the U.S. and State	X		• Impacts to the southern and northern unnamed tributary to McKay Creek and jurisdictional ditches should be avoided.

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Appendix A

Area of Potential Impact Photographs

1

2

MB&G Mason, Bruce & Girard, Inc. February 3, 2010	1. View to the northeast from NW Groveland Drive of the northern unnamed tributary of McKay Creek. 2. View to the southwest of the northern unnamed tributary of McKay Creek from NW Schaff Road. NW Helvetia Road is visible in the photo background.

3

4

MB&G Mason, Bruce & Girard, Inc. February 3, 2010	3. View to the southeast of the Shute Road Interchange. The westbound on-ramp from Shute Road to Highway 26 is visible at photo left, Shute Road is visible in the background, and Highway 26 is visible at photo right. 4. View to the southwest showing the eastern portion of the API. Highway 26 is located behind the photographer.

5

6

MB&G Mason, Bruce & Girard, Inc. February 3, 2010	5. View to the southeast of the Shute Road Interchange. 6. View to the northwest of a roadside drainage ditch and the eastbound off-ramp from Highway 26 to Shute Road

7

8

MB&G Mason, Bruce & Girard, Inc. February 3, 2010	7. View to the west of the southern unnamed tributary of McKay Creek at the western extent of the API. Upland agricultural fields are shown in the background of the photo. 8. Typical upland grass seed production field within the northern portion of the API with a view to the south. The northern unnamed tributary of McKay Creek is visible at the bottom of the photo. Note the numerous stands of Oregon white oak (*Quercus garryana*) (red arrows) within the API. NW Helvetia Road is visible at photo right.

Appendix B

Technical Reports

- **Air Quality Resources**
- **Archaeology Resources**
- **Biology Resources**
- **Hazardous Materials Resources**
- **Land Use Resources**
- **Noise Resources**
- **Historic Resources**
- **Section 4(f)/6(f)**
- **Socioeconomic Resources**
- **Water Quality Resources**
- **Wetlands Resources**
- **Visual Resources**

ODOT Region 1 Environmental Unit

Air Quality Baseline Report

Date: February 23, 2010

Project Name: US26: Shute Road Interchange

Location: U.S. 26 at Shute Road Intersection in Washington County

Project Description Summary: The proposed project would reconstruct the Shute Road/Helvetia Road interchange. The project would include the addition of a Westbound to Southbound loop ramp, reconstructing the Westbound exit and entrance loop ramps, and adding a second right turn lane to the Eastbound entrance ramp.

Air Quality

ODOT Region 1 Environmental Coordinator, Melissa Hogan performed basic scoping for Air Quality as normally documented in a Part 3 document in order to determine the classification of the project under NEPA.

- The project API is located in part within an air quality attainment area and a maintenance area for carbon monoxide. The division between the two areas is Metro's Urban Growth Boundary (UGB) which is Helvetia/Shute Rd. Basically, East of the interchange is within the UGB and West of the interchange is outside the UGB.

- The project involves adding lanes and increasing capacity on the over-crossing, channelization at on/off ramps, and/or alignment changes. The inclusion of any of these elements may require an Air Quality Technical Report.

The project is listed in the 2010-2013 State Transportation Improvement Program (STIP).

- The project is also listed on the 2004 Regional Transportation Plan (RTP) project list (#3149).

The project is identified on Metro's Air Quality Conformity Determination Report (February 2008) list of projects.

Air Quality Summary

This project involves adding lanes (Shute Rd. over-crossing) and is partly within the AQMA. Air Quality Conformance will be needed as part of the project. Air quality is anticipated to improve since a goal of the project is to reduce congestion.

Prepared by: _____ Date: March 2010
Melissa Hogan
ODOT Regional Environmental Coordinator, Region 1, West

Reviewed by:_____ Date: March 2010
Jeff Buckland
ODOT Senior Environmental Project Manager, Region 1

ENVIRONMENTAL BASELINE REPORT
FOR ARCHAEOLOGICAL RESOURCES

Project: US26 @ Shute Road Interchange Project
Key Number: Not provided
Federal Aid Number: Not provided
EA: 10PS120-610-G22
Location: Township 1 North, Range 2 West, Sections 15, 16, 22, 23
Hillsboro Quadrangle, Washington County
Environmental Baseline Report Due Date: February 22, 2010
Environmental Baseline Report Date: February 18, 2010
Let Date: Not provided
Author: Kurt Roedel, ODOT Archaeologist

PROJECT DESCRIPTION: The proposed project would reconstruct the US26/Shute Road/Helvetia Road interchange, add a westbound to southbound loop ramp, reconstruct the westbound exit and entrance loop ramps, and add a second right turn lane to the eastbound entrance ramp (Figures 1 and 2). The proposed project would also widen a portion of NW Helvetia Road, relocating NW Jacobson Road, NW Groveland Drive, NW Meek Road, and a local farm access road. A new, wider five lane over-crossing would also be constructed.

ARCHAEOLOGICAL RESOURCES STUDIES:

ODOT archaeologist Kurt Roedel reviewed maps on file at the Oregon SHPO to determine if previous cultural resources studies have been conducted in the project area vicinity and if archaeological resources are recorded in the project area vicinity.

Ten previous cultural resources studies have been conducted in the project area; however, most of the project area has not been examined for archaeological resources (Armitage 1988; CH2M Hill Northwest, Inc. 1996; Clark 1984; Ellis 2003a, 2003b; Ellis and O'Brien 2003; Hart et al. 2008; Helzer 2004; Hibbs 1988; Pettigrew 1984). Nearly all of the surveys relate to highway improvements along US26 or development west of Shute Road and south of US26. No archaeological sites are recorded in the project area; however, multiple sites and isolates are recorded less than 0.5 miles of the project area (Figure 3). A reported archaeological site is in the northern portion of the project area, north of the US26/Shute Road/Helvetia Road interchange (Figure 3). The site boundaries shown on Figure 3 are approximate.

Historic General Land Office maps (United States Surveyor General 1852, 1862) indicate that most of the project area vicinity was under agricultural production by the early 1850s (Figure 4). Several homesteads had been established near the project area, including Alexander Zachary and Edward Constable (Figure 4). Alexander Zachary's stable was in close proximity to the project area (Figure 4). Early settlers took advantage of the gently rolling prairie with first rate clay loam soil, noted by the surveyor (United States Surveyor General 1852). Travel in the project area vicinity was expedited with the construction of an unnamed wagon road which extends across present Shute Road (Figure 4).

Historic and contemporary aerial photographs dated between 1963 and 1991 (Oregon State Highway Department 1963, 1965, 1966; Oregon Department of Transportation 1972, 1981, 1991) show the expansion of the US26/Shute Road/Helvetia Road interchange from a two-lane highway with a frontage road to a four-lane highway with a wide median and an overcrossing for Shute and Helvetia Roads. The 1966 aerial shows much of the project area remained in agricultural production since the 1850s (Oregon State Highway Department 1966; Figure 5). Two buildings and/or structures are shown near the present interchange (Figure 5). Most development through 1966 was southwest of the project area; however, by 2009, increased development has occurred along the north edge of US26 and south of the project area, along NW Huffman Street (Figure 6).

TRIBAL CONSULTATION:

Mr. Roedel contacted Roberta Kirk (personal communication 2010), Review and Compliance Coordinator, Geo Visions, Confederated Tribes of Warm Springs, Robert Kentta (personal communication 2010), Cultural Resources Director, Confederated Tribes of Siletz Indians, and Eirik Thorsgard (personal communication 2010), Cultural Resources Coordinator, and Don Day (personal communication 2010), Cultural Resources Site Protection Monitor, Confederated Tribes of the Grand Ronde Community of Oregon.

On January 25, 2010, Mr. Thorsgard stated that a landowner north of US26, near Helvetia Road, has an archaeological site on the property. The exact location is unknown; however, an approximate location is shown on Figure 3.

Additional comments may be provided as project development continues.

FIELD VISIT:

Mr. Roedel conducted a field visit on February 11, 2010. Mr. Roedel walked along portions of US26, Shute Road, and Helvetia Road to take photographs and provide notes for this report (Figures 7 through 14). Mr. Roedel did not identify any archaeological resources during the field visit.

Recent construction north of US26 and east of Helevtia Road obscured most of the ground surface in this area (Figures 2 and 6). Fill is immediately north of the new construction (Figure 7). The remaining ground surfaces contained standing water. A small stand of oak trees and Himalayan blackberry and an artificial wetland are between Helvetia Road and the new construction (Figures 7 and 8). Many songbirds were present in the wetland.

An agricultural field north of NW Jacobson Road contained grasses and should provide decent ground visibility for future archaeological examination (Figure 9).

A large stand of oak trees is north of US26 and west of Helvetia Road (Figure 9). McKay creek is east of the oak stand. Reed canary grass is present along the creek banks and provides zero ground visibility (Figure 10). A historic two-story home is north of NW Groveland Drive within the project area. The home was obscured by mature trees (Figure 6).

Ground surfaces in the vicinity of the interchange have been heavily disturbed from construction of the four-lane highway with median and of the Shute Road/Helvetia Road overpass (Figure 11). US26 has been constructed on fill west of the interchange and both cut and filled east of the interchange (Figures 11 and 12).

Areas south of US26 and along Shute Road appear to be in grass production or fallow with limited ground visibility (Figure 13). Figure 14 shows that US26 eastbound is on a cut/fill slope above possible wetlands along the south edge of US26.

CONCLUSIONS AND RECOMMENDATIONS:

Mr. Roedel conducted a literature review and field visit and contacted the Confederated Tribes of Warm Springs, Confederated Tribes of Siletz Indians, Confederated Tribes of the Grand Ronde Community of Oregon, to determine the probability of archaeological resources in the project area.

Both precontact and historic sites are recorded within close proximity of the project area. In addition, a reported site is likely within the project area (Figure 3). Historic maps and aerial photographs suggest additional archaeological resources may be present near the interchange (two buildings and/or structures, the Edward Constable homestead, and an unnamed wagon road) and near the east end of the project area (Alexander Zachary stable) (Figures 4 and 5).

Although a large portion of the project area has been under agricultural production since the 1850s (Figures 4, 5, and 6), the small oak stand and large oak stand along Helvetia Road may have the most intact ground surfaces within the project area. Landforms higher in elevation and northwest of McKay Creek, near the historic house, also have a higher probability for archaeological resources.

Mr. Roedel did not identify any archaeological resources during his field visit. The following recommendations are extended:

- A pedestrian survey should be conducted in the project area. Shovel probes should be placed in areas with a high probability for archaeological resources or with low ground visibility. Special emphasis should occur in areas that may include the reported archaeological site, two buildings and/or structures, the Edward Constable homestead, an unnamed wagon road, and the Alexander Zachary stable.

- If an archaeological site is identified that may be eligible for listing in the National Register of Historic Places and cannot be avoided, subsurface exploration and/or testing/evaluation of the site would be required.

- If an archaeological site eligible for listing in the National Register of Historic Places cannot be avoided, efforts should be made to minimize impacts. Data recovery may be needed if the site cannot be avoided.

- ODOT Determinations of Eligibility would be required for all archaeological sites identified.

- Results of background research and fieldwork should be documented in a technical report meeting SHPO guidelines.

- An ODOT archaeologist would complete Tribal consultation, draft a Finding of Effect and submit final reports to SHPO.

- Water quality facilities, staging areas, disposal areas, and material sources should be identified during the design phase, if possible, and cleared for archaeological resources early in the planning process. If ODOT does not provide the contractor with these locations prior to bid let, the contractor would be responsible for hiring an archaeological consultant to examine these areas after bid let.

- A qualified archaeological monitor and/or Tribal monitor may be retained to monitor ground disturbing activities.

- In the event that archaeological resources or human remains are inadvertently discovered during ground disturbing activities, these activities shall be halted immediately and an ODOT archaeologist shall be contacted immediately for further instructions.

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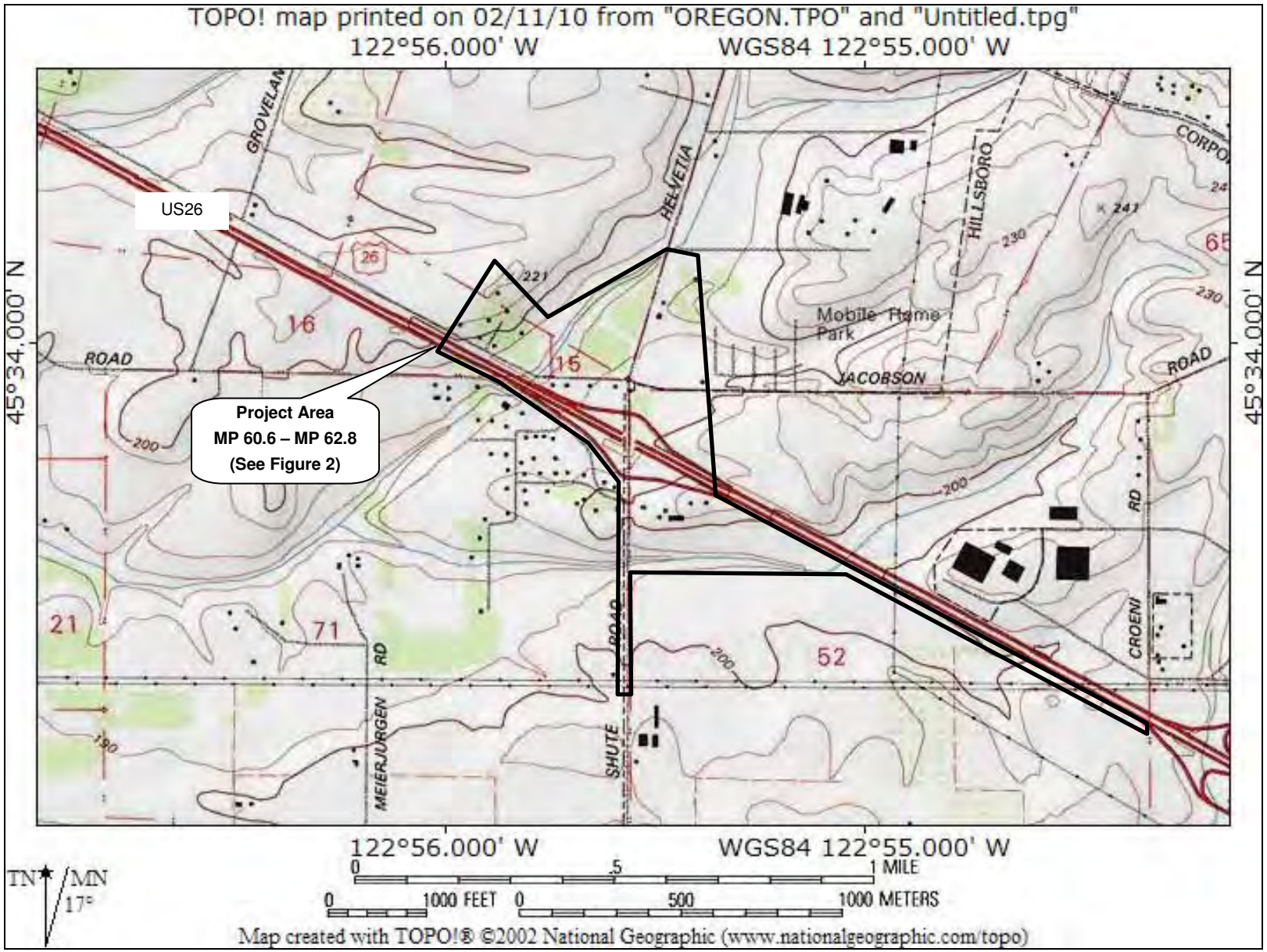

Figure 1. Approximate location of the US26 @ Shute Road Interchange Project, No Key Number.

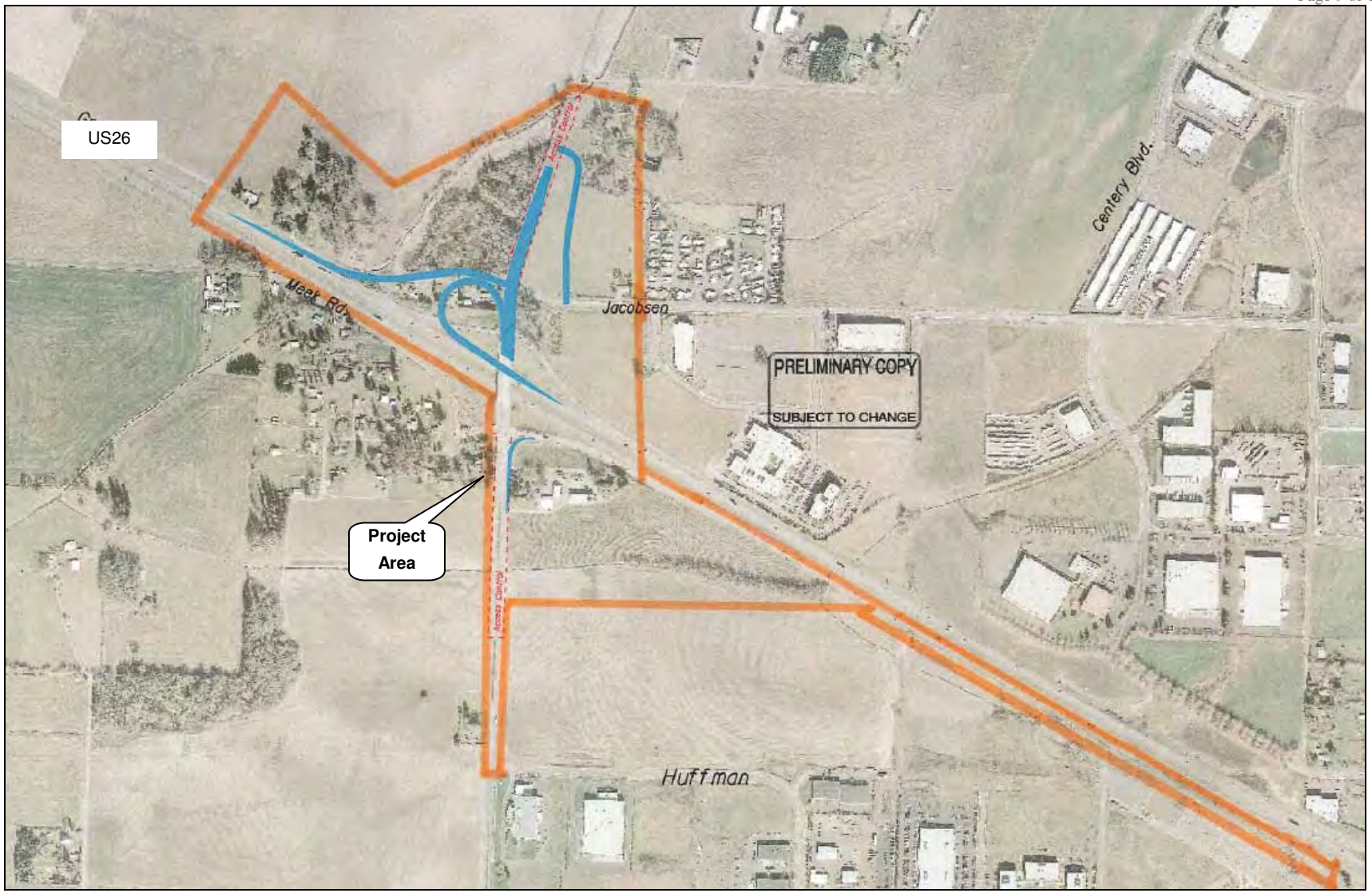

Figure 2. Aerial showing the approximate project area.

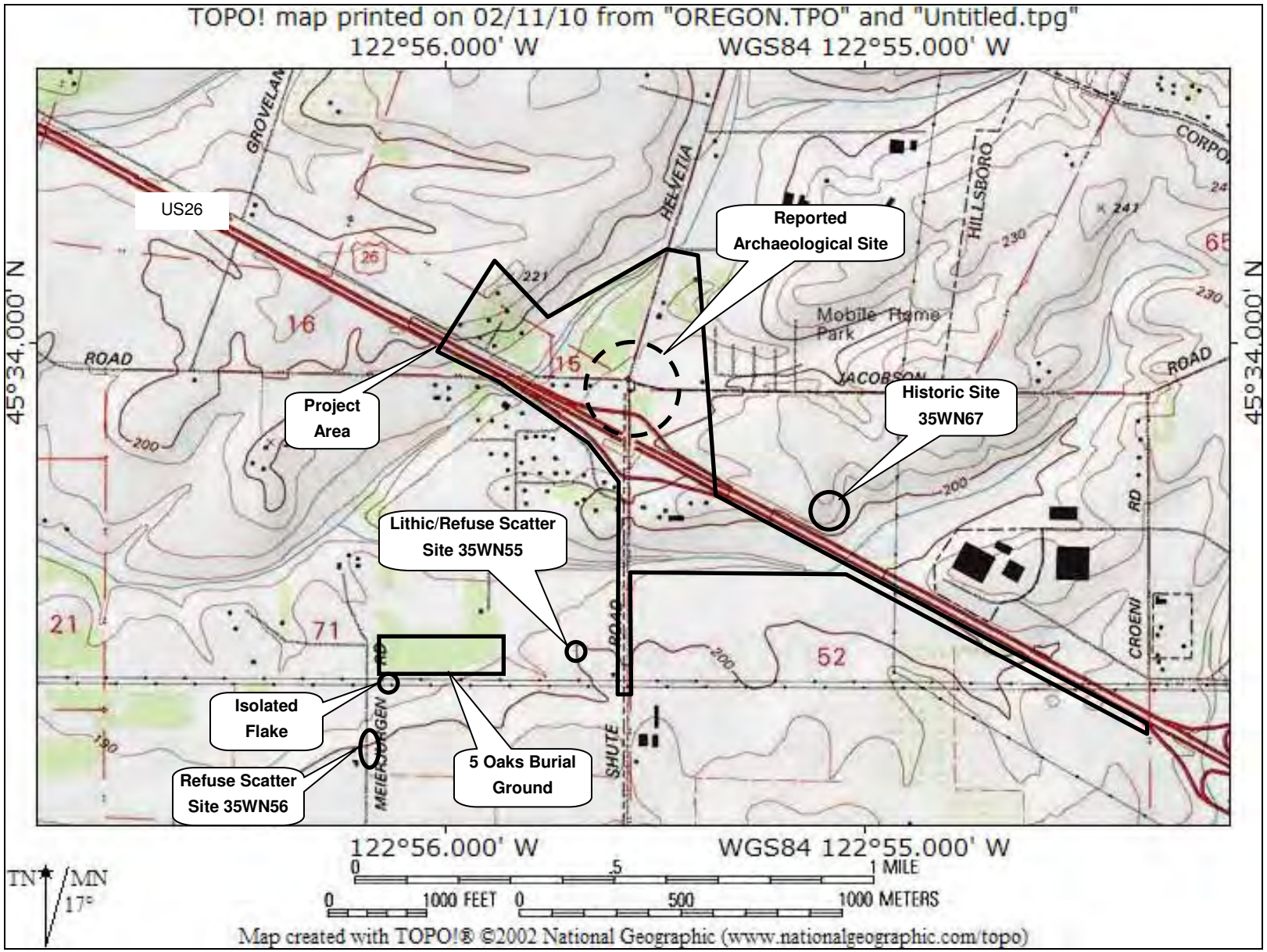

Figure 3. Approximate location of previous archaeological resources studies and reported and recorded cultural resources in the project area vicinity.

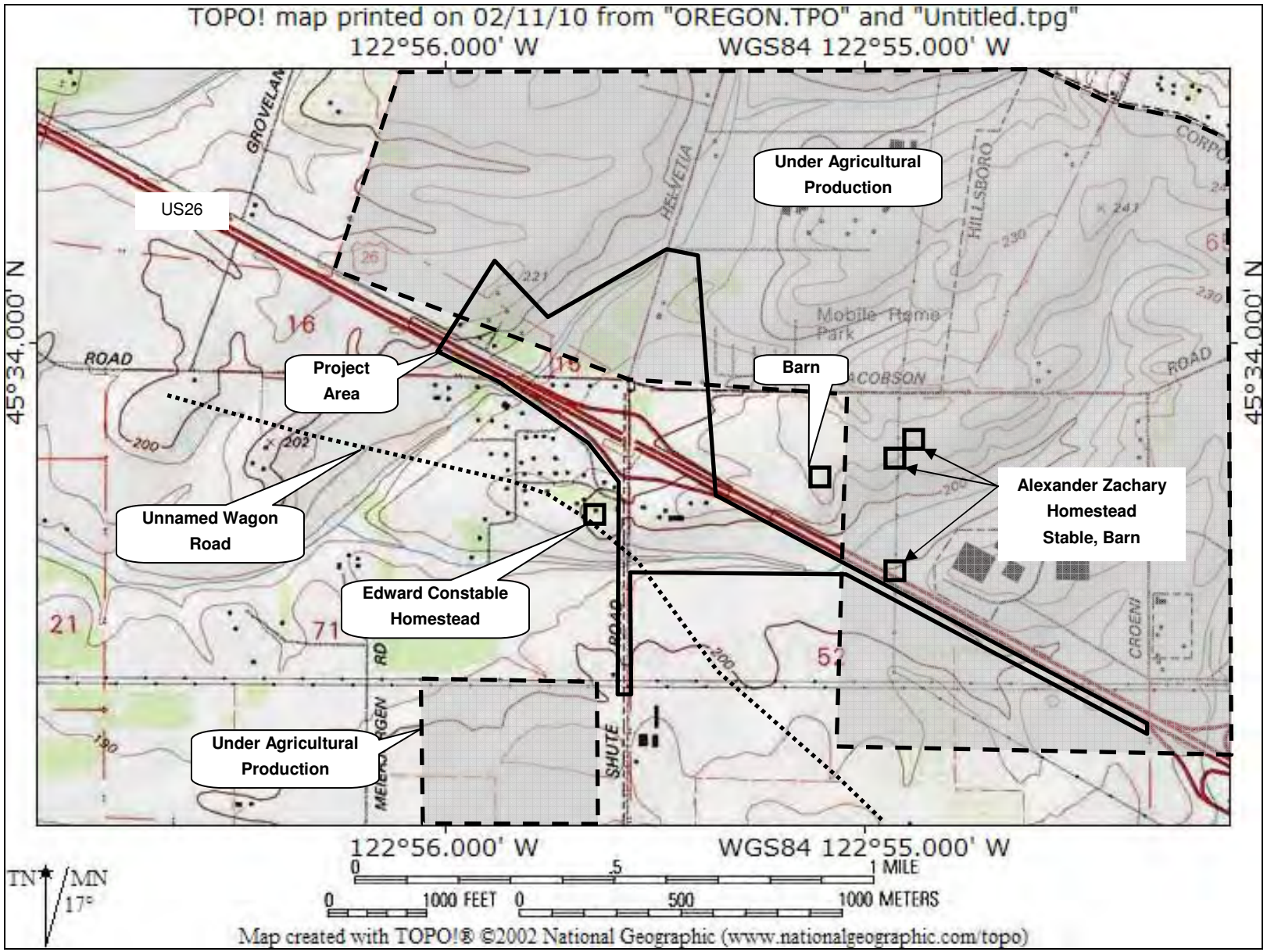

Figure 4. Approximate location of historic period activity (United States Surveyor General 1852, 1862) in the project area vicinity.

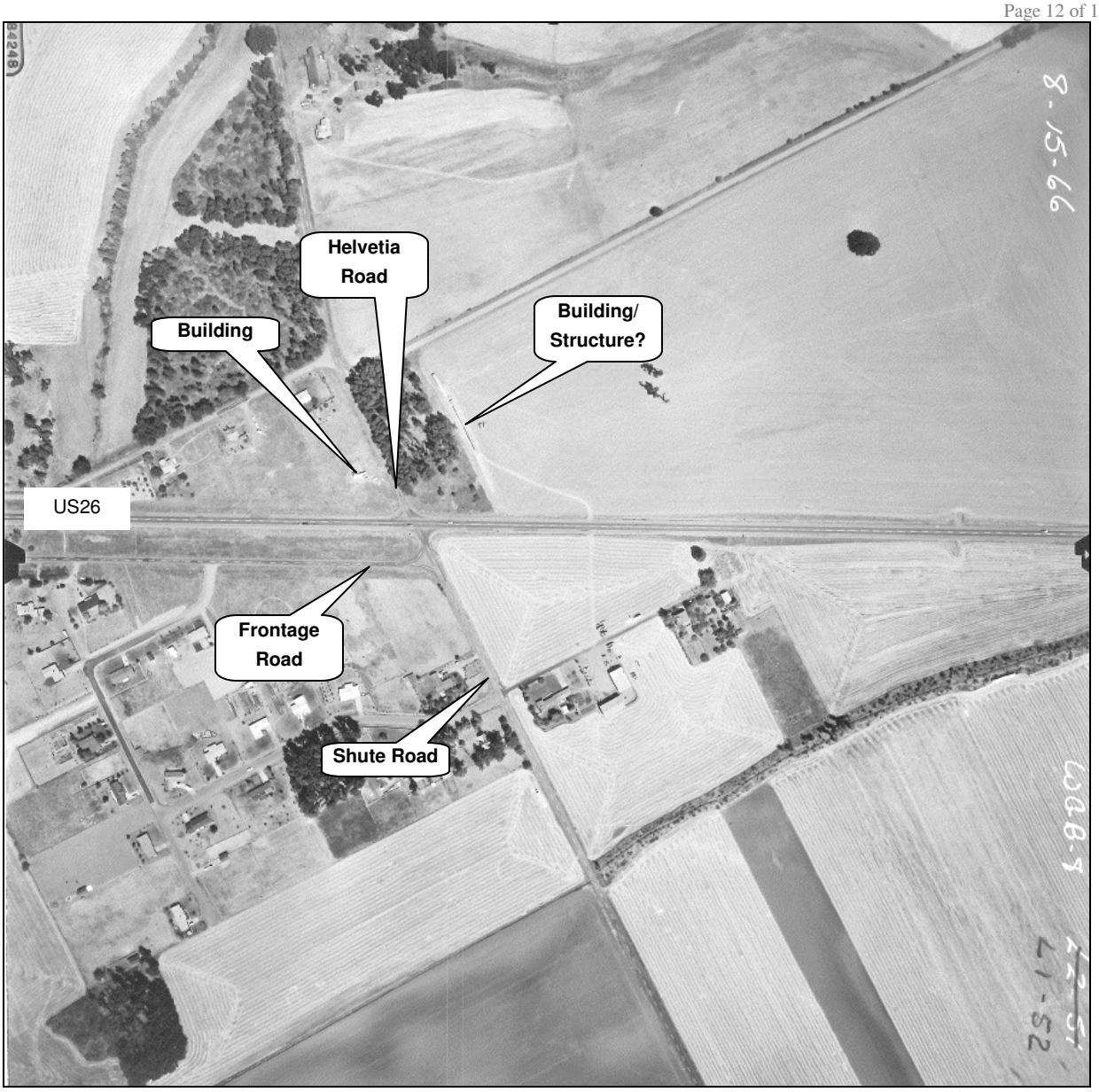

Figure 5. View of the west portion of the project area in 1966 (Oregon State Highway Department 1966).

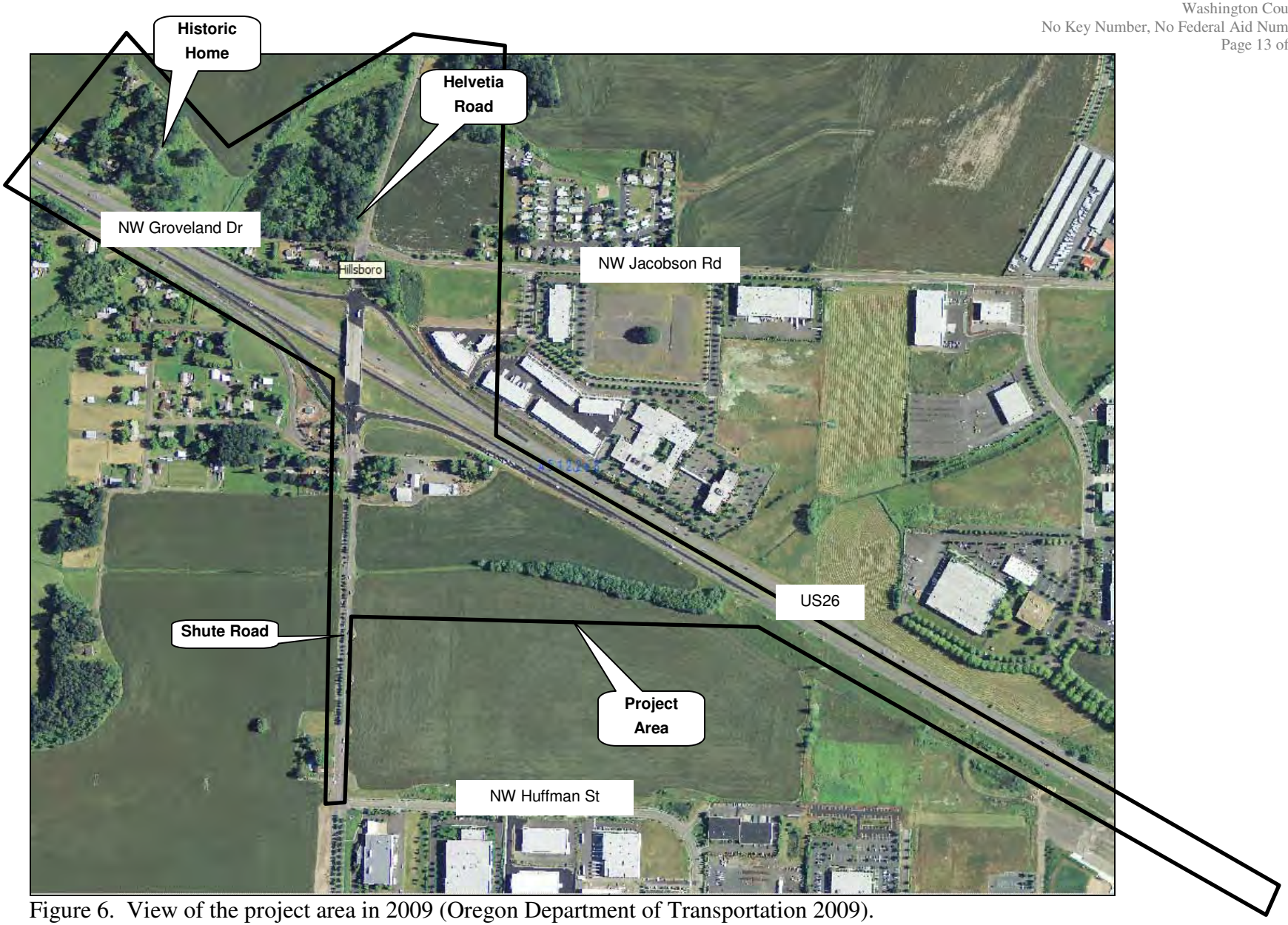

Figure 6. View of the project area in 2009 (Oregon Department of Transportation 2009).

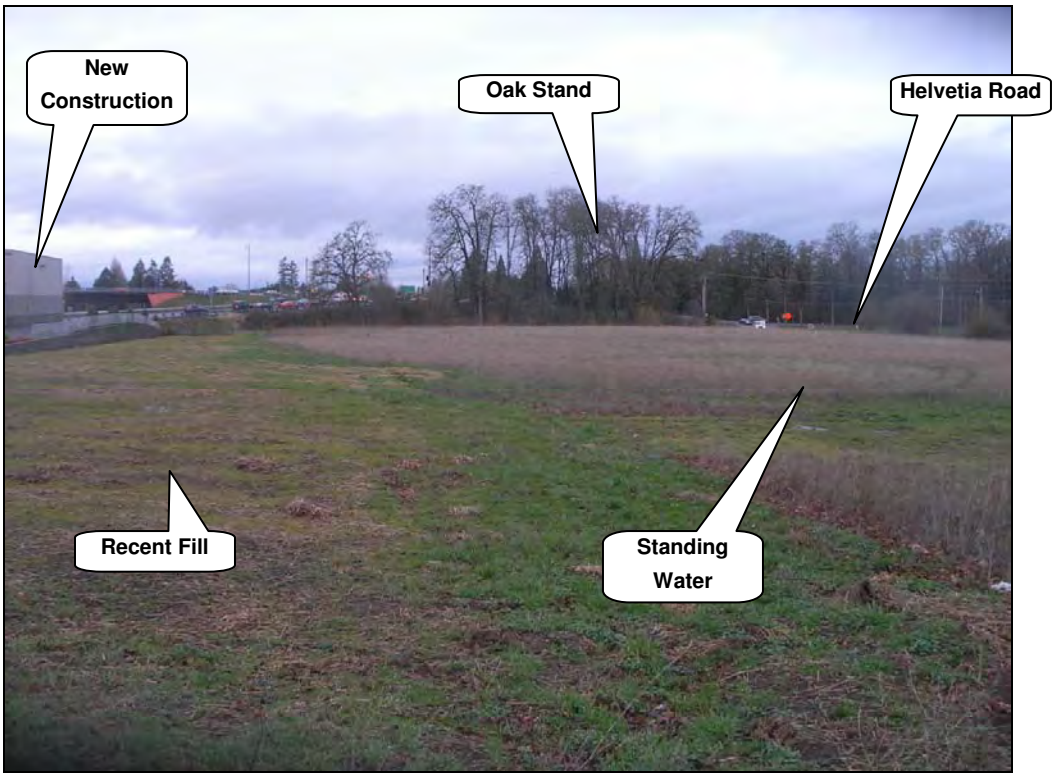

Figure 7. View of new construction and small oak stand north of US26 and east of Helvetia Road, facing west.

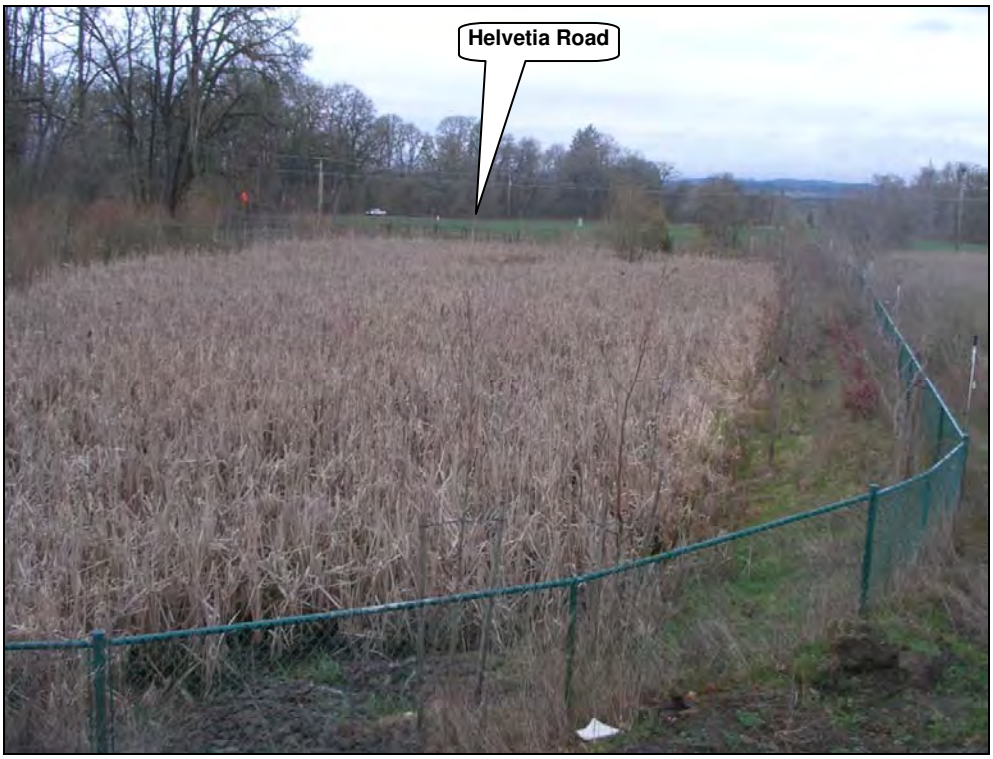

Figure 8. View of artificial wetland and small oak stand north of US26 and east of Helvetia Road, facing north.

Figure 9. View of the grass field east of Helvetia Road and the large oak stand west of Helvetia Road, facing west.

Figure 10. View of McKay Creek and the large oak stand west of Helvetia Road, facing east.

Figure 11. View of the west end of the project area towards the US26/Shute Road/ Helvetia Road interchange, facing southeast.

Figure 12. View of the north edge of US26, east the US26/Shute Road/ Helvetia Road interchange, facing southeast.

Figure 13. View of the south portion of the project area, east of Shute Road, facing northeast.

Figure 14. View of US26 eastbound, in the east portion of the project area, facing southeast.

Biology Environmental Baseline Report

SHUTE ROAD INTERCHANGE IMPROVEMENT PROJECT

Key Number K16842

Washington County, Oregon

Prepared for:

ODOT Region 1
123 Flanders Street
Portland, Oregon 97213

Prepared by:

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(503) 224-3445

February 22, 2010

MB&G Project No. 1581

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Appendix A Area of Potential Impact Photographs

I. SITE DATA SUMMARY

Data Summary	
Project Name:	Shute Road Interchange Improvement Project
ODOT Key #:	K16842
Location of Project:	Mile Posts (MP) 60.6 to 62.8 on Highway 26 Township 1N, Range 2W, Sections 15, 16, 22, and 23
Size Area of Potential Impact (API):	150 acres
City:	Hillsboro
County:	Washington County, OR
Project Staff:	Kristen Currens Alexis Casey
Site Visit:	February 3, 2010
Current Land Use(s):	Highway right-of-way, residential, commercial, and agricultural
Waterways on Site:	Two tributaries to McKay Creek
6th Field HUC:	170900100107 (McKay Creek)
ODFW In Water Work Window:	July 15 – September 30

1.0 INTRODUCTION

This Biology Environmental Baseline Report (EBR) summarizes available baseline biological data and describes environmental permits and clearances that may be necessary for the Shute Road Interchange Improvement Project (Project) along Highway 26 in Washington County, Oregon. While additional data collection may be necessary, existing baseline biological data will be used to thoroughly characterize environmental features for this project, and to help the design team develop alternatives that avoid and/or minimize environmental impacts associated with the interchange improvement project.

1.1 Purpose

The Oregon Department of Transportation (ODOT) proposes to improve the interchange at Shute Road located between Mile Post (MP) 60.6 and MP 62.8 on Highway 26 (Figure 1). The increasing population in Washington County has begun to strain the existing transportation infrastructure. The purpose of this project is to alleviate congestion by increasing the capacity at this interchange.

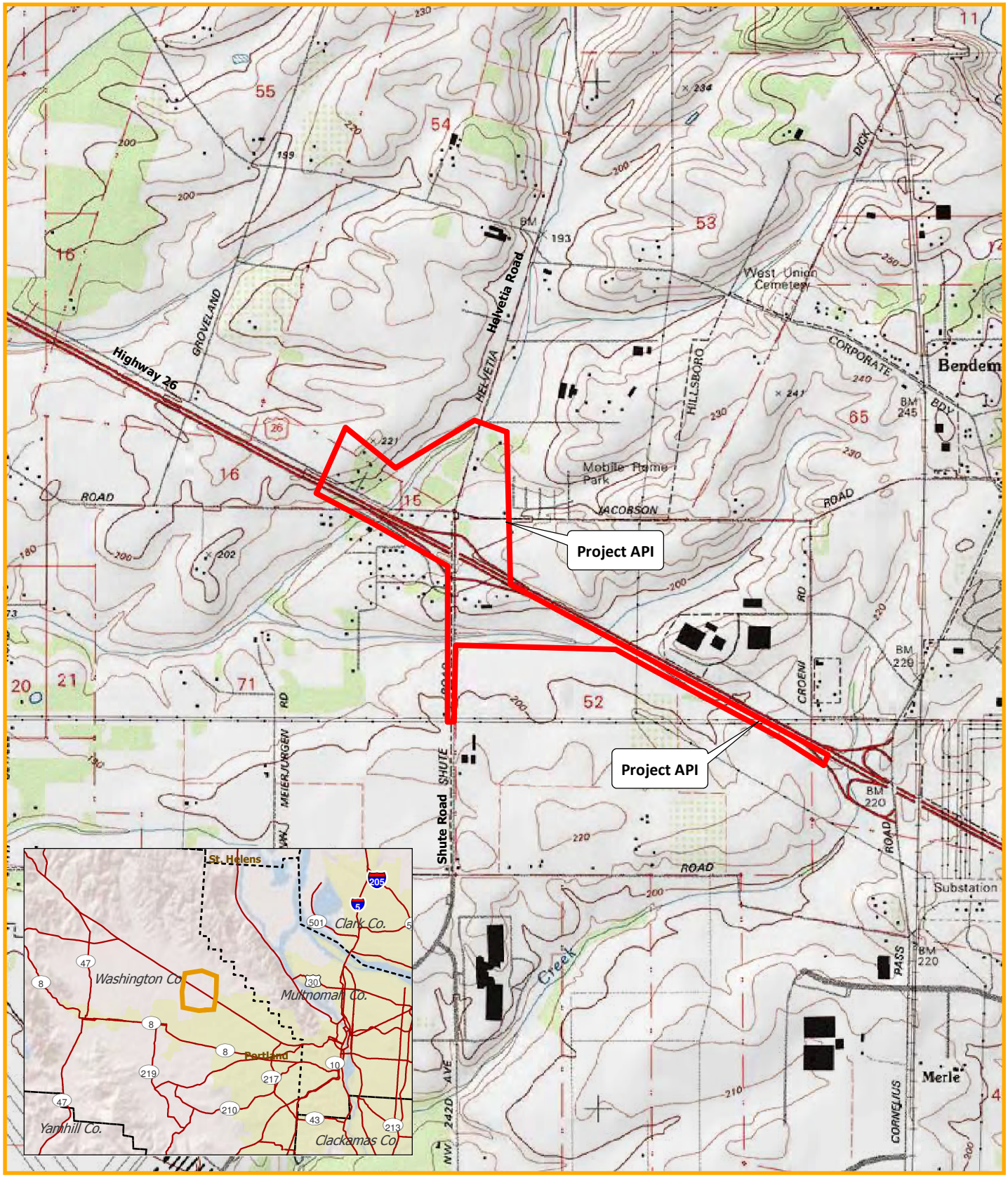
1.2 Project Description

The proposed project would reconstruct the Shute Road/Helvetia Road Interchange. The project would include the addition of a westbound-to-southbound loop ramp, reconstructing the westbound exit and entrance loop ramps, and adding a second right turn lane to the eastbound entrance ramp.

1.3 Area of Potential Impact (API)

The Area of Potential Impact (API) is located along Highway 26 at the Shute Road Interchange in Washington County, Oregon. From the center of the interchange, the API extends approximately 2,000 feet to the north, south and west. In addition, the API extends approximately 1.25 miles east towards the NW Cornelius Pass Road Interchange. The eastern portion of the API is located within the City of Hillsboro. Figure 1 shows the general location of the API.

Topography within the API is generally flat with an approximate elevation of 200 feet above mean sea level (msl) (USGS 1986). The majority of the API has experienced alterations to the natural landscape as the result of the construction of Highway 26, road fill for construction of the elevated Shute Road overcrossing, construction of multiple secondary roadways, agriculture, and residential and commercial development. The majority of the native vegetation has been removed within the API. There are two creeks within the API, both unnamed tributaries of McKay Creek, that have been channelized and now receive greater volumes of water due to the increase in impervious surface within the API.



N

Miles
0 0.25 0.5

Kilometers
0 0.25 0.5 0.75

Figure 1.

Project Location and Vicinity Map
Shute Road Interchange Improvement Project
Washington County, Oregon

MB&G
Mason, Bruce & Girard, Inc.
Natural Resource Consultants since 1921

Data Source: TOPO! USGS 7.5 min., 24K Digital Topographic Data, Oregon. This product is for information purposes only and may not be suitable for legal, engineering or surveying purposes. This information or data is provided with the understanding that conclusions drawn from such information are the responsibility of the user.

Figure1.pdf Creation Date: Feb 9, 2010.

2.0 METHODS

The following sections of this report summarize the major biological resources and issues identified based upon a review of existing database information, discussions with regulatory agency staff, and a site investigation conducted by Mason, Bruce, and Girard, Inc. (MB&G) on February 3, 2010. At the time of the site investigation, ODOT did not have right-of-entry for areas outside of public rights-of-way. As such, areas outside of public rights-of-way were visually inspected from the road or highway.

The site investigation was conducted to evaluate the baseline conditions for natural resources (i.e., aquatic/riparian conditions, presence of wetlands, habitat conditions, and noxious weed presence) within the project API. During the field visit, the API was examined and photographed (Appendix A). Data gaps and/or discrepancies in the baseline information have been noted for each of the sections discussed below and, if needed, additional data gathering tasks have been identified.

Prior to conducting the site investigation on February 3, 2010, MB&G obtained data regarding threatened and endangered species within the API from U.S. Fish and Wildlife Service (USFWS), StreamNet, and the Oregon Natural Heritage Information Center (ORNHIC). MB&G also contacted Oregon Department of Fish and Wildlife (ODFW) to confirm current or historical native migratory fish presence within the API (Brick, J. pers. comm. 2010).

3.0 EXISTING ENVIONMENTAL RESOURCES

3.1 Botanical Resources

3.1.1 Vegetation Communities

The API addressed in this EBR contains three general vegetation communities: riparian forest/wetland fringe, oak woodland, and disturbed/maintained grassland/highway right-of-way. Typical plant species within these communities are summarized below (Tables 1, 2 and 3). Each plant species' status as either a native, introduced, or noxious weed species is also listed. These tables do not constitute a complete inventory of plant species within the site, but are presented to convey the general vegetation communities identified during the site investigation.

Table 1. Typical Vegetation within the Riparian Forest / Wetland Fringe Vegetation Community

Scientific Name	Common Name	Native Status[1,2]
Acer macrophyllum	Bigleaf maple	Native
Alnus rubra	Red alder	Native
Pseudotsuga menziesii	Douglas fir	Native
Polystichum munitum	Western swordfern	Native
Pteridium aquilinum	Western brackenfern	Native
Fraxinus latifolia	Oregon ash	Native
Rubus armeniacus	Himalayan blackberry	Introduced/Noxious
Corylus cornuta	Beaked hazelnut	Native
Phalaris arundinacea	Reed canarygrass	Native

[1] Source Natural Resource Conservation Service Plants National Database (http://plants.usda.gov/index.html)
[2] Source ODA Noxious Weed List (ODA 2009)

Table 2. Typical Vegetation within the Oak Woodland Vegetation Community

Scientific Name	Common Name	Native Status[1,2]
Quercus garryana	Oregon white oak	Native
Alnus rubra	Red alder	Native
Pseudotsuga menziesii	Douglas fir	Native
Polystichum munitum	Western swordfern	Native
Pteridium aquilinum	Western brackenfern	Native
Rubus armeniacus	Himalayan blackberry	Introduced/Noxious
Hedera helix	English ivy	Introduced/Noxious
Symphoricarpos albus	Common snowberry	Native
Oemleria cerasiformis	Indian plum	Native
Prunus sp.	Cherry	Native
Corylus cornuta	Beaked hazelnut	Native
Rubus spectabilis	Salmonberry	Native

[1] Source Natural Resource Conservation Service Plants National Database (http://plants.usda.gov/index.html)
[2] Source ODA Noxious Weed List (ODA 2009)

Table 3. Typical Vegetation within the Disturbed/Maintained Grassland/Highway Right-of-Way Vegetation Community

Scientific Name	Common Name	Native Status[1,2]
Schedonorus phoenix	Tall fescue	Introduced
Poa sp.	Kentucky bluegrass	Native and introduced
Agrostis sp.	Bentgrass	Native and introduced
Trifolium repens	White clover	Introduced
Rumex acetosella	Common sheep sorrel	Introduced
Taraxacum officinale	Common dandelion	Native and introduced
Hypochaeris radicata	Hairy cat's ear	Introduced

[1] Source Natural Resource Conservation Service Plants National Database (http://plants.usda.gov/index.html)
[2] Source ODA Noxious Weed List (ODA 2009)

The riparian forest/wetland vegetation community is located adjacent to both unnamed tributaries to McKay Creek within the API. The oak woodlands located adjacent to Helvetia Road in the northern part of API comprise the oak woodland vegetation community. In addition, the disturbed/maintained grassland/highway right-of-way vegetation community is located on either side of Highway 26 and in the vicinity of the highway on- and off-ramps.

3.1.2 Threatened and Endangered Species

Data from the USFWS and ORNHIC within a 2-mile radius of the proposed API indicates that several federal and state listed threatened and endangered plant species have the potential to occur within the API (USFWS 2010, ORNHIC 2010). A listing of these species including their federal and state listing status, whether critical habitat is designated, blooming period, and habitat requirements is shown in Table 4.

Table 4. Rare Botanical Species with the Potential to Inhabit the API

Scientific Name	Common Name	Federal Status	State Status	Critical Habitat (Y/N)	Blooming Period	Habitat
Lupinus sulphureus ssp. *kincaidii*	Kincaid's lupine	T	T	Yes*	April-July	Upland prairie grasslands, oak savanna, and woodland edges
Sidalcea nelsoniana	Nelson's sidalcea	T	T	No	May-September	Open areas on damp soil, in meadows, wet prairie remnants, fencerows, roadsides, deciduous forest edges, and occasionally Oregon ash wetlands
Aster curtus	White-topped aster	SOC	T	No	July – August	Low elevation, moist native prairies, on well-drained upland soils in oak savannas
Castilleja levisecta	Golden Indian paintbrush	T	E	No	May-June	Moist or wet meadows and native prairies at low elevations
Delphinium leucophaeum	White rock larkspur	SOC	E	No	May - August	Dry roadside ditches, cliffs, rocky slopes and lowland meadows, at cliff bases, and basaltic ledges
Delphinium pavonaceum	Peacock larkspur	SOC	E	No	April – mid July	Well drained areas of native prairie, roadsides with no development
Erigeron decumbens var. *decumbens*	Willamette daisy	E	E	No	May-mid August	Native wetland and upland prairie, oak savanna, heavier soils, restricted to native prairie grassland

E= Endangered; T=Threatened; SOC=Species of Concern
**The designated Critical Habitat for Kincaid's lupine is not located within the vicinity of the API.*

The API contains potentially suitable habitat for all the species listed in Table 4. In particular, suitable habitat is located within the open grass fields, fencerows, and oak groves of the API.

3.1.3 Noxious Weeds

During the February 3, 2009 site investigation, MB&G biologists also observed Oregon Department of Agriculture (ODA)-listed noxious weed species throughout the API (ODA 2009). Due to the timing of the site investigation outside the optimal blooming period for noxious weeds, not all weed infestations may have been recorded. Table 5 provides a listing of the identified weed infestations, the ODA rating of the species observed, and the location of the infestations within the API.

Table 5. ODA-listed Noxious Weed Infestations within API

Scientific Name	Common Name	ODA Rating[1]	Quadrant of API	Location Description
Rubus armeniacus	Himalayan blackberry	B	NE	Open field west of Five Oaks Business Park
Rubus armeniacus	Himalayan blackberry	B	NE	North side of NW Jacobson Road
Rubus armeniacus	Himalayan blackberry	B	NE	Understory of oak grove located between westbound highway off-ramp and NW Jacobson Road
Rubus armeniacus	Himalayan blackberry	B	NE	Riparian area adjacent to northern unnamed tributary to McKay Creek at crossing with NW Helvetia Road
Rubus armeniacus	Himalayan blackberry	B	NW	Understory of oak grove located west of NW Helvetia Road
Rubus armeniacus *Phalaris arundinacea*	Himalayan blackberry Reed canarygrass	B N/A	NW	Wetland fringe along northern unnamed tributary to McKay Creek, north of NW Groveland Road
Rubus armeniacus *Cytisus scoparius*	Himalayan blackberry Scotch broom	B B	NW	Understory of forested area located north of NW Groveland Road at the west end of API
Rubus armeniacus	Himalayan blackberry	B	SW	Understory of oak grove located south of Highway 26 at the west end of API
Rubus armeniacus	Himalayan blackberry	B	SW	Fill slope located south of eastbound highway off-ramp

[1] Source ODA Noxious Weed List (ODA 2009)

3.2 Terrestrial Wildlife Resources

Review of data available from the USFWS and ORNHIC data within a 2-mile radius of the proposed API indicates that several federal and state listed terrestrial wildlife species have the potential to occur within the API (USFWS 2010, ORNHIC 2010). A listing of these species, as well as their federal and state listing status, whether critical habitat is designated, and habitat requirements is shown in Table 6.

Table 6. Terrestrial Wildlife Species with the Potential to Inhabit the API

Scientific Name	Common Name	Federal Status	State Status	Critical Habitat (Y/N)	Habitat
Strix occidentalis caurina	Northern spotted owl	T	T	Yes	Inhabits forests characterized by dense canopy closure of mature and old-growth trees, abundant logs, standing snags, and live trees with broken tops
Brachyramphus marmoratus	Marbled murrelet	T	T	Yes	Nests in forest stands with old growth forest characteristics; forests are generally characterized by large trees with large branches or deformities for use as nest platforms
Eremophila alpestris strigata	Streaked horned lark	C	N/A	No	Associated with bare ground or sparsely vegetated habitats; nests in grass seed fields, pastures, fallow fields and wetland mudflats

E= Endangered; T=Threatened; C=Candidate

The forested areas within the API, which predominantly consist of small oak groves, do not have the habitat characteristics required by either the northern spotted owl or the marbled murrelet. Although critical habitat has been designated for both species, the closest occurrence of critical habitat for both species is located in the Coast Range more than 5 miles to the west of the API. Similarly, the API does not contain suitable habitat for the streaked horned lark which utilizes bare ground or sparsely vegetated habitats. No such habitats are present within the API.

The API does contain potential habitat for nesting migratory birds since they may utilize trees and shrubs located throughout the API.

3.3 Fish and Aquatic Resources

Review of data available from StreamNet and ORNHIC within a 2-mile radius of the proposed API indicates that steelhead of the Upper Willamette River (UWR) Distinct Population Segment (DPS) has the potential to occur within the proposed API (StreamNet 2010, ORNHIC 2010). This species is federally listed as Threatened (T) and state listed as Sensitive Vulnerable (SV). Table 7 summarizes this species federal and state listing status, designated critical habitat, and distribution within the vicinity of the API. .

Table 7. Fish and Aquatic Species with the Potential to Inhabit the API

Scientific Name	Common Name	Federal Status	State Status	Critical Habitat (Y/N)	Distribution
Oncorhynchus mykiss	Steelhead Upper Willamette River DPS	T	SV	No	Tualatin River and tributaries (Rearing and migration)

T = Threatened; SV = Sensitive Vulnerable

Two unnamed tributaries to McKay Creek are located within the proposed API (170900100107 6th Field Hydrologic Unit Code [HUC]): the northern unnamed tributary and the southern unnamed tributary. The northern unnamed tributary flows southwest across the API and underneath Highway 26 through an approximately 8-foot by 8-foot diameter concrete box culvert. Within the API, this tributary is approximately 10 feet wide and 5 feet deep. North of Highway 26, this tributary is bordered on either side by a wetland dominated by reed canarygrass. South of Highway 26, the riparian area consists of reed canarygrass in the understory with red alder and Oregon ash in the overstory.

The southern unnamed tributary to McKay Creek flows west across the southern portion of the API. Within the API, this tributary has been channelized, is approximately 8 feet wide and 2 to 3 feet deep, and is largely devoid of a riparian area.

The unnamed tributaries' confluence with the mainstem of McKay Creek is located approximately 1.5 miles downstream (southwest) of the API. Approximately 5 miles downstream from this confluence, McKay Creek flows into Dairy Creek which then flows into the Tualatin River within 2 miles of the McKay/Dairy Creek confluence.

UWR DPS steelhead utilize McKay Creek for rearing and migration (StreamNet 2010). The upstream extent of steelhead distribution is located approximately 1 mile downstream (southwest) of the proposed API (Figure 2). The unnamed tributaries to McKay Creek do not currently provide rearing and migration habitat for UWR steelhead. The habitat within these unnamed tributaries is considered low quality because of the following factors: the streambed is largely comprised of silt and sand, there is minimal riparian vegetation, and there is a general lack of channel complexity.

McKay Creek is mapped as Essential Salmonid Habitat (ESH) according to the Oregon Department of State Lands. However, the ESH designation does not extend into the two unnamed tributaries of McKay Creek located within the API (DSL 2001).

Although steelhead and other native migratory fish do not currently utilize the tributaries within the API, it is likely that steelhead and native migratory fish used these tributaries historically. This determination is based on an investigation of accessible portions of the two unnamed tributaries to McKay Creek within the API on February 3, 2010 and a review U.S. Geological Survey topographic maps (Hillsboro, Oregon Quadrangle, USGS 1986) for the area. In particular, the size of each unnamed tributary suggests that this system likely supported fish in its upper reaches. Additionally, although man-made barriers (i.e. culverts) to fish passage may have been constructed recently, there are no natural barriers to upstream fish passage within McKay Creek or its tributaries. Lack of current use by native migratory fish is likely due to degradation of stream habitat as a result of development of the surrounding areas.

The Oregon Department of Fish and Wildlife (ODFW) has determined that there was historical use of these streams by native migratory fish. This determination was based upon the physical attributes of the tributaries, the lack of natural barriers downstream, and the size of the drainage basins (J. Brick pers. comm. 2010).

4.0 CONCLUSIONS

4.1 Botanical Resources

Based on the February 3, 2010 site investigation and the review of available information, there is suitable habitat for listed botanical species within the API. As a result, botanical clearance surveys will need to be conducted during the appropriate blooming period for the species listed in Table 4. The API also contains noxious weed species (Table 5). A follow-up weed survey should also be conducted during the blooming period to ensure all noxious weed populations are documented.

In order to capture both early and late blooming botanical species as well as noxious weeds, two site visits are recommended. The results of the botanical clearance and noxious weed surveys should be documented in a Botanical Clearance Report. If listed plant species are observed within the API, the ODOT Biologist should coordinate with the Project Team to avoid impacting these species. If listed species cannot be avoided by the project, a Biological Assessment (BA) should be prepared and submitted to USFWS and/or ODA.

All noxious weed control efforts will follow ODOT standards. Noxious weed infestations located within the API should be included on project plans and be removed prior to construction of the proposed project. In addition, inspection and cleaning of construction equipment prior to entry into the construction site should be required. Weed seeds can easily become trapped in the tread of tires or within the crevices of heavy machinery, and spread across the API during the construction phase of the project. Weed control should also be required during the one year post-construction maintenance period to prevent the spread of noxious weeds.

4.2 Terrestrial Wildlife Resources

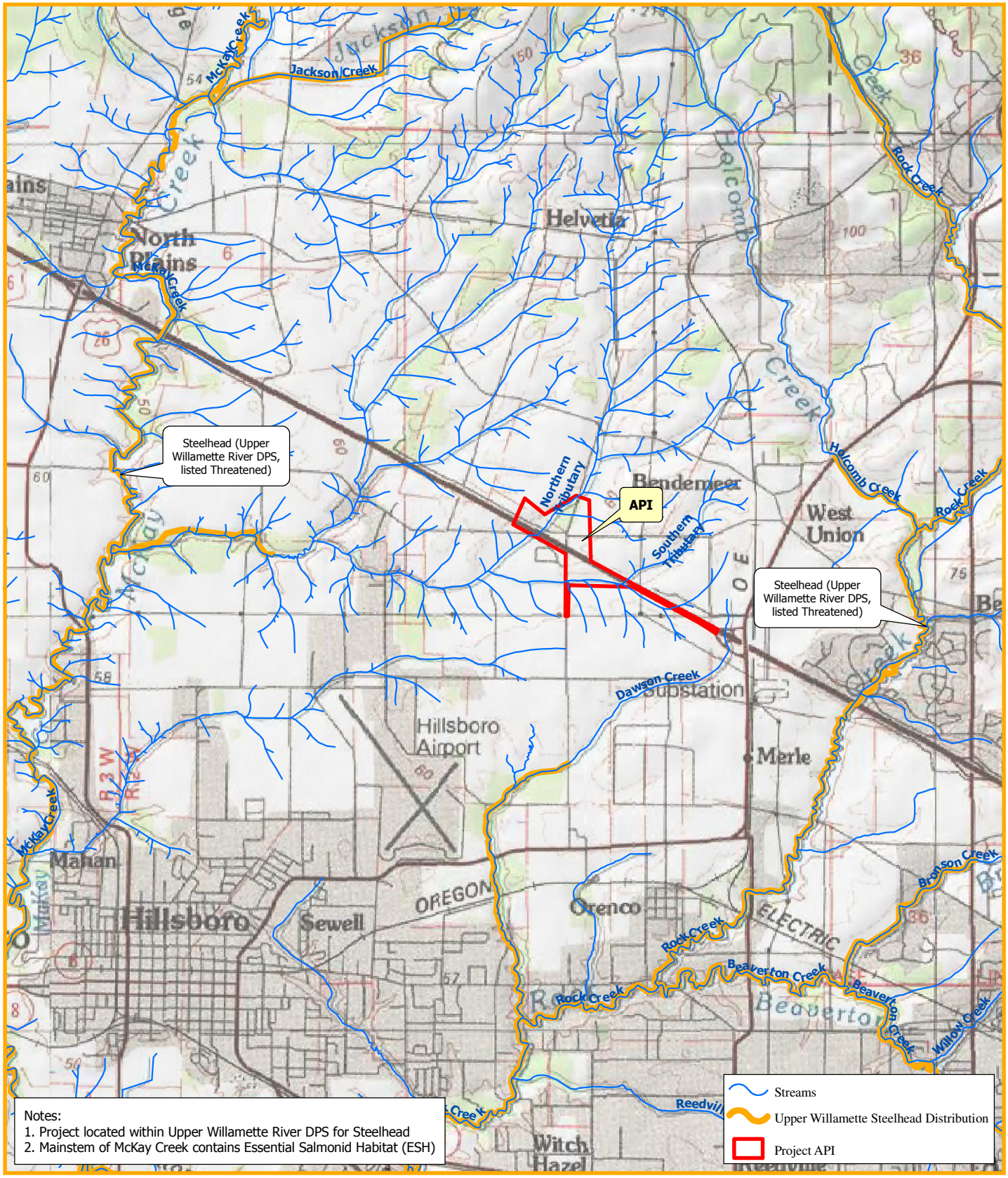
The API does not contain suitable habitat for any state or federally-listed terrestrial wildlife species. A No Effect Memorandum should be prepared to document these results.

Nesting migratory birds have the potential to occupy a significant portion of the API due to the suitable habitat afforded by the trees and shrubs that were observed during the February 3, 2010 site investigation. The Migratory Bird Treaty Act (MBTA) prevents the take of adult migratory birds, their young, eggs, and all body parts. Take permits are not widely available so preventative measures are recommended to avoid violations of the law. Under this law, adult migratory birds can be deterred from nesting and empty nests can be removed or disturbed, but active nests and attending adults are not to be harassed. Incidental take of migratory birds is generally avoided by activity timing restrictions as well as preventive measures. The only proposed project activity that has the potential to conflict with the MBTA is the clearing of trees that may provide nesting habitat for migratory birds. At the Shute Road Interchange Improvement Project, the timing of vegetation removal (clearing and grubbing) should occur between September 1 and March 1 so as to occur outside the nesting period for migratory birds.

4.3 Fish and Aquatic Resources

The API does not contain suitable habitat for any state or federally-listed fish or aquatic species. However, the upstream extent of steelhead distribution is located approximately 1 mile downstream (southwest) of the API. Although direct impacts to listed salmonids are not expected

as a result of the proposed project, indirect impacts are possible. If the project includes work in, over, or adjacent to the two unnamed tributaries to McKay Creek, indirect impacts may include temporary increases in turbidity as a result of construction. In addition, the proposed project will include increases in impervious surface which may cause indirect stormwater impacts to steelhead downstream.



N

0 0.5 1 Miles

0 0.5 1 1.5 2 Kilometers

Figure2.pdf Creation Date: Feb 9, 2010.

Figure 2.

Aquatic Resources Map
Shute Road Interchange Improvement Project
Washington County, Oregon

MB&G

Mason, Bruce & Girard, Inc.
Natural Resource Consultants since 1921

Data Source: TOPO! USGS 7.5 min., 24K Digital Topographic Data, Oregon. Streams data from ODF. This product is for information purposes only and may not be suitable for legal, engineering or surveying purposes. This information or data is provided with the understanding that conclusions drawn from such information are the responsibility of the user.

Due to these anticipated indirect effects to listed species, a BA or Standard Local Operating Procedure for Endangered Species (SLOPES IV) Compliance Report must be prepared to provide Endangered Species Act (ESA) clearance. Upon submittal of this document to the regulatory agencies, ODOT can expect a maximum review timeline of 135 business days for a BA with a Likely to Adverse Affect (LAA) effect determination. Minimizing or avoiding impacts on the natural resources described within the API may shorten the review timeline.

There is evidence that native migratory fish historically utilized the two unnamed tributaries to McKay Creek within the API. As such, all new or improved stream crossings would need to be designed to provide fish passage in accordance with the Oregon Fish Passage Law. As the proposed project design is refined, the ODOT Biologist will need to ensure that any activities within these tributaries (i.e., culvert extensions or replacements) meet ODFW's requirements. In addition, an ODFW Fish Passage Plan may need to be prepared depending on the scope of the proposed project.

If the proposed project does include activities within the two unnamed tributaries to McKay Creek, these activities should be scheduled during ODFW-approved In-Water Work Window for the Tualatin River and its tributaries (July 15 through September 30) (ODFW 2008).

4.4 Summary

Table 8 provides details regarding the applicable permits, approvals, and clearances needed for the proposed Shute Road Interchange Improvement Project.

Table 8. Summary of Applicable Permits, Approvals, and Clearances Needed for the Shute Road Interchange Improvement Project

Type of Permit / Approval/ Clearance	Issuing Agency	Permit / Approval / Clearance	Estimated Timeline (after submittal)
ESA Consultation for listed fish species: SLOPES IV Compliance Report or Biological Assessment	NMFS	SLOPES Approval or Biological Opinion	30 days (SLOPES) 45 days (NLAA) 135 days (LAA)
Botanical Clearance	ODOT	Botanical Clearance Report	N/A
Noxious Weed Clearance	ODOT	Botanical Clearance Report	N/A
ESA Clearance for listed plants and wildlife	ODOT	No Effect Memorandum	N/A
ODFW Fish Passage Plan	ODFW	Fish Passage Approval	30 days
Migratory Bird Treaty Act Compliance for tree clearing	ODOT / APHIS	None (if trees and shrubs are removed outside MBTA nesting window March 1 – September 1) MBTA Clearance	N/A N/A

NLAA – Not Likely to Adversely Affect; LAA – Likely to Adversely Affect; APHIS – Animal and Plant Health Inspection Service; SLOPES – Standard Local Operating Procedures for Endangered Species.

5.0 REFERENCES

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Natural Resource Conservation Service (NRCS). 2010. Plants National Database. Available at URL: http://plants.usda.gov/index.html

Oregon Department of Agriculture (ODA). 2009. Noxious Weed Policy and Classification System. Salem, Oregon.

Oregon Department of Fish and Wildlife (ODFW). 2008. Oregon Guidelines for Timing of In Water Work to Protect Fish and Wildlife Resources. June, 2008. Salem, Oregon.

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Oregon Department of State Lands (DSL). 2001. Essential Salmon Habitat for Washington County, Oregon. Available at URL: http://www.oregon.gov/DSL/PERMITS/esshabitat.shtml

StreamNet. 2010. Fish Data for the Northwest. Available at URL: http://www.streamnet.org/

U.S. Fish and Wildlife Service (USFWS). 2010. Federally listed, proposed, candidate species and species of concern under the jurisdiction of the fish and wildlife service which may occur within Washington County, Oregon. Portland, Oregon.

U.S. Geological Survey (USGS). 1986. Hillsboro, Oregon., 7.5-minute quadrangle, 1:24000.

Appendix A

Area of Potential Impact Photographs

1

2

MB&G Mason, Bruce & Girard, Inc. February 3, 2010	1. View to the northeast from NW Groveland Drive of the northern unnamed tributary of McKay Creek. 2. View to the southwest of the northern unnamed tributary of McKay Creek from NW Schaff Road. NW Helvetia Road is visible in the photo background.

3

4

MB&G Mason, Bruce & Girard, Inc. February 3, 2010	3. View to the southeast of the Shute Road Interchange. The westbound on-ramp from Shute Road to Highway 26 is visible at photo left, Shute Road is visible in the background, and Highway 26 is visible at photo right. 4. View to the southwest showing the eastern portion of the API. Highway 26 is located behind the photographer.

5

6

MB&G Mason, Bruce & Girard, Inc. February 3, 2010	5. View to the southeast of the Shute Road Interchange. 6. View to the northwest of a roadside drainage ditch and the eastbound off-ramp from Highway 26 to Shute Road

7

8

MB&G Mason, Bruce & Girard, Inc. February 3, 2010	7. View to the west of the southern unnamed tributary of McKay Creek at the western extent of the API. Upland agricultural fields are shown in the background of the photo. 8. Typical upland grass seed production field within the northern portion of the API with a view to the south. The northern unnamed tributary of McKay Creek is visible at the bottom of the photo. Note the numerous stands of Oregon white oak (*Quercus garryana*) (red arrows) within the API. NW Helvetia Road is visible at photo right.

ODOT Region 1 Environmental Unit

Hazardous Materials Baseline Report

Date: February 24, 2010

Project Name: US26: Shute Road Interchange

Location: U.S. 26 at Shute Road Intersection in Washington County

Project Description Summary: The proposed project would reconstruct the Shute Road/Helvetia Road interchange. The project would include the addition of a Westbound to Southbound loop ramp, reconstructing the Westbound exit and entrance loop ramps, and adding a second right turn lane to the Eastbound entrance ramp.

Hazardous Materials

ODOT Region 1 Environmental Coordinator, Melissa Hogan performed basic scoping for hazardous materials as normally documented in a Part 3 document in order to determine the classification of the project under NEPA. The purpose of the assessment was to identify potential environmental conditions (sources of hazardous materials) that could impact project construction. This report does not negate the need for additional Hazardous Materials studies that are routinely performed as part of ODOT projects that include ground disturbance.

No Registered Geologist or other Hazardous Materials professional participated with the preparation or review of this baseline overview of Hazardous Materials. It is for internal use only and may not be relied upon by any other entity without written permission from an authorized ODOT representative. No environmental assessment can wholly eliminate uncertainty regarding the potential for environmental conditions in connection with a Project.

The site consists of rural or agricultural land with limited residential and undeveloped land usage. No evidence of environmental impacts was observed.

Hazardous materials are known to be present within project API and include the following:

- Search of the DEQ's hazmat databases indicates sites at the following locations within the API:

DEQ Facility Profiler	2/23/2010
Facility / Site Information:	DEQ Program:
BERGER FARMS 5888 NW SHUTE RD HILLSBORO , 97124	Leaking UST
BERGER FARMS HOT 5870 NW 242ND AVE HILLSBORO , 97124	Leaking UST
BAXTER, B HOT 27700 NW MEEK ROAD HILLSBORO , 97124	Leaking UST
GENENTECH INC 4625 NW SHUTE RD HILLSBORO , 97124-9332	Air Discharge Permit, Haz Waste
FIVE OAKS LOT 7 NW CASPER AT NW CLARA LANE HILLSBORO , 97124	Water Discharge Permit

- Berger Farms is located on US26 just East of the NW Shute Rd over-crossing.
- Berger Farms Hot site is located near the on ramps on the South side of US26 on NW Shute Rd.
- Baxter B Hot is located on US26 just West of the NW Shute Rd over-crossing.
- Genentech Inc is located at the corner of NW Shute Rd and Huffman.
- Five Oaks Lot 7 is located just North and East of the Eastbound off-ramp to NW Shute Rd.

R/W Acquisition(s) do not include gas stations, repair facilities, industrial sites, landfills or any other non-residential facilities that may have used or stored hazardous materials. Ag fields may have high levels of pesticides and should be tested to determine if the soil can be handled as clean fill according to Charles Schwarz, ODOT Hazmat Coordinator.

Hazardous Materials Summary

There are multiple listings for hazardous materials in this project location including but not limited to leaking Underground Stroage Tanks (UST's), Solid (Hazardous) Waste, Air and Water Discharge Permits. A Hazardous Materials Level 1, and potentially Level 2, Analysis (depending on Level 1 findings) are recommended.

List of Potential Environmental Conditions Identified:
The Corridor Study identified the following potential environmental conditions that could impact the proposed construction or right of way acquisitions:

- *Three LUST sites adjacent to the Project Corridor could have contaminated soil and groundwater within the proposed construction areas.*

- *Mercury vapor lamps and treated timbers may be present and would require special handling if they require removal or replacement.*
- *Air and Water Discharge permits may have ultimately resulted in have contaminated soil and groundwater within the proposed construction areas.*

Prepared by: _____ Date: February 2010
Melissa Hogan
ODOT Regional Environmental Coordinator, Region 1, West

Reviewed by:_____ Date: February 2010
Jeff Buckland
ODOT Senior Environmental Project Manager, Region 1

ODOT Region 1 Environmental Unit
Land Use Baseline Report

Date: February 23, 2010

Project Name: US26: Shute Road Interchange

Location: U.S. 26 at Shute Road Intersection in Washington County

Project Description Summary: The proposed project would reconstruct the Shute Road/Helvetia Road interchange. The project would include the addition of a Westbound to Southbound loop ramp, reconstructing the Westbound exit and entrance loop ramps, and adding a second right turn lane to the Eastbound entrance ramp.

Overview/summary
The area surrounding the proposed project is on the edge of the Urban Growth Boundary. The NE, SE and SW quadrants are all currently in the UGB, the NW quadrant is outside of the UGB. This area of the region is predominately industrial and has seen significant development in industrial areas over the last 10 years. Major employers, many oriented to the green industry sector, have located in this area to the south of the interchange resulting in a strong industry cluster. The area to the north of the interchange is primarily rural in character, but has also seen growth in industrial properties. This project will not require a goal exception.

Existing Uses

NW quadrant
The NW quadrant of the interchange is currently primarily undeveloped, except for three single family houses immediately to the north of the WB entrance ramp in the API. Areas outside the API include a large area to the North of Groveland is currently in agricultural use. Groveland Dr continues WB and turns NB after providing access to 4 homes, and an auto repair shop. Groveland currently connects to Helvetia Rd approximately 250-300 feet north of the ramp terminals.

NE quadrant
The NE quadrant of the interchange is currently developed as light industrial land, and the area north of Jacobson Rd is currently vacant in the API. Areas outside the API include several new industrial developments currently accessing NW Clara Ln as well as a few commercial businesses and the Country Haven Mobile Home Park. Jacobson Rd currently connects 250-300 feet from the ramp terminals.

SE quadrant
The area to the Southeast of the interchange in the API is currently a farm in operation and a farming field. Outside of the API, additional fields exist, in addition to several recent industrial developments. The large field to the South of the farm in operation is a Nike Foundation site that is a certified industrial site listed on the Business Oregon website.

SW quadrant
The API is tight to the existing roadway in the SW quadrant. The area outside of the API to the SW of the interchange includes a small, residential area consisting of approximately 20 single family houses on large lots to the immediate south of Meek Rd. The area to the south of this small residential area is a large field in agricultural use. Meek Rd currently connects to Brookwood Parkway approximately 200 feet south of the ramp terminals.

Planned Uses

Summary of planned uses
The area surrounding the project is planned for industrial and employment uses in three of the four quadrants. The recently adopted Urban-Rural Reserves work solidified the future of this area as a major industrial cluster in the region, with significant planned growth in industrial land uses. The area to the NW of the interchange, with the exception of the area in the API, is planned to remain EFU (Exclusive Farm Use) land and should be protected as rural. This project is not likely to result in significant changes to the planned land uses and is consistent with planned uses.

NW quadrant
The NW quadrant of the interchange is currently under Washington County planning and zoning authority. A small area, including the API, to the NW of the interchange is planned for Urban reserve, for transportation purposes. The remainder of the area is planned to remain undesignated, EFU land. A statewide goal exception is needed for any removal of agricultural use of this land, but is not required for the interchange improvement project.

NE quadrant
The NE quadrant of the interchange is planned for industrial use. The area from Jacobsen Rd to West Union Rd is covered in the Helvetia Concept Plan, which created a special district, the Helvetia Area Special Industrial District (HSID). This zoning designation limits use to certain industrial categories and has large minimum lot sizes (10 acres). The intent is to develop this area primarily as industrial land aimed at jobs creation. Some of this concept plan area has not yet been rezoned, is still classified as FD-20 under the County Zoning Code. The FD (Future Development) -20 classification of the County is meant to hold land until which time UGB expansions are applied for and urban zoning is applied from the affected City.

SE quadrant

The area to the Southeast of the interchange is planned and zoned as Industrial by the City of Hillsboro.

SW quadrant
The area immediately to the Southwest of the interchange is planned and zoned as AF-5 and is under County jurisdiction. This area is identified as Urban Reserve through Metro's recent Urban-Rural Reserves process. The area to the south of the AF-5 land, east of 253rd Ave, and West of Brookwood Parkway is all planned as Industrial under the City of Hillsboro comprehensive plan. The City of Hillsboro zoning is Shute RD Special Industrial District Overlay which requires large lots for industrial use. The area to the West of 253rd is covered under the Evergreen Concept Plan, which placed special Evergreen Special Industrial District Zoning that will be applied as properties are annexed into the City. The provisions are similar to the other Special Industrial Districts that require large lot sizes for industrial and employment use. This Evergreen Concept Plan area is currently under county zoning of FD-20.

Part 2: Land Use Plan inventory

Several applicable plans exist that address the project area. No conflicts with existing adopted plans were identified through this analysis.

List of applicable plans reviewed for this report:

City Plans

City Planning Inventory

- Evergreen Concept Plan
- Helvetia Concept Plan
- Shute Rd Industrial Concept Plan
- Hillsboro TSP
- Hillsboro Comprehensive Plan

County Plans

County Planning Inventory

- Washington County Comprehensive Plan
- Washington County TSP

Regional Plans

Regional Plan Inventory

- Metro RTP
- 2040

- Urban Rural Reserves

State Plans

State Plan Inventory

- Sunset Highway Interchange Study (DKS and Associates, November 1999)
- US 26 Corridor Plan (Adopted May 1999)– The US 26 Corridor Plan identified a modernization investment at the Shute Rd interchange in the strategic list.
- Oregon Highway Plan

US 26 and Shute Road Interchange - Comprehensive Plan Map

March 8, 2010

Generalized Comprehensive Plan Designations

- General Commercial
- Neighborhood Commercial
- Agriculture or Forestry
- Heavy Industrial
- Light Industrial
- Mixed Use Industrial
- Multi-family 1
- Multi-family 2
- Mixed Use Center 2
- Public Facilities
- Parks and Open Space
- Rural or Future Urban
- Single Family 2
- Single Family 6

- Streets
- City Boundary
- Metro Urban Growth Boundary

0 1,450 2,900 5,800 Feet

DISCLAIMER: This product is for informational purposes only and may not have been prepared for or be suitable for legal, engineering or surveying purposes. Users of this information should review or consult the primary data and information sources (ODOT production, RLIS data) to ascertain the usability of the information.

BIDWELL
GROVELAND
DICK
WEST UNION
FARM PARK
SUNSET
HELVETIA
PUBOLS
CENTURY
BENDEMEER
271ST
SCHAAF
268TH
MEEK
JACOBSON
CLARA
BIRCH
OAK
CORNELIUS PASS
WAGON
CRONEI
LANDING
208TH
WAHKEENA
PONDOSA
FIVE OAKS
273RD
SEWELL
253RD
BROOKWOOD
HUFFMAN
ROCK CREEK
LAPINE
KIWANDA
BENNETT
235TH
EVERGREEN
City of Hillsboro
IMBRIE
268TH
33RD
DAWSON CREEK
264TH
49TH
AIRPORT
ATKESON
RICKEY
215TH
211TH
ALOCLEK
GRIFFIN OAKS
KATHRYN
25TH
PENNY
SHUTE
AIRPORT
51ST
BUTLER
229TH
CORNELL
AMBERWOOD
21ST
48TH
57TH
61ST
63RD
65TH
RONLER
206TH

US 26 and Shute Road Interchange - Zoning Map

March 8, 2010

Generalized Zoning Sub Classes

- General Commercial
- Agriculture or Forestry
- Light Industrial
- Multi Family 3
- Multi Family 4
- Mixed Use Employment
- Mixed Use Residential 2
- Mixed Use Residential 4
- Mixed Use Residential 8
- Public Facilities
- Rural Residential or Future Urban
- Single Family 4
- Single Family 5
- Single Family 6
- Single Family 9
- Single Family 15

- Streets
- City Boundary
- Metro Urban Growth Boundary

0 1,450 2,900 5,800 Feet

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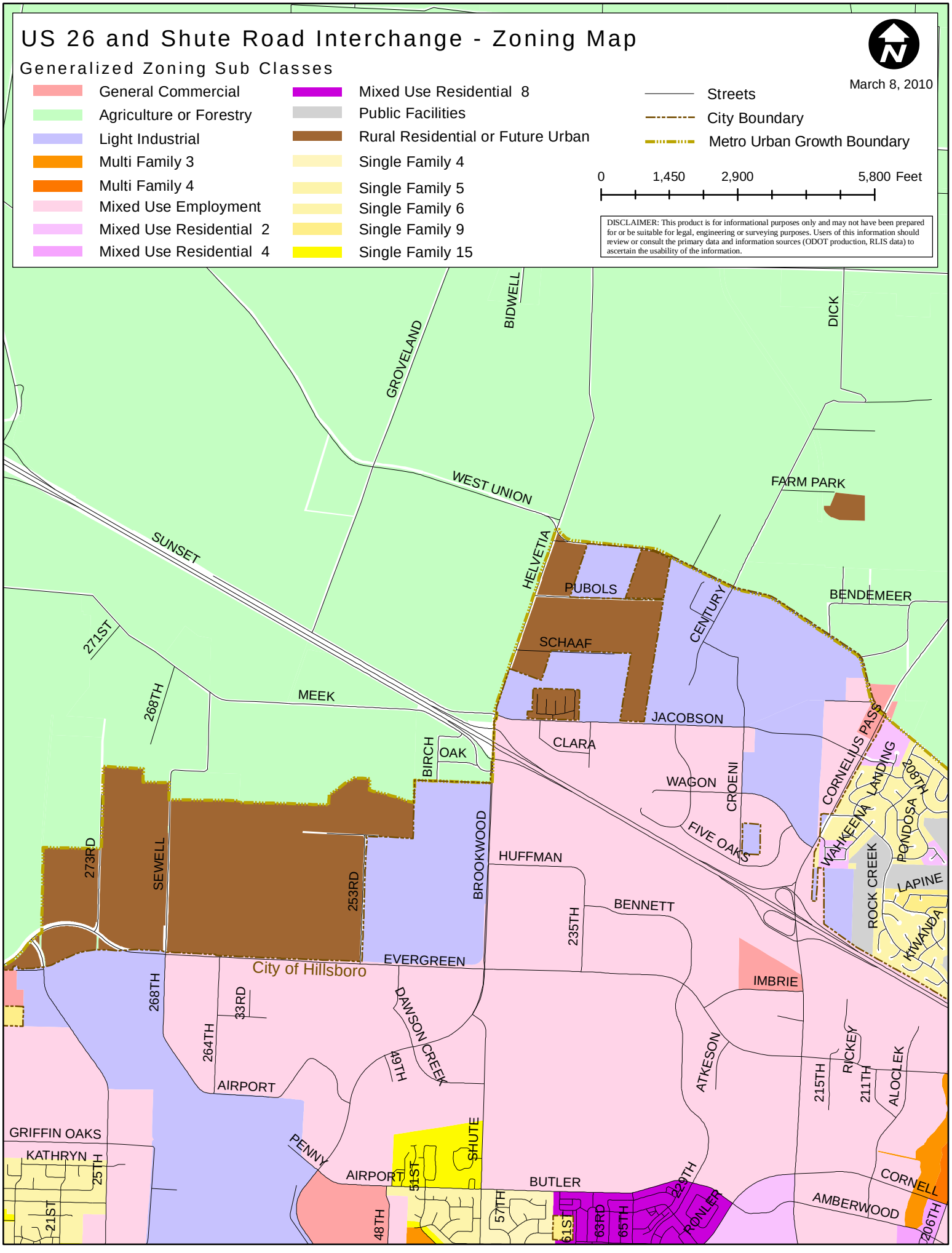

ODOT Region 1 Environmental Unit
Noise Baseline Report

Date: February 23, 2010

Project Name: US26: Shute Road Interchange

Location: U.S. 26 at Shute Road Intersection in Washington County

Project Description Summary: The proposed project would reconstruct the Shute Road/Helvetia Road interchange. The project would include the addition of a Westbound to Southbound loop ramp, reconstructing the Westbound exit and entrance loop ramps, and adding a second right turn lane to the Eastbound entrance ramp.

Noise

ODOT Region 1 Environmental Coordinator, Melissa Hogan performed basic scoping for Noise as normally documented in a Part 3 document in order to determine the classification of the project under NEPA.

Traffic noise has the potential to affect the project design if noise mitigation is necessary or, if avoidance is desirable through grade changes or the wasting of excess cut materials in berm construction. The construction of berms or sound walls can require additional easements or right-of-way acquisition. The construction of noise walls along shoulders may mean a change in the project typical sections for the area where the walls would be constructed.

A Noise Study would be required for this particular project because the following conditions may apply to this project:

- Construction may result in an acoustically significant increase in noise due to a shift in the horizontal and/or vertical alignment of the roadway.
- Construction will create a new roadway on a new alignment. (This also applies to on or off ramps.)
- Construction may remove acoustic shielding (i.e. embankments on on/off ramps) that currently significantly reduce noise to a receptor.

If any of the conditions above occur a noise study is required. The question that must then be answered is, are there noise sensitive developments close enough to the roadway to have potential for noise impact? Noise sensitive developments consist of homes, businesses, parks, schools, churches or playgrounds that currently exist, or that are

planned, designed or programmed. Planned designed or programmed generally refers to building permits issued. If such development is present some basic questions as to the nature of the development must then be answered. For example, is the development a residential subdivision or mobile home park? Does the development have direct access to the roadway, through driveways or streets which would limit or eliminate potential noise mitigation?

At this early stage in project design it might be reasonable to assume that a nearby development has potential for noise impact. If that is the case, a quick estimate of the potential cost of providing noise mitigation can be made by estimating the cost for a wall the length of the development. The cost of such mitigation can then be estimated by multiplying the length of the wall in feet times the height of the wall (use 16 feet) and multiplying that square footage by $20. This is only an estimate for rough dollar value consideration. The final design will require a traffic noise study, complete with a wall design. By no means are these rough considerations to be made public. No implied promise of noise mitigation is to be made until a comprehensive noise study is accomplished that includes an in depth mitigation analysis.

Existing Conditions

A Sensitive Noise Receptor (SNR) is defined as a use that may be impacted by increased noise and/or vibration caused by increased traffic volumes or speeds or by a reconfigured existing roadway directing traffic in a manner that increases noise or vibration.

- Identification of Sensitive Noise Receptors (SNRs) within the API:

  There are residential (single-family homes and mobile homes) uses present..

  There are no Senior /care residential facilities, motels/hotels, hospitals, schools or play grounds, libraries, places of worship, parks, campgrounds, and recreational facilities within the API.

- There are shifts in horizontal and vertical alignment proposed on US26 on/off ramps. At this time the amount of shift is unknown.

- The project does not propose to increase the number of through travel lanes.

- There is a new roadway being proposed on a new alignment as part of access management in the NE quadrant of the intersection.

- Per communication with Community Affairs Representatives Lili Gordon and Elizabeth Craig, no known noise issues have been raised for this location or project.

- This project will not result in the removal of topographical features which currently shield receptors.

- Approximate number of buildings /activity areas within 200 feet of the proposed right-of-way line includes: approximately 12 single family residential homes, 3

agricultural outbuildings, and 4 commercial/office buildings. A mobile home park is also adjacent to the API.

Noise Report Summary:

New lanes and/or shifts in alignment of on/off ramps would both warrant a project Noise Study per ODOT's Noise Manual. If work occurs outside of normal working hours, a noise variance from Washington County and/or City of Hillsboro will also be necessary. No threatened or endangered birds are nesting in or within one mile of the project API, therefore no ambient noise studies or construction noise monitoring is required for ESA compliance.

Prepared by: _____ Date: February 2010
Melissa Hogan
ODOT Regional Environmental Coordinator, Region 1, West

Reviewed by:_____ Date: February 2010
Jeff Buckland
ODOT Senior Environmental Project Manager, Region 1

Photo attached:

Note close proximity of homes to Groveland Road in NW area of project

ODOT Region 1 Environmental Unit

Historic Resources Baseline Report

Date: February 25, 2010

Project Name: US26: Shute Road Interchange, ODOT Key No. 16842

Location: U.S. 26 at Shute Road Intersection in Washington County

Project Description Summary: The proposed project would reconstruct the Shute Road/Helvetia Road interchange. The project would include the addition of a Westbound to Southbound loop ramp, reconstructing the Westbound exit and entrance loop ramps, and adding a second right turn lane to the Eastbound entrance ramp.

Area of Potential Impact: The API extends approximately 2,000 feet in either direction from the Shute Road Interchange with the exception of the eastern portion of the API along US 26, where the API extends approximately 1.25 miles towards the NW Cornelius Pass Road Interchange. Figure 1 shows the general location of the API.

Historic Resources

Robert W. Hadlow, Ph.D., ODOT Region 1 senior historian, performed basic scoping for historic resources in February and March 2010.

Existing Conditions

The methodology used to identify newly-discovered and previously-documented historic resources in the potential API included several techniques: 1) a review of the Oregon State Historic Preservation Office (SHPO) statewide databases for historic sites and for National Register properties; 2) a review of the Washington County Cultural Resource Inventory; and 3) a reconnaissance level (windshield) survey of the potential API.

Literature Search

Review of the State Historic Preservation Office (SHPO) statewide inventory resulted in the identification of one previously-recorded historic resources in the API—the James and Mary Chambers House. The Washington County Cultural Resources Survey and Inventory noted several "inventoried properties" in the project area.

Field Survey/Inventory

The project area was surveyed on February 27 and March 1, 2010, to identify any properties that were 45 years old or older. Thirteen properties were photographed and the addresses noted. The results of the on-site survey are shown in Table 1: Historic

Resource Analysis. The built properties span over a century, from an 1865 farmhouse to a 1963 ranch-style house. In addition, a historic site in the API—Five Oaks Meeting Place—has strong association with local Indians and Oregon pioneers. Most properties were within the marked API. However, a few other properties outside of the API were included because of their close proximity to the project area.

Conclusion

The ODOT historic resources staff reviewed the properties noted in this report. They concluded that several lacked original integrity of one or more of the following aspects: design, materials, workmanship, or feeling. The staff concluded that these properties were not eligible for the National Register and will complete a Programmatic Agreement memo to file that states these conclusions.

A house on NW Birch Avenue requires additional evaluation for integrity and significance. The two houses and associated outbuildings on NW Shute Road, the Classic Revival house on NW Groveland Drive, and the Five Oaks Meeting Place are all likely eligible for the National Register. Additional research is required on all of these properties.

As the project development phase progresses, the proposed interchange project on US 26 at Shute Road may have an effect on significant historic resources within the API.

References

Oregon State Historic Preservation Office. Database of National Register Properties.

Oregon State Historic Preservation Office. Oregon Historic Sites Database.

"Programmatic Agreement among the Federal Highway Administration, the Oregon Department of Transportation, the Oregon State Historic Preservation Office, and the Advisory Council on Historic Preservation," 2001.

Washington County Museum. "Washington County Cultural Resources Survey and Inventory," 1983.

Table 1: Historic Resource Analysis

Map ID	Property Name/Address	Map/Tax Lot	Construction Date/Resource Type	National Register Status	Photograph of Resource
A	House 24250 NW Groveland Dr., Hillsboro, OR	1N21500 01400	1950. Early ranch house. Has been remodeled. Lacks integrity.	**Not eligible.**	
B	House 24380 NW Groveland Dr., Hillsboro, OR	1N21500 01200	1948. Minimal traditional house. Has been remodeled. Lacks integrity.	**Not eligible.**	
C	House 24500 NW Groveland Dr., Hillsboro, OR	1N221AA 00100	1945. Minimal traditional house. Windows replaced/ added. Lacks integrity.	**Not eligible.**	
D	James and Mary Chambers House 24665 NW Groveland Dr. Hillsboro, OR	1N21500 00900	1865. One-1/2-story Classic Revival house associated with Oregon pioneers. Vegetation prevents a close-up view of the house and outbuildings.	**Likely eligible. Listed in Washington County Cultural Resources Inventory**	

E	House 5830 NW Shute Rd. Hillsboro, OR	1N22200 02800	1948. One-story ranch-style house associated with house at 5870 NW Shute Rd. Appears intact.	**Possibly eligible. Additional research is needed.**	
F	House 5870 NW Shute Rd. Hillsboro, OR	1N22200 02900	1922. Craftsman bungalow and period agricultural outbuildings. Appears intact.	**Possibly eligible. Additional research is needed.**	

G	Five Oaks Meeting Place Corner of NW Caspar Pl. & NW Clara Pl. Hillsboro, OR	1N214CC	c.1500. A circle of five oak trees had cultural significance to local Indians and local pioneers. Two original 500-year-old trees remain. Three others were planted in recent decades.	**Likely eligible. Listed in Washington County Cultural Resources Inventory.**	
H	House 24215 NW Meek Rd. Hillsboro, OR	1N221AA 01200	1955. Ranch-style house. Lacks integrity.	**Not eligible.**	
I	House 24640 NW Meek Rd. Hillsboro, OR	1N221AA 00300	1950. Early simple ranch-style house. Lacks integrity.	**Not eligible.**	

J	House 24680 NW Meek Rd. Hillsboro, OR	1N221AA 00400	1950. Early ranch-style house. Lacks integrity.	**Not eligible.**	
K	Lin Tara Sunset Kennel 24810 NW Meek Rd.	1N221AA 00400 or 1N22100 01400	c. 1950. Vernacular commercial building. Lacks integrity.	**Not eligible.**	
L	House 6160 NW Birch Ave. Hillsboro, OR	1N221AA 01305	1959. Simple ranch-style house. Appears intact.	**Possibly eligible. Additional research is needed.**	
M	House 24385 NW Oak Dr. Hillsboro, OR	1N221AA 01308	1963. "California Ranch"-style house. Windows replaced. Lacks integrity.	**Not eligible.**	

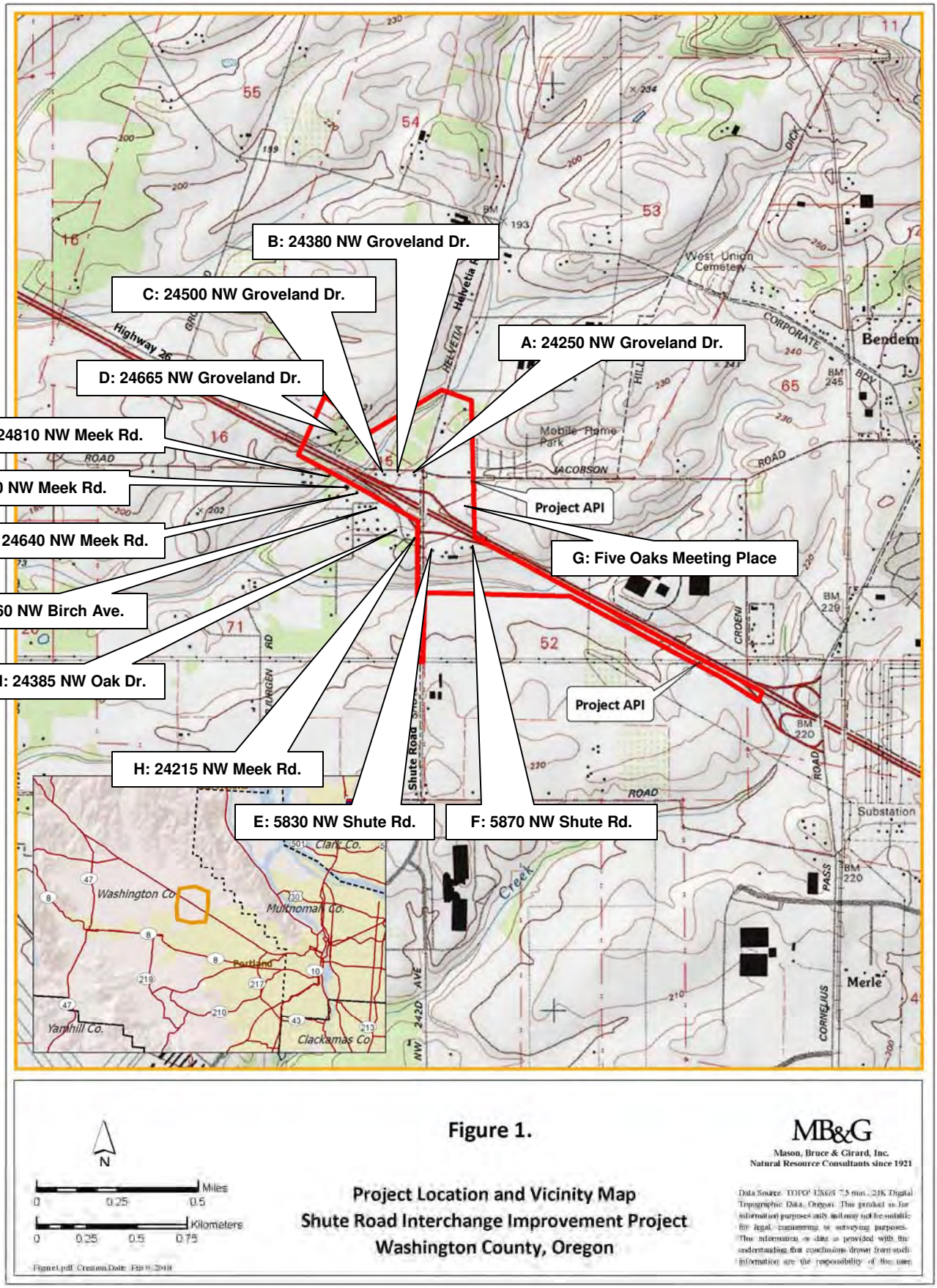

Figure 1.

Project Location and Vicinity Map
Shute Road Interchange Improvement Project
Washington County, Oregon

MB&G
Mason, Bruce & Girard, Inc.
Natural Resource Consultants since 1921

Data Source: TOPO! USGS 7.5 min., 24K Digital Topographic Data, Oregon. This product is for informational purposes only and may not be suitable for legal, engineering, or surveying purposes. The information is data as provided with the understanding that conclusions drawn from such information are the responsibility of the user.

Figure1.pdf Creation Date: Feb 9, 2018

Historic Resources Summary

There are several potential properties within or nearby the API. Further study is recommended.

Prepared by: _____ Date: March 2010
Robert W. Hadlow, Ph.D.
ODOT Senior Historian, Region 1

Reviewed by:_____ Date: March 2010
Jeff Buckland
ODOT Senior Environmental Project Manager, Region 1

ODOT Region 1 Environmental Unit

Section 4(f)/6(f) Baseline Report

Date: February 24, 2010

Project Name: US26: Shute Road Interchange

Location: U.S. 26 at Shute Road Intersection in Washington County

Project Description Summary: The proposed project would reconstruct the Shute Road/Helvetia Road interchange. The project would include the addition of a Westbound to Southbound loop ramp, reconstructing the Westbound exit and entrance loop ramps, and adding a second right turn lane to the Eastbound entrance ramp.

Section 4(f)/6(f)

ODOT Region 1 Environmental Coordinator, Melissa Hogan performed basic scoping for Section 4(f) and 6(f) as normally documented in a Part 3 document in order to determine the classification of the project under NEPA.

Existing Conditions

- Research of quad maps, city and county maps to indicate there are no public parks, recreation lands, or wildlife and waterfowl refuges located within the project API.
- Contact with local planning representatives at Washington County and City of Hillsboro indicates there are no parks and recreation areas within the project API.
- Marilyn Lippincott at State Parks Planning and Grants Project Officer stated there are no properties encumbered with Section 6(f), Land and Water Funds.
- Cultural Resources Technical Reports prepared by Senior Historian Bob Hadlow and Archaeologist Kurt Roedel indicate that historic resources may be present within the API. If the presence of an historical resource is verified, Section 4(f) documentation may be needed to address potential impacts on historic properties/structures.
- Existing conditions include rural residential land, farmland and fallow land.

Section 4(f)/6(f) Summary

Section 4(f) resources may be present within the API. If additional research confirms the presence of historic resources, the project will require Section 4(f) documentation. No 6(f) impacts anticipated since there are no properties encumbered with Section 6(f), Land and Water Funds.

Prepared by: _____ Date: February 2010
Melissa Hogan
ODOT Regional Environmental Coordinator, Region 1, West

Reviewed by:_____ Date: February 2010
Jeff Buckland
ODOT Senior Environmental Project Manager, Region 1

ODOT Region 1 Environmental Unit
Social, Economics and Environmental Justice
Baseline Report

Date: February 23, 2010

Project Name: US26: Shute Road Interchange

Location: U.S. 26 at Shute Road Intersection in Washington County

Project Description Summary: The proposed project would reconstruct the Shute Road/Helvetia Road interchange. The project would include the addition of a Westbound to Southbound loop ramp, reconstructing the Westbound exit and entrance loop ramps, and adding a second right turn lane to the Eastbound entrance ramp.

Social/Economics and Environmental Justice

Existing Conditions

The project is located at the western edge of Hillsboro and adjacent land is in both the City of Hillsboro and unincorporated Washington County. The Shute Road intersection is near the western boundary of the West Union Community Plan area of Washington County, and immediately south of the Helvetia Plan Area in the City of Hillsboro. The area of potential impact includes low-density, rural residential uses and agricultural land. Adjacent land uses are a mix of low-density residential uses, industrial and commercial land uses east of the interchange near both sides of US 26. Much of the property adjacent to the northern and western sides of the area of potential impact is undeveloped farmland. Adjacent property to the south includes rural residential uses and agricultural land (Hillsboro, 2008 and Washington County, 2008).

Population and Housing

This portion of Hillsboro and Washington County is lightly populated and primarily composed of rural residences. Overall, however, the population in the city of Hillsboro has been growing, as has that of Washington County. Housing units in the city and county also reflect these recent growth rates. Table 1 below provides population and housing data for the city and county.

Economy

The City of Hillsboro and Washington County are part of the greater Portland metropolitan area. Because of the proximity to this area, Hillsboro and the County contain some of the largest Portland metropolitan area employers. Core economic

Table 1. Population and Housing Characteristics

	2000	*2008*	*Percent Change*
Hillsboro			
Population	70,186	85,453	21.75%
Total Housing Units	27,211	32,448	19.24%
Washington County			
Population	445,342	519,979	16.75%
Total Housing Units	178,913	204,328	14.20%

Source: US Census 2000, Census Fact Sheet 2006-2008

industries in the Hillsboro area include high-tech electronic and solar companies and biotechnology companies represent an emergent industry. Nearly 66% of the state's employment in computer and electronic manufacturing is located in Washington County (Johnson Reid, 2009). Other retail, commercial and industrial businesses are also present in the region.

The county also includes large areas of rural farm and forest land. In 2009, Washington county ranked sixth among state counties in total agricultural production, with over $230 million in gross farm and ranch sales. Overall, due to the recent economic downturn, total agricultural sales declined by approximately 15% statewide in 2009 (OSU, 2010).

Relocation and Right-of-Way

Local businesses, residences and farmland are located in the area and are accessible via the existing roadway network. Right of way acquisition from adjacent properties would be needed for the proposed project. Approximately forty parcels are within the area of potential impact, and up to thirty parcels could be affected by right-of way needs. It is expected that most of these impacts would be related to partial acquisitions of property from these parcels. There are approximately ten residences that could be affected with potentially four homes that could be displaced by right-of-way acquisition.

Protected Populations and Environmental Justice

Census data (U. S. Census Bureau 2000) was reviewed for the presence of minority and low income groups in the project area. Block data for twelve blocks adjacent to the project area were reviewed for racial characteristics and block group data was reviewed for information on low income populations. For nearly all racial groups, percentages reflected by block groups in the project area are lower than City of Hillsboro and Washington County percentages. For only two groups, American Indian/Alaskan Native and Native Hawaiian/Pacific Islander, were project area averages higher than City and County averages.

The Census block group data indicates that approximately 6.3% of the population within these groups was below the 1999 poverty level. City and County percentages for low income individuals range between 7.3% to 9.0% , thus census block groups near the project area have lower percentages than the percentages reported for the local jurisdictions. Block group data covers a larger area than the immediate project vicinity

and field observations have confirmed that most residential properties are located at a distance from the highway. Census information is provided in Table 2 below.

Table 2. Census Tract Demographic Information

Race/Ethnicity	Local Census Blocks[1]	City of Hillsboro[2]	Washington County[2]	State of Oregon[2]
Total Population	382	70,186	445,342	3,421,399
White	88.2%	77.4%	82.1%	86.5%
Black or African American	0.5%	1.2%	1.1%	1.6%
American Indian and Alaskan Native	1.5%	0.8%	0.6%	1.3%
Asian	0.5%	6.5%	6.6%	2.9%
Native Hawaiian and Other Pacific Islander	0.5%	0.2%	0.2%	0.2%
Some Other Race	4.9%	10.3%	5.8%	4.2%
Two or More Races	3.1%	3.2%	3.1%	3.0%
Hispanic Origin	11.2%	18.8%	11.1%	8.0%
Individuals below poverty level*	6.3%	9.0%	7.3%	11.6%

Source: [1]U.S. Census Block and Block Group Data, 2000; [2]Census Bureau, 2006-2008 Fact Sheets
*Note: Based on Census Tract Block Groups (Block data unavailable)

Although not within the proposed project's potential impact area, the Country Haven Mobile Home park is located immediately adjacent to the northeast boundary of that area, with access from NW Jacobson Road. Mobile home parks are frequently considered sources of affordable housing and may contain minority or low income population group members.

Based on this information, the project area is not expected to result in disproportionate adverse impacts on environmental justice population groups. Because Census data was the primary source of information used to consider local population groups, it is recommended that interaction and communication with minority and low income population groups be documented as part of future public involvement and community outreach efforts for the proposed project.

Community Services and Neighborhood Cohesion
Local services are primarily available in the City of Hillsboro. Hillsboro Fire and Rescue provides firefighting and Emergency Medical Services. Station 3 is located at NW 229th Avenue, approximately 0.75 miles east of the Shute Road intersection. The Hillsboro Police Department has a precinct office near Cornell Road, approximately 1.25 miles east of the Shute Road intersection. Unincorporated areas are served by the Washington County Sheriff's Office and Tualatin Valley Fire and Rescue. TriMet Transit provides bus service in the City of Hillsboro, however, public transit service is not available within the West Union Plan Area (Washington County, 2008).

The nearest schools to the project area are Hillsboro Elementary at NW West Union Road approximately 1 mile north of the Shute Road intersection, and Liberty High School on NW Wagon Way, approximately 2.25 miles northeast of the Shute Road intersection. The nearest churches are the Chinese Evangelical Church, and the Community of Christ Church, both on NW 5 Oaks Drive, approximately 2.25 miles east of the Shute Road intersection; and the West Union Baptist Church on West Union Road, approximately 2 miles north of the Shute Road intersection.

The project area consists primarily of rural farm land and associated residences, as well as a few nearby commercial and industrial buildings. A small residential area is clustered adjacent to the southwest boundary of the project area, and a mobile home park is located near the northeast boundary of the project area. For both of these residential areas the Shute Road intersection is the primary access point for east-west travel on Highway 26. The intersection is also a key access point for travel to locations north and south of the highway both for local residents and emergency service vehicles. Additionally, it provides a primary access point from Highway 26 for travel to Hillsboro Elementary School and the West Union Baptist Church.

Recreation

There are no parks, recreational areas or wildlife refuges in the project area vicinity. The nearest City of Hillsboro park facility is the Gordon Faber Recreation Complex and Hillsboro Stadium at the NW Cornelius Pass Road/US Highway 26 intersection, approximately 1.25 miles east of the NW Shute Road intersection. These facilities provide outdoor recreation opportunities for softball, soccer, football, baseball and lacrosse. The stadium also provides a state-of-the-art facility for these events.

Prepared by: _____ Date: February 2010
Jeff Buckland
ODOT Senior Environmental Project Manager, Region 1

Reviewed by:_____ Date: February 2010
Melissa Hogan
ODOT Regional Environmental Coordinator, Region 1, West

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City of Hillsboro, 2008. *Helvetia Concept Plan*. Prepared by City of Hillsboro, Angelo Planning Group, CH2MHill, Inc., Leland Consulting Group, DKS Associates, Jeanne Lawson Associates, and Pam Baker Consulting. February 2008. Hillsboro, OR.

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Washington County, 2008. *West Union Community Plan*. Updated July 2008. Washington County Department of Land Use and Transportation, Planning Division, Hillsboro, OR.

Water Quality Environmental Baseline Report

SHUTE ROAD INTERCHANGE IMPROVEMENT PROJECT
Key Number K16842
Washington County, Oregon

Prepared for:

ODOT Region 1
123 Flanders Street
Portland, Oregon 97213

Prepared by:

Mason, Bruce & Girard, Inc.
707 SW Washington Street, Suite 1300
Portland, Oregon 97205
(503) 224-3445

February 22, 2010

MB&G Project No. 1581

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APPENDICES

Appendix A Area of Potential Impact Photographs

I. SITE DATA SUMMARY

Data Summary	
Project Name:	Shute Road Interchange Improvement Project
ODOT Key #:	K16842
Location of Project:	Mile Posts (MP) 60.6 to 62.8 on Highway 26 Township 1N, Range 2W, Sections 15, 16, 22, and 23
Size of Area of Potential Impact:	150 acres
City:	Hillsboro
County:	Washington County, OR
Project Staff:	Jonathon Belmont Kristen Currens Alexis Casey
Site Visit:	February 3, 2010
Current Land Use(s):	Highway right-of-way, residential, commercial, and agricultural
Waterways on Site:	Two tributaries to McKay Creek
6th Field HUC:	170900100107 (McKay Creek)
ODFW In Water Work Window:	July 15 – September 30

1.0 INTRODUCTION

This Water Quality Environmental Baseline Report (EBR) summarizes available water quality baseline data and describes environmental permits and clearances that may be necessary for the improvement of the Shute Road Interchange along Highway 26 in Washington County, Oregon. While additional data collection may be necessary, existing baseline data will be used to thoroughly characterize water quality for this project, and to help the design team develop alternatives that avoid and/or minimize impacts associated with the improvement project.

1.1 Purpose

The Oregon Department of Transportation (ODOT) proposes to improve the interchange at Shute Road located between Mile Post (MP) 60.6 and 62.8 on Highway 26 (Figure 1). The increasing population in Washington County has begun to strain the existing transportation infrastructure. The purpose of this project is to alleviate congestion by increasing the capacity at this interchange.

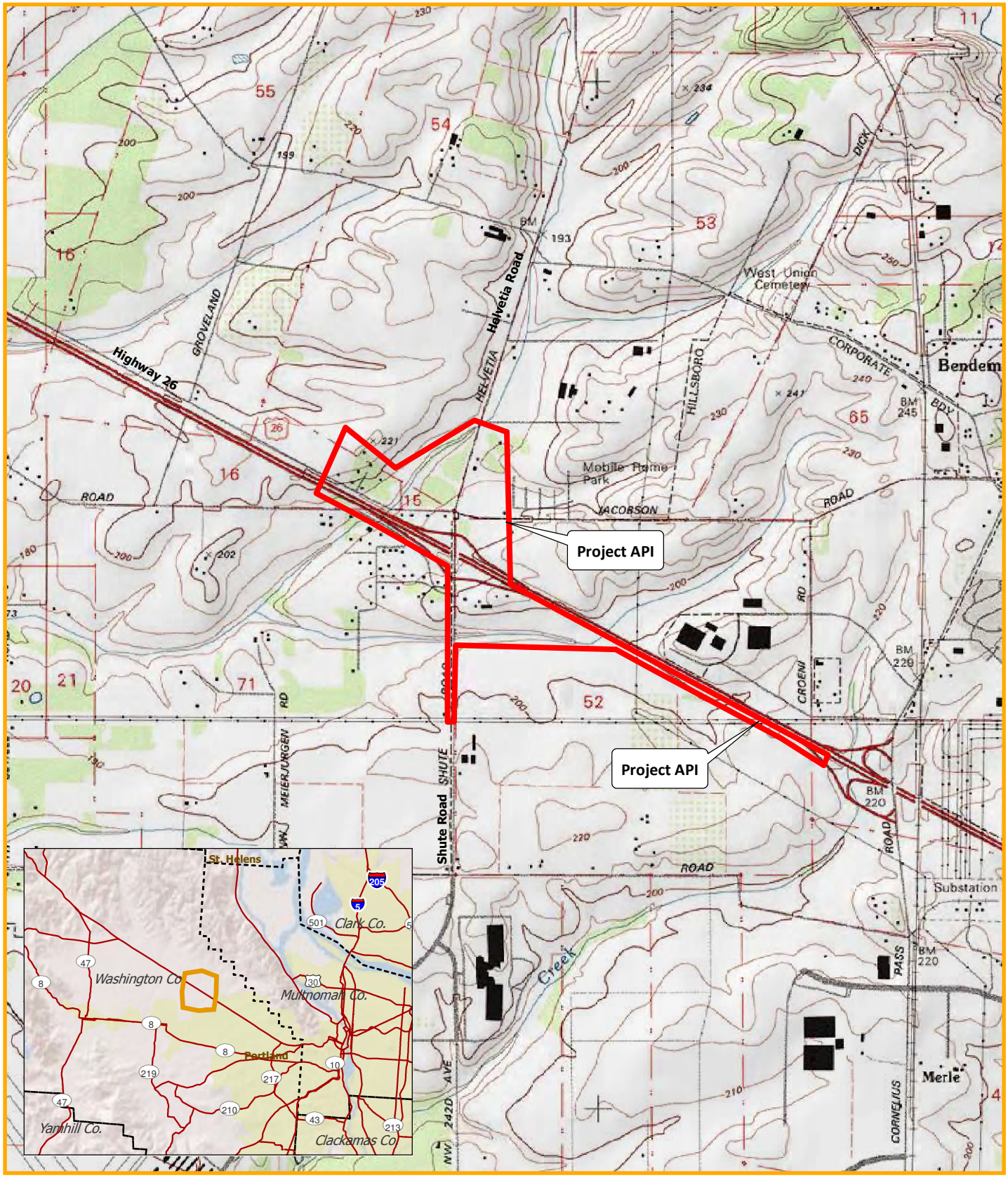
1.2 Project Description

The proposed project would reconstruct the Shute Road/Helvetia Road Interchange. The project would include the addition of a westbound-to-southbound loop ramp, reconstructing the westbound exit and entrance loop ramps, and adding a second right turn lane to the eastbound entrance ramp.

1.3 Area of Potential Impact (API)

The Area of Potential Impact (API) is located along Highway 26 at the Shute Road Interchange in Washington County, Oregon. From the center of the interchange, the API extends approximately 2,000 feet to the north, south and west. In addition, the API extends approximately 1.25 miles east towards the NW Cornelius Pass Road Interchange. The eastern portion of the API is located within the City of Hillsboro. Figure 1 shows the general location of the API.

Topography within the API is generally flat with an approximate elevation of 200 feet above mean sea level (msl) (USGS 1986). The majority of the API has experienced alterations to the natural landscape as the result of the construction of Highway 26, road fill for construction of the elevated Shute Road overcrossing, construction of multiple secondary roadways, agriculture, and residential and commercial development. The majority of the native vegetation has been removed within the API. There are two creeks within the API, both unnamed tributaries of McKay Creek, that have been channelized and now receive greater volumes of water due to the increase in impervious surface within the API.



N

Miles
0 0.25 0.5

Kilometers
0 0.25 0.5 0.75

Figure 1.

Project Location and Vicinity Map
Shute Road Interchange Improvement Project
Washington County, Oregon

MB&G
Mason, Bruce & Girard, Inc.
Natural Resource Consultants since 1921

Data Source: TOPO! USGS 7.5 min., 24K Digital Topographic Data, Oregon. This product is for information purposes only and may not be suitable for legal, engineering or surveying purposes. This information or data is provided with the understanding that conclusions drawn from such information are the responsibility of the user.

Figure1.pdf Creation Date: Feb 9, 2010.

2.0 METHODS

The following sections of this memorandum summarize the water quality issues identified in existing database information, discussions with regulatory agency staff, and a site investigation conducted by Mason, Bruce, and Girard, Inc. (MB&G) on February 3, 2010. At the time of the site visit, ODOT did not have right-of-entry for areas outside of public rights-of-way (ROW). As such, areas outside of public ROW were visually inspected from the adjacent roadway.

The site investigation was conducted to evaluate the baseline water quality conditions of natural resources (i.e., aquatic/riparian conditions, presence of wetlands, habitat conditions) within the Project API. During the field visit, the API was examined and photographed (see Appendix A).

MB&G obtained data regarding threatened and endangered species within the API from U.S. Fish and Wildlife Service (USFWS 2010), StreamNet (StreamNet 2010), and the Oregon Natural Heritage Information Center (ORNHIC 2010). MB&G also contacted Oregon Department of Fish and Wildlife (ODFW) to confirm current or historical native migratory fish presence within the API (J. Brick pers. comm. 2010). MB&G contacted Washington County (S. Roberts pers. comm. 2010) and the City of Hillsboro (T. Steele pers. comm. 2010) for local permitting and water usage information. Lastly, MB&G obtained information from the Federal Emergency Management Agency (FEMA) and Washington County in regard to floodplain issues. Data gaps and/or discrepancies have been noted for each of the sections discussed below and, if needed, additional data gathering tasks have been identified.

3.0 EXISTING ENVIONMENTAL RESOURCES

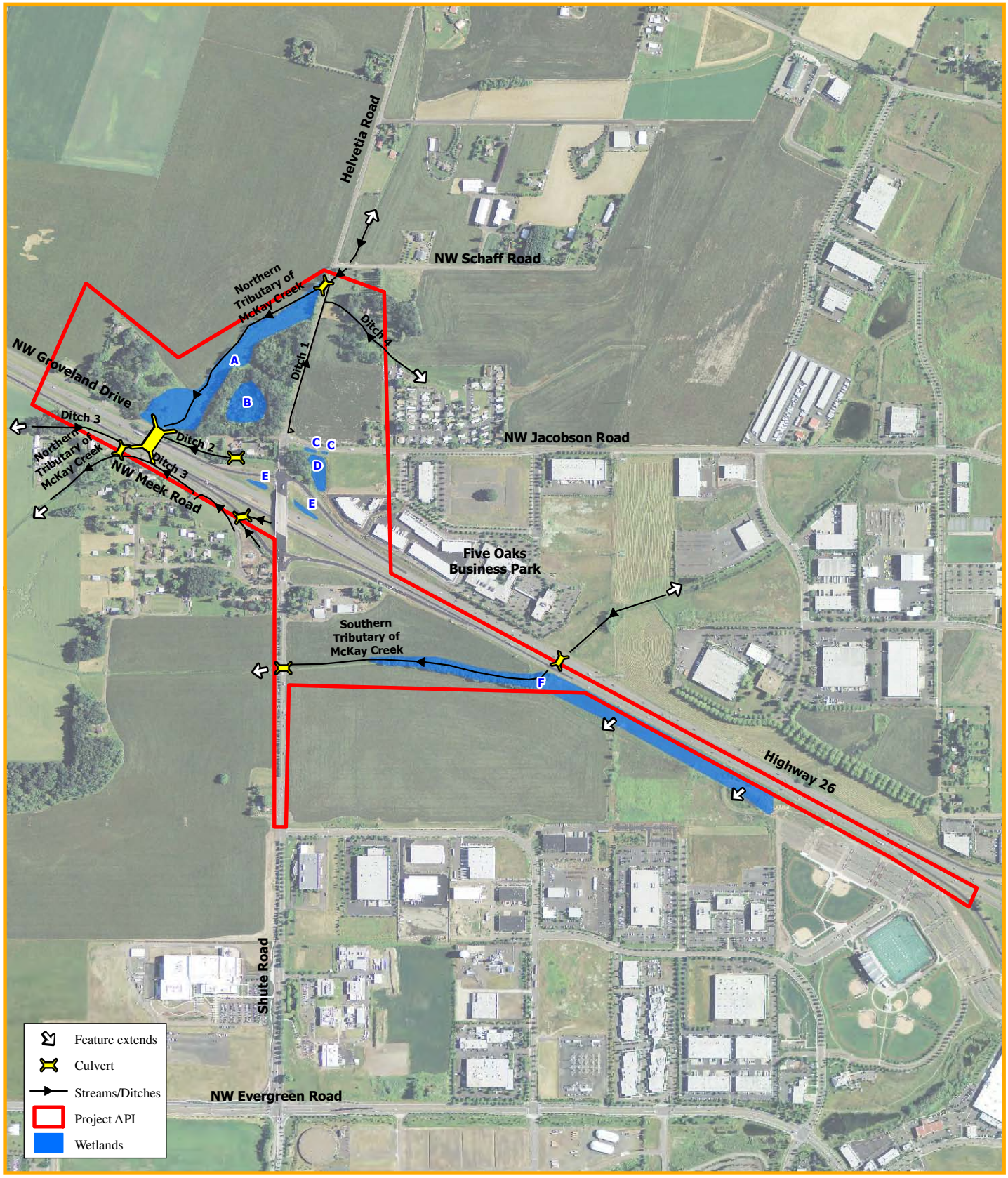
3.1 Receiving Waters

3.1.1 Types of Receiving Waters/Physical Condition/Riparian Condition/Hydrology

Twelve jurisdictional wetlands and waters features were identified during the site investigation on February 3, 2010 (Figure 2). The approximate acreage of each feature within the API is provided in Table 1 and further descriptions of these features follows. As access was not provided beyond public ROW, feature presence, location, boundaries, and acreage are approximate and should be used for preliminary planning purposes only.

Table 1. Wetland/Waters Identified within the API.

Feature	Approximate Acreage
Wetland A	6.9
Wetland B	1.8
Wetland C	0.1
Wetland D	0.6
Wetland E	0.3
Wetland F	4.5
Total Wetland Acreage	***14.1***
Northern Unnamed Tributary of McKay Creek	0.2
Southern Unnamed Tributary of McKay Creek	0.8
Ditch 1	0.1
Ditch 2	0.1
Ditch 3	0.1
Ditch 4	0.1
Total Waters Acreage	***1.3***



N

0 500 1,000 Feet

0 100 200 300 Meters

Figure2.pdf Creation Date: Feb 9, 2010.

Figure 2.

Wetlands and Waters Map
Shute Road Interchange Improvement Project
Washington County, Oregon

MB&G

Mason, Bruce & Girard, Inc.
Natural Resource Consultants since 1921

Data Source: NAIP 2009 imagery. This product is for information purposes only and may not be suitable for legal, engineering or surveying purposes. This information or data is provided with the understanding that conclusions drawn from such information are the responsibility of the user.

3.1.2 Wetlands

Wetland A

Wetland A is a low-quality, palustrine emergent (PEM) wetland that abuts the unnamed tributary of McKay Creek which is located to the north of Highway 26 and west of Helvetia Road. Vegetation within this feature is composed primarily of reed canarygrass (*Phalaris arundinacea* FACW). Hydrology for Wetland A is primarily supplied by overflow from the northern unnamed tributary of McKay Creek.

Wetland B

Due to the location of Wetland B on private property within a forested area, MB&G biologists were not able to visually inspect this feature and, therefore, could not rule out the presence of wetlands in this location. Aerial photos (NAIP 2009) show a potential palustrine forested (PFO) wetland signature pattern (trees are less dense in this area). Based on aerial photos, there is potential surface hydrologic connectivity from Wetland A to Wetland B.

Wetland C

Wetland C is comprised of two low-quality PEM swales located immediately south of NW Jacobson Road. These wetlands are located in man-made depressions and were created for the collection of stormwater runoff. Reed canarygrass and rushes (*Juncus* spp. FACW [est.]) characterized the vegetation in Wetland C.

Wetland D

Wetland D is a stormwater detention/treatment pond for the Five Oaks business development complex. This is a medium-quality PEM wetland that is dominated by broad-leaf cattail (*Typha latifolia* OBL). Although an outlet was not observed, this wetland likely has a direct connection to other waters features.

Wetland E

Wetland E is comprised of two small, low-quality PEM wetlands located on either side of the Shute Road overpass just north of Highway 26. Common roadside grass species, including tall fescue (*Schedonorus phoenix* FAC), were observed in Wetland E. Hydrology for Wetland E is supplied primarily by runoff from Highway 26. This feature does not appear to have a surface hydrology connection to other wetland/waters features.

Wetland F

Wetland F is a large, low to high-quality PEM/PFO wetland located south of Highway 26 and east of Shute Road. This wetland abuts the southern unnamed tributary of McKay Creek. The central, high-quality portion of this wetland is dominated by Oregon ash (*Fraxinus latifolia* FACW), and the western, low-quality portion of the wetland is comprised of unidentified herbaceous species. Hydrology for Wetland F is primarily supplied by overflow from the southern unnamed tributary of McKay Creek.

3.1.3 Waters

Northern Unnamed Tributary of McKay Creek

The northern unnamed tributary of McKay Creek is a small, perennial stream characterized by an altered vegetation community and a channelized morphology. This stream is approximately 10 feet wide, and flowing water was observed in the feature during the February 3, 2010 site investigation. The northern unnamed tributary of McKay Creek, also referred to as Warble Gulch, Waible Creek, and Storey Creek on mapping records, flows under Highway 26 through a 5-foot box culvert where it joins with Ditch 3. Ditches 1 and 2 also drain into this feature. This stream eventually flows into McKay Creek, which drains to Dairy Creek, a tributary of the Tualatin River. Based on Oregon Department of Forestry (ODF) stream mapping (ODF 2003), the northern unnamed tributary of McKay Creek's headwaters is located approximately 3 miles north of the API. This feature receives hydrology from multiple small creeks north of the API. Native riparian vegetation surrounding this feature has been eliminated within the API and substrate in the bed of the feature consists of silt.

Southern Unnamed Tributary of McKay Creek

The southern unnamed tributary of McKay Creek is also a small, perennial stream that has been channelized. The majority of the native vegetation has been removed from the eastern and western portions of this feature within the API. However, a forested wetland fringe comprised primarily of Oregon ash surrounds the central portion of this feature and provides high-quality riparian conditions in this area. This stream is approximately 8 feet wide and flowing water was observed during the February 3, 2010 site investigation; the substrate consists of silt. This perennial stream is also referred to as Waible Creek on some mapping records and it eventually drains into McKay Creek, which drains to Dairy Creek, a tributary of the Tualatin River. Based on Oregon Department of Forestry (ODF) stream mapping (ODF 2003), the southern unnamed tributary of McKay Creek's headwaters is located approximately 1 mile northeast of the API. This feature receives hydrology from multiple small creeks northeast of the API.

Ditch 1

Ditch 1 is an intermittent roadside ditch that is approximately 1-foot wide and has a substrate comprised of silt. Runoff from NW Jacobsen Road and NW Helvetia Road provides hydrology for this ditch. This feature drains directly into the northern unnamed tributary of McKay Creek. Weedy herbaceous vegetation was observed in and adjacent to Ditch 1.

Ditch 2

Ditch 2 is an approximately 5-feet wide man-made swale that drains directly into the northern unnamed tributary of McKay Creek. Substrate in the bed of Ditch 2 consists of silt. A culvert outlet provides the origin of this feature; the hydrology source is unknown. A moderate amount of flowing water was observed in this feature; therefore it may be considered a perennial waterbody. Moderate-quality riparian vegetation comprised of willow species (*Salix* spp. FACW [est.]) surrounds the eastern portion of this feature. The western portion of the ditch has a low quality riparian buffer dominated by reed canarygrass.

Ditch 3

Ditch 3 is an intermittent, 1-foot-wide roadside ditch that receives runoff from NW Meek Road and a small portion of Highway 26. Substrate in the bed of Ditch 3 consists of silt. This feature drains directly into the northern unnamed tributary of McKay Creek. Herbaceous vegetation, including weedy species and rushes, was observed in and adjacent to Ditch 3.

Ditch 4

Ditch 4 is swale that is approximately 2-feet wide that drains directly into the northern unnamed tributary of McKay Creek. This feature is identified on the ODF stream mapping and is located within a hydric soil mapping unit; therefore, this feature may be a historic stream that has been channelized. This feature flows through an agricultural field and vegetation surrounding the ditch is dominated by weedy herbaceous species; substrate consists of silt. Ditch 4 appears to be fed by multiple creeks and other tributaries to the north, and possibly from agricultural runoff. Herbaceous vegetation, including non-native grass species, was observed in and surrounding Ditch 4, the riparian quality surrounding this feature is poor.

3.1.4 Water quality condition and status

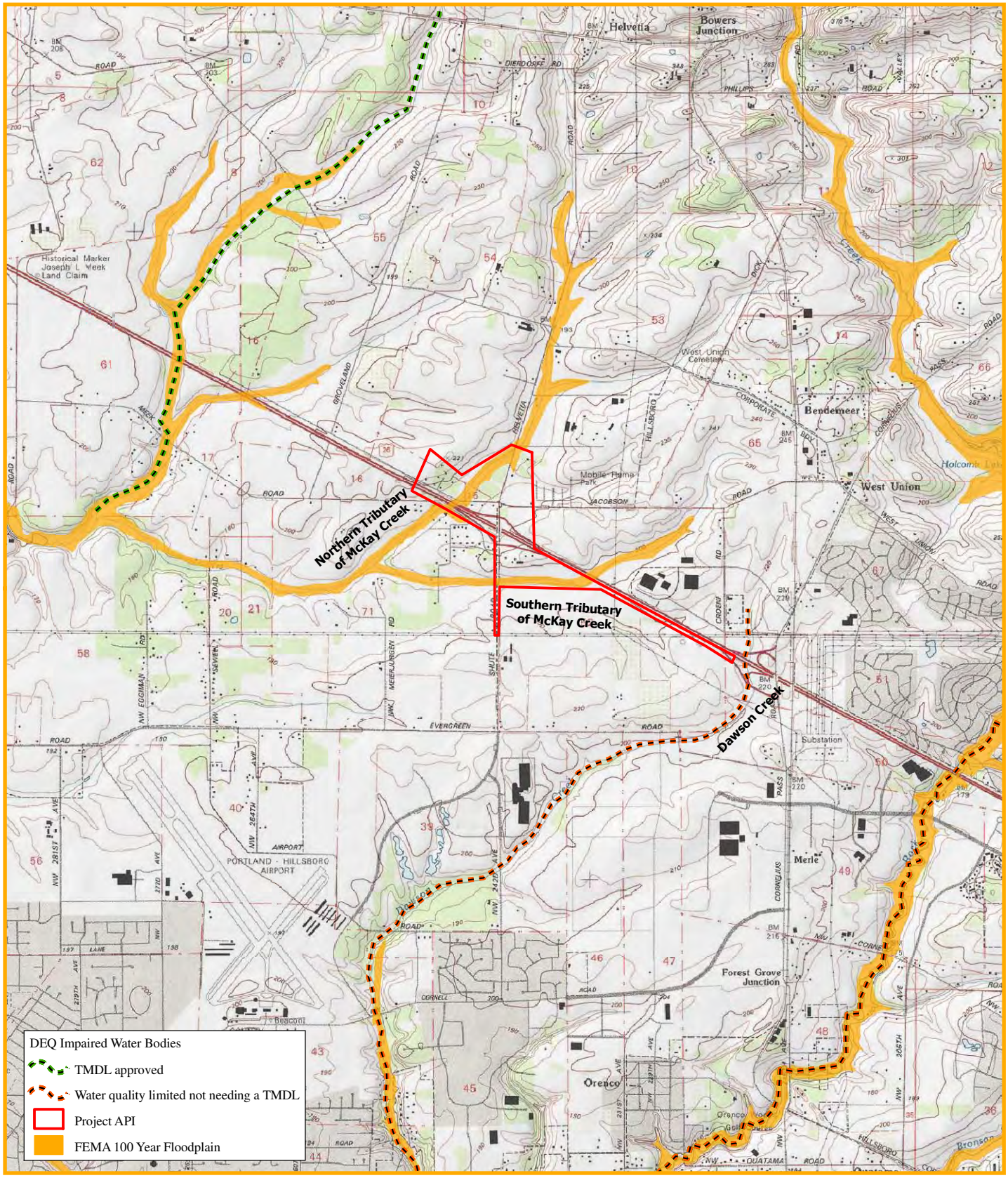
The Oregon Department of Environmental Quality (ODEQ) has listed the mainstem of McKay Creek, located west of the API and upstream of the confluence of McKay and the unnamed tributary of McKay, as having water quality impairments that may warrant special protection measures (Figure 3). In 1998, ODEQ added McKay Creek to the Section 303(d) list for violations including ammonia and phosphorus. Since 1998, the water quality in McKay Creek has further degraded and in 2002, ODEQ added *E. coli* and temperature violations to the creek's water quality impairments (ODEQ 2006). A Total Maximum Daily Load (TMDL) plan has been approved for this creek. The northern and southern unnamed tributaries of McKay Creek located within the API are not specifically identified by ODEQ as having water quality impairments.

Dawson Creek is located approximately 700 feet east of the southeastern corner of the API (Figure 3). ODEQ has identified Dawson Creek as water quality limited (biological criteria), although a TMDL is not currently warranted. Due to its proximity to the API, stormwater from the API may flow into this creek.

3.2 Floodplain

3.2.1 Floodway, 100-year and 500-year floodplain

Areas within the API have been designated within the 100-year floodplain area (Figure 3). The API does not contain areas that have been designated within the 500-year floodplain area (FEMA 2010, S. Roberts pers. comm. 2010).



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Miles
0 0.25 0.5

Kilometers
0 0.25 0.5 0.75 1

Figure3.pdf Creation Date: Feb 9, 2010.

Figure 3.

Water Quality and Flood Plain Map
Shute Road Interchange Improvement Project
Washington County, Oregon

MB&G
Mason, Bruce & Girard, Inc.
Natural Resource Consultants since 1921

Data Source: TOPO! USGS 7.5 min., 24K Digital Topographic Data, Oregon. This product is for information purposes only and may not be suitable for legal, engineering or surveying purposes. This information or data is provided with the understanding that conclusions drawn from such information are the responsibility of the user.

3.3 Beneficial Uses

3.3.1 ODEQ-Defined Beneficial Uses

Designated beneficial use data for the northern and southern unnamed tributaries of McKay Creek are not available. Consequently, the information below is based off the site investigation conducted by MB&G on February 3, 2010.

Table 2. ODEQ Designated Beneficial Uses

ODEQ Designated Beneficial Uses	Northern and Southern Tributaries of McKay Creek
Public Domestic Water Supply	
Private Domestic Water Supply	
Industrial Water Supply	
Irrigation	X
Livestock Watering	X
Fish & Aquatic Life	X
Wildlife & Hunting	
Fishing	
Boating	
Water Contact Recreation	
Aesthetic Quality	X
Hydro Power	
Commercial Navigation & Transportation	

3.3.2 Locally important uses

The City of Hillsboro does not use the northern or southern unnamed tributaries of McKay Creek for drinking water (T. Steele pers. comm. 2010). It is unknown if the unincorporated portions of Washington County use the northern or southern unnamed tributaries of McKay Creek for drinking water.

3.3.3 Threatened or endangered aquatic species

Upper Willamette River (UWR) Distinct Population Segment (DPS) steelhead (*Oncorhynchus mykiss*) utilize McKay Creek for rearing and migration (StreamNet 2010). The upstream extent of steelhead distribution is located approximately 1 mile downstream (southwest) of the proposed API. The unnamed tributaries of McKay Creek do not currently provide rearing and migration habitat for UWR steelhead.

3.4 Soils

3.4.1 Soils

The following table provides a description of the soil types found within the API based on U.S. Department of Agriculture (USDA) Soil Survey for Washington County (Greene 1976).

Table 3. Soils Mapped within the API.

Soil Name	Description	Permeability	Erosion Potential
Amity Silt Loam	Found on smooth terraces, somewhat poorly drained, formed in old alluvium on valley terraces	Moderately slow	Runoff is slow, hazard of erosion is slight
Cove Silty Clay Loam	Found on floodplains, along streams, poorly drained, formed in recent clayey alluvium	Very slow	Runoff is slow, hazard of erosion is slight
Dayton Silt Loam	Found on broad valley terraces, poorly drained, formed in old alluvium on old terraces	Very slow	Runoff is slow, hazard of erosion is slight
Verboort Silty Clay Loam	Found on bottom lands along drainage ways, poorly drained, formed in stratified, moderately fine textured and fine textured alluvium	Very slow	Runoff is slow, hazard of erosion is slight
Willamette Silt Loam (0-3% slopes)	Found on broad valley terraces, nearly level, well drained, formed in old alluvium	Moderate	Runoff is slow, hazard of erosion is slight
Willamette Silt Loam (3-7% slopes)	Found on broad valley terraces, gently sloping, well drained, formed in old alluvium	Moderate	Runoff is slow, hazard of erosion is slight
Woodburn Silt Loam (0-3% slopes)	Found on broad valley terraces, nearly level, moderately well drained, formed in old alluvium	Slow	Runoff is slow, hazard of erosion is slight
Woodburn Silt Loam (3-7% slopes)	Found on broad valley terraces, gently sloping, moderately well drained, formed in old alluvium	Slow	Runoff is slow, hazard of erosion is slight

3.5 Watershed Land Use and Vegetation Cover

3.5.1 Percentage developed, agriculture, undeveloped

The McKay Creek (170900100107) watershed is comprised of mostly agricultural lands (60%). The remaining areas are comprised of approximately 30% developed and 10% undeveloped lands.

The API encompasses roughly 150 acres, of which, approximately 40% (60 acres) is developed lands (residential, commercial, roadway development), 40% (60 acres) is agriculture areas, and 20% (30 acres) is undeveloped lands.

3.6 Existing Highway Facilities

3.6.1 Project existing impervious surface area

The amount of existing impervious surface area within the API is approximately 30 acres (20%).

3.6.2 Drainage facilities description

The following information is based upon the site investigation conducted by MB&G on February 3, 2010.

Table 4. Jurisdictional Drainage Facilities Identified within the API.

Feature	Drainage Facility Type	Approximate Extent (acres)
Wetland C	stormwater drainage swale(s)	0.1
Wetland D	stormwater detention/treatment pond	0.6
Wetland E	stormwater swale(s)	0.3
Ditch 1	roadside ditch	0.1
Ditch 3	roadside ditch	0.1

In addition to the jurisdictional features above, other non-jurisdictional ditches exist throughout the API that are smaller than those above and appear to convey smaller amounts of stormwater runoff.

3.7 Treatment Opportunities

3.7.1 Assessment of project area for treatment options

Due to existing restricted highway ROW, onsite treatment opportunities are limited. Treatment facilities for the proposed project may be located within the existing interchange in the vicinity of the on- and off-ramp loops. If onsite areas do not offer sufficient space for proposed treatment facilities, additional ROW may need to be acquired. The open agriculture field outside ODOT ROW in the southeast quadrant of the API may provide additional areas to provide treatment.

3.8 Permits held by ODOT

3.8.1 Indian Reservation

The API is not located on or near an Indian Reservation. As such, ODOT does not hold associated permits.

3.8.2 National Pollutant Discharge Elimination System1200-C permit

ODOT Region 1 currently holds a National Pollutant Discharge Elimination System (NPDES) 1200-C permit.

3.8.3 UIC (Underground Injection Control system)

There are no UICs within the API (T. Steele pers. comm. 2010). As such, ODOT will not need to obtain UIC permits for discharge to groundwater.

4.0 CONCLUSIONS

4.1 Wetland and Waters Permitting

As impacts to wetlands and waters are likely for the proposed Project, Section 404 of the CWA, administered by the ACOE, and the Removal Fill Law, administered by the Department of State Lands (DSL) will apply to the proposed Project. If proposed impacts are less than 0.5 acre, then the Project may qualify for the ACOE Nationwide Permit (NWP) #14, Linear Transportation Projects and the DSL General Authorization (GA) for Certain Transportation-Related Structures. If the Project requires greater than 0.5 acre of impacts, an individual permit (IP) will be required from the ACOE and DSL. A wetland/waters delineation and report will be required for the proposed Project to determine accurate wetland/waters locations and dimensions.

4.2 Water Quality Permits

ODEQs 401 Water Quality Certification (WQC) process will be triggered if, as is anticipated, the ACOE makes a determination that the application for the activities described above will require a permit and results in a discharge. Once this occurs, a stormwater management plan (SWMP) will be required and need to be approved by ODEQ. Additional information on SWMP requirements are described below in section 4.5 Stormwater Management.

Project construction activities are anticipated to disturb more than one acre of land which will likely lead to discharge to surface waters or conveyance systems leading to surface waters of the state. Consequently, the NPDES permit program, administered under Section 402 of the CWA, will require an NPDES 1200-C permit be secured for the Project. This permit requires that the holder prepare an Erosion and Sediment Control Plan (ESCP) which utilizes approved Best Management Practices (BMPs) to prevent erosion and control sediment runoff from the construction site. In addition, the permit requires the applicant to inspect and maintain erosion controls to ensure they are working properly. ODOT Region 1 currently holds a NPDES 1200-C permit.

There are no 303(d) listed waters located within the API. However, Dawson Creek, which is located approximately 700 feet east of the southeastern corner of the API, is water quality limited, but not needing a TMDL. Due to its proximity to the API, stormwater from within the API may flow into Dawson Creek. Consequently, Project engineers should develop plans to prevent untreated stormwater from within the API from being discharged into Dawson Creek. Additionally, in order to minimize potential direct water resource impacts during Project construction, the Project would require the preparation and implementation of an ESCP and associated BMPs for erosion and sediment control.

4.3 Threatened and Endangered Aquatic Species

The API does not contain suitable habitat for any state or federally-listed fish or aquatic species. However, the upstream extent of steelhead distribution is located approximately 1 mile downstream (southwest) of the API. Although direct impacts to listed salmonids are not expected as a result of the proposed project, indirect impacts are possible. If the project includes work in, over, or adjacent to the two unnamed tributaries to McKay Creek, indirect impacts may include

temporary increases in turbidity as a result of construction. In addition, the proposed project will include increases in impervious surface which may cause indirect stormwater impacts to steelhead downstream.

Due to these anticipated indirect effects to listed species, a BA or Standard Local Operating Procedure for Endangered Species (SLOPES IV) Compliance Report must be prepared to provide Endangered Species Act (ESA) clearance. Upon submittal of this document to the regulatory agencies, ODOT can expect a maximum review timeline of 135 business days for a BA with a Likely to Adverse Affect (LAA) effect determination. Minimizing or avoiding impacts on the natural resources described within the API may shorten the review timeline.

If the proposed Project does include activities within the two unnamed tributaries of McKay Creek, these activities should be scheduled during ODFW-approved In-Water Work Window for the Tualatin River and its tributaries (July 15 through September 30) (ODFW 2008).

4.4 Floodplain/Floodway

Areas within the API reside within the 100-year floodplain areas. Activities located within the FEMA Floodplain/floodway are regulated by Washington County. Project activities within the floodplain need to be authorized by Washington County via the Washington County Land Use Application process (R. Brown pers. comm. 2010). In addition, a Washington County Flood Plain/Drainage Hazard Determination form will be required.

4.5 Stormwater Management

Due to the addition of impervious surface within the API, a SWMP will need to be developed by Project engineers. The SWMP will need to quantify the Project's Contributing Impervious Area (CIA) in order calculate treatment requirements. The CIA will have to be treated to meet ODOT, National Marine Fisheries Service (NMFS), and ODEQ requirements. These requirements, as outlined in SLOPES IV, mandate that all stormwater quality treatment practices and facilities must be designed to accept 50% of the cumulative rainfall from the 2-year, 24-hour storm for that site.

Treatment facilities for the proposed project may be located within the existing interchange in the vicinity of the on- and off-ramp loops. Treatment options could include vegetated swales, ditches, culverts and planting within the ROW. If onsite areas do not offer sufficient space for proposed treatment facilities, additional ROW may need to be acquired.

4.6 Local Jurisdiction permits

If Washington County ROW needs to be acquired by ODOT in order to construct the proposed project, a Washington County ROW permit could be required (J. Kuppler pers. comm. 2010). Additionally, a Washington County Land Use Application (Article VII of the Community Development Code) and review permits could be required (S. Roberts pers. comm. 2010) as a result of the project.

4.7 Summary

Table 5 provides details regarding the applicable permits, approvals, and clearances needed for the proposed Shute Road Interchange Improvement Project.

Table 5. Summary of Applicable Permits, Approvals, and Clearances Needed for the Shute Road Interchange Improvement Project

Type of Permit / Approval/ Clearance	Issuing Agency	Permit / Approval / Clearance	Estimated Timeline (after submittal)
ESA Consultation for listed fish species: SLOPES IV Compliance Report or Biological Assessment	NMFS	SLOPES Approval or Biological Opinion	30 days (SLOPES) 45 days (NLAA) 135 days (LAA)
Removal/Fill Permit	DSL	Joint Permit Application approval	GA: 40 days after Wetland/Waters Delineation Report concurrence IP: 120 days
Section 404 Clean Water Act permit	ACOE	Joint Permit Application approval	NWP: 45-75 days IP: 120 days
Section 401 Water Quality Certification	ODEQ	SWMP	Concurrent with JPA
Washington County Land Use Application- Community Development	Washington County Land Use and Transportation	Public Notice, Public Hearing, Application Review	Project dependent
Washington County Right-of-Way Permit	Washington County Land Use and Transportation	Washington County Right-of-Way Permit	Project dependent
Washington County Floodplain Permit	Washington County Land Use and Transportation	Flood Plain/Drainage Hazard Determination form	Project dependent

NLAA – Not Likely to Adversely Affect; LAA – Likely to Adversely Affect; SWMP – Stormwater Management Plan; SLOPES – Standard Local Operating Procedures for Endangered Species.

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Appendix A

Area of Potential Impact Photographs

1

2

MB&G Mason, Bruce & Girard, Inc. February 3, 2010	1. View to the northeast from NW Groveland Drive of the northern unnamed tributary of McKay Creek. 2. View of southwest portion of API; stormwater ditch from Shute Road Interchange.

3

4

MB&G Mason, Bruce & Girard, Inc. February 3, 2010	3. View to the west of the western portion of Wetland C. NW Jacobson Road is visible at photo right and Helvetia Road is visible in the background. 4. View to the south of Wetland D, the stormwater pond. Note the potential Clean Water Services (CWS) mitigation plantings in the photo foreground. The westbound Shute Road off-ramp is visible in the photo background.

5

6

MB&G Mason, Bruce & Girard, Inc. February 3, 2010	5. View to the southeast of western portion of Wetland E. Note the standing water in the photo center. The westbound on-ramp from Shute Road to Highway 26 is visible at photo left, Shute Road is visible in the background, and Highway 26 is visible at photo right. 6. View to the southwest showing Wetland F. Highway 26 is located behind the photographer.

7

8

MB&G Mason, Bruce & Girard, Inc. February 3, 2010	7. View to the southeast of Ditch 2. The confluence of Ditch 2 and the northern unnamed tributary of McKay Creek is located immediately behind the photographer. NW Groveland Drive is located to the left of the photo. 8. View to the southeast of the eastern extent of Ditch 2. Note the culvert outlet, as indicated by the red arrow. The west bound on-ramp from Shute Road to Highway 26 is located to the right of the photo.

9

10

MB&G Mason, Bruce & Girard, Inc. January 8, 2010	9. View to the southeast of a portion of Ditch 3. The ditch enters into a culvert at the red arrow and passes under the east bound off-ramp from Highway 26 to Shute Road. 10. View to the northwest of a portion of Ditch 3. The east bound off-ramp from Highway 26 to Shute Road is visible at photo right.

11

12

MB&G Mason, Bruce & Girard, Inc. February 3, 2010	11. View to the west of the southern unnamed tributary of McKay Creek at the western extent of the API. 12. Typical upland grass seed production field within the northern portion of the API with a view to the south. The northern unnamed tributary of McKay Creek is visible at the bottom of the photo. Note the numerous stands of Oregon white oak (*Quercus garryana* FACU) (red arrows) within the API. Helvetia Road is visible at photo right.

Wetland Environmental Baseline Report

SHUTE ROAD INTERCHANGE IMPROVEMENT PROJECT
Key Number K16842
Washington County, Oregon

Prepared for:

ODOT Region 1
123 Flanders Street
Portland, Oregon 97213

Prepared by:

Mason, Bruce & Girard, Inc.
707 SW Washington Street, Suite 1300
Portland, Oregon 97205
(503) 224-3445

February 22, 2010

MB&G Project No. 1581

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APPENDICES

Appendix A. Area of Potential Impact Photographs

I. SITE DATA SUMMARY

Data Summary	
Project Name:	Shute Road Interchange Improvement Project
ODOT Key #:	K16842
Location of Project:	Mile Posts (MP) 60.60 to 62.25 on Highway 26 Township 1N, Range 2W, Sections 15, 16, 22, and 23
Size of Area of Potential Impact (API):	150 acres
City:	Hillsboro
County:	Washington County, Oregon
Project Staff:	Kristen Currens Alexis Casey
Site Visit:	February 3, 2010
Current Land Use(s):	Highway right-of-way, residential, commercial, agricultural
Waterways on Site:	Two unnamed tributaries to McKay Creek
6th Field HUC:	170900100107
ODFW In Water Work Window	July 15 – September 30

1.0 INTRODUCTION

This Environmental Baseline Report (EBR) summarizes available baseline data and describes environmental permits and clearances that may be necessary for the improvement of the Shute Road Interchange along Highway 26 in Washington County, Oregon. While additional data collection may be necessary, environmental baseline data described herein will inform project design and the development of alternatives that avoid and/or minimize impacts to sensitive features identified within the area of potential impact (API).

1.1 Purpose

The increasing population in Washington County has begun to strain the existing transportation infrastructure. The purpose of this project is to alleviate congestion by increasing the capacity at the Shute Road Interchange (Project). The Oregon Department of Transportation (ODOT) proposes to improve the interchange at Shute Road located between Mile Post (MP) 60.60 to 62.25 of Highway 26. The purpose of this EBR is to describe and document wetland and waters resources identified within the API for the Project (Figure 1).

1.2 Project Description

The proposed project would reconstruct the Shute Road/Helvetia Road Interchange. The project would include the addition of a westbound-to-southbound loop ramp, reconstructing the westbound exit and entrance loop ramps, and adding a second right turn lane to the eastbound entrance ramp.

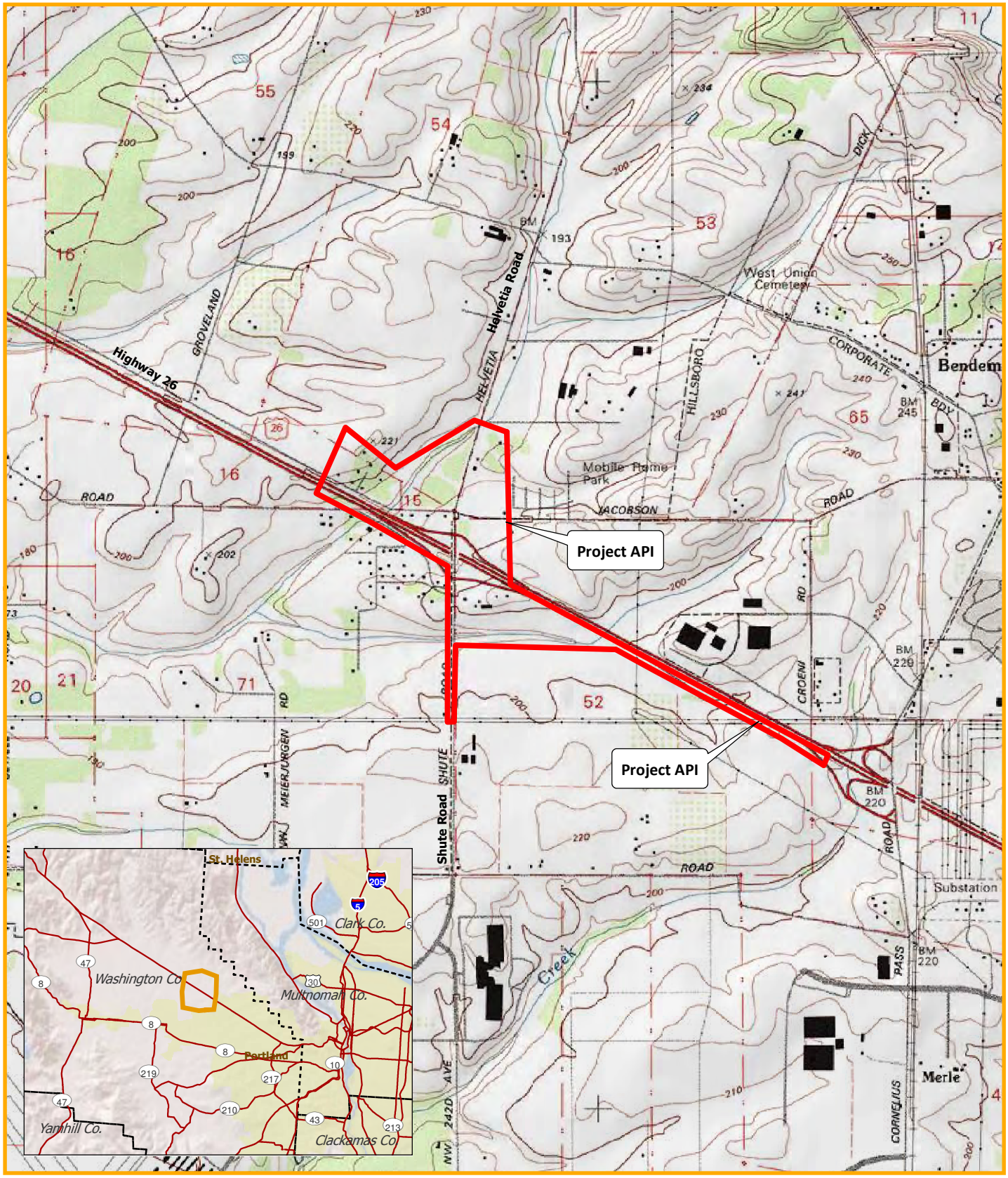
1.3 Area of Potential Impact (API)

The API extends approximately 2,000 feet in either direction from the Shute Road Interchange with the exception of the eastern portion of the API along Highway 26, where the API extends approximately 1.25 miles towards the NW Cornelius Pass Road Interchange. Figure 1 shows the general location of the API.

1.4 Landscape Setting and Land Use

The API for the Shute Road Interchange Improvement Project is located on the outskirts of urbanized Washington County. The eastern portion of the API is located within the City of Hillsboro, and the western portion of the API is located within unincorporated Washington County. Topography within the API is generally flat with an approximate elevation of 200 feet above mean sea level (msl) (USGS 1986).

The majority of the API has experienced alterations to the natural landscape as the result of the construction of Highway 26, road fill for construction of the elevated Shute Road overcrossing, construction of multiple secondary roadways, agriculture, and residential and commercial development. The majority of the native vegetation has been removed within the API. The two creeks within the API, the northern and southern tributaries of McKay Creek, have been channelized and now receive greater volumes of water due to increases in impervious surface within the API.



N

Miles
0 0.25 0.5

Kilometers
0 0.25 0.5 0.75

Figure 1.

Project Location and Vicinity Map
Shute Road Interchange Improvement Project
Washington County, Oregon

MB&G
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Figure1.pdf Creation Date: Feb 9, 2010.

2.0 METHODS

The following sections of this report summarize the major wetland/waters resources and permit requirements identified during a pre-field review of available information and a field visit conducted by Mason, Bruce, and Girard, Inc. (MB&G) wetland biologists on February 3, 2010. Potential wetlands and waters were identified prior to the field visit using aerial photographs (NAIP 2009), U.S. Geological Survey topographic maps (Hillsboro, Oregon Quadrangle, USGS 1986) (Figure 1), U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) mapping (USFW 2010) (Figure 2), Local Wetland Inventory (LWI) mapping records for the City of Hillsboro (east of the Shute Road/Highway 26 intersection only) (Fishman Environmental Services 2001) (Figure 2), Oregon Wetland Assessment Protocol (ORWAP) mapping (OSU 2010), Oregon Department of Forestry (ODF) stream mapping (ODF 2003) (Figure 2), and the Soil Survey of Washington County, Oregon (Green 1982, NRCS 1999) (Figure 2).

The field visit was conducted to evaluate the environmental baseline conditions of the Project API, including potentially jurisdictional wetlands and waters. During the field visit, the API was examined and photographed from public roadways because access onto private property was not permitted (Appendix A). Accordingly, biologists conducted a visual inspection of private properties from public roadways. Therefore, the boundaries of wetland/waters features are approximate and subject to change after an on-site wetland/waters delineation has been conducted. Based on available access, all potential wetlands and waters features identified during the pre-field review were inspected during the field visit. The locations and extent of wetland features were determined by the predominance of hydrophytic plant communities and visual indicators of wetland hydrology, including surface water, drainage patterns, topographic depressions in the landscape, and signature patterns on aerial photography. Due to the scope of the field evaluation and restricted access for the majority of the API, biologists did not excavate soil pits or document the ordinary high water elevation (OHWE) of waters.

Previous wetland/waters delineations have been conducted within the eastern portion of the API, including WD2002-0001 (CWS 2002) and WD2004-0679 (DEA 2004). Although the Letter of Concurrence for Report WD2002-001 has expired, MB&G wetland biologists made an attempt to locate each previously delineated feature during the field visit.

All wetlands/waters identified in the field that may be jurisdictional to the Army Corps of Engineers (ACOE), Department of State Lands (DSL), or Clean Water Services (CWS) were hand-sketched onto aerial photos and then digitized using Geographic Information System (GIS) software. Additional waters features (ditches) were identified in the field; however, due to their small size (less than 10 feet wide), inaccessibility to food and game fish, lack of adjacency to wetlands, artificial creation in uplands, and/or flow for less than three months of the year; these ditches are not likely jurisdictional and are not discussed further in this report.

Data gaps and/or discrepancies have been noted for each of the sections discussed below and, if needed, additional data gathering tasks have been identified.

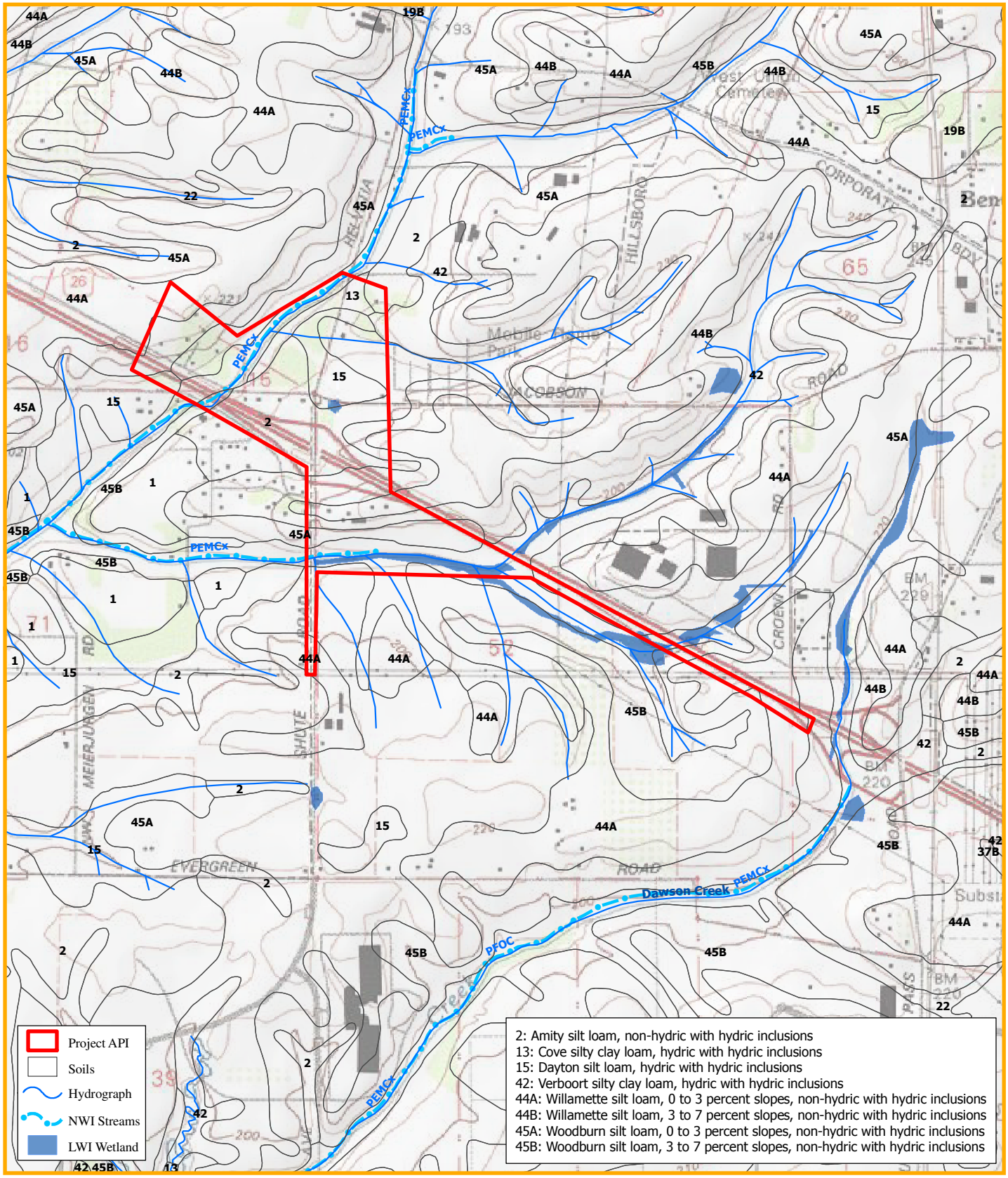

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Figure 2.

LWI/NWI and NRCS Soils Map
Shute Road Interchange Improvement Project
Washington County, Oregon

MB&G

Mason, Bruce & Girard, Inc.
Natural Resource Consultants since 1921

Data Source: TOPO! USGS 7.5 min., 24K Digital Topographic Data, Oregon. This product is for information purposes only and may not be suitable for legal, engineering or surveying purposes. This information or data is provided with the understanding that conclusions drawn from such information are the responsibility of the user.

3.0 PRE-FIELD REVIEW RESULTS

Seven soil types are mapped within the API, three of which are considered hydric (Table 1) (Green 1982, NRCS 1999). The mapped hydric soils within the API are centered on Ditch 4, Wetland F, and the northern and southern unnamed tributaries of McKay Creek (Figure 2).

Table 1. Soil Types and Hydric Ratings Mapped within the API.

Map Unit Symbol	Map Unit Name	Hydric	Hydric Inclusions
2	Amity silt loam	N	Y
13	Cove silty clay loam	Y	Y
15	Dayton silt loam	Y	Y
42	Verboort silty clay loam	Y	Y
44A	Willamette silt loam, 0 to 3 percent slopes	N	Y
44B	Willamette silt loam, 3 to 7 percent slopes	N	Y
45A	Woodburn silt loam, 0 to 3 percent slopes	N	Y
45B	Woodburn silt loam, 3 to 7 percent slopes	N	Y

The Hillsboro NWI map shows three mapped features within the API that correspond to the northern and southern unnamed tributaries of McKay Creek and Wetland F (USFWS 2010) (Figure 2). The presence and approximate locations of all three of these features were confirmed in the field (Figure 3).

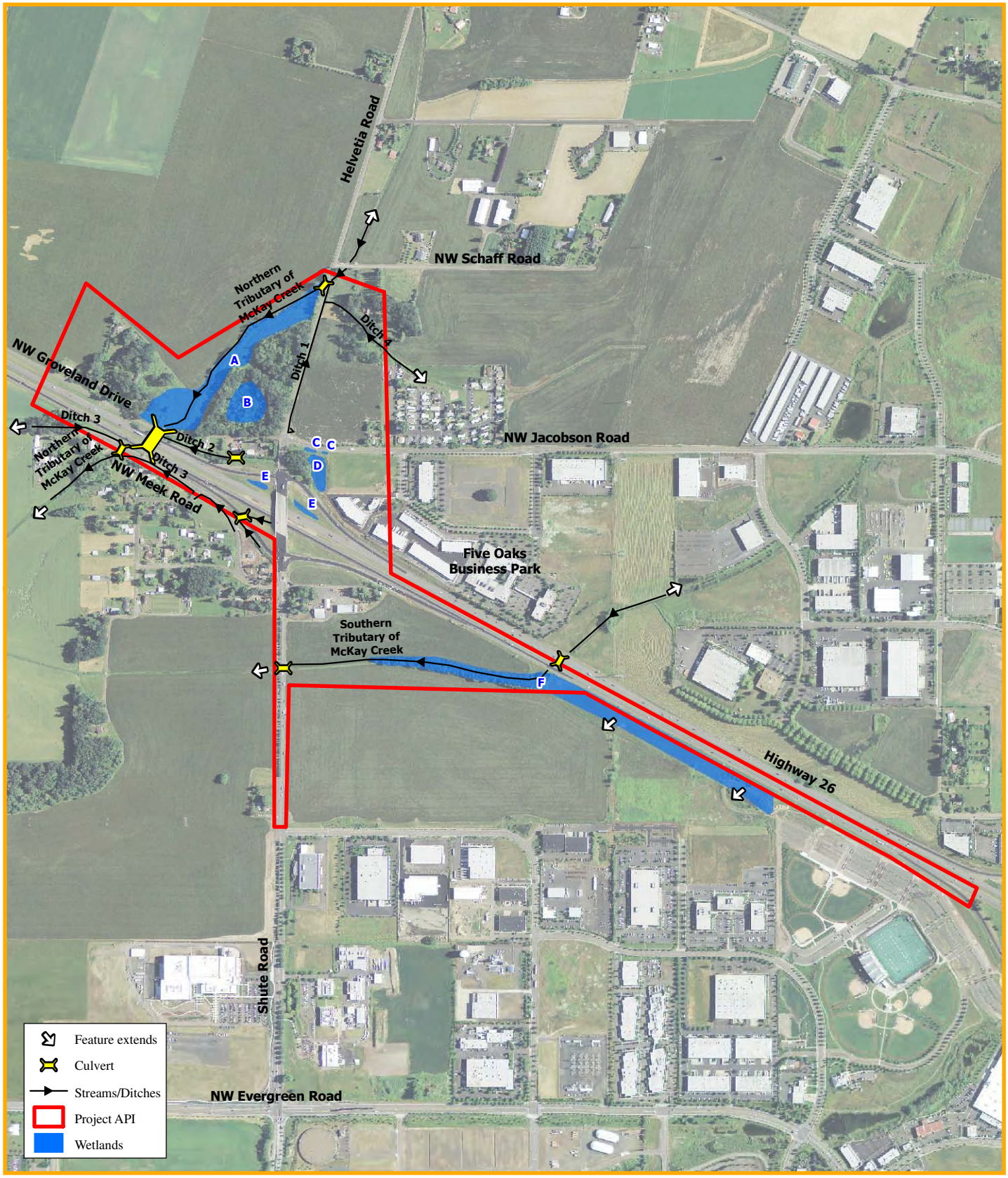
Two features are mapped on the LWI east of the Shute Road Interchange within the API (Fishman Environmental Services 2001) (Figure 2); these features were also identified during the field visit. The first feature, mapped south of Highway 26, corresponds to the southern unnamed tributary of McKay Creek and Wetland F. The second feature, a small wetland just northeast of the Shute Road Interchange, corresponds to Wetland D (Figure 3).

ORWAP mapping shows multiple wetlands that correspond to Wetlands A, B, and F, the northern and southern unnamed tributaries of McKay Creek, and Ditches 2 and 3.

The 2002-0001 wetland delineation report identified a stormwater detention pond, a wetland swale, and a stream identified as Waible Creek. MB&G wetland biologists observed these three features; Waible Creek is described below as the southern unnamed tributary of McKay Creek and the stormwater detention pond and wetland swale are described below as Wetland F. The 2004-0679 wetland delineation report identified a wetland south of Highway 26 and east of Shute Road that corresponds to a portion of Wetland F and the southern unnamed tributary of McKay Creek (Figure 3).

4.0 FIELD VISIT RESULTS

Twelve jurisdictional wetlands and waters features were identified during the field visit on February 3, 2010 (Figure 3). The approximate acreage of each feature within the API is provided in Table 2 and each feature is described below. As access was not provided beyond public right-of-way, feature presence, location, boundaries, and acreage are approximate and should be used for preliminary planning purposes only.



N

0 500 1,000 Feet

0 100 200 300 Meters

Figure3.pdf Creation Date: Feb 9, 2010.

Figure 3.

Wetlands and Waters Map
Shute Road Interchange Improvement Project
Washington County, Oregon

MB&G

Mason, Bruce & Girard, Inc.
Natural Resource Consultants since 1921

Data Source: NAIP 2009 imagery. This product is for information purposes only and may not be suitable for legal, engineering or surveying purposes. This information or data is provided with the understanding that conclusions drawn from such information are the responsibility of the user.

Table 2. Wetland/Waters Identified within the API.

Feature	Approximate Acreage
Wetland A	6.9
Wetland B	1.8
Wetland C	0.1
Wetland D	0.6
Wetland E	0.3
Wetland F	4.5
Total Wetland Acreage	***14.1***
Northern Unnamed Tributary of McKay Creek	0.2
Southern Unnamed Tributary of McKay Creek	0.8
Ditch 1	0.1
Ditch 2	0.1
Ditch 3	0.1
Ditch 4	0.1
Total Waters Acreage	***1.3***

4.1 Wetlands

Wetland A

Wetland A is a low-quality, palustrine emergent (PEM) wetland that abuts the northern unnamed tributary of McKay Creek which is located to the north of Highway 26 and west of Helvetia Road. Vegetation within this feature is composed primarily of reed canarygrass (*Phalaris arundinacea* FACW).

Wetland B

Due to the location of Wetland B on private property within a forested area, MB&G biologists were not able to visually inspect this feature and, therefore, could not rule out the presence of wetlands in this location. Aerial photos (NAIP 2009) show a potential palustrine forested (PFO) wetland signature pattern (trees are less dense in this area). Based on aerial photos, there is potential surface hydrologic connectivity from Wetland A to Wetland B. The quality of this wetland is likely high due to tree cover.

Wetland C

Wetland C is comprised of two low-quality PEM swales located immediately south of NW Jacobson Road. These wetlands are located in man-made depressions and were created for the collection of stormwater runoff. Reed canarygrass and rushes (*Juncus* spp. FACW [est.]) characterized the vegetation in Wetland C.

Wetland D

Wetland D is a stormwater detention/treatment pond for the Five Oaks business development complex and possible CWS vegetated corridor mitigation site. This is a medium-quality PEM wetland that is dominated by broad-leaf cattail (*Typha latifolia* OBL). Although an outlet was not observed, this wetland likely has a direct connection to other waters features.

Wetland E

Wetland E is comprised of two small, low-quality PEM wetlands located on either side of the Shute Road overpass just north of Highway 26. Common roadside grass species, including tall fescue (*Schedonorus phoenix* FAC), were observed in Wetland E. This feature did not appear to have a surface hydrology connection to other wetland/waters features.

Wetland F

Wetland F is a large, low to high-quality PEM/PFO wetland located south of Highway 26 and east of Shute Road. This wetland abuts the southern unnamed tributary of McKay Creek. The central, high-quality portion of this wetland is dominated by Oregon ash (*Fraxinus latifolia* FACW), and the western, low-quality portion of the wetland is comprised of unidentified herbaceous species.

4.2 Waters

Northern Unnamed Tributary of McKay Creek

The northern unnamed tributary of McKay Creek is a small, perennial stream characterized by an altered vegetation community and a channelized morphology. This stream is approximately 10 feet wide, and flowing water was observed in the feature during the February 3, 2010 field visit. The northern unnamed tributary of McKay Creek, also referred to as Warble Gulch, Waible Creek, and Storey Creek on mapping records, flows under Highway 26 through a 5-foot box culvert where it joins with Ditch 3. Ditches 1 and 2 also drain into this feature. This stream eventually flows into McKay Creek, which drains to Dairy Creek, a tributary of the Tualatin River.

Southern Unnamed Tributary of McKay Creek

The southern unnamed tributary of McKay Creek is also a small, perennial stream that has been channelized. The majority of the native vegetation has been removed from the eastern and western portions of this feature within the API; however, a forested wetland fringe comprised primarily of Oregon ash surrounds the central portion of this feature. This stream is approximately 8 feet wide and flowing water was observed during the February 3, 2010 field visit. This perennial stream is also referred to as Waible Creek on some mapping records and it eventually drains into McKay Creek, which drains to Dairy Creek, a tributary of the Tualatin River.

Ditch 1

Ditch 1 is an intermittent roadside ditch that is approximately 1-foot wide and likely carries a relatively permanent flow of water. This feature drains directly into the northern unnamed tributary of McKay Creek. Weedy herbaceous vegetation was observed in Ditch 1.

Ditch 2

Ditch 2 is an approximately 5-feet wide man-made swale that drains directly into the northern unnamed tributary of McKay Creek. A culvert outlet provides the origin of this feature; the hydrology source is unknown. A moderate amount of flowing water was observed in this feature; therefore it may be considered a perennial waterbody. Vegetation surrounding this feature is comprised of willow species (*Salix* spp. FACW [est.]).

Ditch 3

Ditch 3 is an intermittent, 1-foot-wide roadside ditch that likely carries a relatively permanent flow of water. This feature drains directly into the northern unnamed tributary of McKay Creek. Herbaceous vegetation, including weedy species and rushes, was observed in Ditch 3.

Ditch 4

Ditch 4 is swale that is approximately 2-feet wide that drains directly into the northern unnamed tributary of McKay Creek. This feature is identified on the ODF stream mapping and is located within a hydric soil mapping unit; therefore, this feature may be a historic stream that has been channelized. This feature flows through an agricultural field and vegetation surrounding the ditch is dominated by weedy herbaceous species.

5.0 CONCLUSIONS

As impacts to wetlands and waters are likely for the proposed Project, Section 404 of the Clean Water Act, administered by the ACOE; the Removal Fill Law, administered by the DSL; and Water Quality Sensitive Areas and Vegetated Corridors, administered by Clean Water Services (CWS) will apply to the proposed Project. If proposed impacts are less than 0.5 acre, then the Project may qualify for the ACOE Nationwide Permit (NWP) #14, Linear Transportation Projects and the DSL General Authorization (GA) for Certain Transportation-Related Structures. If the project requires greater than 0.5 acre of impacts, an individual permit (IP) will be required from the ACOE and DSL. A wetland/waters delineation and report will be required for the proposed project to determine accurate wetland/waters locations and dimensions.

Impacts to wetlands/waters of the U.S. and State will require compensatory mitigation for both the ACOE and DSL. Currently, the wetland mitigation banks within the service area of the API (Fernhill and Tualatin Valley) do not have credits available. However, as credits become available at these banks in the future, mitigation at these banks may be an option for compensatory wetland mitigation for this Project. If bank credits are unavailable during the permitting process, alternative forms of mitigation will need to be considered, including payment-in-lieu (for DSL-jurisdictional impacts only), fee-in-lieu (if fee-in-lieu sites have been approved for release of credits by the DSL and ACOE in the Project area), or on- or off-site wetland creation, enhancement, or restoration. Minimal on-site locations for wetland creation are available within the API, as areas adjacent to the right-of-way are privately owned and would require property acquisition. If on- or off-site mitigation is proposed, the DSL and ACOE will require a compensatory wetland mitigation plan.

A vegetated corridor analysis and Natural Resource Assessment report will be required for the Project in order to receive a Service Provider Letter from CWS. Impacts to parcels that contain vegetated corridors will require vegetated corridor enhancement by CWS. In addition, impacts to vegetated corridors will require mitigation. CWS enhancement consists of removing noxious weeds and planting native trees and shrubs within the vegetated corridor. Enhancement and/or mitigation plans will be required if impacts are proposed for the Project.

5.1 Summary

Table 3 provides details regarding the applicable permits, approvals, and clearances needed for the proposed Project.

Table 3. Summary of Applicable Permits, Approvals, and Clearances Needed for the Proposed Project.

Type of Permit / Approval/ Clearance	Issuing Agency	Permit / Approval / Clearance	Estimated Timeline (after submittal)
Letter of Concurrence	DSL	Wetland/Waters Delineation Report approval	120 days
Jurisdictional Determination	ACOE	Wetland/Waters Delineation Report approval	60 days
Removal/Fill Permit	DSL	Joint Permit Application approval	GA: 40 days after Wetland/Waters Delineation Report concurrence IP: 120 days
Section 404 Clean Water Act Permit	ACOE	Joint Permit Application approval	NWP: 45-75 days IP: 120 days
Service Provider Letter	CWS	Vegetated Corridor Assessment Report and Enhancement/Mitigation Plan approval	15 days

6.0 REFERENCES

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Appendix A

Area of Potential Impact Photographs

1

2

MB&G Mason, Bruce & Girard, Inc. February 3, 2010	1. View to the northeast from NW Groveland Drive of the northern unnamed tributary of McKay Creek and Wetland A. 2. View to the southwest of the northern unnamed tributary of McKay Creek from NW Schaff Road. NW Helvetia Road is visible in the photo background. Wetland B is located in the dense stand of trees in the photo background.

3

4

MB&G Mason, Bruce & Girard, Inc. February 3, 2010	3. View to the west of the western portion of Wetland C. NW Jacobson Road is visible at photo right and NW Helvetia Road is visible in the background. 4. View to the south of Wetland D, a stormwater pond. Note the potential Clean Water Services (CWS) mitigation plantings in the photo foreground. The westbound Shute Road off-ramp is visible in the photo background.

5

6

MB&G Mason, Bruce & Girard, Inc. February 3, 2010	5. View to the southeast of western portion of Wetland E. Note the standing water in the photo center. The westbound on-ramp from Shute Road to Highway 26 is visible at photo left, Shute Road is visible in the background, and Highway 26 is visible at photo right. 6. View to the southwest showing Wetland F. The low-quality, palustrine emergent portion of Wetland F is visible at photo left and center, and the high-quality palustrine forested portion is visible at photo right. Highway 26 is located behind the photographer.

7

8

MB&G Mason, Bruce & Girard, Inc. February 3, 2010	7. View to the southeast of Ditch 2. The confluence of Ditch 2 and the northern unnamed tributary of McKay Creek is located immediately behind the photographer. NW Groveland Drive is located to the left of the photo. 8. View to the southeast of the eastern extent of Ditch 2. Note the culvert outlet, as indicated by the red arrow. The west bound on-ramp from Shute Road to Highway 26 is located to the right of the photo.

9

10

MB&G Mason, Bruce & Girard, Inc. January 8, 2010	9. View to the southeast of a portion of Ditch 3. The ditch enters into a culvert at the red arrow and passes under the east bound off-ramp from Highway 26 to Shute Road. Ditch 3 may display wetland characteristics in this reach. 10. View to the northwest of a portion of Ditch 3. The east bound off-ramp from Highway 26 to Shute Road is visible at photo right.

11

12

MB&G Mason, Bruce & Girard, Inc. February 3, 2010	11. View to the west of the southern unnamed tributary of McKay Creek at the western extent of the API. 12. A typical upland grass seed production field is located within the northern portion of the API with a view to the south. The northern unnamed tributary of McKay Creek is visible at the bottom of the photo. Note the numerous stands of Oregon white oak (*Quercus garryana* FACU) (red arrows) within the API. Helvetia Road is visible at photo right.

ODOT Region 1 Environmental Unit

Visual Resources Technical Report

Date: February 23, 2010

Project Name: US26: Shute Road Interchange

Location: U.S. 26 at Shute Road Intersection in Washington County

Project Description Summary: The proposed project would reconstruct the Shute Road/Helvetia Road interchange. The project would include the addition of a Westbound to Southbound loop ramp, reconstructing the Westbound exit and entrance loop ramps, and adding a second right turn lane to the Eastbound entrance ramp.

Visual Resources

ODOT Region 1 Environmental Coordinator, Melissa Hogan performed basic scoping for Visual Resources as normally documented in a Part 3 document in order to determine the classification of the project under NEPA.

Research of quad maps, city and county maps to identify Federal Scenic Highway or Tour Route and indicates that none of the following designations apply to this project: National Scenic Byway, All-American Road, Oregon Scenic Byway, Oregon Tour Route, or Oregon Memorial Drive; Oregon Scenic Waterways and National Wild and Scenic Rivers; Federal, State or Local parks and recreation or conservation lands (includes National Historic and Scenic Trails, wildlife sanctuaries, refuges and preserves, 'beach land'). There are also no USFS or BLM properties within the vicinity of the project.

Contact with ODOT's District Maintenance (Sylvan) Office determined that the vegetation management plan for the area is mowed grass that is sprayed occasionally to prevent noxious weeds.

The Oregon Forest Practices Act does not apply because there are no forest properties located within the API of this project.

Major cuts and fills would be associated with this project for the reconstruction of the on/off ramps to US26.

A bridge is anticipated over a tributary of Waible Gulch and large retaining walls would be anticipated in order to avoid and/or minimize impacts to wetlands associated with the tributary.

Contact with the local agencies (Washington County and City of Hillsboro) indicates the following design review requirements: Washington County will require a Type III (public hearing) development review process. City of Hillsboro does not require a development review process.

Existing conditions include gentle grassed slopes within ODOT Right of Way. There are no known Section 4(f)/6(f) resources – see Section 4(f)/6(f) technical report for more details.

Visual Resources Summary

Replacement of an existing grade separated interchange and widening to the recently zoned Industrial area South of US26 should not result in negative visual impacts to this rural residential/farmland area of Washington County. Care should be taken to minimize impacts to adjacent wetlands, waterways and farmland - all visual components to this rural interchange.

References

- Photos by ODOT Archaeologist Kurt Roedel.
- Verification of development review process ascertained from Steven Roberts, Washington County staff and Don Odermott, City of Hillsboro staff. No property owners were contacted for this assessment.

Prepared by: _____ Date: February 2010
Melissa Hogan
ODOT Regional Environmental Coordinator, Region 1, West

Reviewed by:_____ Date: February 2010
Jeff Buckland
ODOT Senior Environmental Project Manager, Region 1

Project Site Photos:

South side of US26 at the East end of the project

NW Area of Project

Existing guardrail and roadway over McKay Creek at location of box culvert

US 26/Brookwood Parkway/Helvetia Road
Interchange Area Management Plan (IAMP)

Hillsboro and Washington County, Oregon

Appendix A

Findings and Compliance with State, Local, and Regional Plans, Policies, Provisions, and Regulations

August, 2012

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Findings and Compliance

This appendix presents relevant state, local, and regional plans and policies, with information supporting the Brookwood Parkway/Helvetia Road IAMP's compliance. In reviewing these findings, it is important to recall that the interchange will be built as part of the Brookwood Parkway Job Transportation Act (JTA) project, which is still in the planning process. Therefore, these findings will refer to activities performed and information gathered as a part of the JTA process, including pending or future actions meant to achieve compliance.

Oregon Statewide Planning Goals and Guidelines

Since 1973, Oregon has maintained a strong statewide program for land use planning. The foundation of that program is a set of 19 statewide planning goals. Most of the goals are accompanied by guidelines, which are suggestions about how a goal may be applied. The goals express the state's policies on land use and related topics, such as citizen involvement, housing, and natural resources. Oregon's statewide goals are achieved through local comprehensive planning. State law requires each city and county to adopt a comprehensive plan, of which transportation system plans must be made a part, and the zoning and land-division ordinances needed to put the plan into effect. The local comprehensive plans must be consistent with the Statewide Planning Goals. When the state's Land Conservation and Development Commission (LCDC) officially approve a local government's plan, the plan is said to be acknowledged. It then becomes the controlling document for land use in the area covered by that plan. Oregon´s planning laws strongly emphasize coordination—keeping plans and programs consistent with each other, with the goals, and with acknowledged local plans. The goals that are most pertinent to transportation system planning are described below.

Statewide Planning Goal 1 (Citizen Involvement)

Goal 1, Citizen Involvement, ensures the opportunity for all citizens to be involved in all phases of the planning process. The citizen involvement program shall be appropriate to the scale of the planning effort. The program shall provide for continuity of citizen participation and for information that enables citizens to identify and understand the issues.

Finding of Consistency: The IAMP will update the transportation plans for the City of Hillsboro and Washington County. Therefore, the planning process requires citizen involvement consistent with Goal 1. Pages 2 through 5 of the IAMP detail the Public Involvement process for the project. Project committees for the IAMP guided the process and provided important policy, community, and technical feedback throughout the project. Interviews, public meetings, and briefings were held with neighbors, business interests, and local community organizations. Informational materials—newsletters, the project website, and a press release—provided project updates to the general public.

The Project Advisory Committee comprised technical staff from partner jurisdictions and community stakeholder representatives. Members were strategically selected to represent the interests of all partners in the IAMP and to provide a venue for representatives of the public to follow and contribute to the plan's development. PAC members included one representative each from the Helvetia Community Association, Meek Neighborhood, Hillsboro Chamber of Commerce, Brookwood area bicyclists, Jacobson Road (Pac Trust), City of Hillsboro, and Washington County, and the ODOT project manager. The purpose of the committee was to ensure that technically viable solutions are also

responsive to community needs. PAC members, project team members, and members of the public attended the PAC meetings.

Two open houses were held to share information and invite feedback from the general public. The first was held January 17, 2012 at Liberty High School in Hillsboro, Oregon. Forty-nine (49) people signed in to the event. The second event was held in June 25, 2012 at the city of Hillsboro Civic Center. The Open House immediately followed the final Project Advisory Committee (PAC) meeting. Twenty three (23) people signed in, however some attendees stayed for the open house after participating at the PAC meeting. Information handouts and comment cards were made available. Feedback received was recorded in an open house summary and shared with the PAC.

Two project newsletters provided project updates and an invitation to the two open houses. Each newsletter was mailed to approximately 3,100 addresses in an area surrounding the interchange and posted on the project website approximately two weeks before each open house. Newsletters included names, titles and contact information for project staff. In addition to the project newsletters, email notifications were sent to approximately 200 addresses for the open houses.

A project website was developed and made publicly available early in the process. The site included a project description, maps, project schedule, open house materials, and PAC materials. The project website also advertised the open houses on its home page. The draft IAMP was made available for public review and comment for a 30-day period in July to September 2012 on the Brookwood IAMP website.

http://cms.oregon.gov/ODOT/HWY/REGION1/pages/us26_brookwoodpkwy/index.aspx

A press release was sent to media contacts through ODOT's Region 1 office before each event. The Hillsboro Argus announced the meeting.

www.oregonlive.com/argus/index.ssf/2012/01/us_highway_26_interchange_open.html

Therefore, the IAMP is consistent with Goal 1.

Statewide Planning Goal 2 (Land Use Planning)

Goal 2 requires that city, county, state, and federal agency and special district plans and actions related to land use be "consistent with the comprehensive plans of cities and counties and regional plans adopted under Oregon Revised Statutes (ORS) Chapter 268." Goal 2 also contains standards for taking exceptions to statewide goals. An exception may be taken when a statewide goal cannot or should not be applied to a particular area or situation.

Land use decisions and actions must be supported by an "adequate factual base." Evidence must be provided that a reasonable person would find sufficient to support a finding of fact that a land use action complies with the applicable review standards.

Finding of Consistency: The IAMP's consistency with the comprehensive plans and other adopted land use and transportation plans for Metro, the City of Hillsboro, and Washington County is demonstrated below under the respective document headings. The IAMP was prepared in conjunction with ODOT, the

City of Hillsboro (City), and Washington County (County). Further coordination efforts are documented on pages 2 through 3 of the IAMP.

The purpose of the IAMP is to:

Support the US 26: Brookwood Parkway/Helvetia Interchange JTA Project

Support the ongoing and future City of Hillsboro and Washington County transportation, land use, and economic development planning efforts in and around the study area described below (North Hillsboro); and

Protect the future function of the interchange.

To achieve the purpose of the IAMP, technical research was conducted on existing and planned land uses, traffic, and natural resources within the IAMP Study Area. The following technical memoranda provide the framework of "adequate factual base" consistent with Goal 2:

- Technical Memorandum #1: IAMP Definition and Background, which includes Purpose and Intent, Problem Statement, Interchange Function, Goals and Objectives, and Management Area.
- Technical Memorandum #2: Identifies existing land use, transportation, and natural and historic resources within the IAMP Study Area.
- Technical Memorandum #3: Develops 2035 baseline (no-build) land use and traffic volume forecasts and analyzes traffic operations.
- Technical Memorandum #4: Develops the 2035 build transportation analysis for the future transportation network, traffic volumes, traffic operations, intersection operations, freeway operations, queuing, and safety in the IAMP Study Area.

Pertinent sections of Technical Memorandums #2, #3, and #4 are incorporated into the IAMP. This appendix to the IAMP documents compatibility and consistency with applicable standards. Therefore, the IAMP is consistent with Statewide Planning Goal 2 (Land Use Planning).

The 2035 build analysis for the future transportation network demonstrates that the proposed improvements and other management actions for the interchange are expected to result in levels of service that meet standards and preserve the function of the interchange, as well as planned land uses. Therefore, the IAMP is consistent with Goal 2.

Statewide Planning Goal 3 (Agricultural Lands)

Goal 3 is to preserve and maintain agricultural lands. Agricultural lands shall be preserved and maintained for farm use, consistent with existing and future needs for agricultural products, forest and open space and with the state's agricultural land use policy expressed in ORS 215.243 and 215.700.

Finding of Consistency: The IAMP Study Area represents the western developed edge of the Portland Metropolitan area, with large areas of farmland mostly to the northwest, and is adjacent to industrial areas and residential development to the south and east. The interchange is partially within and partially outside of the Portland Metropolitan UGB. Some of the area within the IAMP Study Area and within the

Metro UGB is expected to be developed with urban land uses during the planning horizon (year 2035). Those areas outside the Metro UGB will remain designated for rural uses as expressed in *ORS 215.243 and 215.700*.

The IAMP sought to avoid and minimize impacts to agricultural lands in the rural areas in Washington County. One of the IAMP Tier 1 projects, NW Groveland Drive Realignment, is identified as passing through agricultural lands. The purpose of this improvement project is to maintain the NW Groveland Drive connection from Helvetia Road that will be lost as part of the interchange improvements. The realignment of NW Groveland Drive is designed to connect to Helvetia Road at its proposed location to comply with ODOT access spacing standards. Certain transportation improvements including realignments of existing rural roads are conditionally allowed on rural lands under OAR 660-012-0065 without a goal exception. See Transportation Planning Rule (TPR) section on page ---- for goal exception discussion.

The proposed IAMP local street improvements are conceptual and will require Washington County to develop and construct the rural road. The IAMP relies on the County's Rural/Natural Plan to ensure that development will not adversely affect the surrounding agricultural and forest activities. The Gloveland Drive realignment is located in Washington County designated EFU Farm Use zone which is an exclusive farm use zone The preferred alternative concept must be consistent with the requirements of ORS 215.283 and 215.296.

The purpose of the realignment is not to shorten travel times or provide additional capacity or other advantages that might induce land use development pressures on agricultural lands. The improvement of service levels on the local road network will enhance the ability of farm operators to move equipment along those roadways.

The proposed realignment will not result in following farm and forest impacts:

- Fragmentation. The proposed realignment will require a strip of land adjacent to the existing white oak grove and wetland. No parcel fragmentation will occur as a result of the proposed IAMP interchange concept.

- Access and Maneuverability. The proposed realignment will allow the surrounding farms to continue to access their fields for county roads. This will not result in any equipment maneuverability issues or significant out-of-direction travel for farm activities in the vicinity of the interchange. The proposed realignment will not create farm parcels that can not be economically farmed.

- Removal of farm/forest land. The proposed realignment will not significantly reduce the amount of farm/forest land there will be no significant change to farm practices or cost associated with the acquisition of the land.

The NW Groveland Drive Realignment improvement project is consistent with this definition. Washington County will require a land use permit approval for the realignment in which the applicant will be required to demonstrate that there will be no significant changes to farm practices nor significant increases in farm costs as a result of the realignment (per ORS 215.213 (2) or (11) or 215.283 (2) or (4).

See additional findings under OAR 660, Division 12 Transportation Planning Rule and Statewide Planning Goal 12 (Transportation).

As such, the IAMP has adequately addressed Goal 3, Agricultural Lands.

Statewide Planning Goal 5 (Open Spaces, Scenic and Historic Areas and Natural Resources)

Goal 4 is to protect natural resources and conserve scenic and historic areas and open spaces. Local governments shall adopt programs that will protect natural resources and conserve scenic, historic, and open spaces for present and future generations. These resources promote a healthy environment and natural landscape that contributes to Oregon's livability.

Finding of Consistency: The IAMP sought to avoid and minimize impacts to natural resources lands in the rural areas in Washington County. The wetland/oak woodland adjacent to Helvetia Road was indentified as potential natural, scenic and historic areas to be avoided. The Groveland Drive realignment sought to avoid the impacts to this area and recommended an alignment out of the wetland/oak woodland area to reconnect the road to Helvetia Road. Therefore, the IAMP is consistent with Goal 5.

Statewide Planning Goal 9 (Economic Development)

This goal requires that local comprehensive plans and policies contribute to a stable and healthy economy in all regions of the state.

Finding of Consistency: The Brookwood Parkway interchange provides a vital function in supporting local and regional economic development goals and plans. The interchange serves employee commute trips and truck freight traffic generated by raw material supply and finished product distribution associated with the major industries in North Hillsboro. The IAMP was developed jointly with ODOT, city of Hillsboro and Washington County to ensure that transportation improvements will be available to support the planned employment uses in the urban areas of the city and the rural farming activities in Washington County that are consistent with the County and City's economic development goals. Therefore, the IAMP is consistent with Goal 9.

Statewide Planning Goal 10 (Housing)

Goal 10 Housing is to provide for the housing needs of the citizens of the state. Buildable lands for residential use shall be inventoried and plans shall encourage the availability of adequate numbers of needed housing units at price range and rent levels which are commensurate with the financial capabilities of Oregon households and allow for flexibility of housing location, type and density.

Finding of Consistency: The IAMP analysis using Metro 2035 population forecast and 2035 traffic projections, indicated the new interchange will operate at acceptable mobility levels. The Metro population and housing forecasts establishes the region housing needs and the City's Comprehensive Plan determines the location and density of the city's housing needs. No actions are required to comply with the region or city's housing policies. The improvements identified are able to accommodate the planned residential growth in the area and still meet ODOT mobility standards. Therefore, the IAMP is consistent with Goal 10.

Statewide Planning Goal 11 (Public Facilities and Services)

Cities and counties shall plan and develop a timely, orderly and efficient arrangement of public facilities and services to serve as a framework for urban and rural development. The goal requires that urban and rural development be "guided and supported by types and levels of urban and rural public facilities and services appropriate for, but limited to, the needs and requirements of the urban, urbanizable and rural areas to be served."

Finding of Consistency: Transportation facilities are considered a primary type of public facility. The Brookwood IAMP documents the current and future transportation needs of the urban and rural areas in the vicinity of the Brookwood Parkway interchange. The IAMP contains policies that will guide growth within the vicinity of the interchange to ensure that development takes place at a rate and density that is compatible with the capacity of the interchange. In terms of other, non-transportation public facilities, the IAMP does not result in any land use changes. No impact on public facilities is expected because no intensification of land use is created as a result of improvements recommended in the IAMP. The IAMP is consistent with the proposed land uses and public facilities of the urban and rural areas surrounding the interchange. Therefore, the IAMP is consistent with Statewide Planning Goal 11 (Public Facilities and Services).

Statewide Planning Goal 12 (Transportation)

Goal 12 requires cities, counties, metropolitan planning organizations, and ODOT to provide and encourage a "safe, convenient and economic transportation system." This is accomplished through development of Transportation System Plans based on inventories of local, regional and state transportation needs. Goal 12 is implemented through OAR 660, Division 12, also known as the Transportation Planning Rule (TPR). The TPR contains numerous requirements governing transportation planning and project development. (See the OAR 660, Division 12 section of this document for findings of compliance with the TPR.)

Finding of Consistency: The purpose of the Brookwood Parkway/Helvetia Road IAMP is to protect the function of the interchange and its ability to serve future transportation demands, thereby preserving the state's investment in the facility. The IAMP contains a discussion of the transportation analysis that was conducted in order to determine future demand, available capacity, deficiencies, and necessary improvements for this interchange area. The analysis demonstrates that the planned transportation facility will be adequate to safely and efficiently serve trips generated by future land uses for a period of at least 20 years.

To implement the IAMP, the City HCP-3-12: North Hillsboro TSP Amendment (Ordinance # 2793) will amend the Hillsboro Comprehensive Plan specifically to the TSP to reclassify and update information for transportation improvements within the IAMP area to be consistent with the IAMP. Refer to Attachment A-1. Washington County Ordinance # 749 amends the Transportation Plan Element of the Comprehensive Plan relating to the IAMP. Refer to Attachment A-2.

By providing for safe and efficient operations of the interchange and local road network that accommodates existing and planned land uses and through amending the transportation plans of Hillsboro and Washington County, the IAMP is consistent with Goal 12.

See additional findings under OAR 660, Division 12 Transportation Planning Rule and Statewide Planning Goal 3 (Agricultural Lands) and Statewide Planning Goal 12 (Transportation).

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Statewide Planning Goal 14 (Urbanization), and OAR 660, Divisions 14 and 22

This goal requires cities to estimate future growth and needs for land and then plan and zone enough land to meet those needs. Goal 14 requires an orderly and efficient transition from rural to urban land use by establishing UGBs and unincorporated communities to separate urbanizable land from rural land.

Finding of Consistency: The IAMP Study Area is partially within the Portland Metro UGB. The IAMP documents the existing and planned land use designations and identifies future transportation needs based on these designations and the associated land use regulations. The IAMP model determined needed improvements to support future land uses by assuming that existing and planned land uses would not change, and the uses allowed by the zoning would stay the same. Since provisions of the Hillsboro Comprehensive Plan and Washington County Comprehensive Framework Plan, West Union Community Plan, and Rural/Natural Resource Plan, and the city and county zoning and subdivision ordinances are adopted by reference into the IAMP, ODOT has the ability to review and weigh in on proposed amendments to plans and codes, before their adoption by the City of Hillsboro and Washington County, to ensure that any changes to these land use controls would avoid development that would jeopardize the achievement of the goal and objectives of the IAMP. Therefore, the IAMP is consistent with Goal 14.

Other Statewide Goals:

These goals were determined not to be applicable to the development of the IAMP. The IAMP does not have an effect on the following goals:

Goal 4 Forest Lands

Goal 6 Air, Water and Land Resources Quality

Goal 7 Areas Subject To Natural Disasters and Hazards

Goal 8 Recreation Needs

Goal 13 Energy

Goal 15 Willamette Greenway

Goal 16 Estuarine Resources

Goal 17 Coastal Shorelands

Goal 18 Beaches and Dunes

Goal 19 Ocean Resources

Oregon Transportation Plan

The Oregon Transportation Plan (OTP) is the state's long-range multimodal transportation plan. The OTP considers all modes of Oregon's transportation system as a single system. The current OTP assesses state, regional, and local public and private transportation facilities through 2030. The OTP establishes goals, policies, strategies, and initiatives that address the core challenges and opportunities facing Oregon. It also provides the framework for prioritizing transportation improvements based on varied future revenue conditions.

Finding of Consistency:

An IAMP must be consistent with the applicable OTP goals and policies. The applicable policies are listed below, followed by a finding for consistency.

Policy 1.3 – Relationship of Interurban and Urban Mobility

US 26 is a freight route linking Portland to Washington County and the Oregon coast. The Brookwood Parkway interchange on US 26 serves as a major entry point to large high-tech employment centers based throughout North Hillsboro. The interchange serves employee commute trips and truck freight traffic generated by raw material supply and finished product distribution associated with the major industries in North Hillsboro. The interchange is currently approaching or exceeding the mobility standards identified in the OHP for this facility. The heavy traffic has a detrimental effect on traffic operations on the US 26 mainline, the surface arterial roadways near the interchange, and the expansion of current and future businesses (and jobs) in the surrounding area.

The IAMP complies with the policy to minimize adverse effects on urban land use and travel patterns and provide for efficient long distance travel by correcting the current and projected deficiencies. The improvements on the interchange ramps, and the intersection and storage improvements will protect the future functioning of the interchange. Improved bicycle and pedestrian facilities and a new SB travel lane will improve safety and urban mobility. Implementing the IAMP ramp changes will allow the facility to operate at levels consistent with the mobility standard for the 2035 planning year and beyond. Therefore, the IAMP is consistent with this policy.

Policy 2.1 – Capacity and Operational Efficiency

The project was developed in response to safety, capacity, and operational efficiency issues, as documented in Technical Memorandum #2: Existing Conditions Analysis. Those issues, briefly characterized under the response to Policy 1.3 concern the declining function of the interchange, which is currently approaching or exceeding the mobility standards identified in the OHP. The capacity and operational efficiency improvements that will result from the IAMP's implementation will benefit all users of the interchange and US 26 by adding capacity to meet projected long-term development, and improve safety for the movement of goods and people across US 26. Therefore, the IAMP is consistent with this policy.

Policy 2.2 – Management of Assets

The policy calls for managing transportation assets to extend their life and reduce maintenance costs. The Oregon JTA of 2009 appropriated $45,000,000 for ODOT to design and construct needed

improvements to the interchange to address existing operation and safety issues and to address anticipated future travel demand in North Hillsboro. The stated purpose of the IAMP is to maximize the operational life of the interchange and, consequently, protect the State of Oregon's investment in the facility. The IAMP includes management actions identified for ODOT, Washington County, and the City of Hillsboro to protect the long-term system capacity of the interchange through ongoing management of the roads and facilities that are integral to its function. Further, the three partners signed a Memorandum of Understanding (MOU) that memorializes the intentions of the Partners for their collaborative work on the JTA Project. Therefore, the IAMP is consistent with this policy.

Policy 3.1 – An Integrated and Efficient Freight System

The primary function of the US 26/Brookwood Parkway/Helvetia Road interchange is to provide employee vehicle and bicycle commute trips and truck freight traffic access to existing and future large high-tech employment centers based throughout North Hillsboro. The interchange improvements will increase efficiency and reliability for freight accessing nearby industrial businesses through the interchange and local street improvements. Therefore, the IAMP is consistent with this policy.

Policy 3.2 – Moving People to Support Economic Vitality

This policy supports an integrated system of transportation facilities, services and information so that intrastate, interstate and international travelers can travel easily for business and recreation. The IAMP will improve multi-modal mobility on the interchange and in the Interchange Management Area, by improving roadway, bicycle, and pedestrians connections to commerce and employment. Therefore, the IAMP is consistent with this policy.

Policy 4.1 – Environmentally Responsible Transportation System

This policy provides for a transportation system that encourages conservation and protection of natural resources. Technical Memorandum #2 identified environmental resources in the IAMP Study Area, including wetlands, Goal 5 Resources, hazardous materials, and cultural resources. Mitigation for any impacts to these resources will meet local, state, and federal standards when each individual improvement project is being developed. Therefore, the IAMP is consistent with this policy.

Policy 4.3 – Creating Communities

Creating communities is about compact communities and neighborhoods that integrate residential, commercial and employment land uses to help make shorter trips, transit, walking and bicycling feasible. The IAMP supports the integration of land uses because the interchange provides access primarily to industrial and secondarily to residential uses. Bicycle and pedestrian facilities were integrated into all but one of the improvement projects (the project that is identified as a rural collector). The local street improvements will provide safer and more connective bicycle and pedestrian facilities in the Interchange Management Area, thus providing increased accessibility to goods and services. Therefore, the IAMP is consistent with this policy.

Policy 5.1 – Safety and Security

The IAMP sets a goal of ensuring safe and efficient operations between connecting roadways and protecting the function, operations, and safety of the interchange. The IAMP addresses safety concerns

through the closing and realigning of streets that currently connect to Brookwood Parkway near the interchange. The access of Meek Road to Brookwood Parkway will be closed. NW 253rd Avenue will provide an alternate route for residents in the area and provide access to industrial lands and a parallel route to Brookwood Parkway. (Part of NW 253rd is outside of the current UGB but within the Urban Reserve area.) Additionally, the NW Groveland Drive Realignment (project 2) will meet spacing standards and will address spacing concerns related to the current location of NW Groveland Drive's intersection with Helvetia Rd near the interchange. Therefore, the IAMP is consistent with this policy.

Policy 7.1 – A Coordinated Transportation System

One of the stated goals of the IAMP was to support the ongoing and future City of Hillsboro and Washington County transportation, land use and economic development planning efforts in and around the study area. As described earlier in these findings (see response to Statewide Planning Goal 2, Land Use Planning), development of this IAMP involved ongoing collaboration with the City of Hillsboro and Washington County with regard to their planning efforts for the area. The MOU spells out the nature of the agencies' collaboration on the JTA and IAMP. The project team for the IAMP comprised lead staff from ODOT, Washington County, City of Hillsboro, and the consultant team. The Project Advisory Committee (PAC) was created to guide the IAMP process and provide important policy, community and technical feedback through the project. The PAC was comprised of technical staff from partner jurisdictions and community stakeholder representatives. The IAMP's local access and circulation projects were developed in consideration of the projects identified in the County's and City's TSPs and community plans. The IAMP was developed to safely accommodate freight traffic and provide for pedestrian and bicycle facilities and increased connectivity in the area. The IAMP also provides for three tiers of projects to allow for the future construction of the local streets identified in the North Hillsboro Industrial Area Community Plan. Therefore, the IAMP is consistent with this policy.

Policy 7.3 – Public Involvement and Consultation

The response to Statewide Planning Goal 1 (Citizen Involvement), above, documents Public Involvement for the project. In addition, comments from the public have been responded to and, where applicable, incorporated into project deliverables, as documented in the Responses to Comments table found on the project website.

(http://www.oregon.gov/ODOT/HWY/REGION1/US26_brookwoodpkwy/)

Policy 7.4 – Environmental Justice

The IAMP process included public meetings held at times when stakeholders and community members could attend. A description of the public involvement program is contained in the IAMP starting on page 4. The IAMP had four PAC meetings and two Open Houses that were located the city of Hillsboro. The agendas of each PAC meeting and Open House provided opportunities for public comments. The PAC and Open House agendas and project information was posted to the project web site to provide all members of the community, including diverse populations such people with lower incomes and disabilities to participate in the process. Therefore, the IAMP is consistent with this policy.

Oregon Highway Plan (2011)

The 2011 OHP establishes policies and investment strategies for Oregon's state highway system over a 20-year period and refines the goals and policies found in the OTP. Policies in the OHP emphasize the efficient management of the highway system to increase safety and to extend highway capacity, partnerships with other agencies and local governments, and the use of new techniques to improve road safety and capacity. These policies also link land use and transportation, set standards for highway performance and access management, and emphasize the relationship between state highways and local road, bicycle, pedestrian, transit, rail, and air systems.

OAR 734-051-0155 requires IAMPs to be consistent with the OHP. Consistency with applicable OHP goals are addressed below:

Goal 1 – System Definition

Policy 1B (Land Use and Transportation) recognizes the need for coordination between state and local jurisdictions.

Finding of Consistency: As described under the finding for Policy 7.1 of the OTP, coordination with local jurisdictions occurred throughout the preparation of the IAMP via the project team and PAC. Members included representatives from ODOT, the City of Hillsboro, and Washington County. Pages 2 through 6 of the IAMP further documents the decision making and public involvement related to planning for the US 26: Brookwood Parkway/Helvetia Road Interchange. Therefore, the IAMP is consistent with this policy.

Goal 2 – System Management

Policy 2B (Off–System Improvements) helps local jurisdictions adopt land use and access management policies.

Finding of Consistency: Chapter 4 of the IAMP contains the management actions. The adoption of the IAMP will enable the partner agencies to comply with applicable agency planning requirements and provide for the future planning, development, and management of transportation system within the IAMP Study Area. The IAMP will be used by ODOT as a planning tool to guide the future planning and management of the interchange that connects to the County and City street systems. The IAMP will be utilized by Washington County and the City of Hillsboro to guide the management and improvements to the local road network in the IAMP Management Area. Specific IAMP implementation actions are detailed below for each partner agency.

The IAMP identifies management actions for both the City and the County. The City of Hillsboro will continue to coordinate with ODOT and Washington County in evaluating land use actions (including amendments to the comprehensive plan, TSP, and development code, the UGB expansion, and transportation improvements) that could affect the function of the interchange, in order to ensure that coordination is timely and that actions and improvements are consistent with the defined function of the IAMP. Therefore, the IAMP is consistent with this policy.

Goal 3 – Access Management

Policy 3A (Classification and Spacing Standards) sets access spacing standards for driveways and approaches to the state highway system.

Policy 3C (Interchange Access Management Areas) sets policy for managing interchange areas by developing an IAMP that identifies and addresses current interchange deficiencies and short, medium and long term solutions.

Policy 3D (Deviations) establishes general policies and procedures for deviations from adopted access management standards and policies.

Finding of Consistency: The Oregon JTA of 2009 appropriated $45,000,000 for ODOT to design and construct needed improvements to the interchange to address existing operation and safety issues and to address anticipated future travel demand in North Hillsboro. An access management strategy is being prepared for the JTA Project that identifies short-term access management measures for each approach that will be implemented during the construction phases of the JTA Project.

To meet access spacing standards, NW Jacobson Road will be widened/realigned to the north to improve access spacing between the new JTA interchange and Jacobson Road. In addition, safety concerns near the new US 26/Brookwood Parkway/Helvetia Road Interchange will require closing the Meek Road access to Brookwood Parkway and realigning NW Groveland Drive to the north, so that it will access Helvetia Road across from Schaaf Road.

The IAMP Problem Statement on page 3 of the IAMP summarizes the existing deficiency and is corroborated by the traffic analysis in Chapter 2, Existing Conditions, of the IAMP. Short-, medium-, and long-term solutions are presented in the IAMP in Table 6, Proposed IAMP Improvement Projects. Deviation requests will follow established general policies and procedures.

The Oregon Department of Transportation State Agency Coordination Program (Oregon Administrative Rule Chapter 731, Division 15)

This section of the findings addresses compliance with applicable provisions of the Oregon Department of Transportation's (ODOT's) State Agency Coordination Program, which is Division 15 of Oregon Administrative Rule (OAR) Chapter 731. The purpose of ODOT's State Agency Coordination Program is to ensure that ODOT plans and projects "are carried out in compliance with the statewide planning goals and in a manner compatible with acknowledged comprehensive plans."[1] The provisions of ODOT's State Agency Coordination Program below apply to the Facility Plan for the Brookwood Parkway/Helvetia Road Interchange Area Management Plan.

ODOT adopted its State Agency Coordination Program to comply with Division 30 of OAR Chapter 660, issued by the Oregon Land Conservation and Development Commission (LCDC). Division 30 of OAR Chapter 660 implements LCDC's statutory duty to "coordinate planning efforts of state agencies to assure compliance with goals and compatibility with city and county comprehensive plans." The section of these findings entitled "below, further addresses the requirements of Division 30 of OAR Chapter 660.

OAR 731-015-0065, Coordination Procedures for Adopting Final Facility Plans

OAR 731-015-0065 regulates ODOT procedure for adopting facility plans. An IAMP is a facility plan. The procedure outlined in OAR 731-015-0065 requires that ODOT coordinate with LCDC and local

[1] Oregon Administrative Rule (OAR) 731-015-0005.

government agencies during development of the facility plan, and provide a draft of the plan to affected cities, counties, and other agencies for comment. The facility plan must be consistent with statewide planning goals and local comprehensive plan policies, and findings of compatibility must be presented to the OTC for facility plan adoption.

Finding of Consistency: The IAMP is the result of a collaborative planning effort between ODOT, the City, and the County. Findings addressing statewide goals and requirements, as well as local plan policies, are included herein. Findings of compliance with statewide planning goals and local comprehensive plans will be included in the OTC adoption materials.

ODOT Administrative Rules on Highway Approaches Highway Approaches, Access Control, and Spacing Standards (OAR Chapter 734, Division 51)

The purpose of OAR 734-051 is to "…establishes procedures, standards, and approval criteria used by the department to govern highway approaches, access control, spacing standards, and restriction of turning movements in compliance with statewide planning goals and in a manner compatible with acknowledged comprehensive plans and consistent with Oregon Revised Statutes (ORS), Oregon Administrative Rules (OAR), and the Oregon Highway Plan (OHP)."

OAR Chapter 734, Division 51 was last updated on May 3, 2012. The update identifies IAMP criteria in section 734-051-7010, Access Management Plans and Interchange Area Management Plans, which are addressed below:

> *(7) Interchange Area Management Plan Criteria. An interchange area management plan must comply with the following criteria, unless the plan documents why compliance with a criterion is not applicable:*
>
> *(a) Be developed no later than the time an interchange is designed or is being redesigned.*

Finding of Consistency: The IAMP was completed in tandem with the interchange design as part of the JTA project.

> *(b) Identify opportunities to improve operations and safety in conjunction with roadway projects and property development or redevelopment and adopt policies, provisions, and development standards to capture those opportunities.*

Finding of Consistency: The local street circulation improvement projects were designed to serve anticipated future property development, primarily industrial development. The improvements are described in the IAMP in the section Prioritized Transportation and Circulation Improvement Projects, starting on page 32. Projects are listed in Table 8 will be adopted into the City's and County's TSPs as applicable.

> *(c) Include short, medium, and long-range actions to improve operations and safety within the designated study area.*

Finding of Consistency: Table 8, Proposed IAMP Improvement Projects, in the IAMP lists the improvement projects identified to improve operations and safety within the Interchange Management Area. The projects are prioritized in tiers. Although the tiers are not directly attributed to short-, medium-, and long-range actions, the implication is that the Tier 1 projects will be the first projects constructed as funding is identified.

(d) Consider current and future traffic volumes and flows, roadway geometry, traffic control devices, current and planned land uses and zoning, and the location of all current and planned approaches.

Finding of Consistency: Technical Memorandums #2 through #4 studied current and future traffic and land use characteristics, which were used for development of the IAMP. These studies are summarized in Chapters 2 and 3 of the IAMP, and the technical memorandums are appended to the IAMP.

(e) Provide adequate assurance of the safe operation of the facility through the design traffic forecast period, typically twenty (20) years.

Finding of Consistency: The design traffic forecast period used for development of the IAMP is 2035 (or 23 years from the IAMP completion). The 2035 Build condition shows improvement from the Baseline condition. For the Interchange Management Area, the JTA and Brookwood Parkway improvements would improve intersection operations near US 26. The Brookwood Interchange ramp terminals would not impact US 26 operations as they are forecast to impact under the Baseline scenario. All intersections analyzed within the Interchange Management Area are forecast to meet operational standards with the exception of Helvetia Road at Jacobson Road during the PM peak hour.

(f) Consider existing and proposed uses of all the property within the designated study area consistent with its comprehensive plan designations and zoning.

Finding of Consistency: Existing and proposed uses were considered, as documented in the IAMP sections 2 and 3 and Technical Memorandums #2 through #4. Currently, the IAMP Study Area represents the urbanized edge of the Portland Metropolitan area, with areas of industrial uses to the south and east and large areas of agricultural and rural uses to the west and north. Some of the land within the IAMP Study Area and within the Metro UGB is expected to be developed with urban land uses during the planning horizon, as determined by the City of Hillsboro. Those areas outside the Metro UGB will remain designated for rural uses. After adoption of the IAMP, the City of Hillsboro plans to start the planning process required by Metro's Urban Growth Management Functional Plan Title 11: Planning for New Urban Areas (Metro Code section 3.07) to allow for the future planning and development of the 358.89-acre land area in the southwest quadrant of the management area that was added to the Metro UGB in 2011. The City of Hillsboro will annex the land areas within the UGB for future industrial land uses.

(g) Be consistent with any applicable access management plan, corridor plan or other facility plan adopted by the commission.

Finding of Consistency: Additional facility plans, such as an access management plan, will be completed after the IAMP. There are no other applicable facility plans that apply to the interchange.

(h) Include policies, provisions and standards from local comprehensive plans, transportation system plans, and land use and subdivision codes that are relied upon for consistency and that are relied upon to implement the interchange area management plan.

Finding of Consistency: Policies, provisions, and standards from local comprehensive plans, transportation system plans, and land use and subdivision codes that are relied upon for consistency and provisions that are specifically relied upon to implement the IAMP are included in Regional Plans, Local Plans and Policies sections..

Transportation Planning Rule

This section of the findings addresses compliance with applicable provisions of Section 0030 of Division 12, Chapter 660 (OAR 660-012-0030) of the Oregon Administrative Rules, known as the Transportation Planning Rule (TPR). The TPR implements Statewide Planning Goal 12, Transportation. Pursuant to ODOT's State Agency Coordination Program (addressed beginning on page 14), provisions of OAR 660-012-0030 apply to the IAMP. For the reasons stated below, neither Goal 12, itself, nor any sections of the administrative rules that implement Goal 12 other than OAR 660-012-0030, nor any other of the Statewide Planning Goals, apply to the IAMP.

OAR 660, Division 12, Transportation Planning Rule

The purpose of the TPR is "to implement Statewide Planning Goal 12 (Transportation) and promote the development of safe, convenient and economic transportation systems that are designed to reduce reliance on the automobile so that the air pollution, traffic and other livability problems faced by urban areas in other parts of the country might be avoided." A major purpose of the Transportation Planning Rule (TPR) is to promote more careful coordination of land use and transportation planning, to ensure that planned land uses are supported by and consistent with planned transportation facilities and improvements. The TPR references OAR 731, Division 15 for ODOT coordination procedures for adopting facility plans and plans for Class 1 and 3 projects.

Section 660-012-0005 through 660-012-0050.

These sections of the TPR contain policies for preparing and implementing a transportation system plan. The TPR requirement that local governments adopt consistent land use regulations "to protect transportation facilities, corridors and sites for their identified functions" (OAR 660-012-0045(2)) is achieved through a variety of measures, including:

- *Access control measures that are consistent with the functional classification of roads and consistent with limiting development on rural lands to rural uses and densities;*
- *Standards to protect future operations of roads;*
- *A process for coordinated review of future land use decisions affecting transportation facilities, corridors or sites;*
- *A process to apply conditions to development proposals in order to minimize impacts and protect transportation facilities, corridors or sites;*
- *Regulations to provide notice to ODOT of land use applications that require public hearings, involve land divisions, or affect private access to roads; and*

- *Regulations ensuring that amendments to land use designations, densities, and design standards are consistent with the functions, capacities, and performance standards of facilities identified in the TSP. See also OAR 660-012-0060.*

Finding of Consistency: The IAMP documents existing and future conditions for the Interchange Management Area and IAMP Study Area in sections 2 and 3, respectively. The most salient changes expected are build out of the newly-created industrial lands in Hillsboro's expanded UGB. Traffic analysis of future planned growth showed significant deficiencies at many intersections without changes to the interchange. Current problems and the demands from future planned land uses were considered in the design of the interchange in order to ensure its ability to function adequately and to ensure the local network continues to function at level of service standards.

The IAMP "Implementation" chapter outlines the amendments necessary to make the IAMP and the City's and County's TSPs consistent. Attachment A of this document outlines the City of Hillsboro Comprehensive Plan, TSP, and zoning and subdivision ordinances, and the Washington County Comprehensive Framework Plan, Community Plans, 2035 TSP, and Community Development Code that that the IAMP relies on for implementation.

An access management strategy is being prepared for the JTA Project that identifies short-term access management measures for each approach that will be implemented during the construction phases of the JTA Project.

The IAMP assumes that, within the IAMP Management Area, the City of Hillsboro and Washington County will maintain their respective land use designations, plan and code amendment processes; requirements for traffic impact studies; and processes to notify ODOT regarding land use actions that may affect state transportation facilities.

Since provisions of the Hillsboro Comprehensive Plan and Washington County Comprehensive Framework Plan, West Union Community Plan, and Rural/Natural Resource Plan, and the city and county zoning and subdivision ordinances are adopted by reference into the IAMP, ODOT has the ability to review and weigh in on proposed amendments to plans and codes, before their adoption by the City of Hillsboro and Washington County, to ensure that any changes to these land use controls would avoid development that would jeopardize the achievement of the goal and objectives of the IAMP.

For additional findings on local compliance see Local Plans and Policies section for Washington County and the City of Hillsboro.

Section 660-012-0055 – Timing of Adoption and Update of Transportation System Plans

Part 5 of this section requires cities and counties to update their TSPs and implementing measures when a refinement plan has been completed.

Finding of Consistency: The City HCP-3-12: North Hillsboro TSP Amendment (Ordinance # 2793) will amend the Hillsboro Comprehensive Plan specifically to the TSP to reclassify and update information for transportation improvements within the IAMP area to be consistent with the IAMP. Refer to Attachment A-2.

Washington County Ordinance # 749 amends the Transportation Plan Element of the Comprehensive Plan relating to the IAMP. Refer to Attachment A-1.

For additional findings on local compliance see Local Plans and Policies section for Washington County and the City of Hillsboro.

Section 660-012-0065 – Transportation Improvements on Rural Lands

This rule identifies transportation facilities, services and improvements which may be permitted on rural lands consistent with Goals 3, 4, 11, and 14 without a goal exception. Section 2 (f) states:

> *"Realignment" means rebuilding an existing roadway on a new alignment where the new centerline shifts outside the existing right of way, and where the existing road surface is either removed, maintained as an access road or maintained as a connection between the realigned roadway and a road that intersects the original alignment. The realignment shall maintain the function of the existing road segment being realigned as specified in the acknowledged comprehensive plan"*

Finding of Consistency: The IAMP calls for the realignment of Groveland Drive an existing rural road in the County's EFU zoning designation. The IAMP is a planning level document that designates local transportation system to support the long-term function of the interchange. The recommendation to realign Groveland Drive is to support the access management of local road at the interchange. The recommended realignment suggests the reconnection of the existing rural road network at a logical location. At the time of project development for the realignment, Washington County will be required to develop the location and justification for the rural road. Because Gloveland Drive is a County rural local road it does not require an amendment to the Transportation Plan. The Washington County's Community Development Code Article 7 requirements will apply to the realignment project.

Section 5 states:

> *"For transportation uses or improvements listed in subsections (3)(d) to (g) and (o) of this rule within an exclusive farm use (EFU) or forest zone, a jurisdiction shall, in addition to demonstrating compliance with the requirements of ORS 215.296:*
>
> *(a) Identify reasonable build design alternatives, such as alternative alignments, that are safe and can be constructed at a reasonable cost, not considering raw land costs, with available technology. The jurisdiction need not consider alternatives that are inconsistent with applicable standards or not approved by a registered professional engineer;*
>
> *(b) Assess the effects of the identified alternatives on farm and forest practices, considering impacts to farm and forest lands, structures and facilities, considering the effects of traffic on the movement of farm and forest vehicles and equipment and considering the effects of access to parcels created on farm and forest lands; and*
>
> *(c) Select from the identified alternatives, the one, or combination of identified alternatives that has the least impact on lands in the immediate vicinity devoted to farm or forest use.*

Finding of Consistency: The JTA interchange's westbound exit loop ramp will require the closing of the existing Groveland Drive connection to Helvetia Road. Groveland Drive needs to be realigned to improve safety and meet access spacing standards. The IAMP was jointly developed by ODOT, City of Hillsboro and Washington County. ODOT, Washington County, and the City of Hillsboro explored a wide range of

options to reconnect or reroute Groveland Drive (see Table 9). Using engineering judgment and public comments the following options were analyzed and rejected.

Table 9. Groveland Drive Realignment Options Considered and Rejected

Options	Property Impacts	Environmental Impacts	Comments
Permanently Close	No property impacts	No environmental impacts	Rejected because of out-of-direction travel and impact to property owners of permanently routing trips on a substandard rural road, including the Rice Rock Museum.
Tunnel	Limited property impacts	Potential environmental and engineering issues	Rejected because of the major engineering impacts and cost factors.
Roundabout	Major property impacts	Major environmental impacts	Rejected because of the major environmental impacts to the oak grove and traffic operations impacts to the interchange.
Realign through the Oak Grove Area	Major property impacts	Major environmental impacts	Rejected because of the major property and environmental impacts to the oak grove.

After the evaluation and consultation, it was determined that the reconnection of Groveland Drive to Helvetia Road was needed to provide access to the surrounding existing rural uses. The realignment is a safe and reasonable reconnection of the existing rural road to Helvetia Road. The impacts to farm uses and environmental features are minimal. The realignment of the rural road will follow the Washington County policies and requirements for realignment of an existing rural road in farm land.

See additional findings under Statewide Planning Goal 3 (Agricultural Lands) and Statewide Planning Goal 12 (Transportation).

The IAMP is consistent with the TPR.

Regional Plans and Policies

Metro Region 2040 Growth Concept

The Region 2040 Growth Concept, a long-range regional plan originally adopted in December of 1995 and periodically amended, provides visionary guidance through land use and transportation policies that will allow Metro and the metropolitan area cities and counties to manage growth, protect natural resources, and make improvements to facilities and infrastructure while maintaining the region's quality of life.

Finding of Compatibility: The 2040 Concept Plan Map (dated January 1, 2011) identifies the eastern portion of the IAMP Study Area, which is within the current UGB, as mostly "employment land" with areas designated "neighborhood" closer to Cornelius Pass Road.

Employment lands are typically considered industrial areas and are described as the following in the Region 2040 Growth Concept:

Serving as hubs for regional commerce, industrial land and freight facilities for truck, marine, air and rail cargo provide the ability to generate and move goods in and out of the region. Access to these areas is centered on rail, the regional freeway system and key roadway connections. Keeping these connections strong is critical to maintaining a healthy regional economy.

The third goal of the IAMP, as referenced in Technical Memorandum #1, is to "accommodate planned growth that depends on the interchange," which is consistent with the Region 2040 Growth Concept employment industrial areas designation.

The IAMP includes improvement projects that will serve as key roadway connections to the regional transportation network to accommodate the planned industrial growth in the area and to protect the function of the interchange in support of efficient freight movement through the region. The IAMP is consistent with the 2040 Growth Concept.

Metro Urban Growth Management Functional Plan (UGMFP)

The UGMFP (the Functional Plan) implements the Region 2040 Growth Concept and the Regional Framework Plan (a general, regional land use planning policy document that establishes a framework for planning in the region by linking land use and transportation plans). The Functional Plan requires cities and counties to designate boundaries for the 2040 Growth Concept Design Types, including the Portland Central City, Regional Centers, Town Centers, and Station Communities.

The purpose of the Functional Plan is to implement the Regional Urban Growth Goals and Objectives (RUGGO) adopted by the Metro Council, including the Metro Region 2040 Growth Concept and the Regional Framework Plan.

Finding of Compatibility: The three sections of the UGMFP most relevant to the US 26/Brookwood Parkway/Helvetia Road IAMP are: (1) Title 11: Planning for New Urban Areas, (2) Title 4: Industrial and Other Employment Areas, and (3) Title 3: Water Quality and Flood Management.

According to the March 17, 2011 Metro reserves map, the southwest quadrant of the US 26/Brookwood Parkway/Helvetia Road IAMP Study Area is designated as an urban reserve. A portion of the northwest quadrant is shown as an undesignated reserve area (8B-urban). Title 11: Planning for New Urban Areas, details the components of a concept plan that local governments are required to prepare prior to adding an urban reserve to the UGB.

Metro requires that, before adding land into the UGB, the local jurisdiction must provide documentation that the comprehensive plan amendment is consistent with all applicable titles of the Functional Plan. The City of Hillsboro completed Concept Plans for the Evergreen, Shute Road, and Helvetia areas following their addition to the UGB in 2002 and 2005, as required under Metro's Title 11. Since completing the concept planning analysis, the City of Hillsboro has annexed the entire Shute Road concept planning area and portions of the Helvetia concept planning area. The highly parcelized Evergreen concept planning area remains outside the Hillsboro city limits. Planning efforts and urban reserves allotments are discussed further under Section 3, Ongoing Planning Efforts, below. The transportation and circulation improvement projects in the IAMP are consistent with Title 11: Planning

for New Urban Areas because they provide the framework for an improved road network to support development.

Title 4: Industrial and Other Employment Areas of the Functional Plan establishes the regulatory framework for protecting regionally significant industrial areas (RSIAs). These areas are near the region's most significant transportation facilities, including US 26 in Hillsboro. Local jurisdictions implement the RSIA designation through zoning and special plan designations that limit land division of parcels of more than 50 acres in order to preserve large parcels for future industrial development. In some circumstances, larger parcels may be subdivided if the city has developed and adopted a master plan for the area, allowing clustering of similar industries to operate more productively than if they were in dispersed locations. Title 4 is an important component of the ongoing urban/rural reserves discussion (please see Section 3, Ongoing Planning Efforts). As areas are added to the UGB, Metro and local jurisdictions will be required to identify RSIAs and implement regulatory measures to ensure that those areas are protected for future industrial development. The proposed improvement projects in the IAMP are consistent with Title 4, because they are intended to support the planned industrial development in the area

Title 3: Water Quality and Flood Management protects designated Water Quality and Flood Management Areas by limiting or mitigating the impact of development activities on those areas. Best Management Practices and mitigation will limit the impact of development on water quality and flood management, and meet all local and federal regulations when each individual improvement project is being developed.

The IAMP is consistent with these documents.

Metro Regional Transportation Plan (RTP)

On June 10, 2010, Metro's Joint Policy Advisory Committee on Transportation (JPACT) and the Metro Council approved the 2035 RTP for the purpose of completing a federal- and state-required air quality conformity analysis of the proposed system. The RTP introduces the concept of organizing the region's multimodal transportation improvements by mobility corridors. The regional mobility corridor framework calls for consideration of multiple facilities, modes, and land use when identifying needs and the most effective mix of land use and transportation solutions to improve mobility within a specific corridor area.

Finding of Compatibility: The IAMP is in Mobility Corridor 22 – Highway 217 to North Plains. The interchange improvements (JTA project) and IAMP are listed as a five- to ten-year investment strategy.

The RTP identifies the overall function of the corridor as:

2040 Access: Connects the Central City to Hillsboro regional central the Sunset industrial area and provides regional access to Hillsboro Airport, Portland Community College (Rock Creek Campus), and the Oregon Graduate Institute.

Freight Mobility: Provides air freight access for west side industrial areas, and statewide access to marine and rail facilities.

Statewide Travel: Serves as a western gateway to the region, and provides access to Central City interstate hub and travel to the northern Oregon coast.

The IAMP incorporates the RTP Corridor Function in its statement of interchange function, as follows:

The primary function of the US 26/Brookwood Parkway/Helvetia Road Interchange is to provide employee vehicle and bicycle commute trips and truck freight traffic access to existing and future large high-technology employment centers based throughout North Hillsboro. The secondary function is to provide access to the residences in the unincorporated community surrounding the interchange.

According to Figure 2-22 of the RTP, there is a designated Community Bikeway loop formed by NW West Union Road, NW Cornelius Pass Road, NW Brookwood Parkway, and NW Evergreen Parkway. NW Evergreen Parkway is a designated Community Bikeway throughout its length. Community Bikeways provide for travel to and within other 2040 Target Areas or areas identified for development as part of the 2040 Growth Concept. US 26 west of NW Brookwood Parkway is a designated Regional Bikeway. These routes also provide access to regional attractions, such as schools and parks, and connect neighborhoods to the rest of the regional bicycle network.

The IAMP is listed as a five- to ten-year investment strategy, and therefore completion of the IAMP is consistent with and implements the RTP. All but one of the improvement projects include bicycle lanes that will be constructed to applicable standards to the maximum extent practicable. All but four of the improvement projects (which are new proposed streets) in the IAMP are included in the Metro 2035 RTP (Proposed IAMP Improvement Projects 2, 4, 8, and 11, see Table 8 in IAMP).

The IAMP is consistent with the RTP.

Metro Regional Transportation Functional Plan

The Regional Transportation Functional Plan (RTFP) implements the Goals and Objectives in section 2.3 of the Regional Transportation Plan (RTP). Cities and counties in the region implement the Goals and Objectives in their comprehensive plans, TSPs, other land use regulations, and transportation project development.

Finding of Compatibility: Development of the improvement projects will be done so in accordance with the local jurisdiction's standards, which integrate RTFP standards. The IAMP is consistent with the TPR.

Local Plans and Policies

Washington County 2020 Transportation Plan

The Washington County 2020 Transportation Plan (2020 TP) addresses provisions of the RTP and the state TPR. The 2020 TP classifies existing and future roads and streets and addresses transit, pedestrian, and bicycle transportation issues. The local street system is designated on the community plans and the Rural/Natural Resource Plan, which are best suited for addressing the local street system. Many provisions of the 2020 TP are implemented by the community plans, the Rural/Natural Resource Plan, and the Community Development Code.

Finding of Compatibility: The 2020 TP consists of 23 elements. The Roadway, Bicycle and Pedestrian, and Roadway Freight Elements are the most applicable elements to planning for the interchange.

The IAMP is consistent because it provides the framework for a more interconnected roadway system in the IAMP Study Area to meet the future needs of the area, based on anticipated land use development. Bicycle and pedestrian facilities are incorporated into all of the improvement projects except one to create a more multimodal and safer environment for bicyclists and pedestrians. The suggested improvements were designed to meet operational standards and meet the expected needs of future industrial development in the area, and the needs of the residents who live and work in the area.

The interchange improvements are consistent with the 2020 TP except for:

NW Brookwood Parkway (Proposed IAMP Improvement Projects #3 and #5, see Table 8 in the IAMP). The 2020 TP lists the roadway as four to five lanes and classifies it as an arterial, but the proposed improvement is for six lanes. The new interchange loop ramp requires three lanes southbound to accommodate the amount of traffic expected to use the interchange in the AM and to access industrial lands. Three lanes northbound will provide storage for vehicles entering the highway in the PM.

Additionally, there are projects that need to be included in the TSP:

NW 253rd Avenue (Proposed IAMP Improvement Project #1, see Table 8 in the IAMP). NW 253rd Avenue is required to provide an alternate route once Meek Road is cut off from Brookwood Parkway to meet interchange spacing standards and resolve safety concerns. NW 253rd Avenue will also provide access to industrial lands and a parallel route to Brookwood Parkway

NW Huffman Street East of NW 253rd Avenue (Proposed IAMP Improvement Project #4, see Table 8 in IAMP). Huffman Street is required to access undeveloped industrial land within the UGB and provide a parallel route to Evergreen Parkway. Five lanes will be needed at the Huffman Street/Brookwood Parkway intersection to accommodate traffic accessing the industrial lands while preserving capacity for through movements.

NW Huffman Street West of NW 253rd Avenue (Proposed IAMP Improvement Project #7, see Table 8 in IAMP). Huffman Street west of NW 253rd Avenue is needed to access industrial lands and provide a parallel route to Evergreen Parkway.

NW 264th Avenue (Proposed IAMP Improvement Project #8, see Table 8 in IAMP). NW 264th Avenue is needed to provide a parallel local route to Jackson School Road and to access industrial lands (part of this is outside of the current UGB but within the 330-acre expansion area).

NW Schaaf Road (Proposed IAMP Improvement Project #12, see Table 8 in IAMP). Schaaf Road west of Helvetia Road is needed to access industrial lands and provide a parallel route to Jacobson Road.

Washington County will adopt the IAMP as a refinement plan to its 2020 TP. Washington County will continue to coordinate with ODOT and the City of Hillsboro in evaluating amendments that could affect the function of the interchange in order to ensure that coordination is timely and that actions and improvements are consistent with the defined function of the IAMP.

Washington County Comprehensive Framework Plan for the Urban Area

The Comprehensive Framework Plan for the Urban Area (Framework Plan) contains specific standards designed to regulate the growth and development of unincorporated properties inside the Regional Urban Growth Boundary and the UGBs of Banks, Gaston, and North Plains. The overall goal of the countywide development concept is:

> *… to create a series of distinct, balanced, relatively self-sufficient and diverse communities throughout the urban portion of Washington County. Employment centers (e.g., distribution services and industries and offices) will be located in accord with market, transportation and environmental considerations in order to reduce impacts on residential areas and community.*

This includes "a variety of transportation modes ranging from pedestrian movement to transit corridors [that] should provide for intra-community and inter-community movement of people, goods and services."

Finding of Compatibility: The IAMP is compatible with the overall goal of the Framework Plan. The IAMP supports industrial development in an area that has access to the regional transportation network and limits the impacts to residential areas. The improvements will also provide for increased multimodal options by providing sidewalks and bicycle lanes. The IAMP is consistent with the Framework Plan.

Washington County Community Plans

Adopted Community Plans are the legally binding statements of county policy within the boundaries of the particular community planning area.

West Union Community Plan

The West Union Community Plan applies to the area adjacent to and north of US 26, west of Cornelius Pass Road to the UGB, and represents the northeast portion of the IAMP Study Area. The entire West Union Community Plan area is within the IAMP Study Area. It consists of four subareas within West Union (Five Oaks, Jacobson, Cornelius Pass, and Helvetia). All four subareas have the Special Industrial District Overlay (described further in this document). According to the West Union Community Plan, the characterization of land use in the West Union planning area "is that of an employment center which will likely consist of a combination of industrial uses. As a result of transportation services available to the West Union area, the relationship between transportation costs and industrial location, and the cost of transporting service personnel, equipment and supplies within a region, it is likely that the clustering of interdependent industries will occur in West Union. This will foster the location of industrial neighbors whose operations are compatible, thus furthering the employment center concept."

Some of the basic objectives of the West Union Community Plan are:

> to improve access to the industrial area and to minimize traffic impacts on surrounding residential areas;
>
> to ensure access to West Union shall not require through travel on neighborhood streets and shall minimize travel on streets adjacent to residential areas; new access onto Arterials and Collectors shall be limited; and
>
> and to require shared or consolidated access prior to the issuance of a development permit for land divisions or structures located adjacent to these facilities, unless demonstrated to be infeasible.

During the development review process, new development must identify any potential traffic impacts to the surrounding roadway system and recommend steps to mitigate these impacts, as provided for by the Washington County Community Development Code.

The West Union Community Plan assumes eventual development of all pedestrian and bicycle facilities identified in the Washington County 2020 Transportation Plan. Generally speaking, the transportation plan calls for bikeways along all Arterial and Collector roads in the area, as well as along major streams and in power line easements. A system of multiple-purpose pedestrian/bicycle pathways will be instituted to allow access through the development, and to link buildings to each other, to off-street parking areas, and to any proposed transit stops. This system will connect to the bicycle pathways along West Union and Cornelius Pass Roads, as proposed by the Washington County 2020 Transportation Plan. Adequate parking facilities for bicycles and curb cut ramps at street crossings will be included in the design of all new development. The timing of pathway development will be determined by the availability of resources.

Each subarea has its own identified opportunities and constraints and designations within the overall objectives of the West Union Community Plan. The Helvetia subarea, because it was the area most recently adopted into the UGB as an Urban Reserve (there are additional areas within the IAMP Study Area awaiting adoption into the UGB), has more specific development criteria.

Helvetia Subarea

This area consists of several parcels located at the southeast corner of Helvetia and West Union Roads and encompasses approximately 250 acres. These properties were added to the UGB by Metro Ordinance 04-1040B, adopted on June 24, 2004. Metro designated the area as a Regionally Significant Industrial Area (RSIA) on the 2040 Growth Concept Plan. The area is designated Future Development - 20 Acre (FD-20) District on the West Union Community Plan and the FD-20 designation will be maintained until the property is annexed to the City of Hillsboro and rezoned.

East Hillsboro Community Plan

A portion of the IAMP Study Area west of Cornelius Pass Road and south of US 26, to the UGB, is in the East Hillsboro Community Plan area. The East Hillsboro Area is within the Hillsboro UGB. In the East Hillsboro Community Plan area, properties that have been annexed to the City of Hillsboro are regulated by the City of Hillsboro. Properties that have not been annexed to the City of Hillsboro are regulated by Washington County. However, general planning for the area is through a joint planning process between Washington County and the City of Hillsboro.

Some of the general Design Guidelines of the East Hillsboro Community Plan applicable to planning for the IAMP are:

Washington County will emphasize non-auto (transit, bicycle, and pedestrian) measures as an interim solution to circulation issues. These measures will be used to facilitate access to transit centers.

New development will, when determined appropriate through the development review process, dedicate right-of-way for road extensions and alignments indicated on the Washington County 2020 Transportation Plan or the Hillsboro Transportation Plan. New development will also be subject to conditions set forth in the County's growth management policies during the development review process.

The portion of the IAMP Study Area within the East Hillsboro Planning Area is in the Evergreen Road Subarea.

Evergreen Road Subarea

This area encompasses approximately 539 acres located on the north side of Evergreen Road and generally west of Shute Road and east of Jackson School Road. This property was added to the UGB by Metro Ordinance 05-1070A adopted November 17, 2005. On the 2040 Growth Concept Plan, Metro designated the eastern half of the area (Area of Special Concern 6) as a Regionally Significant Industrial Area (RSIA) and the remaining area (Area of Special Concern 7) as Industrial land. The area is designated Future Development - 20 Acres (FD-20) on the East Hillsboro Community Plan. Once properties within the subarea have been annexed to the City of Hillsboro, they are regulated by the Hillsboro Comprehensive Plan and its implementing ordinances.

The Washington County Department of Land Use and Transportation Annual Work Program outlines tasks necessary to keep the County Comprehensive Plan in conformance with regional, state, and federal law. There are two application deadlines each year, February 15 and August 15. Complete applications received by February 15 will be placed on the Planning Commission's summer hearing schedule; those received by August 15 usually are scheduled for a fall or winter hearing. An application cannot be scheduled for a hearing until it is deemed complete and accepted by the County. Each year after considering plan upkeep requirements and issue topics, the Long Range Planning Division prepares a draft work program for approval by the Board of Commissioners. The draft work program describes and prioritizes potential planning projects and land use ordinances. When there are a number of large planning tasks to be addressed, staff will prepare a multi-year work program. The draft work program is then distributed to the Planning Commission, Citizen Participation Organizations, Committee for Citizen Involvement, and other interested parties for consideration and comments. Staff may prepare an issue paper about a subject when the Board of Commissioners asks for additional information before making a decision about the work program. It is also posted on the division's Web page. After considering available staff resources and public comments, a final work program is approved by the Board of Commissioners.

Finding of Compatibility: The IAMP is compatible with the West Union and East Hillsboro Community Plans because it improves access to industrial areas by providing for improvements and the development of new streets, and identifies bicycle and pedestrian facilities on Arterials and Collectors (except for one Rural Collector). In general, the IAMP was developed to be consistent with applicable Washington County Community Plans.

Washington County Rural/Natural Resource Plan

The Rural/Natural Resource Plan addresses all properties outside of an urban growth boundary. The Rural/Natural Resource Plan applies to the western portion of the IAMP Study Area.

The Rural/Natural Resource element of the Washington County Comprehensive Plan provides the framework for guiding future land use decisions in Washington County in areas outside of the established UGBs.

There are nine land use designations in this plan element for lands that make up the areas of Washington County outside the acknowledged UGBs. The IAMP Study Area contains two of those nine

designations, one of which is a resource designations (Exclusive Farm Use and the other a "Rural Development" designation (Agriculture and Forest-5). An exception to LCDC Goals 3 and 4, utilizing the Exception Process specified in Goal 2, has been established for those lands designated for rural development.

Finding of Compatibility: According to the Rural/Natural Resource Land Use Designation Map, most of the IAMP Study Area outside of the UGB is currently designated as Exclusive Farm Use (EFU), which is intended to preserve existing agricultural lands and prohibit land uses that are not compatible with agricultural practices. There are a few parcels zoned Agriculture and Forest -5 (AF-5) in the southern portion of the IAMP Study Area that allow for rural residential uses.

The Significant Natural Resource Map Number 4 (http://www.co.washington.or.us/LUT/Divisions/LongRangePlanning/upload/RNRP-SIGMAP4.pdf) shows Water Areas, Wetlands, and Fish and Wildlife Habitat designation for Waibel Gulch, which parallels NW Helvetia Road and crosses Meek Road, and a Water Areas and Wetland designation for a wider portion adjacent to Waibel Creek north of US 26. There is also a Water Areas, Wetlands, and Fish and Wildlife Habitat designation for a tributary to Waibel Gulch that crosses under NW Brookwood Parkway just south of the interchange.

The IAMP is consistent with the Washington County Rural/Natural Resource Plan because it adopts the plan by reference into the IAMP. In addition, the IAMP and the projected improved function of the interchange is based on continuance of the current and planned land uses under existing and planned designations.

Therefore, the IAMP is consistent with the Rural/Natural Resource Plan.

Washington County Community Development Code

The purpose of the Washington County Community Development Code is to implement the Washington County Comprehensive Plan through the adoption and coordination of planning and development regulations that provide for the health, safety, and general welfare of the citizens of Washington County.

Finding of Compatibility: Lots within the UGB under Washington County jurisdiction (primarily in the Helvetia and Evergreen subareas) are zoned Future Development - 20 Acres (FD-20), except for a couple of small parcels along NW Cornelius Pass Road that are zoned Special Industrial Overlay District (SID). The FD-20 District encourages and retains limited interim uses until the urban comprehensive planning for future urban development of areas brought within the UGB after 1998 is completed. The Special Industrial Overlay District has provisions designed to establish development opportunities for industrial uses which may require large sites as well as for small and medium size industrial uses which desire to locate in proximity to large single user industrial uses.

Outside the UGB, lots within the IAMP Study Area are zoned primarily Exclusive Farm Use (EFU) District, with some areas of Agriculture and Forest (AF-20) District adjacent to the southwest corner of the interchange and along NW Evergreen Road. There are also seven lots zoned Agriculture and Forest (AF-5) District between NW Meek Road and NW Evergreen Road in the IAMP Study Area.

As described in the Rural/Natural Resource Plan section above, there are natural resource overlay areas within the IAMP Study Area.

The provisions in Sections 308 (FD-20), 340 (EFU), 348 (AF-5), 377 (SID), and , Article 7 of the Community Development Code (CDC) will apply to many of the road projects contained in the IAMP. Application of the CDC to development of those projects will ensure that land uses and natural resources are protected at the local level. Section 422, Significant Natural Resources, and Section 421, Floodplain and Drainage Hazard Area Development, only apply to these resources when they are impacted by projects other than transportation projects.

The IAMP is consistent with the Washington County Rural/Natural Resource Plan because it adopts the plan by reference into the IAMP. In addition, the IAMP and the projected improved function of the interchange is based on continuance of the current and planned land uses under existing and planned designations.

City of Hillsboro Transportation System Plan (Update)

The TSP for the City of Hillsboro was adopted in 1999. The TSP provides specific information regarding transportation needs to guide future transportation investment in the City of Hillsboro. The TSP update (2020 planning horizon) includes additional key intersections, recently annexed land and neighborhoods within the Hillsboro School District boundaries, and recently completed transportation projects.

Finding of Compatibility: The IAMP is consistent with the maps on Figures 1-2, 1-3, and 1-5 of the City of Hillsboro TSP.

Figure 1-2, Pedestrian Master Plan, identifies Planned Sidewalks on Arterials, Collectors, and Neighborhood Routes on NW Evergreen Road west of NW Shute Road, NW Jacobson Road, and NW Meek Road.

Sidewalks are included on all proposed improvement projects in the IAMP Study Area except for NW Groveland Drive, which is a Rural Collector.

Figure 1-3, Bicycle Master Plan, identifies planned bike lanes from NW Shute Road over US 26 to Helvetia Road, and on NW Jacobson and NW West Union with connections outside of the UGB. A Bicycle Way is indicated for NW Rock Creek and NW Wagon Way.

Bicycle lanes are included on all proposed improvement projects in the IAMP Study Area except for NW Groveland Drive, which is a Rural Collector.

Figure 1-5, Street Improvement Plan, identifies street widening (to five lanes) on SW Evergreen Road west from NW Shute Road, on NW Cornelius Pass Road north of the interchange (to five lanes), and to three lanes on NW Jacobson Road. Proposed streets shown on the figure include NW 229th (three lanes) and NW Huffman Street west to outside of the UGB.

The improvement projects for the IAMP include an area consistent with the street improvements identified above for NW Huffman Street and NW Jacobson Road. The NW Cornelius Pass Road and NW Evergreen Road projects are outside of the IAMP Management Area, and their circulation isn't directly impacted by the interchange project. Therefore, they aren't included as IAMP projects. However, this does not preclude their improvements.

Other Potential Future Connections/Realignments:

2. Extensions of NW Huffman Street and NW Dawson Creek Drive into NW 253rd Avenue – Part of the Shute Road Concept Plan, these road extensions are intended to provide access to the newly added 203-acre Shute Road Special Development District.

3. NW Jacobson Road Realignment to NW Helvetia Road – The realignment north of the US 26/Shute Road interchange is intended to accommodate potential increased right-of-way necessary for interchange improvements.

Both these projects are included in the IAMP (Proposed IAMP projects 4 and 9).

Figure 1-8, Traffic Signal Master Plan, shows planned signals at NW Huffman Street and NW Brookwood Parkway and NW Helvetia Road and NW Schaaf Road.

These projects are not included in the IAMP but the IAMP projects are not inconsistent with them nor are they precluded by the IAMP from being developed.

Figure 1-4, Transit Master Plan, shows RTP designation as community bus service on NW Shute, NW Jacobson, NW Evergreen, and NW Cornelius Pass Roads.

Bus service is not included in the IAMP; however, the IAMP's local improvements will benefit all modes of travel, including bus service.

The RTP also identified several roadways within Hillsboro for regional bus service, including NW 185th Avenue, NW Cornell Road, NW Evergreen Road, NW 229th/231st/234th Avenue, and Baseline Road. High-quality regional transit service on corridors can link many high employment, regional center, and town center areas.

Bus service is not included in the IAMP; however, the IAMP's local improvements will benefit all modes of travel, including bus service.

The TSP designates the Meek Road Special Study Area, which is consistent with the Washington County 2020 TP as the following:

The Meek Road Study Area. Concerns exist regarding the proximity of the intersection of Meek Road and Shute Road to the interchange at US 26 and Shute Road. Washington County has designated this as a study area in order to evaluate options for moving the intersection of Meek Road further south. However, reorienting the roadway to the south would place it within the Shute Road Site Special Development District. The 203 acre site, located at the intersection of Evergreen Road and Shute Road, was added to the urban growth boundary for the purpose of providing large lots for high tech industrial development. Meek Road, situated immediately north of the new district, will be influenced by future development within the Shute Road site. The Conceptual Transportation Plan for Shute Road, drafted by Group MacKenzie, suggests that additional analysis would be required with regards to Meek Road to determine any relocation of Meek Road or re-routing of traffic.

To meet access spacing standards and alleviate safety concerns, the Meek Road connection to Brookwood Parkway will be closed. A new connection from extended NW 253rd Avenue to Meek Road will allow access and connections from Meek Road to the south.

The City of Hillsboro will adopt the IAMP as a refinement plan to its TSP. Implementation of the local improvement projects shown on Figure 8 in the IAMP will require the City of Hillsboro to amend the TSP. The local improvement projects that the City will need to adopt are:

NW 253rd Avenue (Proposed IAMP Improvement Project #1). NW 253rd Avenue is required to provide an alternate route once Meek Road is cut off from Brookwood Parkway to meet interchange spacing standards and address safety concerns. It will also provide access to industrial lands and a parallel route to Brookwood Parkway (part of this is outside of the current UGB but within the 330-acre expansion area).

NW Huffman Street East of NW 253rd Avenue (Proposed IAMP Improvement Project #4). Huffman Street is required to access undeveloped industrial land within the UGB and provide a parallel route to Evergreen Parkway. Five lanes will be needed at the Huffman Street/Brookwood Parkway intersection to accommodate traffic accessing the industrial lands while preserving capacity for through movements.

NW Huffman Street West of NW 253rd Avenue (Proposed IAMP Improvement Project #7). Huffman Street west of NW 253rd Avenue is needed to access industrial lands and provide a parallel route to Evergreen Parkway.

NW 264th Avenue (Proposed IAMP Improvement Project #8). NW 264th Avenue is needed to provide a parallel local route to Jackson School Road and to access industrial lands (part of this is outside of the current UGB but within the 330-acre expansion area).

NW Schaaf Road (Proposed IAMP Improvement Project #12). Schaaf Road west of Helvetia Road is needed to access industrial lands and provide a parallel route to Jacobson Road.

Four new extensions of roadways (NW 253rd NW Huffman West of NW 253rd, NW 264th and Schaaf), are included that are outside the existing city limits, but within the new UGB expansion area. Washington County lists all four proposed roadways as Collectors in its TSP.

The City of Hillsboro will continue to coordinate with ODOT and Washington County in evaluating land use actions (including amendments to the comprehensive plan, TSP, and development code, the UGB expansion and transportation improvements) that could affect the function of the interchange in order to ensure that coordination is timely and that actions and improvements are consistent with the defined function of the IAMP.

City of Hillsboro Comprehensive Plan

The City of Hillsboro Comprehensive Plan was passed by the Hillsboro City Council and approved by the mayor on April 5, 1977, and has been amended through June 2010. The Comprehensive Plan provides goals, policies, and implementation measures for 29 different sections to guide growth and development for the City of Hillsboro. It includes area-specific Community Plans that establish coordinated policies and development guidelines within specific areas of the City of Hillsboro.

There are three Community Plans that apply to the IAMP Study Area: Section 20 Shute Road Industrial Site, Section 24 Evergreen Area Industrial Plan, and Section 25 Helvetia Area Industrial Plan. However, these Community Plans are currently being consolidated and are intended to be replaced by the Section 30 North Hillsboro Industrial Area Community Plan.

Comprehensive Plan Map Designations for the IAMP Study Area are almost entirely for industrial uses. However, there is a band of area designated Floodplain starting at NW Century Drive, crossing under US 26, and then continuing to NW Brookwood just south of the interchange.

Finding of Compatibility: The IAMP was developed to be consistent with the City of Hillsboro Comprehensive and Community Plans, including the North Hillsboro Industrial Community Plan. Specifically, the IAMP includes Proposed IAMP Improvement Project projects 5, 7, 1, 9, and 12 (listed in Table 8 of the IAMP), which are also projects identified in the North Industrial Community Plan. Policies from the Comprehensive Plan relied on to implement the IAMP.

City of Hillsboro Zoning Ordinance

The purpose of the City of Hillsboro Zoning Ordinance is to encourage the most appropriate use of land. Zoning for the IAMP Study Area within City of Hillsboro jurisdiction include the following specialized industrial zones: Industrial Park (M-P), Helvetia and Evergreen Area Special Industrial Districts (HSID and ESID), and several overlays for industrial development for large lots, Shute Road area, (SSID, SID M-P), for Planned Unit Development, and for natural resources (SNRO, RFD).

Finding of Compatibility: .The IAMP is consistent with the City of Hillsboro Development Code because it adopts the plan by reference into the IAMP. In addition, the IAMP and the projected improved function of the interchange is based on continuance of the current and planned land uses under existing and planned designations.

US26: Brookwood Parkway/Helvetia Road Interchange Area Management Plan

Attachment A-1

Washington County, Ordinance 749 and Staff Report (pending adoption in September 2012)

August 2012

FILED

MAY 11 2012

Washington County
County Clerk

IN THE BOARD OF COUNTY COMMISSIONERS

FOR WASHINGTON COUNTY, OREGON

ORDINANCE No. 749

An Ordinance Amending the Transportation Plan Element of the Comprehensive Plan Relating to the Brookwood Parkway Interchange Area Management Plan

The Board of County Commissioners of Washington County, Oregon, ordains as follows:

SECTION 1.

A. The Board of County Commissioners of Washington County, Oregon, recognizes that the Transportation Plan Element of the Comprehensive Plan (Volume XV) was adopted on October 25, 1988, by way of Ordinance Nos. 332 and 333, with portions subsequently amended by Ordinance Nos. 343, 382, 409, 419, 426, 432, 450, 463, 470, 471, 473, 474, 480, 483-485, 493, 494, 503, 515, 526, 537, 542, 546, 552, 556, 588, 601, 609, 611, 626, 627, 631, 642, 649, 663, 674, 683, 712, 713, 717, 718, 730, and 739.

B. Subsequent ongoing planning efforts of the County indicate a need for changes to the Transportation Plan to incorporate provisions of the U.S. 26 – Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP). The Board recognizes that the U.S. 26 – Brookwood interchange is slated for improvement beginning in 2013 and, as a result, coordinated development of the local transportation system identified in the IAMP is important in order to ensure sufficient capacity and safe operations due to increased future use. The Board takes note that such changes are necessary for the benefit of the health, safety, and general welfare of the residents of Washington County, Oregon.

WASHINGTON COUNTY COUNSEL
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C. Under the provisions of Washington County Charter Chapter X, the Department of Land Use and Transportation has carried out its responsibilities, including preparation of notices, and the County Planning Commission has conducted public hearings on the proposed amendments and has submitted its recommendations to the Board. The Board finds that this Ordinance is based on that recommendation and any modifications made by the Board, as a result of the public hearings process.

D. The Board finds and takes public notice that it is in receipt of all matters and information necessary to consider this Ordinance in an adequate manner, and that this Ordinance complies with the Statewide Planning Goals, the Metro Urban Growth Management Functional Plan, and the standards for legislative plan adoption, as set forth in Chapters 197 and 215 of the Oregon Revised Statutes, the Washington County Charter, and the Washington County Development Code.

SECTION 2.

The following exhibits, attached and incorporated herein by reference, are hereby adopted as amendments to the Transportation Plan:

(A) Exhibit 1: Figure 4C – Washington County Functional Classification System map, is amended to add or modify the functional classification of transportation facilities consistent with the IAMP;

(B) Exhibit 2: Figure 5 – Washington County Lane Numbers map, is amended to add or modify the number of lanes on transportation facilities consistent with the IAMP;

(C) Exhibit 3: Policy 10.0 – Functional Classification Policy, is amended to add a strategy to describe and enable implementation of the U.S. 26 – Brookwood

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Parkway/Helvetia Road Interchange Area Management Plan; and

(D) Exhibit 4: Policy 19.0 – Transportation Planning Coordination and Public Involvement Policy, is amended to integrate the U.S. 26 – Brookwood Parkway/Helvetia Road Interchange Area Management Plan with the Transportation Plan.

SECTION 3.

All other Comprehensive Plan provisions that have been adopted by prior ordinance, which are not expressly amended or repealed herein, shall remain in full force and effect.

SECTION 4.

All applications received prior to the effective date shall be processed in accordance with ORS 215.427.

SECTION 5.

If any portion of this Ordinance, including the exhibits, shall for any reason be held invalid or unconstitutional by a body of competent jurisdiction, the remainder shall not be affected thereby and shall remain in full force and effect, and any provision of a prior land use ordinance amended or repealed by the stricken portion of this Ordinance shall be revived and again be considered in full force and effect.

SECTION 6.

The Office of County Counsel and Department of Land Use and Transportation are authorized to prepare planning documents to reflect the changes adopted under Section 2 of this Ordinance, including deleting an adding textual material and maps, renumbering pages or sections, and making any technical changes not affecting the substance of these amendments as necessary to

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conform to the Washington County Comprehensive Plan format.

SECTION 7.

This Ordinance shall take effect thirty (30) days after adoption.

ENACTED this _____ day of_____, 2012, being the _____ reading and _____ public hearing before the Board of County Commissioners of Washington County, Oregon.

BOARD OF COUNTY COMMISSIONERS
FOR WASHINGTON COUNTY, OREGON

_____
CHAIRMAN

_____
RECORDING SECRETARY

READING		PUBLIC HEARING	
First	_____	First	_____
Second	_____	Second	_____
Third	_____	Third	_____
Fourth	_____	Fourth	_____
Fifth	_____	Fifth	_____

VOTE: *Aye:* _____ *Nay:* _____

Recording Secretary: _____ Date: _____

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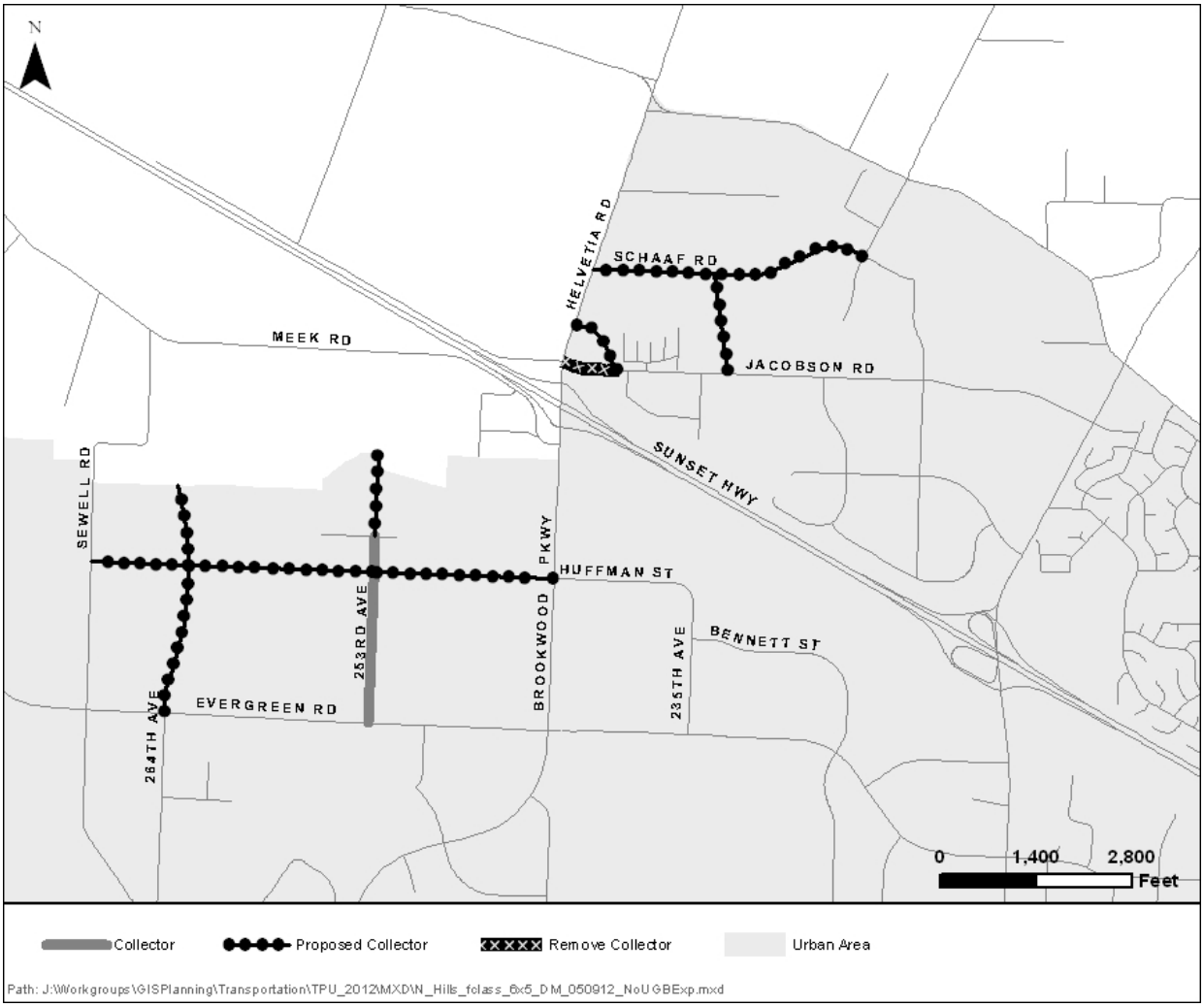
Figure 4C – Washington County Functional Classification System map, is amended as follows:



abcdef Proposed additions
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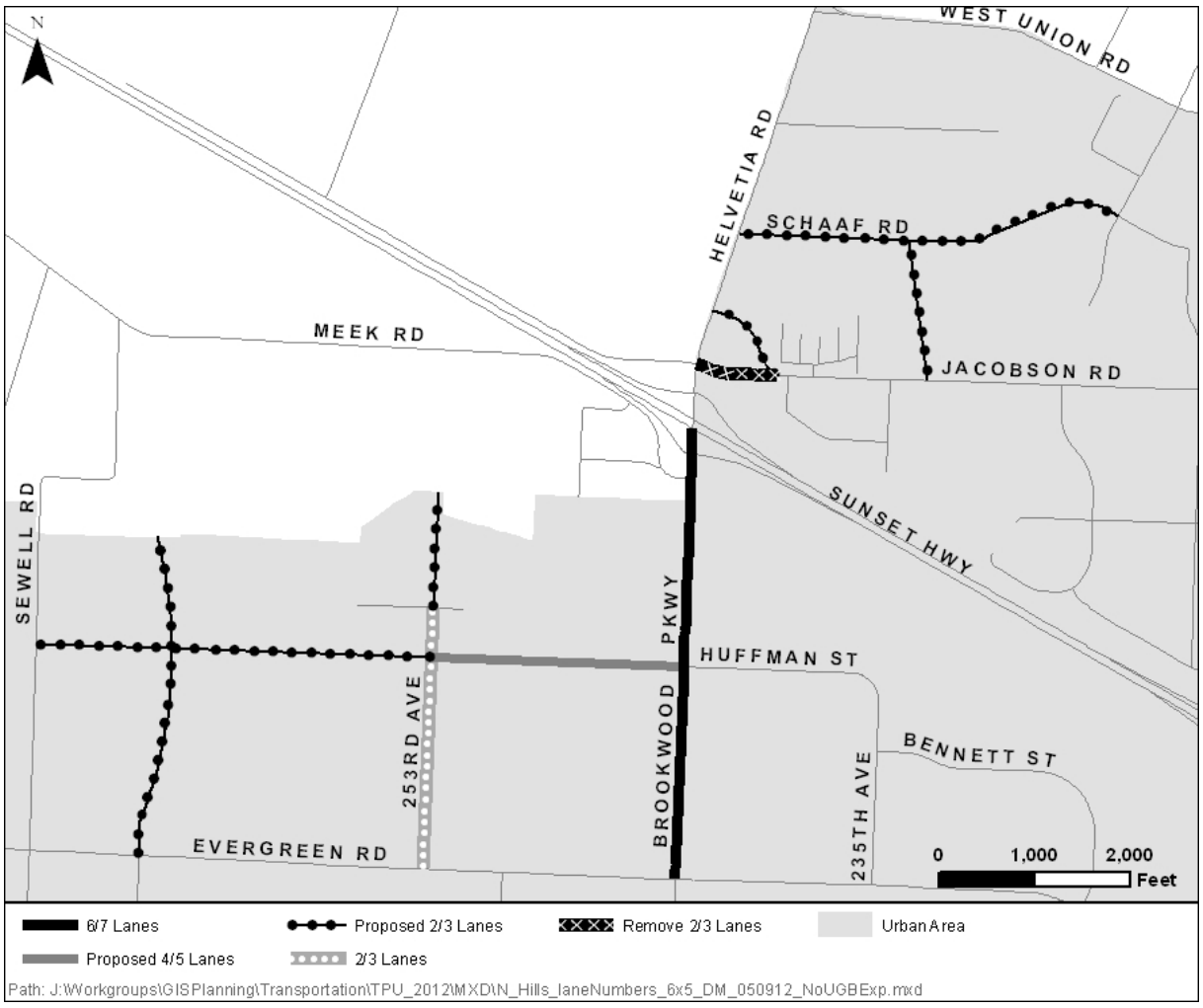
Figure 5 – Washington County Lane Numbers map, is amended as follows:



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Policy 10.0 – Functional Classification Policy is amended as follows:

10.11 The Oregon Department of Transportation (ODOT), the City of Hillsboro and Washington County have developed and adopted an Interchange Area Management Plan (IAMP) for the U.S. 26 - Brookwood Parkway/Helvetia Road Interchange. This interchange, a locally and regionally significant facility, is slated for improvement with funds provided by the state Jobs and Transportation Act. Among its functions is to serve as a primary entry point to regionally-significant high-tech employment centers south of the interchange. The IAMP defines improvements to the local transportation system in the vicinity of the interchange that are necessary to ensure the intended purpose and function of the interchange are maintained and sufficient to ensure safe operations through the year 2035. IAMP elements should be incorporated into the Washington County Transportation Plan, as appropriate.

10.~~11~~12 The Transportation Plan also identifies several specific study areas where the function or alignment of the facility has not been determined. These study areas are described below and shown on the Study Area Map.

Meek Road - Realignment at Brookwood Parkway~~Shute Road~~:
There has been concern regarding the proximity of the intersection at Meek Rd and Brookwood Parkway~~Shute Rd~~ to the interchange at US 26 and Brookwood Parkway~~Shute Rd~~. This ~~study will evaluate options for moving the intersection of Meek further south~~issue has been evaluated and a proposed solution identified through development of the U.S. 26 – Brookwood Parkway/Helvetia Road Interchange Area Management Plan that was developed in conjunction with plans for improvements to the interchange itself.

abcdef Proposed additions
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Policy 19.0 – Transportation Planning Coordination and Public Involvement Policy, is amended as follows:

19.15 Integrate the U.S. 26 -- Brookwood Parkway/Helvetia Road Interchange Area Management Plan with the Washington County Transportation Plan and carry out its applicable provisions as part of transportation plan implementation.

abcdef Proposed additions
~~abcdef~~ Proposed deletions

WASHINGTON COUNTY
OREGON

June 20, 2012

To: Washington County Planning Commission

From: Andy Back, Interim Long Range Planning Manager

Subject: Ordinance No. 749: Concerning Adoption of the U.S. 26 – Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP)

I. STAFF RECOMMENDATION:

Staff recommends that the Planning Commission hold the public hearing, consider testimony, then either 1) allow for further consideration by continuing the hearing until its July 11 meeting, or 2) forward the Ordinance to the Board of County Commissioners for a public hearing and consideration at its July 24 meeting.

II. OVERVIEW:

Ordinance No. 749 is intended to add to the Washington County transportation plan some new streets and modify plans for some existing streets identified in the U.S. 26 –Brookwood Parkway/Helvetia Road Interchange Area Management Plan (IAMP). The Ordinance also would incorporate strategies in the plan calling for implementation of the IAMP.

ODOT's initial deadline for local adoption of the IAMP was mid-September, 2012, at the time the Ordinance was filed.

For reasons more fully described later in this staff report, Ordinance No. 749 was developed and filed with two issues still outstanding:

- IAMP recommendations had not been finalized by May 11, the date the Ordinance needed to be filed in order to meet ODOT's IAMP adoption deadline;
- The status of the Urban Growth Boundary (UGB) expansion area endorsed by Metro in October 2011 and located within the study area remained uncertain.

To address the potential need for changes associated with the resolution of these uncertainties, the Ordinance review and adoption process allows for modifications to Ordinance 749 at a later date. The Ordinance itself includes only portions of roadway modifications and/or new roadways proposed by the draft IAMP that are located within the UGB but not within the previously mentioned UGB expansion area endorsed by Metro. Reasons for this are more fully explained later in the staff report.

Department of Land Use & Transportation • Long Range Planning Division
155 N. First Avenue, Suite 350-14, Hillsboro, OR 97124-3072
phone: (503) 846-3519 • fax: (503) 846-4412

III. BACKGROUND:

Improvements to the U.S. 26 –Brookwood Parkway/Helvetia Road Interchange (Interchange) itself are planned for construction beginning in 2013. The improvements are funded with $45 million provided by the Jobs and Transportation Act (JTA) enacted by the 2009 Oregon Legislature. Under agreement with ODOT, if the Interchange costs less than $45 million, remaining funds would be available for priority projects identified in the IAMP.

The need for an interchange improvement initially grew out of Concept Planning work done by the city of Hillsboro for the 249-acre Helvetia Concept Planning Area (located northeast of the Interchange) and the 534-acre Evergreen Concept Planning Area (located southwest of the Interchange). Metro brought these two areas into the UGB in 2002 and 2005, respectively. The city developed Concept Plans for the two areas that identified the type of development that should occur and a general infrastructure framework necessary to serve it. The concept plans were completed in February 2008. These areas will be annexed by the city before they develop or redevelop with urban uses.

When an interchange is to be built or significantly improved, Oregon Administrative Rules (OAR 734-051) require IAMPs to be developed and adopted by affected local governments before the Oregon Transportation Commission (OTC) releases interchange construction funds. IAMPs are intended to identify transportation system facilities and improvements in the vicinity of an interchange that are needed to adequately support its operation over time.

Development of this IAMP started in Fall, 2010, with the first Project Advisory Committee meeting in May, 2011. The fourth and final Project Advisory Committee meeting on this IAMP is scheduled for June 25, 2012. ODOT anticipates having the final IAMP recommendations completed shortly thereafter.

Analysis completed during IAMP development shows that the Interchange is approaching or exceeding Oregon Highway Plan (OHP) mobility standards. The heavy westbound off-ramp traffic during the AM peak hour heading southbound and the corresponding northbound-to-eastbound movement in the PM peak hour currently have a detrimental effect on traffic operations on the US 26 mainline, the surface arterial roadways near the interchange, and the expansion of current and future businesses (and jobs) in the surrounding area that depend on adequate interchange traffic capacity. In addition, roadway connections to Brookwood Parkway and Helvetia Road near the interchange do not meet OHP access spacing standards, making access difficult and potentially unsafe, and contributing to traffic congestion at and near the interchange during peak travel times.

Additional traffic associated with new industrial development attracted to North Hillsboro also is expected. The approximately 330-acre UGB expansion area in the IAMP study area is intended to help attract future large-site industrial employers to the region.

IAMP Public Involvement:
A Project Advisory Committee (PAC) was created to guide the IAMP process and provide important policy, community and technical feedback. The PAC included one representative each from the Helvetia Community Association, Meek Neighborhood, Hillsboro Chamber of Commerce, Brookwood area bicyclists, Jacobson Road (Pac Trust), City of Hillsboro, and Washington County, and the ODOT project manager. Project team members and members of the public also attended the PAC meetings.

Residents of the area received project updates and an invitation to the two project open houses through two project newsletters, the project website, and area media. Each newsletter was mailed to approximately 3,100 addresses in the interchange area and posted on the website approximately two weeks before each open house. E-mail notifications of the open houses also were sent (200 addresses for the first open house), primarily to individuals who had expressed interest in the project, legislators, emergency service providers, local businesses, organizations, and members of the PAC.

One of the open houses was held on January 17, 2012 at Liberty High School in Hillsboro, Oregon (49 attended); the second is scheduled from 5-7 PM on June 25, 2012 at the Hillsboro Civic Center. Comment forms made available at each open house provide the primarily tool for recording feedback received.

Ordinance No. 749 Notification:
Ordinance No. 749 and an accompanying summary were mailed to Citizen Participation Organizations (CPOs) and interested parties on May 21, 2012. Individual Notice 2012-5 describing proposed Ordinance No. 749 was mailed to 252 people on the General Notification List on June 6, 2012. A copy of this notice was also mailed to the Planning Commission at that time. A display advertisement regarding the proposed ordinance was published in the Washington County Weekly section of *The Oregonian* on June 9, 2012 and in the *Hillsboro Argus* on June 8, 2012.

IV. ANALYSIS:

The IAMP:
The IAMP is being developed by the Oregon Department of Transportation (ODOT) in partnership with the City of Hillsboro and Washington County. Roadway system improvements proposed in the IAMP are described in Attachment A. The tiers into which projects are organized in Attachment A show their relative priorities as defined during IAMP development.

The city of Hillsboro and Washington County transportation plans need to be modified to allow the recommended improvements that are not on currently planned roadways. The following facilities would need to be added to the Washington County transportation plan:

- NW 253rd Avenue from NW Evergreen Parkway to NW Meek Road – (Project 1 on Attachment A),
- NW Huffman Street from NW Brookwood Parkway west to NW Sewell Road – (Projects 4 and 7)

- NW 264th Avenue from NW Evergreen Parkway to NW Meek Road – (Project 8)
- New Connector from NW Jacobson to NW Schaaf Road – (Project 11)
- NW Schaaf Road east from NW Helvetia Road to NW Century Drive -- (Project 12)

Some facilities already in the Washington County transportation plan would need to be modified:

- Northwest Brookwood Parkway from NW Evergreen Parkway to the Interchange (Projects 3 and 5) would increase to six travel lanes from four (a 7-lane designation in the Transportation Plan; it is currently designated in the Plan for 5-lanes), and
- NW Helvetia Road from the westbound Interchange on-ramp north to NW Schaaf Road transitions from the six-lanes at the overcrossing to three lanes at NW Schaaf Road and should be designated as 4/5 lanes on the Plan (Project 13).

Other facilities need to be realigned to relocate access to NW Helvetia Road:

- NW Jacobson just east of NW Helvetia Road would be realigned to move its intersection with Helvetia to the north, as indicated (Project 9, west end);
- NW Groveland Drive just west of NW Helvetia Road would be realigned to move its intersection with NW Helvetia further to the north, as indicated (Project 2). (This realignment does not require an amendment to the Transportation Plan. (see OAR 660-012-0065 (2) (f)).

Most of the roadways identified above are now or ultimately will be under jurisdiction of the city of Hillsboro, since the land they are on either is in the city now or must be annexed by the city before it is developed. Remaining under County jurisdiction would be NW Groveland Drive, a rural local road that remains outside the UGB, and NW Brookwood Parkway/NW Helvetia Road, an arterial that is on the Countywide Road System and over which the county plans to retain jurisdiction.

The additional northbound lane on NW Brookwood Parkway is necessary in 2035 to accommodate PM peak hour traffic waiting to move eastbound on U.S. 26, the queue for which, with the additional lane, is anticipated to extend south past the existing Genentech access, located approximately 1000 feet north of Evergreen. The additional southbound lane is necessary to accommodate AM peak hour traffic volumes southbound on NW Brookwood Parkway north of NW Huffman Street, to prevent queues from extending to the U.S. 26 eastbound off-ramp onto NW Brookwood. Also, peak hour traffic volumes on NW Brookwood Parkway are such that they require the majority of green-time at intersections between the Interchange and NW Evergreen Parkway, resulting in extended queues on intersecting streets during these periods.

Facilities for bicycles and pedestrians are proposed to be included on all collector and arterial roadways, consistent with facility and design standards. Alternatives to standard designs contained in the recently developed Washington County Bicycle Design Tool Kit will be considered on Washington County facilities during the project development process.

Ordinance No. 749:
As noted earlier, the timing and content of Ordinance No. 749 are influenced by ODOT's IAMP schedule (adoption by mid-September, 2012), time required for the Ordinance itself (file by May 11, 2012 to meet ODOT's IAMP deadline), and continuing uncertainty associated with status of inclusion of the Metro-endorsed UGB expansion area in which portions of some IAMP projects are located.

The Ordinance itself proposes only facilities within the existing UGB. Attachment B shows the UGB expansion area and changes to the Transportation Plan Functional Classification and Lane Numbers Maps called for the in the IAMP, and which would have been included in the Ordinance had the UGB decision been final.

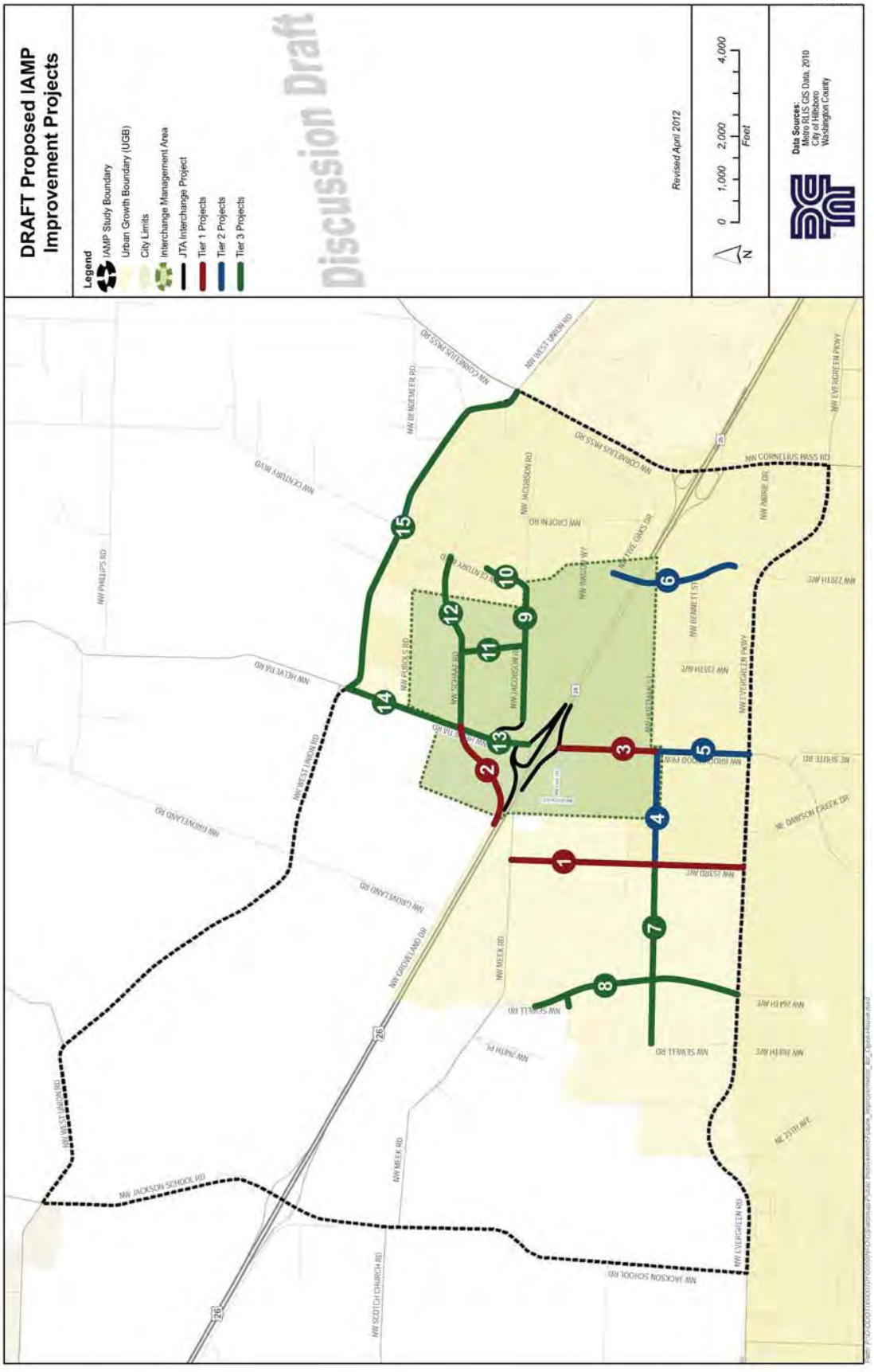
While Metro endorsed inclusion of the expansion area within the UGB as part of its regional decision in October, 2011, Metro's action has not been formally acknowledged by the Land Conservation and Development Commission (LCDC). LCDC considered the matter during its May 10 and 11, 2012 meeting and public hearing but continued it until its June 14, 2012 meeting for further consideration and action. Once LCDC has acted it must issue a final order. A 60-day appeals period begins once the final order is issued.

Given UGB expansion area status, staff determined that only portions of IAMP facilities within the UGB should be included in this ordinance for the following reasons:

- Including roadway extensions outside the urban area would require the county to seek a goals exception for these portions of proposed facilities;
- Developing justification for a goals exception, which may be difficult to get, can be an onerous and time consuming process;
- Timing of roadway project construction is likely to be generally linked to industrial development in the expansion area, which could not occur until area is formally included within the UGB anyway; and
- The Ordinance review and adoption process and schedule provide an opportunity to amend the Ordinance to accommodate proposed changes, should they be warranted based on the resolution of some of these uncertainties. As scheduled, the opportunity to modify the Ordinance occurs in early August. This could be extended a month or so if ODOT determines the IAMP adoption deadline is sufficiently flexible, as appears may be the case as this staff report is being written.

Information on U.S. 26 – Brookwood Parkway/Helvetia Road IAM Plan may be viewed at: http://www.oregon.gov/ODOT/HWY/REGION1/pages/us26_brookwoodpkwy/index.aspx and on Ordinance No. 749 at: http://www.co.washington.or.us/LUT/Divisions/LongRangePlanning/2012-land-use-ordinances.cfm .

Attachments:
A -- Proposed IAMP Improvement Projects Map and List
B – Plan changes for IAMP-Recommended Project Elements in proposed UGB Expansion Area


DRAFT Proposed IAMP Improvement Projects
Legend
IAMP Study Boundary
Urban Growth Boundary (UGB)
City Limits
Interchange Management Area
JTA Interchange Project
Tier 1 Projects
Tier 2 Projects
Tier 3 Projects
Discussion Draft
Revised April 2012
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Feet
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Data Sources:
Metro RLIS GIS Data, 2010
City of Hillsboro
Washington County
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NW WEST UNION RD
NW JACKSON SCHOOL RD
NW MEEK RD
NW GROVELAND DR
NW SCHMELL RD
NW 25TH AVE
NW 24TH AVE
NW 20TH AVE
NE DAWSON CREEK DR
NW EVERGREEN PKWY
NW 229TH AVE
NW 235TH AVE
NE SHUTE RD
NW HELVETIA RD
NW PHILLIPS RD
NW CENTURY BLVD
NW JACOBSON RD
NW CHOCTAW DR
NW PUBLIC RD
NW BERNET ST
NW ABBEY DR
NW SCHOOL HOUSE LN
NW SCOTCH CHURCH RD
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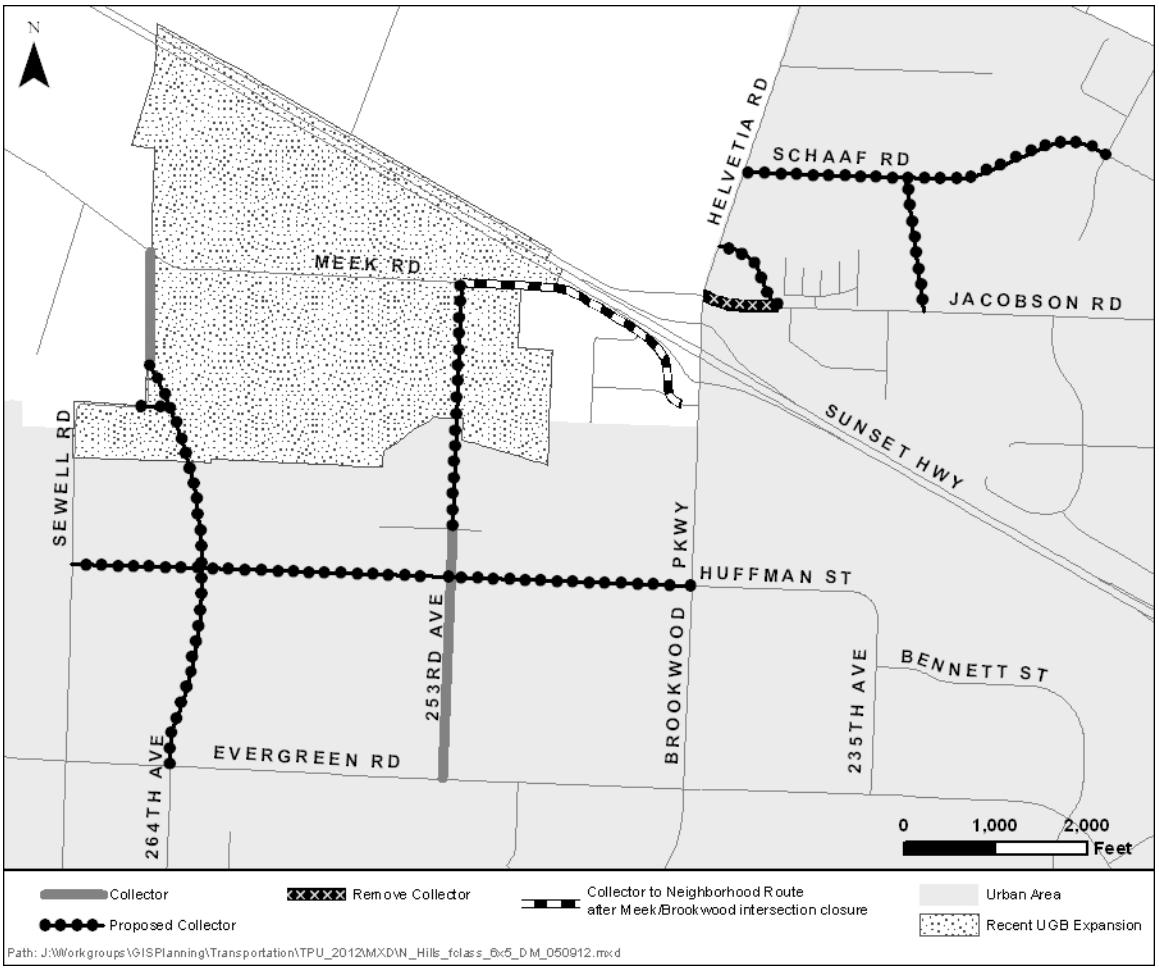
U.S. 26 BROOKWOOD/ HELVETIA INTERCHANGE

Proposed IAMP Improvement Projects

	Map #	Project Name	Project Location	Project Description
Tier 1 Projects	1	NW 253rd Avenue	NW Evergreen Road to NW Meek Road	Build 3 lanes with bike lanes and sidewalks
	2	NW Groveland Drive Realignment	NW Helvetia Road to NW Groveland Drive	Construct 2-lane rural connector
	3	NW Brookwood Parkway	NW Huffman Street to US 26 eastbound ramp terminal	Widen to 3-lanes northbound and 3 lanes southbound and construct with bike lanes and sidewalks
Tier 2 Projects	4	NW Huffman Street	NW Brookwood Parkway to NW 253rd Avenue	Build 3/5-lanes with bike lanes and sidewalks
	5	NW Brookwood Parkway	NW Evergreen Parkway to NW Huffman Street	Widen to 3-lanes northbound and 3-lanes southbound and construct with bike lanes and sidewalks
	6	NW 231st/NW Century Boulevard	NW Bennett to NW West Union	Construct 2/3-lanes US 26 Overpass, connect existing segments
Tier 3 Projects	7	NW Huffman Street	NW 253rd Avenue to NW Sewell Road	Build 3-lanes with bike lanes and sidewalks
	8	NW 264th Ave	NW Evergreen Road to NW Meek Road	Build 3-lanes with bike lanes and sidewalks
	9	NW Jacobson Road	NW Jacobson Road at NW Helvetia Road	Widen and add bike and pedestrian facilities
	10	NW Century Boulevard	NW Jacobson Road and NW Century Boulevard	Construct 3-lane roadway with bike lanes and sidewalk
	11	NW Jacobson Road to NW Schaaf Road	NW Jacobson Road to NW Schaaf Road	Construct 3-lane roadway with bike lanes and sidewalks
	12	NW Schaaf Road	NW Helvetia Road to NW Century Road	Construct 3-lane roadway with bike lanes and sidewalks
	13	NW Helvetia Road	US 26 westbound ramp terminal to NW Schaaf Road	Construct 3/5-lane roadway with bike lanes and sidewalks
	14	NW Helvetia Road	NW Schaaf Road to NW West Union Road	Construct 3-lane roadway with bike lanes and sidewalks
	15	NW West Union Road	NW Helvetia Road to NW Cornelius Pass Road	Construct 3-lane roadway with bike lanes and sidewalks

Washington County Oregon · Oregon Department of Transportation · City of Hillsboro

Washington County Transportation Plan Figure 4C – Functional Classification System map: Modifications that would be proposed in Ordinance 749 if the decision to include the UGB expansion area referenced in the June 20, 2012 Planning Commission staff report was final.



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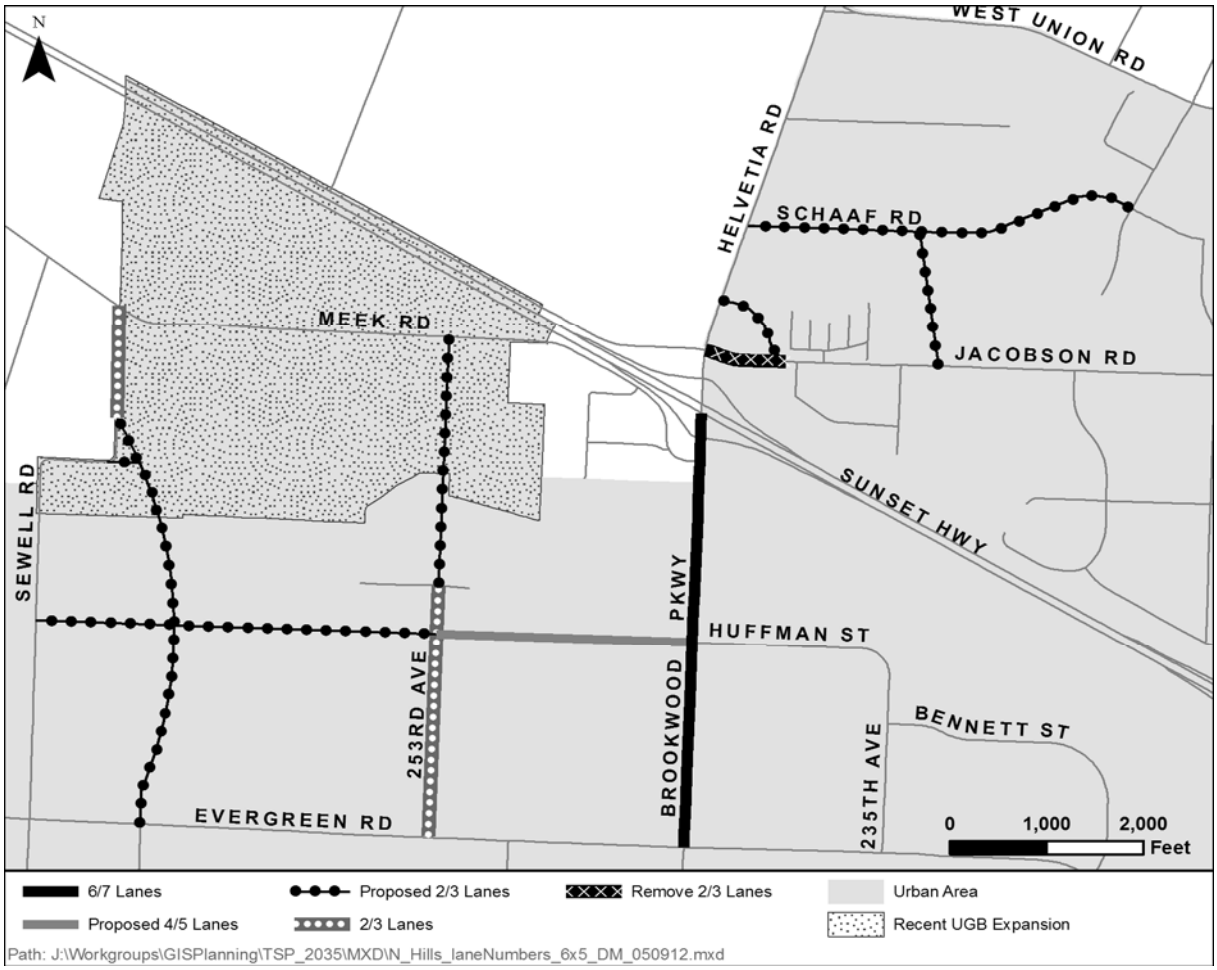
Washington County Transportation Plan, Figure 5 – Lane Numbers map: Modifications that would be proposed in Ordinance 749 if the decision to include the UGB expansion area referenced in the June 20, 2012 Planning Commission staff report was final.



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US26: Brookwood Parkway/Helvetia Road Interchange Area Management Plan

Attachment A-2

City of Hillsboro, Ordinance 2793 and Staff Report (pending adoption in October 2012)

August 2012

August 2, 2012

TO: Hillsboro Planning Commission

FROM: Hillsboro Planning Department

RE: Initiation of Proposed Comprehensive Plan Amendments to the Transportation System Plan for the North Hillsboro Industrial Area

REQUEST

The Planning Department requests that the Planning Commission adopt the attached draft Order initiating amendments to the Hillsboro Comprehensive Plan and Transportation System Plan to implement transportation improvements for the North Hillsboro Industrial Area (North Hillsboro). There are two transportation system project areas for North Hillsboro as follows:

The first project area involves the transportation system surrounding and supporting the US 26 Interchange with NW Brookwood Parkway-NW Helvetia Road. Transportation system improvements for this project are encompassed in ODOT's Interchange Area Management Plan (IAMP).

Recommended transportation system improvements for the second project area have been identified through traffic studies prepared for recent industrial and commercial expansion projects in the corridor, as well as travel forecasting analysis prepared by City staff. These improvements affect NW Cornelius Pass Road, NW Evergreen Parkway and NW Imbrie Drive.

The proposed text and map amendments to the Hillsboro Comprehensive Plan (HCP) Ordinance, No. 2793, as amended, and the City of Hillsboro Transportation System Plan Update, January 2004 (TSP), would reclassify or create new alignments for roadways located within North Hillsboro and make revisions to the TSP's project lists for motor vehicles, bicycles and pedestrians to add the transportation improvements.

BACKGROUND

Brookwood-Helvetia/US 26 Interchange Area Management Plan:

The need for transportation system improvements at, and surrounding, the NW Brookwood Parkway-NW Helvetia Road/US 26 Interchange grew out of concept planning work done by the city of Hillsboro for the 249-acre Helvetia Concept Planning Area (located northeast of the Interchange) and the 534-acre Evergreen Concept Planning Area (located southwest of the Interchange). Metro brought these two areas into the Urban Growth Boundary (UGB) in 2002, and 2005, respectively. The Concept Plans identified the type of development (primarily industrial) that should occur and established the general framework for the infrastructure needed to serve these two areas. These areas will be annexed to the city before they develop or redevelop with urban uses.

The Concept Plans were adopted by the Hillsboro City Council on February 5, 2008, and were added to the Hillsboro Comprehensive Plan (Plan) as Section 24. City of Hillsboro, Evergreen Area Industrial Plan (EAIP) and Section 25. City of Hillsboro Helvetia Area Industrial Plan (HAIP). On January 17, 2012, the City amended the Plan to add a new Section 30. North Hillsboro Industrial Area Community Plan, which consolidated the EAIP and HAIP and the Shute Area Industrial Site (Section 20. Shute Road Industrial Site) into a single North Hillsboro Industrial Community Plan, and deleted Sections 20, 24 and 25.

Development of the IAMP started in fall, 2010, when the city of Hillsboro and Washington County (County) entered into a Memorandum of Understanding (MOU) with ODOT on December 16, 2010. The MOU established the Oregon Jobs and Transportation Act (JTA) and IAMP terms, tasks, priorities, boundaries, phases, roles and responsibilities, and communications protocols. The JTA project is a joint planning effort between ODOT, the County and the City (Partners).

The purpose of this partnership is to document and affirm land use assumptions and to identify necessary transportation system improvements required to maintain acceptable levels of transportation mobility. This includes improvements at the interchange, as well as additional infrastructure improvements surrounding and supporting the interchange which will preserve the state's investments for their intended purpose.

On October 20, 2011, the Metro Council approved modest expansions to the region's UGB in four areas. One of the four areas is a 330-acre area north of Hillsboro, in the vicinity of the US 26/Brookwood Parkway/Helvetia Road interchange, for the purposes of attracting future large-site industrial employers. The 330-acre expansion in North Hillsboro, located southwest of the interchange, will add additional traffic at the interchange and has been considered in the IAMP analysis.

Improvements to the Interchange itself are planned to commence construction in 2013. The improvements are funded with $45 million dollars provided by the JTA enacted by the 2009 Oregon Legislature. Under agreement with the Oregon Department of Transportation (ODOT), if the Interchange costs are less than $45 million, remaining funds would be available for priority projects identified in the IAMP (which occur on both Washington County and City roads).

NW Evergreen Parkway-NW Imbrie Drive–NW Cornelius Pass Road TSP Amendments:

The recommended transportation system improvements for the second project area for North Hillsboro are in response to anticipated development expansion on the Intel Ronler Acres Campus, and on adjacent industrial green field sites, and are based upon traffic impact studies received over the past 18 months from Intel Corporation's traffic consultant, Group Mackenzie, as well as supplemental transportation studies completed by City of Hillsboro transportation planning division staff. There are two projects that make up these recommended transportation improvements, as follows:

The first project results from an initial draft traffic study for the Intel Ronler Acres Campus D1X Fabrication Plant expansion and focuses on recommended intersection improvements at NW Evergreen Parkway with NW 229th Avenue and NW Imbrie Drive. Its focus is the development of future side-by-side double left turns on NW Evergreen Parkway between NW 229th Avenue and NW Imbrie Drive.

The second project is based upon technical analyses prepared by Group Mackenzie in June 2012, supplemented by technical analyses prepared by City of Hillsboro Transportation Planning Division staff and their consultants, David Evans & Associates. These studies recommend consideration of TSP amendments to expand capacity on NW Cornelius Pass Road through the addition of a third northbound and third southbound travel lane extending from NW Cornell Road to the US 26 Eastbound onramp. Left turn lane improvements to Evergreen Parkway between NW 229th Avenue and NW Imbrie Drive, specifically widening to provide double left turn lanes in each direction in this tightly spaced offset of intersections, would necessitate widening NW Imbrie Drive with a second eastbound lane between NW Evergreen Parkway and approximately the Fred Meyer's traffic signal where a second eastbound lane exists.

The city of Hillsboro will hold an open house on August 16, 2012 to engage the community for feedback on the transportation improvements for this project area. If needed, a second open house would be scheduled before September 12, 2012. As these amendments affect the commuting public traveling to and from employment located in North Hillsboro, via NW 229th Avenue/NW Cornelius Pass Road/NW Evergreen Parkway, and residents that live in North Hillsboro near the Intel Ronler Acres Campus, public notice of the proposed open house will be given in the local newspaper and posted on the City's website, as well as distributed in a mailing to property owners extending from NW 206th/NW John Olsen Avenue to the east, SE Imlay Avenue/NE 53rd Avenue/NE Elam Young Parkway (west)/NE Shute Road to the west, TV Highway to the south, and US 26 to the north.

COMPREHENSIVE PLAN AMENDMENT PROCEDURES

To amend the TSP, the City is required to conduct the Major Plan Amendment process, as the proposed amendments refine both Plan text and maps that have an operative effect over a large geographic area and is likely to have significant environmental, energy, economic and social consequences. Major plan amendments include amendments that incorporate portions of public facility plans as part of the Comprehensive Plan in accordance with state statute and regulations implementing Statewide Planning Goal 11. The Transportation System Plan is a public facility plan as it contains maps, policies and recommendations relating to public facilities and establishes jurisdictional responsibilities, project timing or financing for public facilities or services.

Comprehensive Plan Section 1(III) requires plan revisions and major plan amendments be processed as legislative procedures, and Section 1(III) (A) requires that Planning Department follow the public involvement processes as outlined in Sections (III) (A)(1) through (A) (5) for each proposed plan revision or major plan amendment.

These public involvement processes including establishing a public involvement program with the advice and assistance of the Citizen Involvement Advisory Committee (CIAC) which provides for public involvement and input into the proposed revision or amendment which complies with Planning Goal 1 requirements. On June 25, 2012, the CIAC approved the Public Involvement Plan (PIP) for the North Hillsboro TSP Amendments.

After completion of the tasks set forth in Sections (III) (A)(1) through (A) (5), a Planning Commission public hearing on a plan revision or major plan amendment shall be conducted. But before the public hearing can be held, the Planning Commission needs to initiate the plan revision or major plan amendment to the text and maps of the Comprehensive Plan by order whenever a need for a revision is documented.

Should the Planning Commission choose to initiate the proposed major plan amendment, staff will schedule a public hearing before the Planning Commission for a future date and public notice for the public hearing shall be published in a newspaper of general circulation (Hillsboro Argus) in the City a minimum of 20 days prior to the date of the initial public hearing, in accordance with the notification requirements contained in Plan Section (III)(A)(6).

At the public hearing the Commission will receive a staff report and any public testimony on the proposed amendment. At the conclusion of the hearing the Commission will render a decision on whether to recommend denial, approval or approval with modifications of the plan revision or major plan amendment to the City Council.

The City Council shall hold a hearing during its consideration of a plan revision and may hold a public hearing on any major plan amendment. After consideration of the plan revision or major plan amendment, the City Council may adopt or deny the land use decision on the plan revision or major plan amendment. The final City Council decision on a plan revision or major plan amendment may be appealed in accordance with applicable state statutory provisions, relating to appeals of decisions amending an acknowledged comprehensive plan.

LEGISLATIVE BACKGROUND

The current version of the TSP was compiled by the City in conjunction with DKS Associates and completed in July 1999 with an update completed in January 2004. The functions of the TSP are to provide specific information on transportation needs and how to coordinate land use with transportation needs. The TSP is a planning document which is incorporated into the Comprehensive Plan in its entirety by reference. Therefore, any amendment or modification of the TSP requires the City to conduct and follow the Plan amendment process outlined in Section 1 of the Comprehensive Plan.

DESCRIPTION OF PROPOSED COMPREHENISVE PLAN AND TSP AMENDMENTS

As previously mentioned in the Background section, there are two distinct project areas for North Hillsboro, each with a list of required transportation improvements to be added to the TSP's project lists for motor vehicles, bicycles and pedestrians, and reclassification of roadways or adding street segments to create new alignments. This section lists the IAMP and the NW Evergreen Parkway - NW Imbrie Drive - NW Cornelius Pass Road required transportation improvements, with the IAMP improvements listed first.

IAMP Transportation Improvements:

- NW 253rd Avenue: NW Evergreen Road to NW Meek Road (3-lane City collector cross section)
- NW 264th Avenue: NW Evergreen Road to NW Meek Road (3-lane City collector cross section)
- NW Brookwood Parkway: NW Evergreen Road to US 26 (7-lane, County arterial cross section)
- NW Huffman Street: NW Brookwood Parkway to NW 253rd Avenue (5-lane City collector cross section)
- NW Huffman Street: NW 253rd Avenue to NW Sewell Road (3-lane City collector cross section)

- Collector Extension (actual name to be determined): from NW Jacobson Road to NW Schaaf Road (3-lane City collector cross section)
- NW Meek Road: disconnect from NW Brookwood Parkway
- NW Meek Road Residential Area: remove Special Study Area Boundary and Alignment Study
- NW Schaaf Road: from NW Helvetia Road to NW Century Boulevard (3-lane City collector cross section)
- US 26/NW Brookwood Parkway/NW Helvetia Road Interchange: new loop ramp and interchange modifications including NW Jacobson Road and NW Groveland Road realignment

NW Evergreen Parkway-NW Imbrie Drive–NW Cornelius Pass Road Improvements:

- NW 229th Avenue: Construct 2nd southbound lane for 400 feet south of NW Evergreen Parkway
- NW Evergreen Parkway: NW 229th Avenue to NW Imbrie Drive (widen to provide dual eastbound and westbound left turn lanes)
- NW Imbrie Drive: NW Evergreen Parkway to NW Cornelius Pass Road (add second eastbound through-lane, for a 4-lane cross section with 2 eastbound lanes, 1 westbound lane and 1 continuous left turn median lane)
- NW Cornelius Pass Road: NW Cornell Road to US 26 eastbound (widen to provide 7-lane County arterial boulevard cross section)

PROPOSED TEXT AMENDMENTS

The following sections of the TSP need to be amended to add the transportation improvements associated with the roadways or change functional classifications for the roadways listed previously. All of the text amendments would involve text in the Transportation System Plan Update dated January 2004.

Table 1-1 Amendments
Pedestrian Master Plan Priority Projects

This table includes pedestrian projects recommended to be shown on Figure 1-2 Pedestrian Master Plan and are illustrated on Figure 1-2a. Cost estimates are based on additional sidewalk, curb and gutter, drainage, driveway adjustments and landscaping as required. Right-of-way costs and additional roadway pavement costs, if known are included in the estimates. The cost estimates are conceptual and subject to refinement upon further study.

There is an existing project listed in Table 1-1 located in North Hillsboro that is proposed to be deleted (as shown in strikeout text). Staff recommends that the table be amended with the following:

Pedestrian Master Plan Priority Projects

Project	From	To	Stand-alone Project	Roadway Improvement Project	Lead Agency	Cost**
NW 253rd Ave	NW Evergreen Rd	NW Meek Rd		√	Hillsboro	$5,000,000
NW 264th Ave	NW Evergreen Rd	NW Meek Rd		√	Hillsboro	$18,600,000
NW Brookwood Pkwy	NW Evergreen Rd	US 26		√	Washington County	$6,700,000
NW Brookwood Pkwy/ NW Helvetia Rd	US 26 Eastbound Ramps	NW Jacobson Rd		Part of Brookwood Interchange Project	ODOT	$38,000,000
NW Cornelius Pass Rd	NW Cornell Rd	US 26		√	Washington County	$8,600,000
NW Huffman St	NW Brookwood Pkwy	NW 253rd Ave		√	Hillsboro	$4,500,000
NW Huffman St	NW 253rd Ave	NW Sewell Rd		√	Hillsboro	$7,500,000
Collector Rd (actual name TBD)	NW Jacobson Rd	NW Schaaf Rd		√	Hillsboro	$2,500,000
NW Schaaf Rd	NW Helvetia Rd	NW Century Blvd (at NW Westmark Dr)		√	Hillsboro	$4,000,000
~~NW Shute Rd~~	~~NW Evergreen Rd~~	~~US 26/Sunset Hwy~~	~~√~~		~~Washington County~~	~~TBD~~

** Project cost estimates represent 2012 dollars. All cost estimates are conceptual. For roadway improvement projects, the cost estimate represents the whole street improvement necessary for a multi-modal street including sidewalks. For stand-alone projects, the cost estimate represents the cost for retrofitting the existing street cross section to add sidewalks and landscape strips and associated costs.

Table 1-2 Amendments
Bicycle Master Plan Priority Projects

This table includes bicycle projects recommended to be shown on Figure 1-3 Bicycle Master Plan and are illustrated in Figure 1-3a. Cost estimates are based on additional sidewalk, curb and gutter, drainage, driveway adjustments and landscaping as required. Right-of-way costs and additional roadway pavement costs, if known are included in the estimates. The cost estimates are conceptual and subject to refinement upon further study.

There is an existing project listed in Table 1-2 for North Hillsboro that is proposed to be deleted (as shown in strikeout text). Staff recommends that the table be amended with the following:

Bicycle Master Plan Priority Projects

Project	From	To	Stand-alone Project	Roadway Improvement Project	Lead Agency	Cost*8
NW 253rd Ave	NW Evergreen Rd	NW Meek Rd		√	Hillsboro	$5,000,000
NW 264th Ave	NW Evergreen Rd	NW Meek Rd		√	Hillsboro	$18,600,000
NW Brookwood Pkwy	NW Evergreen Rd	US 26		√	Washington County	$6,700,000
NW Brookwood Pkwy/ NW Helvetia Rd	US 26 Eastbound Ramps	NW Jacobson Rd		Part of Brookwood Interchange Project	ODOT	$38,000,000
NW Cornelius Pass Rd	NW Cornell Rd	US 26		√	Washington County	$8,600,000
NW Huffman St	NW Brookwood Pkwy	NW 253rd Ave		√	Hillsboro	$4,500,000
NW Huffman St	NW 253rd Ave	NW Sewell Rd		√	Hillsboro	$7,500,000
Collector Rd (actual name TBD)	NW Jacobson Rd	NW Schaaf Rd		√	Hillsboro	$2,500,000
NW Schaaf Rd	NW Helvetia Rd	NW Century Blvd (at NW Westmark Dr)		√	Hillsboro	$4,000,000
~~NW Shute Rd~~	~~NW Evergreen Rd~~	~~US 26/Sunset Hwy~~	~~√~~		~~Washington County~~	~~TBD~~

** Project cost estimates represent 2012 dollars. All cost estimates are conceptual. For roadway improvement projects, the cost estimate represents the whole street improvement necessary for a multi-modal street including bike lanes. For stand-alone projects, the cost estimate represents the cost for retrofitting the existing street cross section to add bike lanes and associated costs.

Table 1-3 Amendments
Motor Vehicle Project List

This table lists motor vehicle projects illustrated in Figure 1-5a, recommended to be included in, amended, or deleted from the list including sidewalks, bicycle lanes, mixed use paths, cycle tracks, and transit accommodations as required, with the projects organized by priority: Highest Priority, Second Highest Priority and Third Highest Priority. It includes the location and description of the projects, indicates the Regional Transportation Plan (RTP) planning status (for financially constrained and priority system improvements in June 2010 RTP), the lead agency for the project, and the estimated cost (based on 2012 dollars).

There are some existing projects listed in Table 1-3 located in North Hillsboro that are proposed to be deleted or amended (as shown in strikeout text) and replaced by the new or amended motor vehicle projects. Staff recommends that the table be amended with the following:

Motor Vehicle Project List

Location	Description	Planning Status*	Lead Agency	Cost**
Highest Priority Projects				
NW 253rd Ave: NW Evergreen Rd to NW Meek Rd	Construct 3 Lanes	RTP 10822	Hillsboro	$5,000,000
~~253rd Avenue~~	~~Improvements north of Evergreen Road; add southbound right turn lane~~	~~Not in Plans~~	~~Wash. County~~	~~$690,000~~
NW 264th Ave: NW Evergreen Rd to NW Meek Rd	Construct 3 Lanes	Not in Plans	Hillsboro	$18,600,000
NW Brookwood Pkwy: NW Evergreen Rd to US 26	Widen to 7 Lanes	RTP 11146	Washington County	$6,700,000
NW Cornelius Pass Rd: NW Cornell Rd to US 26	Widen to 7 Lanes	Not in Plans	Washington County	$8,600,000
~~Huffman Road~~	~~Extend west of Shute Rd to 253rd Ave~~	~~Not in Plans~~	~~Wash. County~~	~~$922,300~~
NW Huffman St: NW Brookwood Pkwy to NW 253rd Ave	Construct 5 Lanes	RTP 10821	Hillsboro	$4,500,000
NW Huffman St: NW 253rd Ave to NW Sewell Rd	Construct 3 Lanes	RTP 10821	Hillsboro	$7,500,000
Collector Rd (actual name TBD): NW Jacobson Rd to NW Schaaf Rd	Construct 3 Lanes	Not in Plans	Hillsboro	$2,500,000
NW Schaaf Rd: NW Helvetia Rd to NW Century Blvd	Construct 3 Lanes	Not in Plans	Hillsboro	$4,000,000
US 26/NW Brookwood Pkwy/NW Helvetia Rd Interchange	New loop ramp and interchange modifications including NW Jacobson Rd and NW Groveland Rd realignment	RTP 10600	ODOT/Washington County/Hillsboro	$38,000,000
Second Highest Priority Projects				
~~Jacobson Road at Helvetia~~	~~Realign intersection north of US 26~~	~~Not in Plans~~	~~Hillsboro~~	~~$1,900,000~~
~~US 26/Shute Road~~	~~New loop ramp and interchange modifications~~	~~RTP 3149~~	~~ODOT/Wash. County~~	~~$6,400.000~~

* RTP = Regional Transportation Plan, financially constrained and priority system improvements, June 2010 for RTP project numbers: 10600, 10821, 10822, and 11146.

** Cost estimates represent 2012 dollars.

Table 4-7 Amendments
Updates to Bicycle Master Plan

Table 4-7 contains the proposed updates to the Bicycle Master Plan (Figure 1-3) as illustrated in Figure 1-3a. Staff proposes updating this table to add planned bike facilities for the proposed transportation improvements in North Hillsboro. Staff recommends that the table be amended with the following:

Roadway	Hillsboro 2015 TSP	Draft Hillsboro 2020 TSP
NW 253rd Ave - NW Evergreen Rd to NW Meek Rd	N/A	Planned Bike Lanes
~~NW 253rd Realignment – NW Evergreen Rd to NW Huffman St~~	~~N/A~~	~~Planned Bike Lanes~~
NW 264th Ave - NW Evergreen Rd to NW Meek Rd	N/A	Planned Bike Lanes
NW Brookwood Pkwy - NW Evergreen Rd to US 26	N/A	Planned Bike Lanes
NW Brookwood Pkwy/NW Helvetia Rd – US 26 Eastbound Ramps to NW Jacobson Rd	N/A	Planned Bike Lanes
Collector Rd (actual name TBD) – NW Jacobson Rd to NW Schaaf Rd	N/A	Planned Bike Lanes
~~NW Huffman St Extension – NW Shute Rd to NW Evergreen Rd~~	~~N/A~~	~~Planned Bike Lanes~~
NW Huffman St – NW Brookwood Pkwy to NW 253rd Ave	N/A	Planned Bike Lanes
NW Huffman St – NW 253rd Ave to NW Sewell Rd	N/A	Planned Bike Lanes
~~NW Imbrie Dr~~	~~Bicycle Way Network~~	~~Planned Bike Lanes~~
~~North/South Road – NW Huffman St to NW Meek Rd~~	~~N/A~~	~~Planned Bike Lanes~~

Table 4-10 Amendments
Updates to Functional Classification Plan

Table 4-10 shows updates to the Functional Classification Plan illustrated in Figure 1-9a to reflect the expanded TSP study area, on-going regional planning, the functional needs of Hillsboro, and consistency with the Regional Transportation Plan. This table is proposed to be amended to address changes in functional classification for the transportation projects added to the motor vehicles project list. These projects need to be added to be consistent with the RTP and implement the transportation system for North Hillsboro. Staff recommends that the table be amended with the following:

Updates to Functional Classification Plan

Roadway	Hillsboro 2015 TSP	Draft Hillsboro 2020 TSP
NW 253rd Ave - NW Evergreen Rd to NW Meek Rd	N/A	Planned Collector
~~253rd Avenue realigned – Evergreen to Huffman~~	~~N/A~~	~~Planned Collector~~
NW 264th Ave - NW Evergreen Rd to NW Meek Rd	N/A	Planned Collector
Collector Rd (actual name TBD) – NW Jacobson Rd to NW Schaaf Rd	N/A	Planned Collector
NW Huffman St – NW Brookwood Pkwy to NW 253rd Ave	N/A	Planned Collector
NW Huffman St – NW 253rd Ave to NW Sewell Rd	N/A	Planned Collector

Roadway	Hillsboro 2015 TSP	Draft Hillsboro 2020 TSP
~~North/South road – Huffman to Meek~~	~~N/A~~	~~Planned Collector~~
NW Schaaf Rd – NW Helvetia Rd to NW Century Blvd	N/A	Planned Collector

Table 4-11 Amendments
Updates to Future Streets Right-of-Way Plan

The Future Streets Right-of-Way Plan (Figure 1-6) provides the right-of-way requirements for arterial and collector streets which are anticipated within the TSP planning horizon to require more than two lanes. The updates to the Future Streets Right-of-Way Plan for North Hillsboro are summarized in Table 4-11 and are illustrated in Figure 1-6a. Staff recommends that the table be amended with the following:

Updates to Future Streets Right-of-Way Plan

Roadway	Hillsboro 2015 TSP	Draft Hillsboro 2020 TSP
NW 253rd Ave - NW Evergreen Rd to NW Meek Rd	N/A	Planned 2/3 lanes
~~253rd Avenue realigned – Evergreen to Huffman~~	~~N/A~~	~~Planned 2/3 lanes~~
NW 264th Ave - NW Evergreen Rd to NW Meek Rd	N/A	Planned 2/3 lanes
NW Brookwood Pkwy – NW Evergreen Rd to US 26	N/A	Planned 6/7 lanes
Collector Rd (actual name TBD) – NW Jacobson Rd to NW Schaaf Rd	N/A	Planned 2/3 lanes
NW Cornelius Pass Rd – NW Cornell Rd to US 26	N/A	Planned 6/7 lanes
~~Huffman – 253rd to Shute~~	~~N/A~~	~~Planned 2/3 lanes~~
NW Huffman St – NW Brookwood Pkwy to NW 253rd Ave	N/A	Planned 4/5 lanes
NW Huffman St – NW 253rd Ave to NW Sewell Rd	N/A	Planned 2/3 lanes
NW Imbrie Dr – NW Evergreen Pkwy to just east of Fred Meyer signal	N/A	Planned 4 lanes
~~North/South road – Huffman to Meek~~	~~N/A~~	~~Planned 2/3 lanes~~
NW Schaaf Rd – NW Helvetia Rd to NW Century Blvd	N/A	Planned 2/3 lanes

Table 4-13
Updates to Street Improvement Plan

This table summarizes updates to the Street Improvement Plan (Figure 1-5) which are illustrated in Figure 1-5a. Staff recommends that the table be amended with the following:

Updates to Street Improvement Plan

Roadway	Hillsboro 2015 TSP	Draft Hillsboro 2020 TSP
NW 253rd Ave - NW Evergreen Rd to NW Meek Rd	N/A	Proposed street
~~253rd Avenue realigned – Evergreen to Huffman~~	~~N/A~~	~~Proposed street~~
NW 264th Ave - NW Evergreen Rd to NW Meek Rd	N/A	Proposed street
NW Brookwood Pkwy – NW Evergreen Rd to US 26	N/A	7 lanes
NW Cornelius Pass Rd – NW Cornell Rd to US 26	N/A	7 lanes

Roadway	Hillsboro 2015 TSP	Draft Hillsboro 2020 TSP
~~Huffman – 253rd to Shute~~	~~N/A~~	~~Proposed street~~
NW Huffman St – NW Brookwood Pkwy to NW 253rd Ave	N/A	Proposed street
NW Huffman St – NW 253rd Ave to NW Sewell Rd	N/A	Proposed street
NW Imbrie Dr – NW Evergreen Pkwy to just east of Fred Meyer signal	N/A	Street widening
~~North/South road – Huffman to Meek~~	~~N/A~~	~~Proposed street~~
Proposed road – NW Jacobson Rd to NW Schaaf Rd	N/A	Proposed street
NW Schaaf Rd – NW Helvetia Rd to NW Century Blvd	N/A	Proposed street

Table 4-14
Updates to Traffic Signal Master Plan

This table summarizes updates to the Traffic Signal Master Plan (Figure 1-8) as illustrated in Figure 1-8a. Staff proposes adding the proposed traffic signals for North Hillsboro to this table. Staff recommends that the table be amended with the following:

Updates to Traffic Signal Master Plan

Intersection	Hillsboro 2015 TSP	Draft Hillsboro 2020 TSP
Evergreen Pkwy/253rd Ave	N/A	Proposed Traffic Signal
Brookwood Pkwy/Huffman St	N/A	Proposed Traffic Signal
Helvetia Rd/Schaaf Rd	N/A	Proposed Traffic Signal

The IAMP transportation analysis addressed the issues identified within the Meek Road Study Area in more depth as described in the original text below and recommends changes within the Area including revised transportation connections. Staff proposes to delete the text contained in the Meek Road Study Area in its entirety as follows and to also remove Figure 4-9 Meek Road Study Area from the TSP.

SPECIAL STUDY AREAS

~~Meek Road Study Area~~

~~Concerns exist regarding the proximity of the intersection of Meek Road and Shute Road to the interchange at U.S. 26 and Shute Road. Washington County has designated this as a study area (see Figure 4-9) in order to evaluate options for moving the intersection of Meek Road further south. However, reorienting the roadway to the south would place it within the Shute Road Site Special Development District. The 203 acre site, located at the intersection of Evergreen Road and Shute Road, was added to the urban growth boundary for the purpose of providing large lots for high tech industrial development. Meek Road, situated immediately north of the new district, will be influenced by future development within the Shute Road site. The Conceptual Transportation Plan for Shute Road, drafted by Group MacKenzie suggests that additional analysis would be required with regards to Meek Road to determine any relocation of Meek Road or re-routing of traffic.~~

Within the Special Study Areas section, there is also a section titled Potential Future Connections/Realignments. The TSP is designed to permit consideration of road extensions beyond study areas like the Meek Road Study Area and the urban growth boundary. No specific

roadway alignments have been defined for any of these extensions or realignments, however Figure 4-10 shows seven study areas that were categorized as potential future connections/realignments. Two of the study areas are within North Hillsboro. Staff proposes deleting the description of those two study areas as follows and removing the two study areas from Figure 4-10.

Potential Future Connections/Realignments

~~2. Extensions of Huffman Street and Dawson Creek Drive into 253rd Avenue – part of the Shute Road Concept Plan, these road extensions are intended to provide access to the newly added 230-acre Shute Road Special Industrial Development District.~~

~~3. Jacobson Road Realignment to Helvetia Road – the realignment north of U.S. 26/Shute Road interchange is intended to accommodate potential increased right-of-way necessary for interchange improvements.~~

PROPOSED MAP AMENDMENTS

The TSP and Comprehensive Plan Maps listed below will be amended to reflect the classification change of the planned roadways and proposed improvements for North Hillsboro. Detail maps are provided to show more clearly how the TSP maps are being amended, however these maps will not be added to the TSP. The proposed roadways are labeled as follows on the detail maps:

A. NW Meek Road: disconnect from NW Brookwood Parkway

B. NW Schaaf Road: NW Helvetia Road to NW Century Boulevard (3-lane City collector cross section)

C. Collector Extension (actual name to be determined): from NW Jacobson Road to NW Schaaf Road (3-lane City collector cross section)

D. NW Helvetia Road: US 26 to NW West Union Road (Re-designate as Arterial)

E. NW 253rd Avenue: NW Evergreen Road to NW Meek Road (3-lane City collector cross section)

F. NW West Union Road: from NW Helvetia Road to City Limits (Re-designate as Arterial)

G. NW 264th Avenue: NW Evergreen Road to NW Meek Road (3-lane City collector cross section)

H. NW Huffman Street: NW Brookwood Parkway to NW 253rd Avenue (5-lane City collector cross section)

I. NW Huffman Street: NW 253rd Avenue to NW Sewell Road (3-lane City collector cross section)

J. NW Westmark Drive: NW Croeni Road to NW West Union Road (Re-designate as a Collector)

K. NW Pubols Road: NW Helvetia Road to NW Century Boulevard (Designate as a Local or Street.

L. NW Sewell Road: NW Evergreen Road to NW 264th Avenue (Re-designate as a Local Street - Industrial)

TSP Figure 1-2: Pedestrian Master Plan (see attachment A). See Figure 1-2a: North Hillsboro TSP Amendment Pedestrian Master Plan Detail Map for specific details on how this map is being amended. The Special Study Area Boundary for the Meek Road Study Area and symbols (one in the Special Study Area and one for the NW Dawson Creek Drive/NW 253rd Avenue alignments) for the note that states: "Alignment subject to UGB expansion and/or future refinement or study in these areas" has been deleted from Figure 1-2.

TSP Figure 1-3: Bicycle Master Plan (see attachment B). See Figure 1-3a: North Hillsboro TSP Amendment Bicycle Master Plan Detail Map for specific details on how this map is being amended. The Special Study Area Boundary for the Meek Road Study Area and symbols (one in the Special Study Area and one for the NW Dawson Creek Drive/NW 253rd Avenue alignments) for the note that states: "Alignment subject to UGB expansion and/or future refinement or study in these areas" has been deleted from Figure 1-3.

TSP Figure 1-5: Street Improvement Plan (see attachment C). See Figure 1-5a: North Hillsboro TSP Amendment Improvement Plan Detail Map for specific details on how this map is being amended. The Special Study Area Boundary for the Meek Road Study Area and proposed street arrows for the extensions of NW 253rd Avenue and NW Huffman Street has been deleted from Figure 1-5.

TSP Figure 1-6: Future Streets Where Right of Way is Planned for Two or More Lanes (see attachment D). See Figure 1-6a: North Hillsboro TSP Amendment Future Streets Where Right of Way is Planned for Two or More Lanes Detail Map for specific details on how this map is being amended. The Special Study Area Boundary for the Meek Road Study Area and symbols (one in the Special Study Area and one for the NW Dawson Creek Drive/NW 253rd Avenue alignments) for the note that states: "Alignment subject to UGB expansion and/or future refinement or study in these areas" has been deleted from Figure 1-6.

TSP Figure 1-8: Traffic Signal Master Plan (see attachment E). See Figure 1-8a: North Hillsboro TSP Amendment Traffic Signal Master Plan for specific details on how this map is being amended. The Special Study Area Boundary for the Meek Road Study Area has been deleted from Figure 1-8.

TSP Figure 1-9: Functional Classification Plan (see attachment F). See Figure 1-9a: North Hillsboro TSP Amendment Functional Classification Plan for specific details on how this map is being amended. The Special Study Area Boundary for the Meek Road Study Area and symbols (one in the Special Study Area and one for the NW Dawson Creek Drive/NW 253rd Avenue alignments) for the note that states: "Alignment subject to UGB expansion and/or future refinement or study in these areas" has been deleted from Figure 1-9.

TSP Figure 4-9: Meek Road Study Area (see attachment G). This figure will be deleted in its entirety.

TSP Figure 4-10: Potential Future Connections/Realignments (see attachment H). See Figure 4-10a: North Hillsboro TSP Amendment Potential Future Connections/Realignments for specific details on how this map is being amended. Study Area Nos. 2 and 3, Potential Collector Extensions for NW Dawson Creek Drive/NW 253rd Avenue, NW Beech Street and NW Huffman Street, and the symbols for the note: Alignment subject to UGB expansion and/or future refinement or study in these areas located adjacent to the Potential Collector Extensions will be deleted from Figure 4-10.

Comprehensive Plan Figure 14-1: Functional Classification Plan (see attachment I). Figure 14-1 will be amended similar to TSP Figure 1-9.

Comprehensive Plan Figure 14-1a: Future Streets Where Right of Way is Planned for More Than Two Lanes (see attachment J). This map will be amended similar to TSP Figure 1-6.

Comprehensive Plan Figure 14-2: Street Improvement Plan (see attachment L). This map will be amended similar to TSP Figure 1-5.

Comprehensive Plan Figure 14-4: Bicycle Master Plan (see attachment M). This map will be amended similar to TSP Figure 1-3.

Comprehensive Plan Figure 14-6: Traffic Signal Master Plan (see attachment N). This map will be amended similar to TSP Figure 1-8.

Comprehensive Plan Figure 14-7: Pedestrian Master Plan (see attachment O). This map will be amended similar to TSP Figure 1-2.

RECOMMENDATION

Staff recommends that the Planning Commission approve the attached order, initiating the HCP amendments to the Transportation System Plan to implement North Hillsboro transportation improvements. The initiating order set the date for the first public hearing on the amendments for September 26, 2012.

Respectfully,
CITY OF HILLSBORO PLANNING DEPARTMENT

Jennifer K. Wells, CSBA
Senior Planner

Attachments:

Draft Initiating Order

A. TSP Figure 1-2: Pedestrian Master Plan and Figure 1-2a: North Hillsboro TSP Amendment Pedestrian Master Plan Detail Map

B. TSP Figure 1-3: Bicycle Master Plan and Figure 1-3a: North Hillsboro TSP Amendment Bicycle Master Plan Detail Map

C. TSP Figure 1-5: Street Improvement Plan and Figure 1-5a: North Hillsboro TSP Amendment Street Improvement Plan Detail Map

D. TSP Figure 1-6: Future Streets Where Right of Way is Planned for Two or More Lanes and Figure 1-6a: North Hillsboro TSP Amendment Future Streets Where Right of Way is Planned for Two or More Lanes Detail Map

E. TSP Figure 1-8: Traffic Signal Master Plan and Figure 1-8a: North Hillsboro TSP Amendment Traffic Signal Master Plan

F. TSP Figure 1-9: Functional Classification Plan and Figure 1-9a: North Hillsboro TSP Amendment Functional Classification Plan

G. TSP Figure 4-9: Meek Road Study Area

H. TSP Figure 4-10: Potential Future Connections/Realignments and Figure 4-10a: North Hillsboro TSP Amendment Potential Future Connections/Realignments

I. Comprehensive Plan Figure 14-1: Functional Classification Plan

J. Comprehensive Plan Figure 14-1a: Future Streets Where Right of Way is Planned for More than Two Lanes

K. Comprehensive Plan Figure 14-2: Street Improvement Plan

L. Comprehensive Plan Figure 14-4: Bicycle Master Plan

M. Comprehensive Plan Figure 14-6: Traffic Signal Master Plan

N. Comprehensive Plan Figure 14-7: Pedestrian Master Plan

ORDER NO. 8074

HCP 3-12: NORTH HILLSBORO
TRANSPORATION SYSTEM PLAN AMENDMENTS

AN ORDER INITIATING AMENDMENTS TO HILLSBORO COMPREHENSIVE PLAN ORDINANCE NO. 2793, AS AMENDED, SPECIFICALLY TO THE TRANSPORTATION SYSTEM PLAN TEXT IN TABLES 1-1, 1-2, 1-3, 4-7, 4-10, 4-11, 4-13, AND 4-14 TO RECLASSIFY AND UPDATE INFORMATION FOR TRANSPORTATION IMPROVEMENTS FOR THE NORTH HILLSBORO INDUSTRIAL AREA, AND DELETING TEXT IN ITS ENTIRETY CONTAINED IN CHAPTER 4: FUTURE DEMAND AND LAND USE, SPECIAL STUDY AREAS, MEEK ROAD STUDY AREA, POTENTIAL FUTURE CONNECTIONS/REALIGNMENT ITEMS NOS. 2 AND 3, AND AMENDING TRANSPORTATION SYSTEM PLAN MAPS IN FIGURES 1-2, 1-3, 1-5, 1-6, 1-8, AND 1-9 TO RECLASSIFY AND UPDATE INFORMATION FOR TRANSPORTATION IMPROVEMENTS IDENTIFIED FOR THE NORTH HILLSBORO INDUSTRIAL AREA, AND DELETING FIGURE 4-9 AND TWO STUDY AREAS FROM FIGURE 4-10, AND AMENDING COMPREHENSIVE PLAN MAPS FIGURES 14-1, 14-1A, 14-2, 14-4, 14-6, AND 14-7 TO REFLECT THE CHANGES TO THE TRANSPORTATION SYSTEM PLAN REGARDING THE RECLASSIFICATION AND UPDATE OF INFORMATION FOR TRANSPORTATION IMPROVEMENTS IDENTIFIED FOR THE NORTH HILLSBORO INDUSTRIAL AREA

WHEREAS, Comprehensive Plan Section 1 (III) authorizes the Planning Commission to initiate major Comprehensive Plan text and map amendments, and

WHEREAS, Comprehensive Plan Section 1 (III) sets forth the procedures and criteria for major Comprehensive Plan amendments, and

WHEREAS, in the North Hillsboro Industrial Area, transportation improvements were identified in ODOT's US-26 / Brookwood-Helvetia Interchange Area Management Plan and separately for NW Cornelius Pass Road, NW Evergreen Parkway and NW Imbrie Drive for future industrial development, where Hillsboro Transportation System amendments are necessary in order to ensure that the transportation improvements can occur in the near future, and

WHEREAS, Section 1 (III) of the Hillsboro Comprehensive Plan Ordinance, as amended, requires consideration, process, and a public hearing by the Hillsboro Planning Commission with respect to initiating proposed major amendments to the Comprehensive Plan such as the proposed Transportation System Plan amendments to implement transportation improvements in the North Hillsboro Industrial Area, and

WHEREAS, if approved, this Order would initiate Planning Commission consideration and action on the proposed Transportation System Plan text and map amendments to the Hillsboro Comprehensive Plan Ordinance, as amended.

THE CITY OF HILLSBORO PLANNING COMMISSION ORDERS AS FOLLOWS:

Section 1. The Planning Director is directed to schedule a public hearing before the Planning Commission on September 26, 2012, on the proposed Major Comprehensive Plan Text and Map

amendments to reclassify and update information for transportation improvements identified for the North Hillsboro Industrial Area.

Section 2. The Planning Director is further directed to give notice of the public hearing before the Planning Commission following the procedures set forth in Section 1(III)(6) of the Hillsboro Comprehensive Plan.

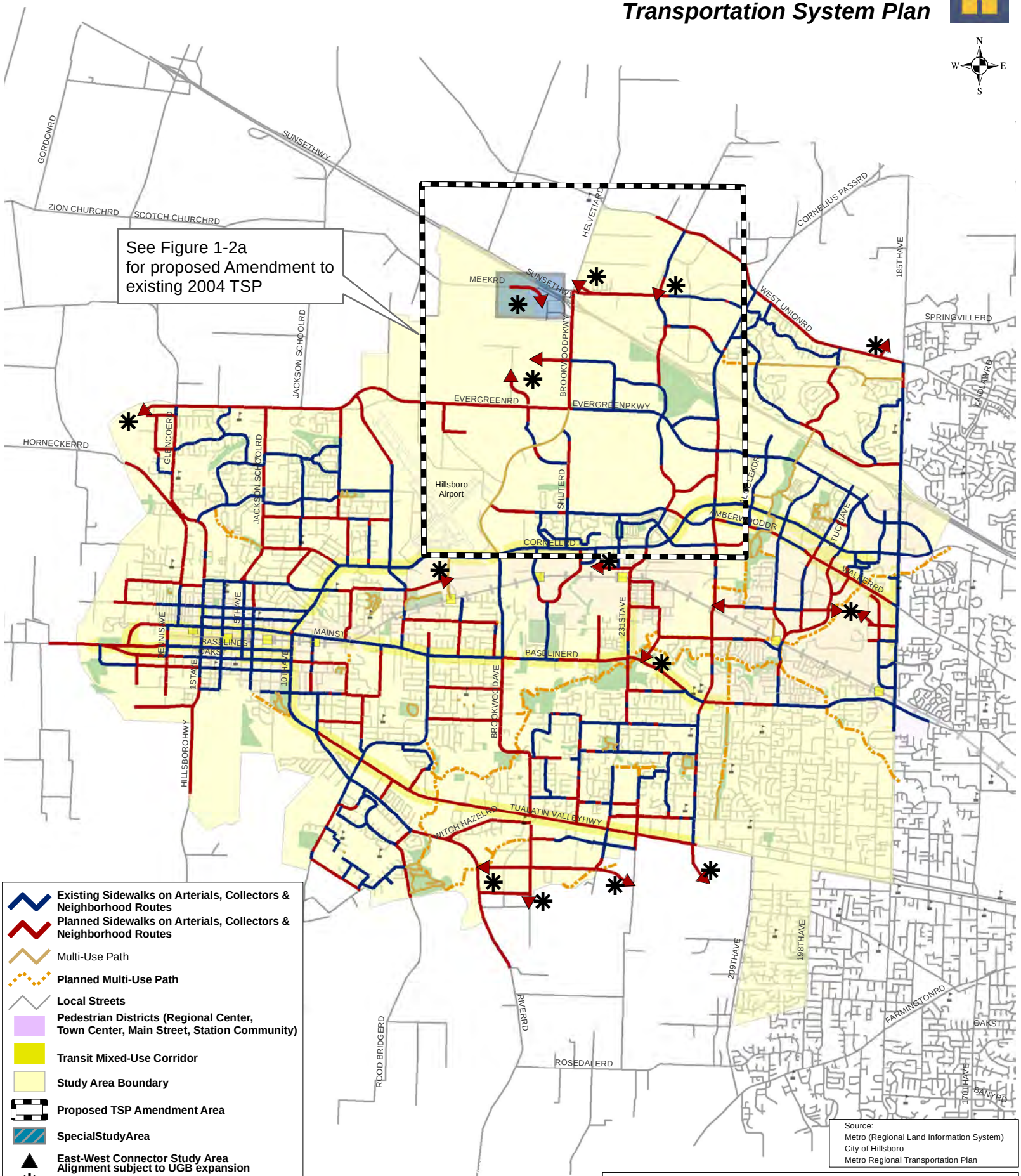
Section 3. This order takes effect immediately upon approval.

Approved this 8th day of August, 2012.

_____
John Coulter President

ATTEST: _____
Lisa Califf, Secretary

City of Hillsboro
Transportation System Plan



Existing Sidewalks on Arterials, Collectors & Neighborhood Routes

Planned Sidewalks on Arterials, Collectors & Neighborhood Routes

Multi-Use Path

Planned Multi-Use Path

Local Streets

Pedestrian Districts (Regional Center, Town Center, Main Street, Station Community)

Transit Mixed-Use Corridor

Study Area Boundary

Proposed TSP Amendment Area

SpecialStudyArea

East-West Connector Study Area
Alignment subject to UGB expansion and/or future refinement or study in these areas.

Light Rail Transit Stop

Light Rail Transit Line

Parks

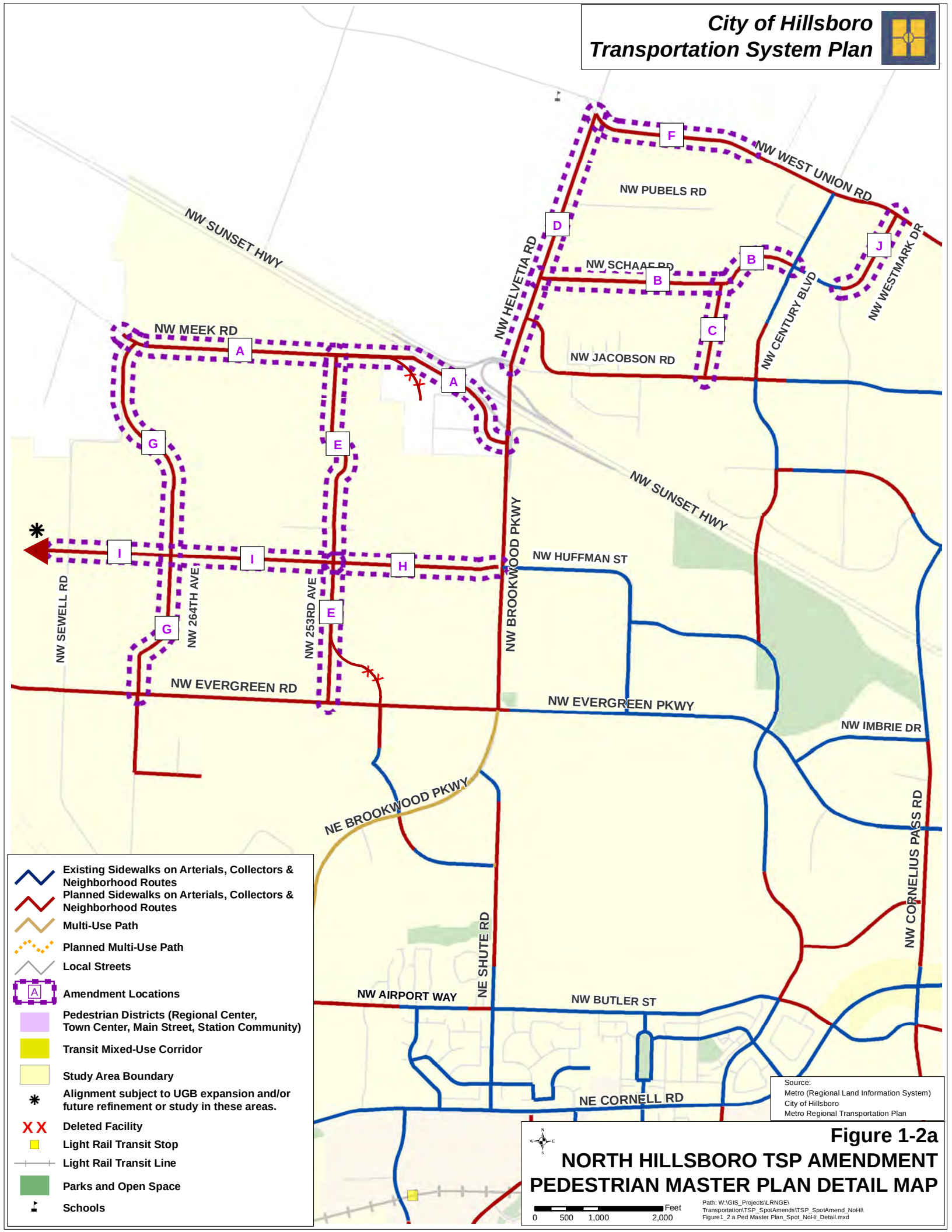
Schools

Source:
Metro (Regional Land Information System)
City of Hillsboro
Metro Regional Transportation Plan

Figure 1-2
PEDESTRIAN MASTER PLAN

0 2,500 5,000 10,000 Feet

Path: W:\GIS_Projects\LRNGE\Transportation\TSP_SpotAmends\TSP_SpotAmend_NoHi\Figure1_2 Ped Master Plan_Spot_NoHi.mxd


City of Hillsboro
Transportation System Plan
NW SUNSET HWY
NW MEEK RD
NW PUBELS RD
NW WEST UNION RD
NW HELVETIA RD
NW SCHAAF RD
NW CENTURY BLVD
NW WESTMARK DR
NW JACOBSON RD
NW SUNSET HWY
NW BROOKWOOD PKWY
NW HUFFMAN ST
NW SEWELL RD
NW 264TH AVE
NW 253RD AVE
NW EVERGREEN RD
NW EVERGREEN PKWY
NW IMBRIE DR
NE BROOKWOOD PKWY
NW CORNELIUS PASS RD
NE SHUTE RD
NW AIRPORT WAY
NW BUTLER ST
NE CORNELL RD
A
B
C
D
E
F
G
H
I
J
Existing Sidewalks on Arterials, Collectors & Neighborhood Routes
Planned Sidewalks on Arterials, Collectors & Neighborhood Routes
Multi-Use Path
Planned Multi-Use Path
Local Streets
Amendment Locations
Pedestrian Districts (Regional Center, Town Center, Main Street, Station Community)
Transit Mixed-Use Corridor
Study Area Boundary
Alignment subject to UGB expansion and/or future refinement or study in these areas.
Deleted Facility
Light Rail Transit Stop
Light Rail Transit Line
Parks and Open Space
Schools
Source:
Metro (Regional Land Information System)
City of Hillsboro
Metro Regional Transportation Plan
Figure 1-2a
NORTH HILLSBORO TSP AMENDMENT
PEDESTRIAN MASTER PLAN DETAIL MAP
Feet
0 500 1,000 2,000
Path: W:\GIS_Projects\LRNGE\Transportation\TSP_SpotAmends\TSP_SpotAmend_NoHi\Figure1_2 a Ped Master Plan_Spot_NoHi_Detail.mxd

City of Hillsboro
Transportation System Plan

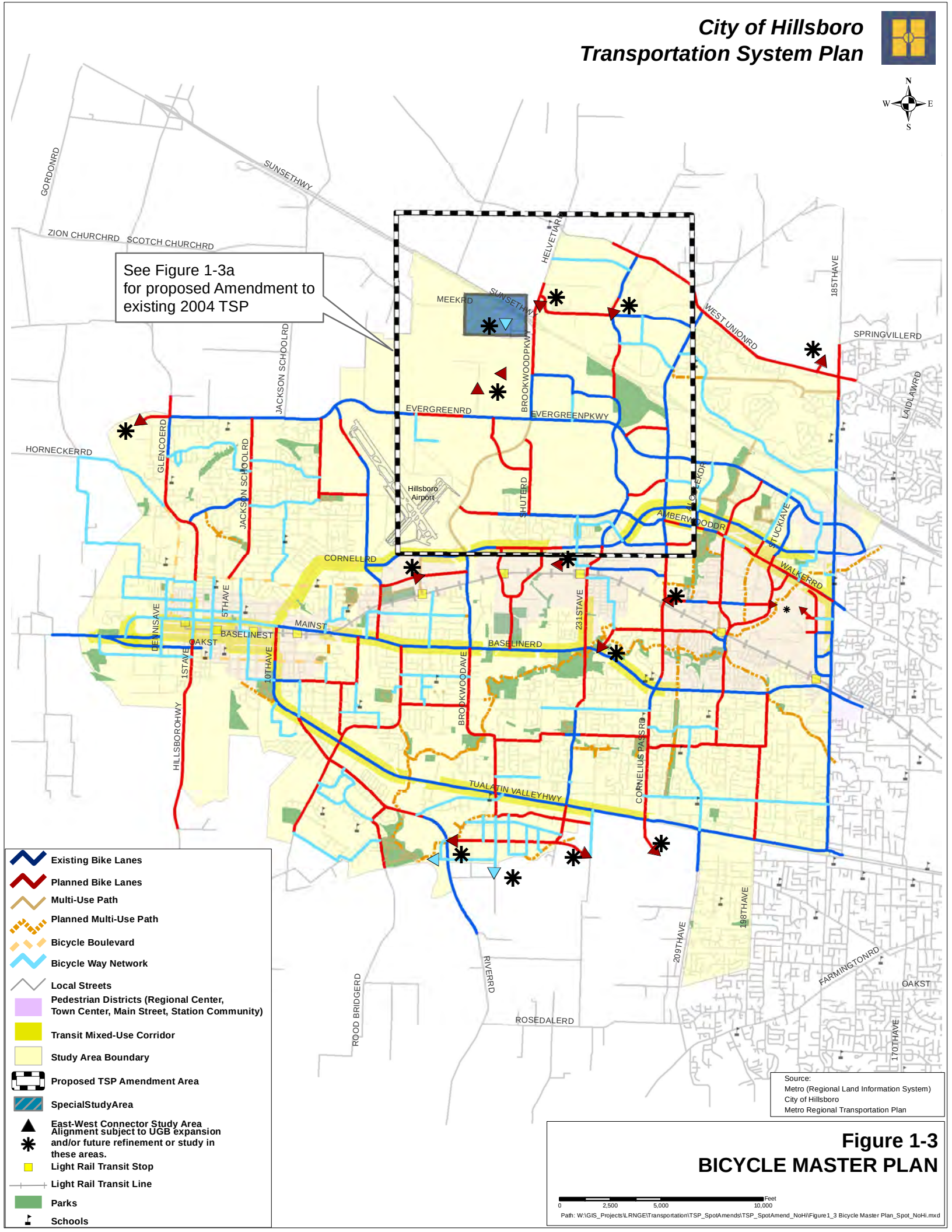


Figure 1-3
BICYCLE MASTER PLAN

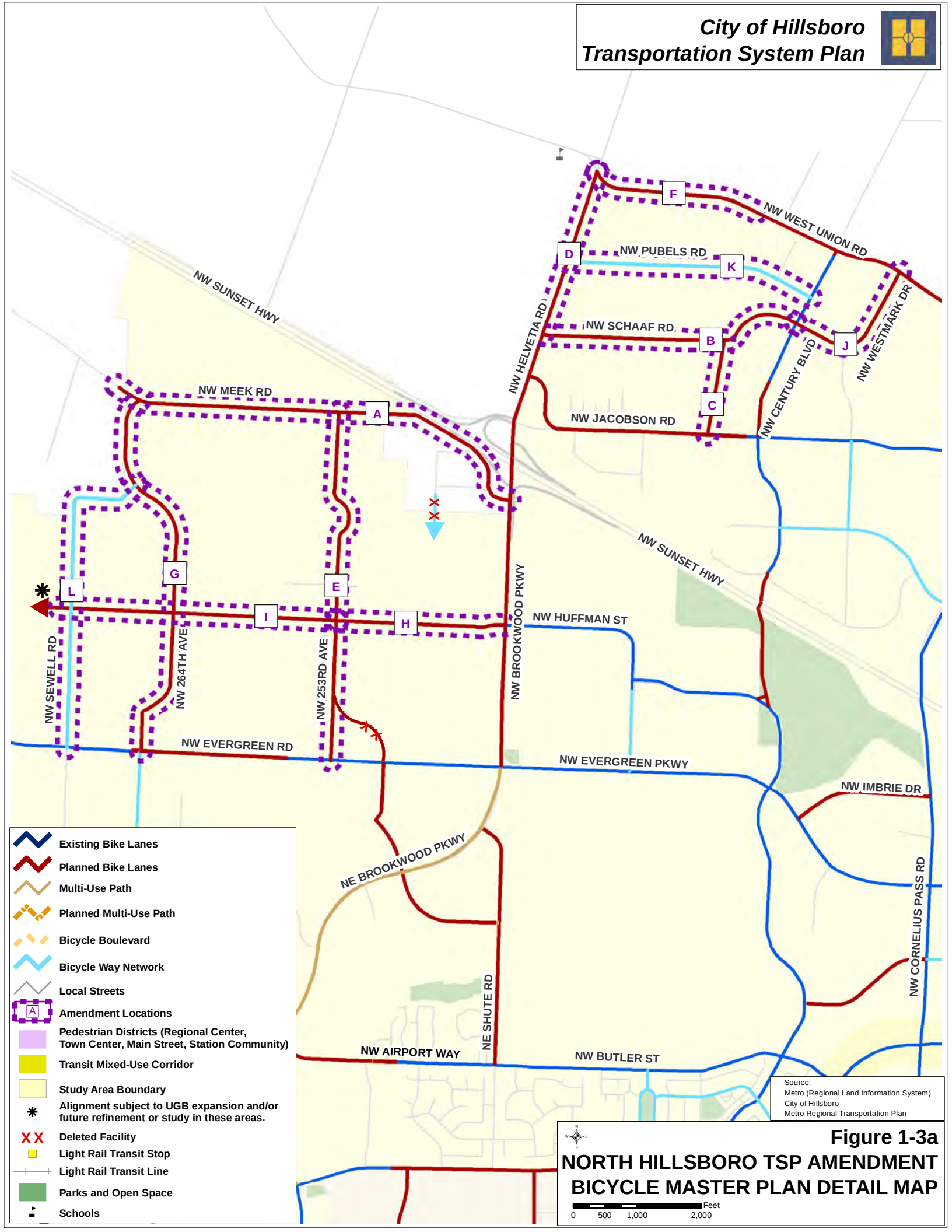
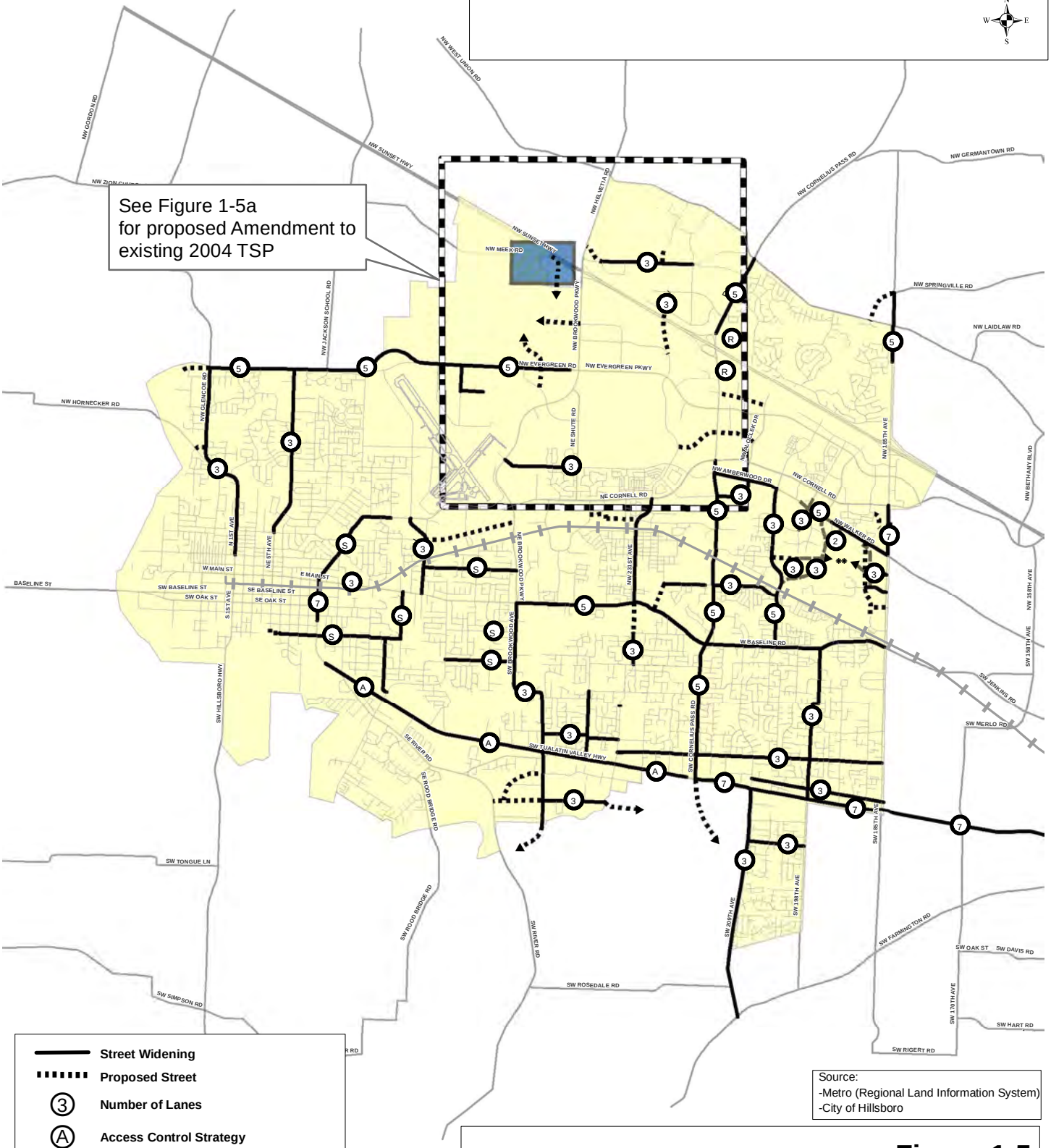


Figure 1-3a
NORTH HILLSBORO TSP AMENDMENT
BICYCLE MASTER PLAN DETAIL MAP

City of Hillsboro
Transportation System Plan



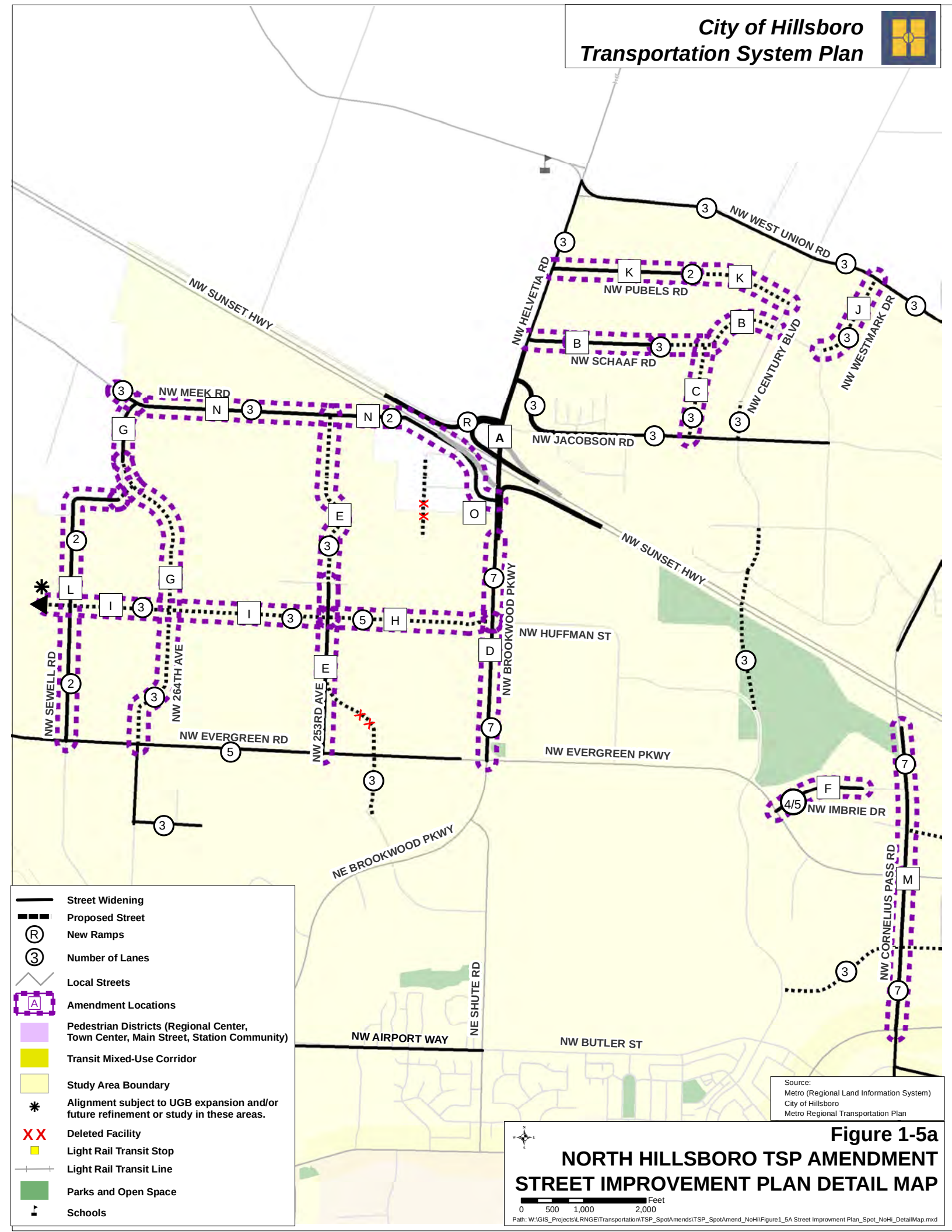
Street Widening
Proposed Street
Number of Lanes
Access Control Strategy
New Ramps
Multi-modal Street Reconstruction
SpecialStudyArea
Proposed TSP Amendment Area
Potential Wilkins Street Alignment Area

Source:
-Metro (Regional Land Information System)
-City of Hillsboro

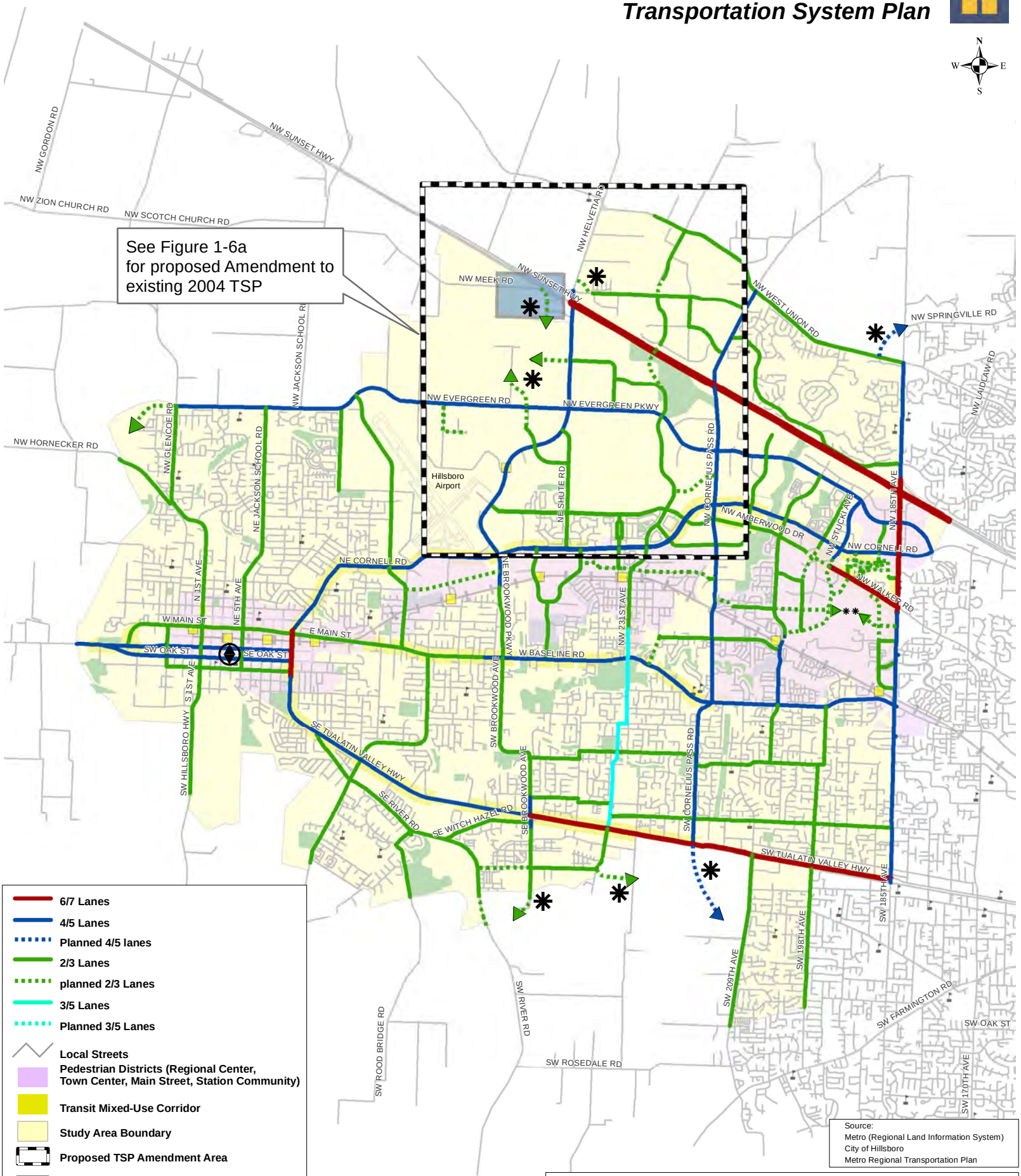
Figure 1-5
STREET IMPROVEMENT PLAN

0 5,000 10,000 Feet

Path: W:\GIS_Projects\LRNGE\Transportation\TSP_SpotAmends\TSP_SpotAmend_NoHi\Figure1_5 Street Improvement Plan_Spot_NoHi.mxd


City of Hillsboro
Transportation System Plan
NW SUNSET HWY
NW WEST UNION RD
NW HELVETIA RD
NW PUBELS RD
NW SCHAAF RD
NW CENTURY BLVD
NW WESTMARK DR
NW JACOBSON RD
NW MEEK RD
NW SUNSET HWY
NW BROOKWOOD PKWY
NW HUFFMAN ST
NW SEWELL RD
NW 264TH AVE
NW 253RD AVE
NW EVERGREEN RD
NW EVERGREEN PKWY
NW IMBRIE DR
NE BROOKWOOD PKWY
NW CORNELIUS PASS RD
NE SHUTE RD
NW AIRPORT WAY
NW BUTLER ST
Street Widening
Proposed Street
New Ramps
Number of Lanes
Local Streets
Amendment Locations
Pedestrian Districts (Regional Center, Town Center, Main Street, Station Community)
Transit Mixed-Use Corridor
Study Area Boundary
Alignment subject to UGB expansion and/or future refinement or study in these areas.
Deleted Facility
Light Rail Transit Stop
Light Rail Transit Line
Parks and Open Space
Schools
Source:
Metro (Regional Land Information System)
City of Hillsboro
Metro Regional Transportation Plan
Figure 1-5a
NORTH HILLSBORO TSP AMENDMENT
STREET IMPROVEMENT PLAN DETAIL MAP
Feet
0 500 1,000 2,000
Path: W:\GIS_Projects\LRNGE\Transportation\TSP_SpotAmends\TSP_SpotAmend_NoHi\Figure1_5A Street Improvment Plan_Spot_NoHi_DetailMap.mxd

City of Hillsboro
Transportation System Plan

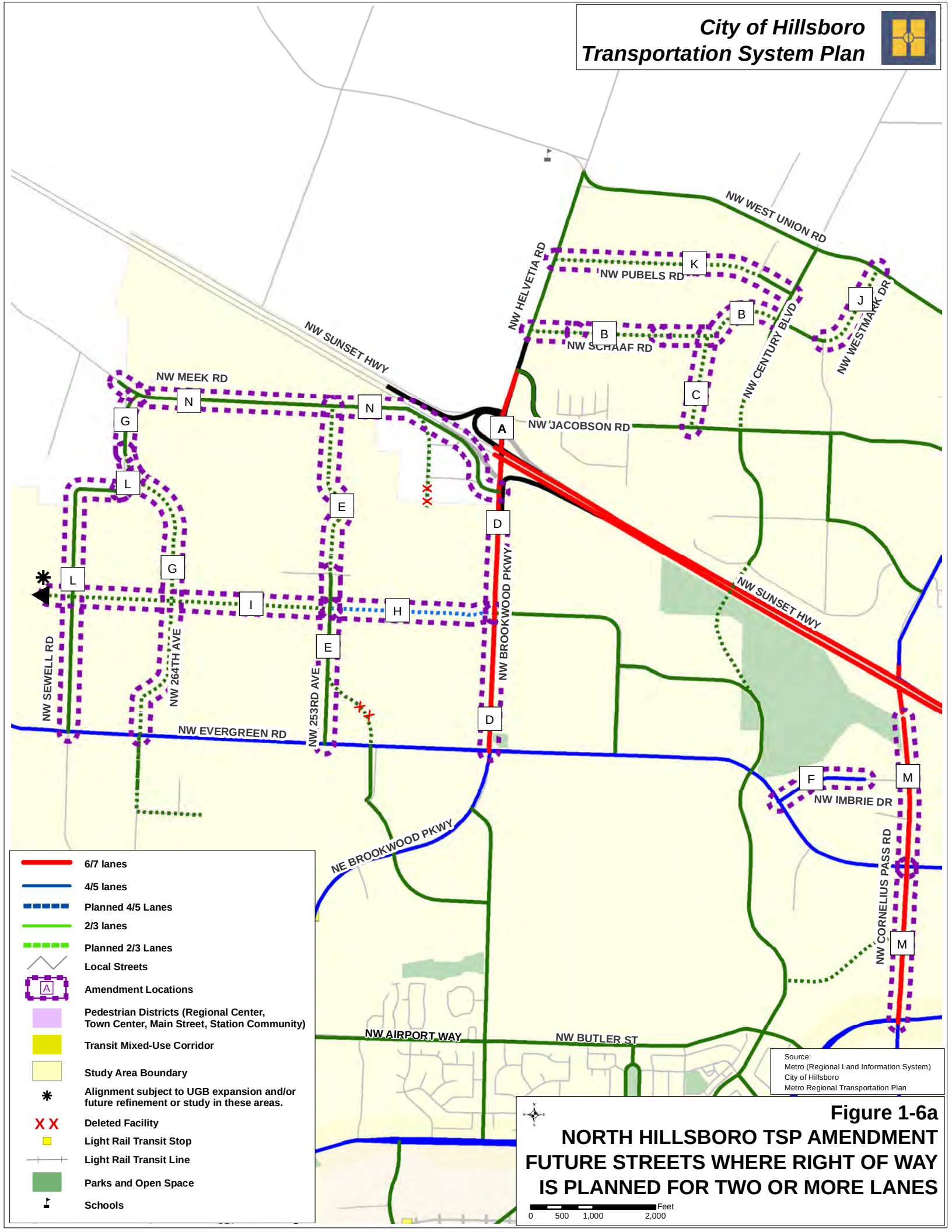


- 6/7 Lanes
- 4/5 Lanes
- Planned 4/5 lanes
- 2/3 Lanes
- planned 2/3 Lanes
- 3/5 Lanes
- Planned 3/5 Lanes
- Local Streets
- Pedestrian Districts (Regional Center, Town Center, Main Street, Station Community)
- Transit Mixed-Use Corridor
- Study Area Boundary
- Proposed TSP Amendment Area
- SpecialStudyArea
- Alignment subject to UGB expansion and/or future refinement or study in these areas.
- East-West Connector Study Area
- Couplet with 3 lanes in each direction

Source:
Metro (Regional Land Information System)
City of Hillsboro
Metro Regional Transportation Plan

Figure 1-6
FUTURE STREETS WHERE RIGHT OF WAY IS PLANNED FOR TWO OR MORE LANES

0 2,500 5,000 10,000 Feet


City of Hillsboro
Transportation System Plan
NW WEST UNION RD
NW HELVETIA RD
NW PUBELS RD
NW SCHAAF RD
NW CENTURY BLVD
NW WESTMARK DR
NW SUNSET HWY
NW MEEK RD
NW JACOBSON RD
NW BROOKWOOD PKWY
NW SUNSET HWY
NW SEWELL RD
NW 264TH AVE
NW 253RD AVE
NW EVERGREEN RD
NW IMBRIE DR
NE BROOKWOOD PKWY
NW CORNELIUS PASS RD
NW AIRPORT WAY
NW BUTLER ST
A
B
C
D
E
F
G
H
I
J
K
L
M
N
6/7 lanes
4/5 lanes
Planned 4/5 Lanes
2/3 lanes
Planned 2/3 Lanes
Local Streets
Amendment Locations
Pedestrian Districts (Regional Center, Town Center, Main Street, Station Community)
Transit Mixed-Use Corridor
Study Area Boundary
Alignment subject to UGB expansion and/or future refinement or study in these areas.
Deleted Facility
Light Rail Transit Stop
Light Rail Transit Line
Parks and Open Space
Schools
Source:
Metro (Regional Land Information System)
City of Hillsboro
Metro Regional Transportation Plan
Figure 1-6a
NORTH HILLSBORO TSP AMENDMENT
FUTURE STREETS WHERE RIGHT OF WAY IS PLANNED FOR TWO OR MORE LANES
Feet
0
500
1,000
2,000

City of Hillsboro
Transportation System Plan

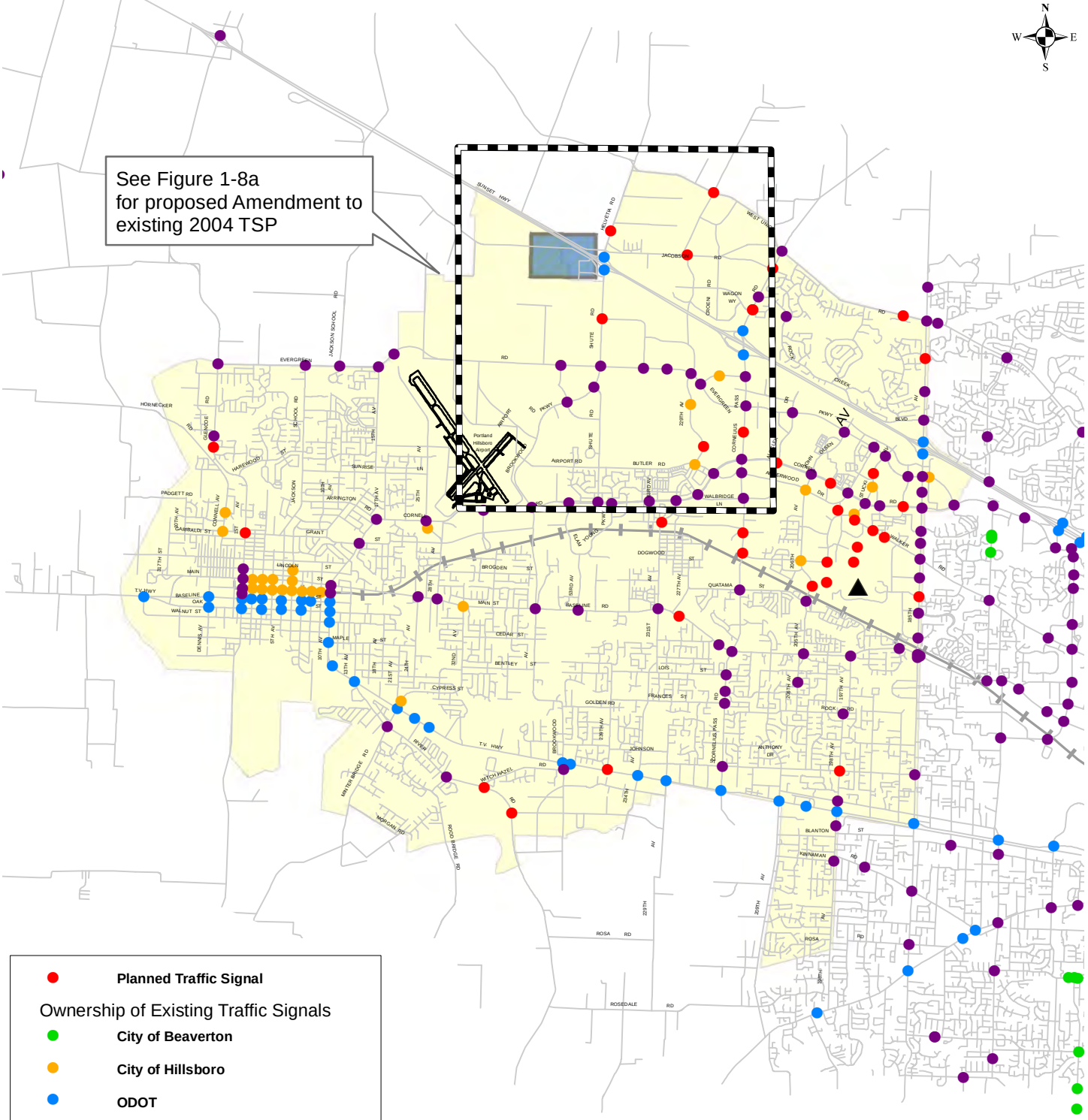
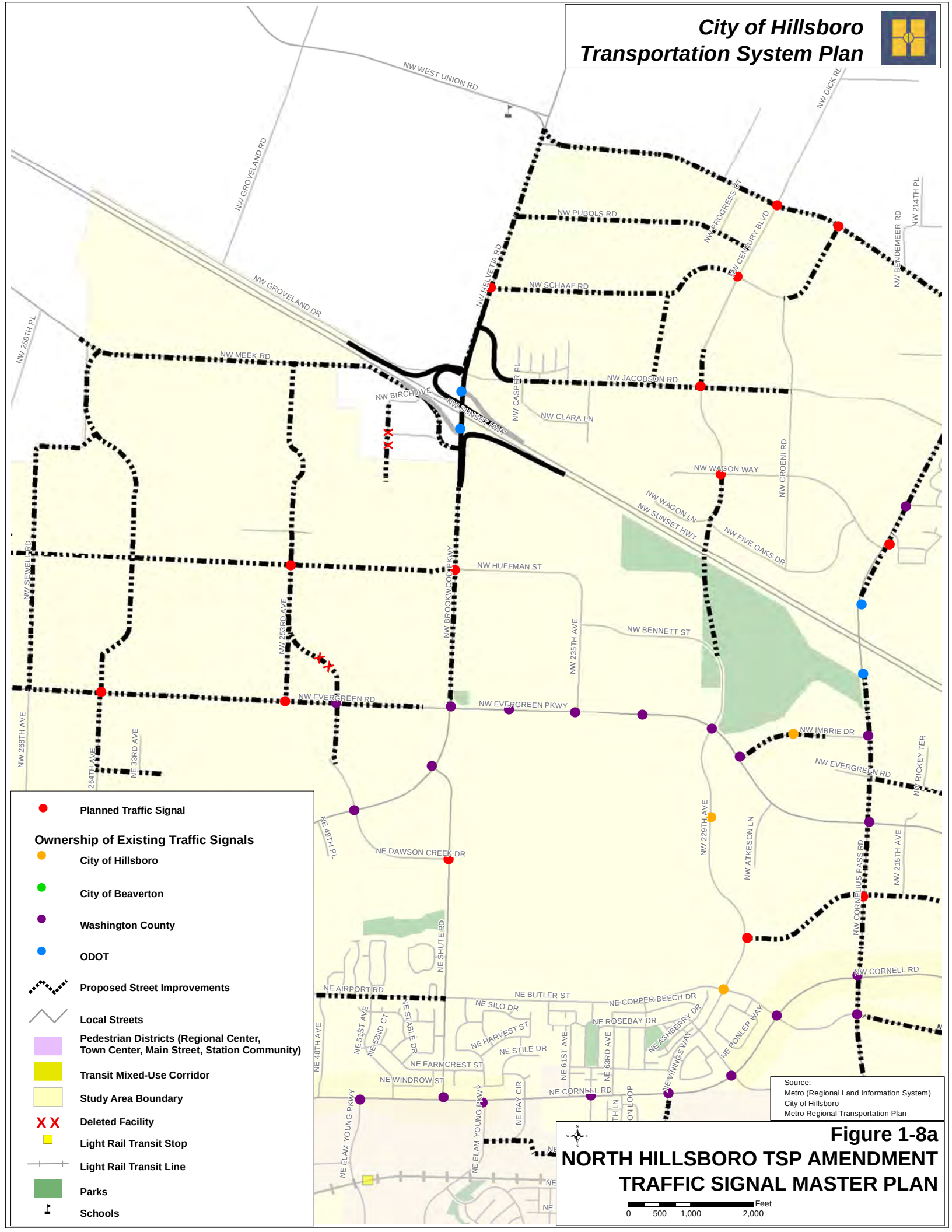
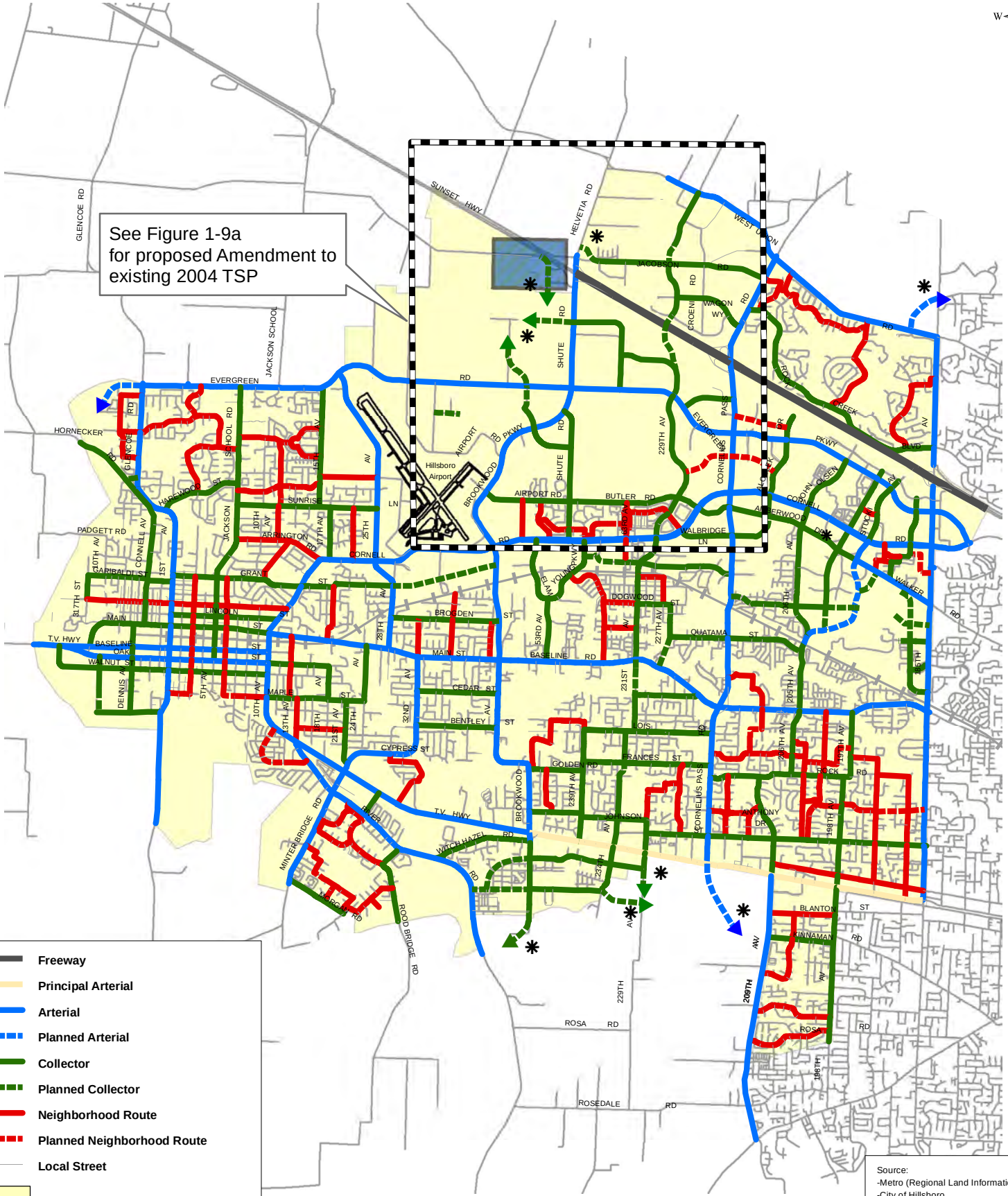


Figure 1-8
HILLSBORO TRAFFIC SIGNAL MASTER PLAN

Path: W:\GIS_Projects\LRNGE\Transportation\TSP_SpotAmends\TSP_SpotAmend_NoHi\Figure1_8 Traffic Signal Master Plan_Spot_NoHi.mxd


City of Hillsboro
Transportation System Plan
NW WEST UNION RD
NW GROVELAND RD
NW GROVELAND DR
NW DICK RD
NW PUBOLS RD
NW PROGRESS ST
NW CENTURY BLVD
NW BRANDEMEER RD
NW 214TH PL
NW HELVETIA RD
NW SCHAAF RD
NW 268TH PL
NW MEEK RD
NW BIRCH AVE
NW SUNSET HWY
NW CASPER PL
NW JACOBSON RD
NW CLARA LN
NW WAGON WAY
NW CROENI RD
NW WAGON LN
NW SUNSET HWY
NW FIVE OAKS DR
NW SEWELL RD
NW HUFFMAN ST
NW BROOKWOOD PKWY
NW 253RD AVE
NW 235TH AVE
NW BENNETT ST
NW EVERGREEN RD
NW EVERGREEN PKWY
NW 268TH AVE
264TH AVE
NE 33RD AVE
NW IMBRIE DR
NW EVERGREEN RD
NW RICKEY TER
NW 229TH AVE
NW ATKESON LN
NW CORNELIUS PASS RD
NW 215TH AVE
NE 49TH PL
NE DAWSON CREEK DR
NE SHUTE RD
NW CORNELL RD
NE AIRPORT RD
NE BUTLER ST
NE SILO DR
NE COPPER BEECH DR
NE ROSEBAY DR
NE ASHBERRY DR
NE RONLER WAY
NE 48TH AVE
NE 51ST AVE
NE 52ND CT
NE STABLE DR
NE HARVEST ST
NE STILE DR
NE 61ST AVE
NE 63RD AVE
NE FARMCREST ST
NE WINDROW ST
NE CORNELL RD
NE VININGS WAY
NE ELAM YOUNG PKWY
NE RAY CIR
Planned Traffic Signal
Ownership of Existing Traffic Signals
City of Hillsboro
City of Beaverton
Washington County
ODOT
Proposed Street Improvements
Local Streets
Pedestrian Districts (Regional Center, Town Center, Main Street, Station Community)
Transit Mixed-Use Corridor
Study Area Boundary
Deleted Facility
Light Rail Transit Stop
Light Rail Transit Line
Parks
Schools
Source:
Metro (Regional Land Information System)
City of Hillsboro
Metro Regional Transportation Plan
Figure 1-8a
NORTH HILLSBORO TSP AMENDMENT
TRAFFIC SIGNAL MASTER PLAN
Feet
0 500 1,000 2,000

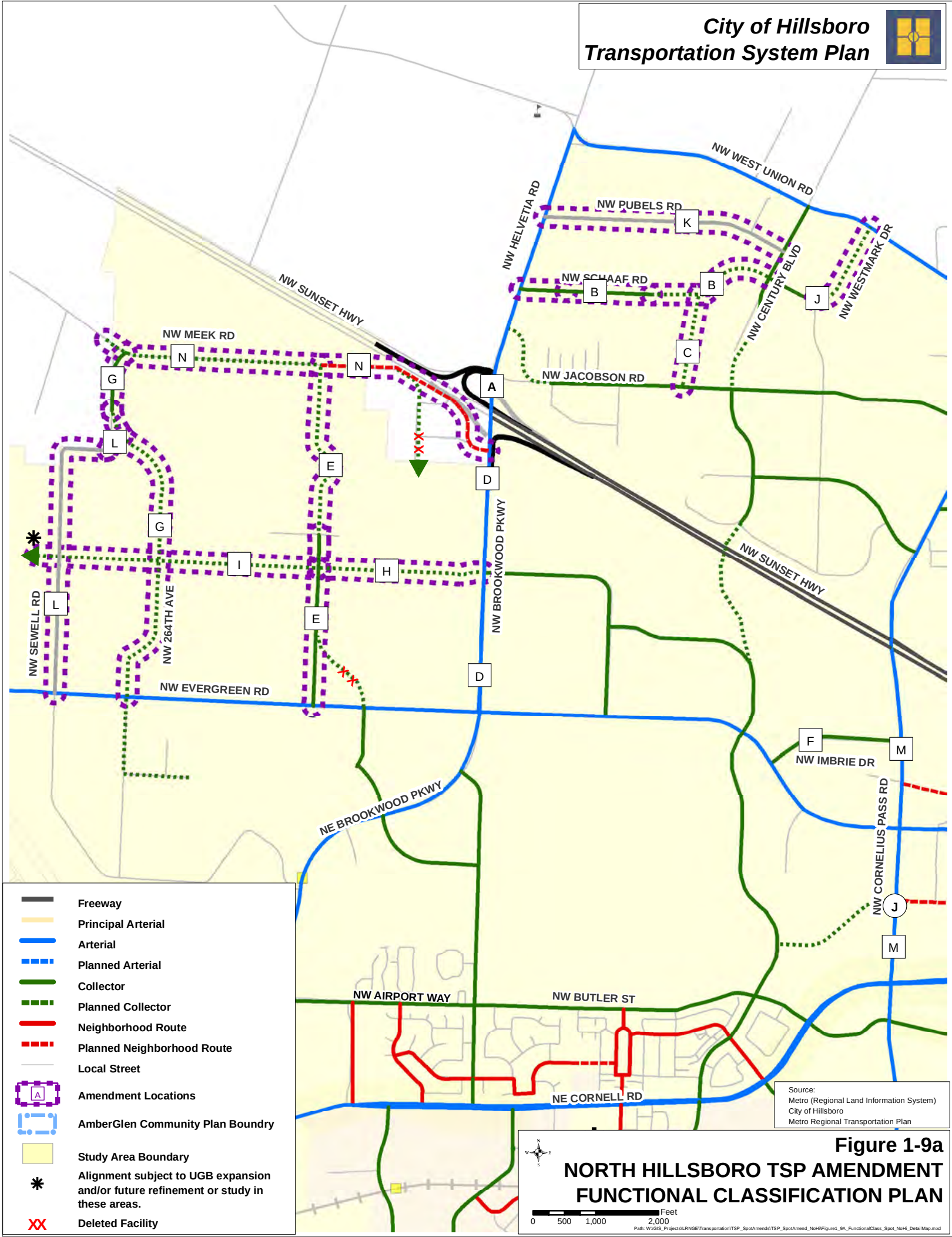


Source:
-Metro (Regional Land Information System)
-City of Hillsboro

Figure 1-9
HILLSBORO FUNCTIONAL CLASSIFICATION PLAN

0 2,500 5,000 10,000 Feet

City of Hillsboro
Transportation System Plan



- Freeway
- Principal Arterial
- Arterial
- Planned Arterial
- Collector
- Planned Collector
- Neighborhood Route
- Planned Neighborhood Route
- Local Street
- Amendment Locations
- AmberGlen Community Plan Boundry
- Study Area Boundary
- * Alignment subject to UGB expansion and/or future refinement or study in these areas.
- XX Deleted Facility

Source:
Metro (Regional Land Information System)
City of Hillsboro
Metro Regional Transportation Plan

Figure 1-9a
NORTH HILLSBORO TSP AMENDMENT
FUNCTIONAL CLASSIFICATION PLAN

0 500 1,000 2,000 Feet

Path: W:\GIS_Projects\LRNGE\Transportation\TSP_SpotAmends\TSP_SpotAmend_NoHil\Figure1_9A_FunctionalClass_Spot_NoHi_DetailMap.mxd