APPENDIX C – TRAFFIC AND TRANSPORTATION

SUNRISE EXPRESSWAY INTERCHANGE AREA MANAGEMENT PLANS

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Introduction

The Sunrise Project would construct a 4.9-mile, limited access facility, the Sunrise Expressway, between the Clackamas area near I-205 and the Rock Creek Junction near the cities of Happy Valley and Damascus. The Sunrise Expressway would add needed capacity in the east-west corridor now served primarily by OR 212/224, a 4-lane state highway through the Clackamas industrial area. The state highway currently has serious congestion and safety problems, and forecasted 2030 traffic will far exceed roadway capacities, impacting residential, freight and emergency traffic.

The Rock Creek interchange for the Sunrise Project would be the eastern interchange for the new expressway. The grade-separated interchange would be located at the junction of State Highways OR 212 and OR 224, replacing the current at-grade intersection of these highways. The area to be served by the interchange was annexed to the Metro region urban growth boundary in 2002. Subsequently, properties north of the interchange area were annexed to the City of Happy Valley, and the new City of Damascus was incorporated east and south of the interchange area.

See Rock Creek Land Use Analysis for information on household and employment in this IAMP area.

Summary of Operations of the Rock Creek Interchange

The analyses for the year 2030 No Build Alternative show that the existing interchange configuration would have complete failure under all operational standards.

The two 2030 Build Alternatives – Alternative 2 and Alternative 3 – would construct the grade-separated Rock Creek interchange. The distinction between them is that Alternative 2 would have a Midpoint Interchange at approximately SE 122nd, connecting the Sunrise Expressway to OR 212/224. Alternative 3 would not have a midpoint interchange.

Each Build Alternative had two Design Options for the configuration of the Rock Creek Interchange. Design Option 2 (D2) is a folded diamond configuration that would add two signals to the transportation system. Design Option 3 (D3) is a single point urban interchange (SPUI) that would add three signals to the system. D3 would require less right-of-way to be purchased than D2, but would cost more to construct.

The results of the analyses show that each Build Alternative would meet overall intersection level-of-service standards (minimum LOS D) in both the AM and PM peak periods. Design Option 3 had the best level-of-service results whether it was incorporated into Alternative 2 or Alternative 3.

Individual lane operations for Alternative 3 would have several over-capacity queues in the eastbound and westbound ramps during both peak periods under Design Option 2. Alternative 2 did not have these over-capacity conditions.

Under each Build Alternative, Design Option 2 had a few intersection volume/capacity ratios for the eastbound and westbound ramps that were greater than 0.75, the maximum desired V/C ratio. Design Option 3 had the higher V/C ratio only in the eastbound ramps during the PM peak hour, although its V/C ratio was higher than those for the eastbound ramps with Design Option 2.

Overall, traffic operations under Design Option 2 and Design Option 3 were comparable and each would be a suitable design for the Rock Creek Interchange. Alternative 2, which would include a Midpoint Interchange west of Rock Creek, had better operations than Alternative 3, and both Alternative 2 and Alternative 3 functioned better than the No Build alternative.

Comparison of Existing Operations to Applicable Operations Standards

The traffic operation standards that the transportation system should meet for existing and future conditions are outlined in **Table 1**. The criteria are from the following sources:

- the 1999 Oregon Highway Plan (OHP), August 2006 Version (Oregon Department of Transportation);
- the 2003 ODOT Highway Design Manual (HDM)
- the 2004 Regional Transportation Plan (Metro's RTP); and,
- Clackamas County's Comprehensive Plan, Chapter 5

Within the Rock Creek IAMP area, the state highway operations meet existing standards. Metro's and Clackamas County's standards also are currently met.

TABLE 1 OPERATION STANDARDS FOR EXISTING AND FUTURE ROADWAYS

Criteria Thresholds	Existing/No-Build	Build
Freeway	**1.1 (1st hour v/c)** [1]	**0.75 v/c** [2]
Signalized Intersections in Interchange Area (ODOT)	**0.90 v/c** [1]	**0.75 v/c** [2]
Clackamas County [3]		
Regional Centers	**LOS E**	**LOS E**
Outside Regional Centers	**LOS D**	**LOS D**
Metro [4]		
Regional Centers	**LOS F (1st hour)** **LOS E (2nd hour)**	**LOS F (1st hour)** **LOS E (2nd hour)**
Outside Regional Centers	**LOS E**	**LOS E**

1. Existing and no-build requirements outlined in 1999 OHP and based on v/c.
2. Build requirements outlined in 2003 ODOT HDM and based on v/c.
3. Clackamas County operating standards outlined in County Comprehensive Plan: Chapter 5.
4. Metro operating standards outlined in the 2004 RTP: Table 1.2

Conclusions - Rock Creek Interchange

In the year 2030 No Build alternative, the existing OR 212/OR 224 intersection fails under all operational standards, including delay, queue length, intersection level-of-service and intersection volume/capacity ratio.

Under either Build **Alternative 2 or Alternative 3**, a grade-separated interchange would be constructed to improve traffic capacity and traffic operations. Alternative 2, which would provide a Midpoint interchange to the west of Rock Creek interchange, had less delay and no queue problems at the interchange ramps, while Alternative 3 would experience some queue length problems during both the AM and PM peak hours.

The Build Alternatives had two Design Options for the configuration of the interchange.

- **Design Option 2 (D2)** is a folded diamond configuration that would add two signals to the transportation system.
- Individual lane operations for Alternative 3 would have several over-capacity queues in the eastbound and westbound ramps during both peak periods. Alternative 2 did not have these over-capacity conditions.
- During the AM peak for Alternative 2, D2 had an intersection volume/capacity ratio greater than 0.75 for the eastbound ramps. That elevated v/c ratio also occurred in the PM peak for both eastbound and westbound ramps. Alternative 3 had the high v/c ratio for both ramps during the PM peak period.
- **Design Option 3 (D3),** a single point urban interchange (SPUI), would add three signals to the system. D3 would require less right-of-way to be purchased than D2, but would cost more to construct. D3 had the best level-of-service results whether it was incorporated into Alternative 2 or Alternative 3.
- D3 had the v/c ratio greater than 0.75 only in the eastbound ramps during the PM peak hour. However, this ratio was higher than that for the eastbound ramps under D2 for either Build Alternative.

Each Build Alternative would construct a new road connection, the “Jug Handle,” needed for travel between OR 212 and OR 212/224 around the new interchange. Both Build Alternatives had long delays during the AM period (Alternative 2 had longer delay than Alternative 3), with the overall intersection level-of-service at “F” during the AM peak hours.

The future (2030) regional through traffic volumes are the primary determinate of the future LOS for the Rock Creek Interchange and for the major intersections with in the Rock Creek IAMP Management Area. If the assumed improvements to the state highway system to the east (5 lane OR 212) or the south (5 land OR 224) do not occur, there will be a significant negative change in the LOS for the Rock Creek Interchange and the major intersections with in the Rock Creek IAMP Management Area.

The primary source of access changes on the state highway system within in the Rock Creek IAMP Management Area will be the construction of the Sunrise Project facilities. These new facilities will remove a number of existing access point on the state highways and substantially modify most of the other access points. The resulting access system will provide better access management on the state highway system than the current system of access points.

The Sunrise Project does not propose any new access points within 1,320 of the proposed Rock Creek Interchange ramp terminals.

In keeping with the provisions of OAR 734 Division 51, no new access points within 1,320 of the proposed Rock Creek Interchange ramp terminals

Existing Transportation System

Existing Transportation Facilities

Roadways are designated by jurisdictions with specific "functional classifications" to indicate the mobility and accessibility functions that they serve. The functional classification also signifies the design needed for existing or anticipated traffic volumes, speeds and multi-modal uses for that roadway. Clackamas County uses a classification system to include principal, major and minor arterials (supporting a range of mobility and less access), and collector, connector and local roads (providing increasing focus on access over mobility). The Oregon Department of Transportation (ODOT) also applies functional classifications to the state highway system. **Figure D-1** shows the Existing Network and road Functional Classification.

State Highways OR 212 and OR 224 are major arterials in the Rock Creek IAMP Management area. They merge at Rock Creek Junction in the southwest portion of this Management area and continue west to I-205 as OR 212/224 (also referred to as Clackamas Highway). The State's designations are District Highway for OR 224 south of Rock Creek Junction, and Statewide Highway (National Highway System – NHS) to OR 212 east of the Junction and to the combined OR 212/224.

Eckert Lane, a collector street, and Goosehollow Drive, a local street, serve residential developments off OR 224 as it heads south from the Junction. SE 162nd Avenue, a local road approximately 2,300 feet east of the Junction, heads north from OR 212, but has no other connections with the road network.

SE 152nd Avenue, approximately 700 feet west of Rock Creek Junction and just outside the Management area boundary, is a collector road connecting OR 212/224 and Sunnyside Road. Because of its proximity to the Junction, traffic operations information is included in this report.

Existing Traffic Volumes and System Operations

Existing transportation system performance was assessed for year 2005 based on available 2004 traffic data.

Road Jurisdiction, Average Daily Traffic (ADT), and Level of Service

The road network is planned, constructed and maintained through cooperation of public and private interests, including state, county, cities and private owners. In the Management area, the state of Oregon, Clackamas County, City of Happy Valley and City of Damascus all contribute to this road system. **Figure D-2** shows the area's road network and jurisdictions' ownerships, including private and local roads. Also on this figure are the Average Daily Traffic (ADT) volumes (an average of the 24-hour traffic volume by direction) on sections of roadway. The percentage of the ADT that is heavy truck traffic also is noted.

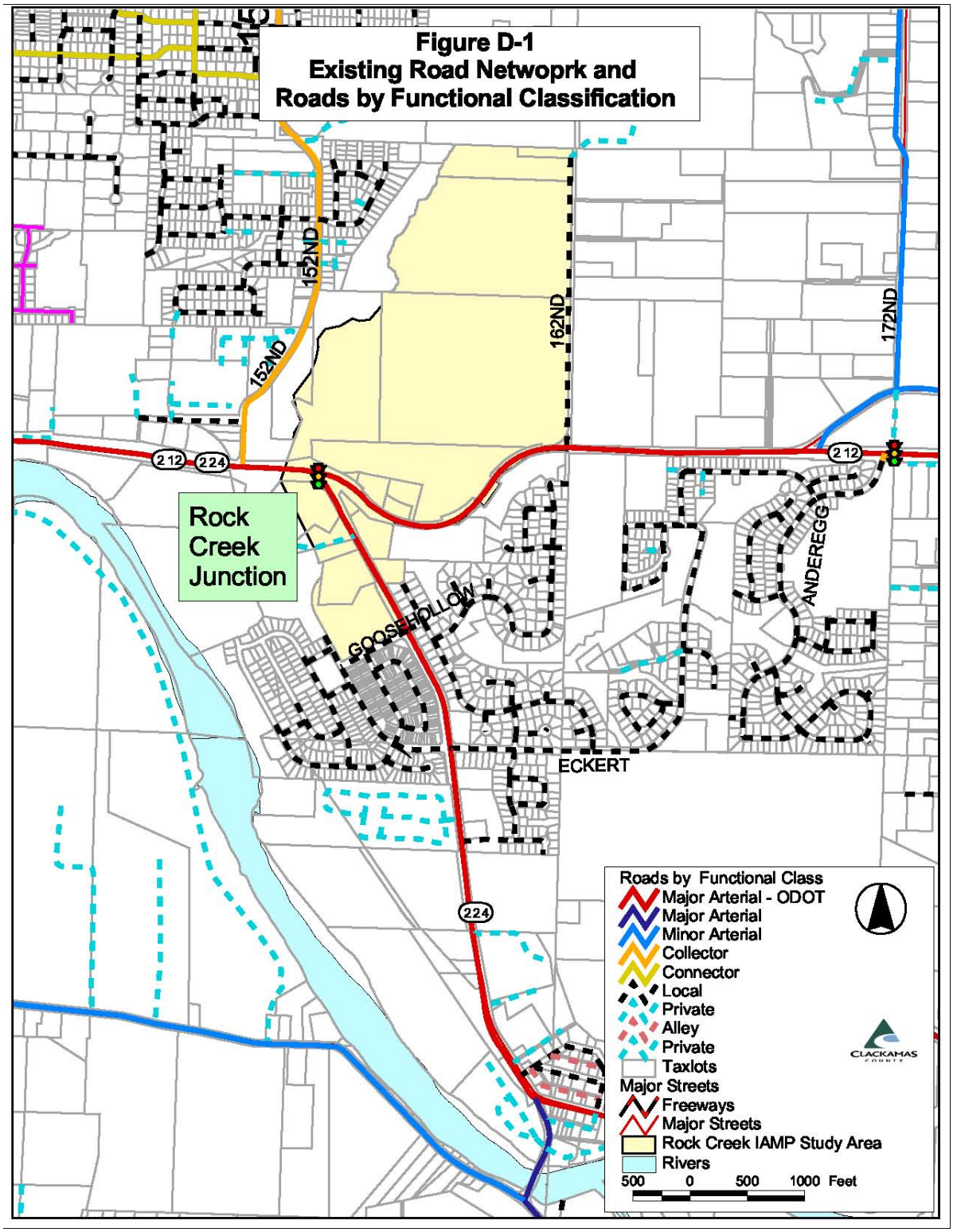


Figure D-1
Existing Road Netwoprk and
Roads by Functional Classification
152ND
152ND
162ND
172ND
212
224
212
212
Rock
Creek
Junction
GOOSEHOLLOW
ANDEREGG
ECKERT
224
Roads by Functional Class
Major Arterial - ODOT
Major Arterial
Minor Arterial
Collector
Connector
Local
Private
Alley
Private
Taxlots
Major Streets
Freeways
Major Streets
Rock Creek IAMP Study Area
Rivers
500 0 500 1000 Feet
CLACKAMAS

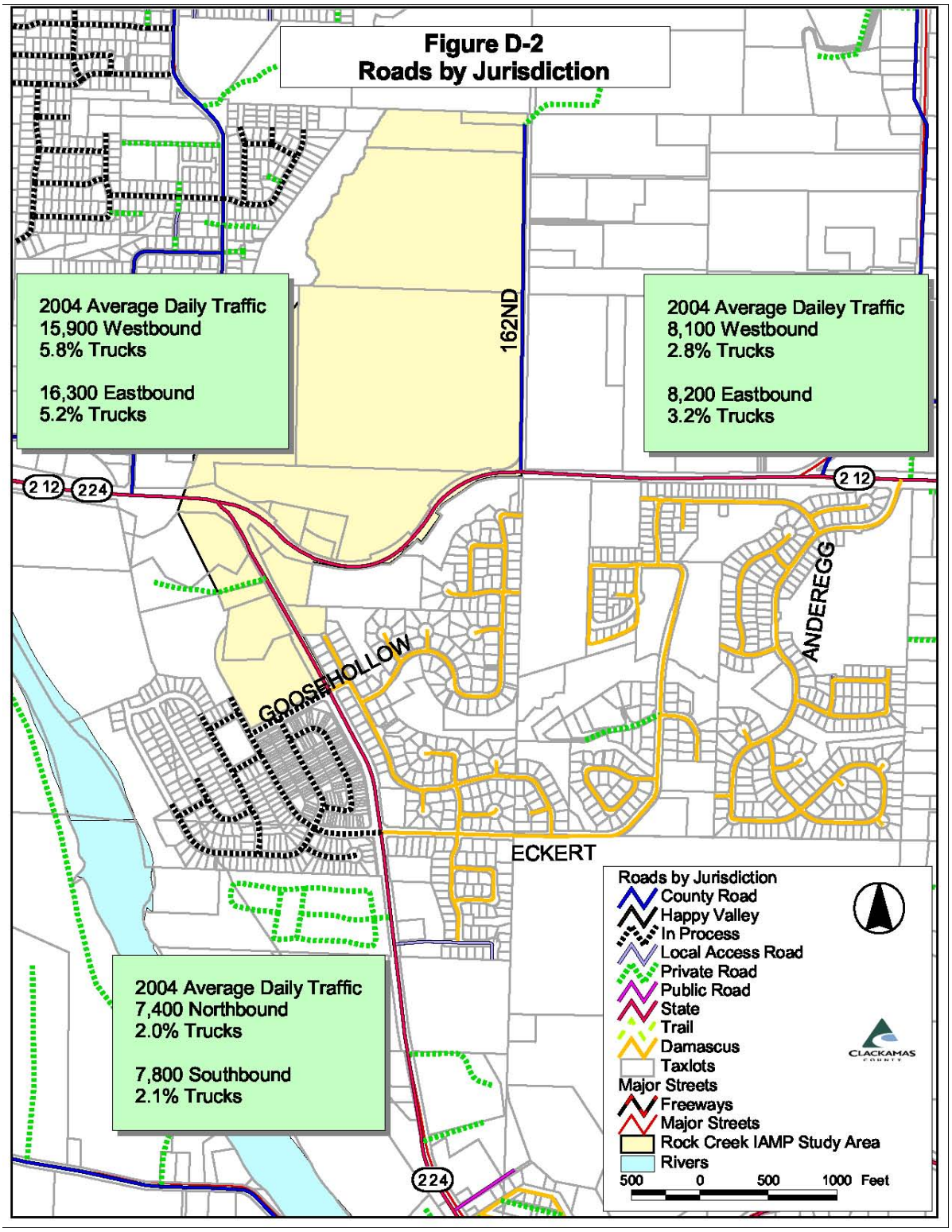


Figure D-2
Roads by Jurisdiction
2004 Average Daily Traffic
15,900 Westbound
5.8% Trucks
16,300 Eastbound
5.2% Trucks
162ND
2004 Average Dailey Traffic
8,100 Westbound
2.8% Trucks
8,200 Eastbound
3.2% Trucks
212
224
212
ANDEREGG
GOOSEHOLLOW
ECKERT
2004 Average Daily Traffic
7,400 Northbound
2.0% Trucks
7,800 Southbound
2.1% Trucks
224
Roads by Jurisdiction
County Road
Happy Valley
In Process
Local Access Road
Private Road
Public Road
State
Trail
Damascus
Taxlots
Major Streets
Freeways
Major Streets
Rock Creek IAMP Study Area
Rivers
500 0 500 1000 Feet
CLACKAMAS

The ADT by direction, percentage heavy truck traffic and total traffic are listed next in **Table 2.**

TABLE 2
EXISTING CONDITIONS – 2004
AVERAGE DAILY TRAFFICE AND PERCENTAGE TRUCKS

AVERAGE DAILY TRAFFIC (PERCENTAGE HEAVY TRUCKS)			
Direction	**OR 212/224, west of Junction, 135th to 142nd**	**OR 212, east of Junction at SE 172nd**	**OR 224, south of Junction at Eckert Lane**
Eastbound	16,300 (5.2% trucks)	8,200 (3.2% trucks)	
Westbound	15,900 (5.8% trucks)	8,100 (2.8% trucks)	
Northbound			7,400 (2.0% trucks)
Southbound			7,800 (2.1% trucks)
TOTAL	**32,200 (5.5% trucks)**	**16,300 (3.0% trucks)**	**15,200 (2.1% trucks)**

An arterial level-of-service (LOS) is determined to show the overall functioning of the roadway sections. **Figure D-3** and **Figure D-4** show the road segments with congestion and the arterial LOS for these segments during the AM and PM peak hours respectively.

Analysis showed that during the AM peak period, no congestion is found for OR 212 or OR 224 in the Management area. Westbound lanes of OR 212/224 are congested around SE 135th Avenue to SE 142nd Avenue west of this IAMP Management area. This highway segment has LOS F.

The PM peak period does not have congestion on OR 212/224 west of the Junction. However, OR 212 east of the Junction has moderate-to-heavy congestion due to the uphill grade and curve toward SE 162nd Avenue; this highway segment has LOS D. OR 224 south of the Junction does not experience congestion.

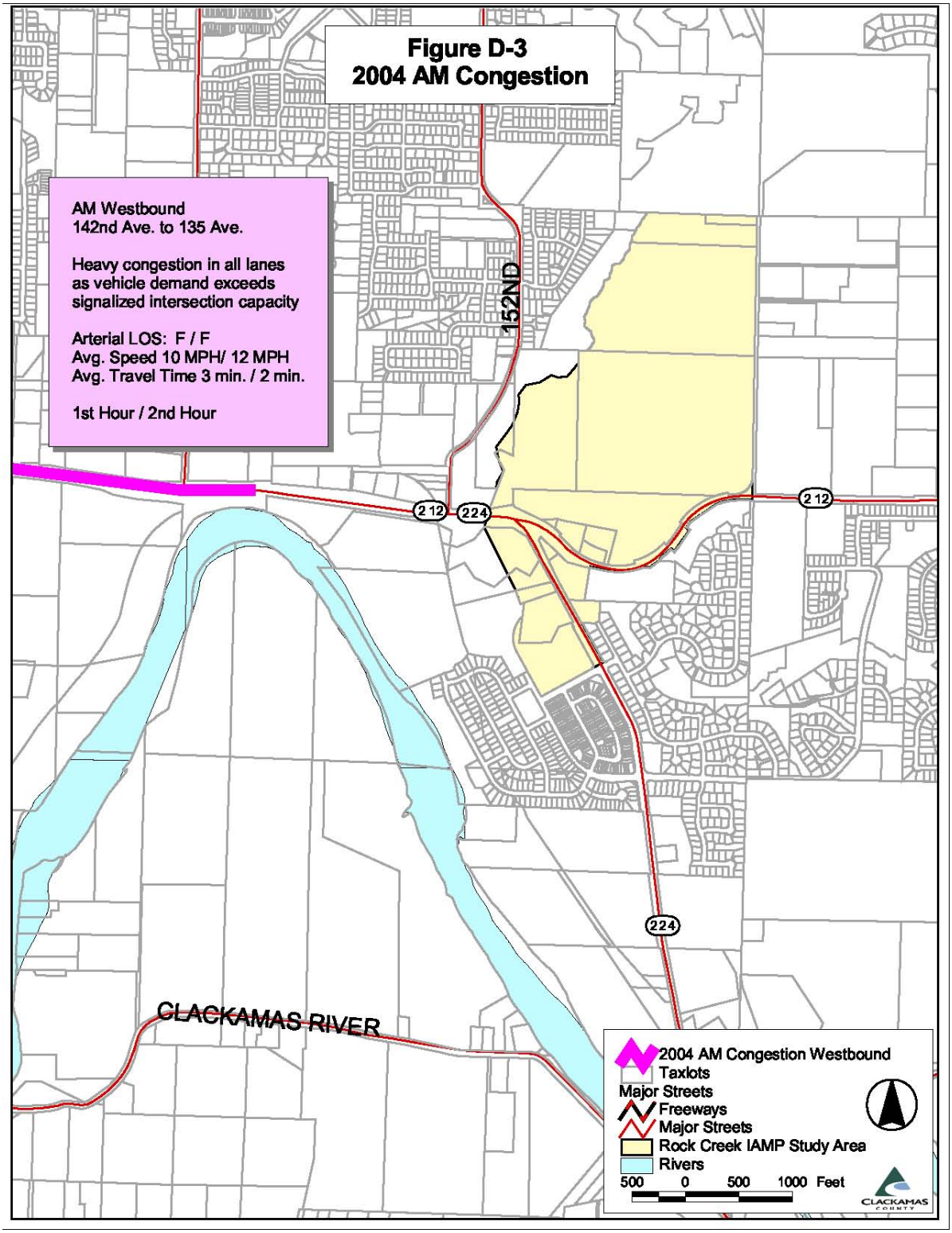


Figure D-3
2004 AM Congestion
AM Westbound
142nd Ave. to 135 Ave.
Heavy congestion in all lanes
as vehicle demand exceeds
signalized intersection capacity
Arterial LOS: F / F
Avg. Speed 10 MPH/ 12 MPH
Avg. Travel Time 3 min. / 2 min.
1st Hour / 2nd Hour
152ND
212
224
212
224
CLACKAMAS RIVER
2004 AM Congestion Westbound
Taxlots
Major Streets
Freeways
Major Streets
Rock Creek IAMP Study Area
Rivers
500 0 500 1000 Feet
CLACKAMAS COUNTY

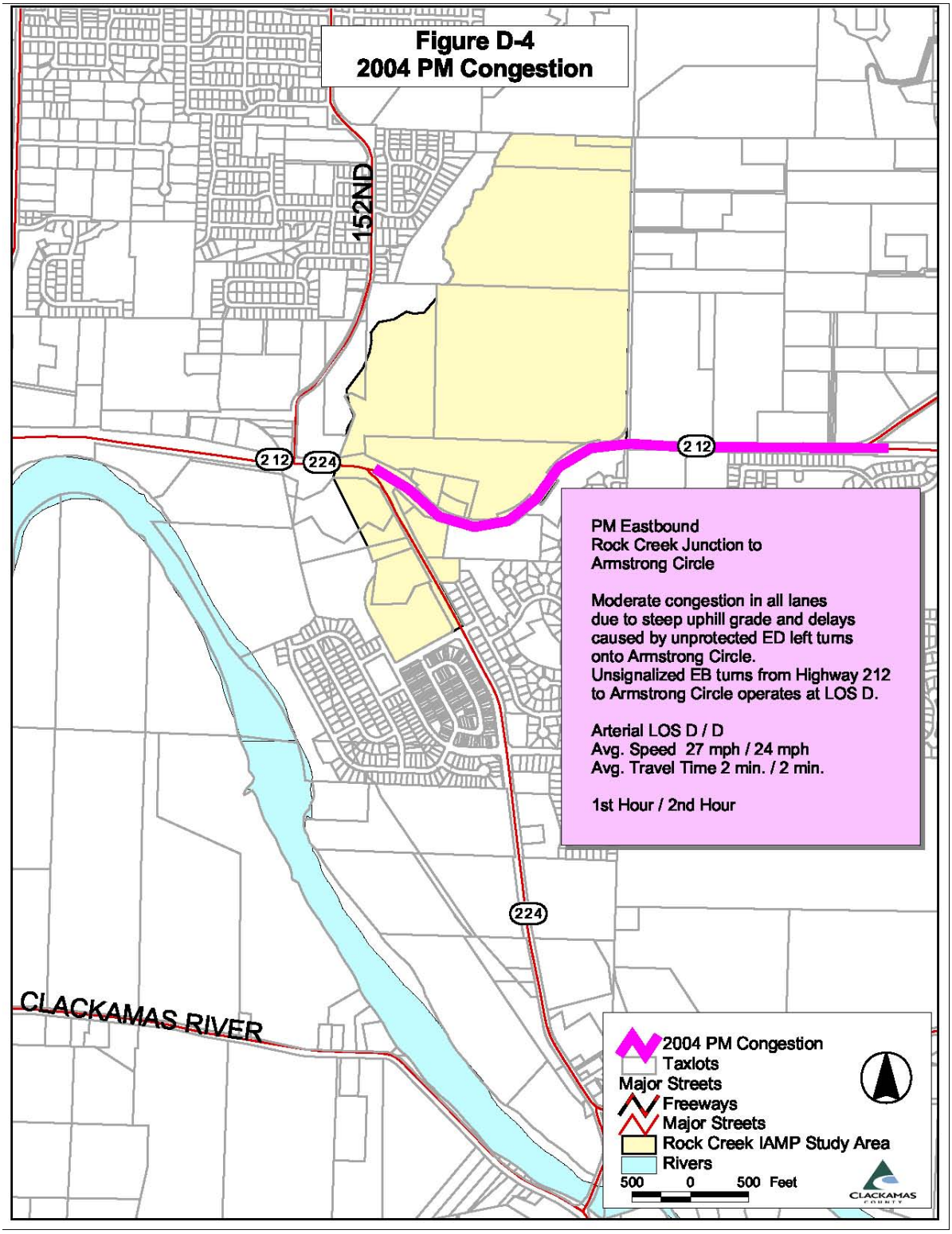


Figure D-4
2004 PM Congestion
152ND
212
224
212
224
CLACKAMAS RIVER
PM Eastbound
Rock Creek Junction to
Armstrong Circle
Moderate congestion in all lanes
due to steep uphill grade and delays
caused by unprotected ED left turns
onto Armstrong Circle.
Unsignalized EB turns from Highway 212
to Armstrong Circle operates at LOS D.
Arterial LOS D / D
Avg. Speed 27 mph / 24 mph
Avg. Travel Time 2 min. / 2 min.
1st Hour / 2nd Hour
2004 PM Congestion
Taxlots
Major Streets
Freeways
Major Streets
Rock Creek IAMP Study Area
Rivers
500 0 500 Feet
CLACKAMAS

Intersection Configurations and Operations Analyses

For ease of comparing intersection operations between Existing Conditions and the Alternatives, details about the intersections (including lane delay and queuing, and intersection level-of-service and volume-to-capacity ratios) are described in "Intersection Operations" and summarized in **Table 9**.

The basic configurations in the existing intersections are as follows:

Rock Creek Junction is formed by OR 224 from the south merging with OR 212 from the east at a signalized, 3-way intersection. The combined OR 212/224 continues west to I-205. Each highway approach has two travel lanes. Northbound-right and eastbound-right turns have separate turn pockets near the intersection, but not fully separated turn lanes. The westbound-left turn has a separate turn bay. The intersection currently meets operational standards, although the eastbound-right volumes may exceed available storage during the PM peak hour.

Eckert Lane and Goosehollow Drive are stop-sign controlled intersections on OR 224 (2,600 ft. and 1,500 ft. and south of the Junction respectively) and each meets operational standards.

SE 162nd Avenue T's into OR 212 (stop-sign control) and serves about 15 properties north of the highway. No transportation analysis was done for this intersection.

SE 152nd Avenue is stop-sign controlled at its "T" intersection with OR 212/224. Its southbound-right/left lane has one hour at LOS F during the PM peak period.

Traffic Control

The existing network does not have medians or turn restrictions.

Existing Access Densities and Types

There are 32 existing, access points onto the state highway facilities and other roads in and around the Rock Creek IAMP Management Area. See **Figure D-5** and Table 3. Fifteen of these access points will be removed or substantially modified by the Sunrise Project and an additional four agricultural driveways are expected to be closed as the existing land uses change from agricultural to urban uses.

Local Street Intersections West of OR 224

The Windswept Waters Subdivision is located west of OR 224 and contains five of the existing local street access points that are either along the boundary of the Rock Creek IAMP Management Area or along OR 224.

Goosehollow Drive and OR 224 (#9) is located approximately 1,600 feet south of the existing Rock Creek Junction on the west side of OR 224. It currently is the primary access to Windswept Waters subdivision and is unsignalized. The Sunrise Project will create a new arterial connection between the existing OR 212/224 and this intersection, cutting off the existing access to Windswept Waters at this point.

Goosehollow Drive and Pyrite Drive (#10), Goosehollow Drive and Eckert Lane (#11), and Pebble Lane and Eckert Lane (#12) are three local street, access intersections with Windswept Waters subdivision that are also located along the boundary of the Rock Creek IAMP Management Area. All of these intersections will have their access to OR 224 changed by the new arterial connection between the existing OR 212/224 and the **new Goosehollow Drive and OR 224 (#9)** intersection.

Eckert Lane and OR 224 (#14), the unsignalized intersection of a county collector and OR224, is located approximately 2,700 feet south of the existing Rock Creek Junction. Changes to the local street system produced by the Sunrise Project will result in this intersection becoming the southern access point to Windswept Waters.

Local Street Intersections East of OR 224

The Orchard Lake Subdivision is located east of OR 224 and contains two of the existing local street access points that are either along the boundary of the Rock Creek IAMP Management area or along OR 224.

Goosehollow Drive and OR 224 (#13), located approximately 1,600 feet south of Rock Creek Junction on the east side of OR 224, is the primary access to Orchard Lake subdivision. The distance from OR 224 to Orchard View Lane (the first intersection to the east) is approximately 100 feet. This distance is too short to provide adequate queue storage for the future operation of a signalized intersection at Goosehollow Drive and OR 224. This intersection will be closed by the Sunrise Project because of safety and intersection operations issues.

Eckert Lane and OR 224 (#15), the unsignalized intersection of a county collector and OR 224, is located approximately 2,700 feet south of the existing Rock Creek Junction. Changes to the local street system produced by the Sunrise Project will result in this intersection becoming the southern access point to Orchard Lake Subdivision and the other subdivision east of OR 224 and south of OR 212.

Local Street Intersections North of OR 212/224 or OR 212

Three other existing, local street, access points are either along the boundary of the Rock Creek IAMP Management area or along OR 212/224.

152nd Avenue and OR 212/224 (#1), located approximately 600 feet west of Rock Creek Junction, is an unsignalized intersection with a County collector street. This intersection will not be directly changed by the Sunrise Project, but is expected to be signalized by 2030. Although this intersection is outside of the Rock Creek IAMP Management Area, it is within the traffic signal influence area for the existing Rock Creek Junction Intersection and affects the operation of this signalized intersection.

162nd Avenue and OR 212 (#22) is located on a county local street that also is designated as a collector in the recently adopted Happy Valley TSP. This intersection, located 2,700 feet east of Rock Creek Junction, currently is unsignalized. The intersection will be a primary southern access point onto OR 212 for the future Providence Medical Center and the two schools that will be located along Rock Creek Boulevard east of the Rock Creek IAMP Management Area. It is also located on one corner of the Rock Creek IAMP Management Area. The intersection will not be directly changed by the Sunrise Project, but is expected to be signalized by 2030.

162nd Avenue and Rock Creek Boulevard (#28) is a new intersection that is currently being constructed between 162nd Avenue (a collector) and Rock Creek Boulevard (a major arterial). This intersection is located approximately 1,500 north of OR 212 and eventually will be a signalized intersection on the edge of the Rock Creek IAMP Management Area.

Residential Driveway on the State Facilities

15302 SE Highway 224 (#6) and **15576 SE Highway 224 (#7**) are residential driveways that currently access OR 224 from the west, to the south of Rock Creek Junction. These driveways are currently

within the traffic signal influence area for the existing Rock Creek Junction Intersection. The Sunrise Project will require the purchase of both residential units in order to construct the new arterial connection between the existing OR 212/224 and the new Goosehollow Drive and OR 224 (#9) intersection. This will result in the closure of these two access points.

15583 SE Highway 212 (#8) is located east of Rock Creek Junction on the north side of OR 212. These driveways are currently within the traffic signal influence area for the existing Rock Creek Junction Intersection. This residential unit will need to be purchased in order to construct any of the proposed Rock Creek Interchanges. This will result in the closure of this driveway access point.

15687 SE Highway 212 (#16 and #17) and **15690 SE Highway 212 (#18, #19 and #20)** are located east of Rock Creek Junction on either side of OR 212. 15687 SE Highway 212 has two driveway access points on the inside of the curve on the north side of Highway 212. 15690 SE Highway 212 has three driveway access points on the outside of the curve on the south side of OR 212. Neither of these access points will be affected by the Sunrise Project.

15951 SE Highway 212 (#21) is located east of Rock Creek Junction on the north side of OR 212. This residential unit will need to be purchased in order to construct any of the proposed Rock Creek Interchanges. This will result in the closure of this driveway access point.

16410 SE Highway 212 (#23) is located east of Rock Creek Junction on the north side of OR 212. This access point is at the approximate location of the "south leg" of a future 162nd Avenue and Highway 212 intersection. The existing access functions as both a residential and an agricultural access point. While it is anticipated that the Sunrise Project will have no direct impacts on this access, it is also assumed that future land uses changes will result in this access being replaced by a local street access that provides a connection from a future residential development in the City of Damascus to OR 212 and Rock Creek Boulevard by way of 162nd Avenue.

16409 SE Highway 212 (#24) is located east of Rock Creek Junction on the north side of OR 212 and the access functions as both a residential and an agricultural access point. This access will be closed in order to construct the extension of the Sunrise Project from the Rock Creek Interchange to the OR 212 in the vicinity of 172nd Avenue. As part of the Sunrise Project, a replacement access connection to the public street system will need to be established in the area north of the proposed facility in accordance with the Happy Valley TSP.

14908 SE 162nd Avenue (#27) is located on 162nd Avenue at the eastern edge of the Rock Creek IAMP Management Area. While there are no expected direct impacts to this access from the Sunrise Project, it is assumed that this access point will be changed by future changes in land use in accordance with the Happy Comprehensive Plan.

Commercial Driveways on the State Facilities

15221 SE Highway 212 (#2), located approximately 450 feet west of Rock Creek Junction on OR 212/224, is currently within the traffic signal influence area for the existing Rock Creek Junction Intersection. This driveway access point provides commercial access to Great Floors and residential access to an existing house and related agricultural uses and is an unsignalized access. The Sunrise Project is expected to close this access point through a project right-of-way purchase. If future access is provided to the north portion of this site, the new access point will be on 152nd Avenue north of the Sunrise Project.

15252 SE Highway 224 (#4), located approximately 350 feet south of Rock Creek Junction on OR 212/224, is within the traffic signal influence area for the existing Rock Creek Junction Intersection.

This driveway access point provides commercial access to Alice's Country Market. The access point provides full, unsignalized access to the site. The Sunrise Project will create a new arterial connection between the existing OR 212/224 and OR 224 that will cut off this existing access. A replacement access via a frontage road with no direct access to either OR 224 or the new arterial has been proposed.

15278 SE Highway 224 (#5), located approximately 650 feet south of Rock Creek Junction on OR 212/224, is within the traffic signal influence area for the existing Rock Creek Junction Intersection. This driveway access point provides full, unsignalized, commercial access to Bachman Paving. The Sunrise Project will create a new arterial connection between the existing OR 212/224 and OR 224 that will cut off this existing access. A replacement access via a frontage road with no direct access to either OR 224 or the new arterial has been proposed.

16410 SE Highway 212 (#25) The Sunnyside Community Church takes access to OR 212 at this point. While there are no anticipated direct project impacts to this access, the Sunrise Project proposes to cul-de-sac OR 212 just to the east of this access point, changing the travel path to the church.

Agricultural Driveways

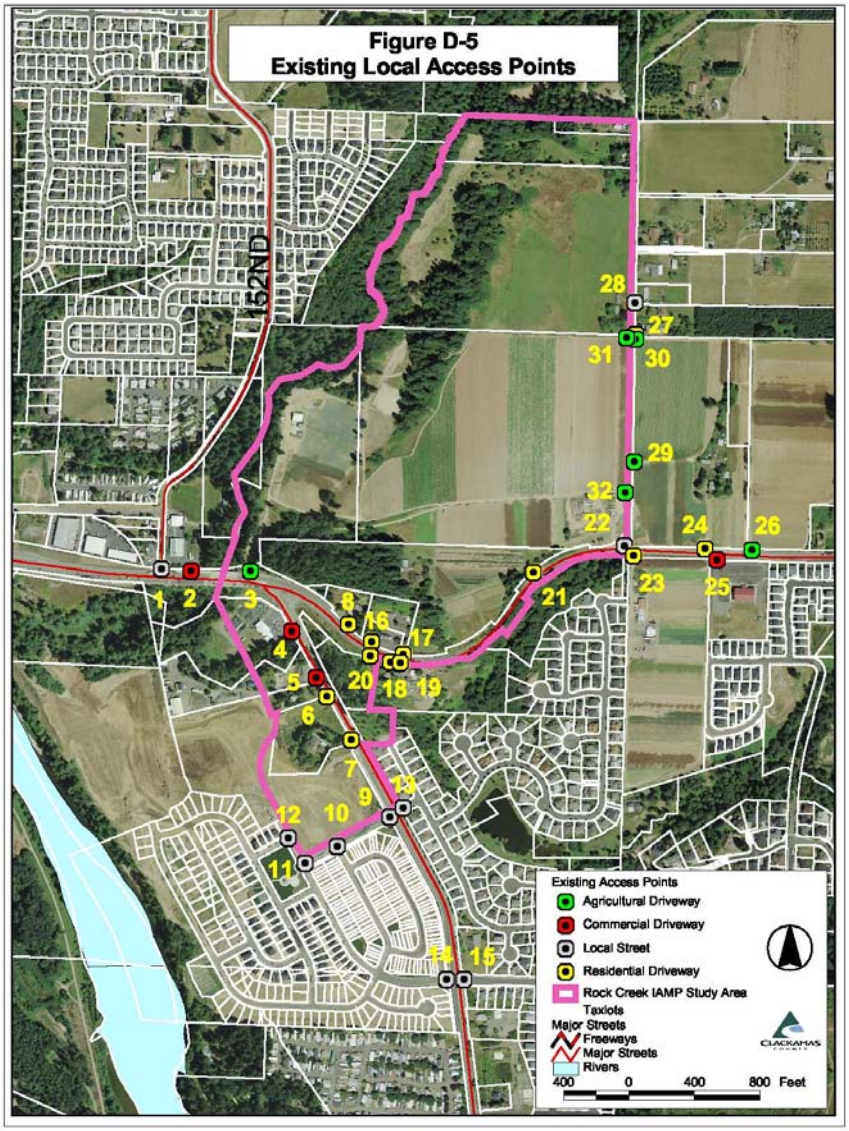
The agricultural driveways, identified as **#3 (Highway 212 / 224**) and **#26 (Highway 212),** will be closed by the purchase of right-of-way for the Sunrise Project. A future utility access point may be needed at access point #3 to provide access to the sewer trunk lines that are located to the east of Rock Creek.

The agricultural driveways along 162nd Avenue, identified as **# 29, #30, #31 and #32**, will be closed by future changes in land use. It is anticipated that they will be replaced by local street access points that meet local access management standards.

Table 3 Rock Creek IAMP Area Existing Access Points

ID	Access Type	Access Location	Impact on Existing Access Points
1	Local Street	152nd Avenue and Highway 212	No Project Impacts
2	***Commercial Driveway***	***15221 SE Highway 212***	***Closed - ROW Purchase***
3	***Agricultural Driveway***	***Highway 212 / 224***	***Closed - ROW Purchase***
4	***Commercial Driveway***	***15252 SE Highway 224***	***Closed - ROW Purchase***
5	***Commercial Driveway***	***15278 SE Highway 224***	***Closed - ROW Purchase***
6	***Residential Driveway***	***15302 SE Highway 224***	***Closed - ROW Purchase***
7	***Residential Driveway***	***15576 SE Highway 224***	***Closed - ROW Purchase***
8	***Residential Driveway***	***15583 SE Highway 212***	***Closed - ROW Purchase***
9	***Local Street***	***Goosehollow Drive West of Highway 224***	***Access Replaced by New Arterial***
10	***Local Street***	***Pyrite Lane and Goosehollow Lane***	***Closed - ROW Purchase***
11	***Local Street***	***Eckert Lane and Goosehollow Lane***	***Closed - ROW Purchase***
12	***Local Street***	***Pebble Lane and Eckert Lane***	***Closed - ROW Purchase***
13	***Local Street***	***Goosehollow Drive East of Highway 224***	***Access Closed by Project - Safety Issues***
14	Local Street	Eckert Lane West of Highway 224	No Project Impacts
15	Local Street	Eckert Lane East of Highway 224	No Project Impacts
16	Residential Driveway	15687 SE Highway 212	No Project Impacts
17	Residential Driveway	15687 SE Highway 212	No Project Impacts
18	Residential Driveway	15690 SE Highway 212	No Project Impacts
19	Residential Driveway	15690 SE Highway 212	No Project Impacts
20	Residential Driveway	15690 SE Highway 212	No Project Impacts
21	***Residential Driveway***	***15951 SE Highway 212***	***Closed - ROW Purchase***
22	Local Street	162nd Avenue and SE Highway 212	No Project Impacts
23	Residential Driveway	16410 SE Highway 212	No Project Impacts
24	***Residential Driveway***	***16409 SE Highway 212***	***Closed - ROW Purchase***
25	Commercial Driveway	16410 SE Highway 212	No Project Impacts
26	***Agricultural Driveway***	***Highway 212***	***Closed - ROW Purchase***
27	Residential Driveway	14908 SE 162nd Avenue	No Project Impacts
28	Local Street	Rock Creek Boulevard and 162nd Avenue	No Project Impacts

29	***Agricultural Driveway***	***162nd Avenue***	***Removed by future land use***
30	***Agricultural Driveway***	***162nd Avenue***	***Removed by future land use***
31	***Agricultural Driveway***	***162nd Avenue***	***Removed by future land use***
32	***Agricultural Driveway***	***162nd Avenue***	***Removed by future land use***



Crash Locations and Types

The Rock Creek IAMP area included three of the seven sub-corridors that were used to analyze safety in the Sunrise Corridor. The applicable corridors are as follows:

Clackamas Highway (from the Fred Meyer Distribution Center, just east of SE 106th, to Rock Creek Junction);

OR 224 (Rock Creek Junction south to Carver); and,

OR 212 (Rock Creek Junction east to Wyeast Avenue)

The analysis included a review of Planning Research Corporation crash listings (1998 to 2002) provided by ODOT, Safety Priority Index System (SPIS) data from ODOT, Clackamas County SPIS data, and calculated crash rates. The results showed that the three sub-corridors had crash rates lower than comparable statewide facilities. **Figure D-6** shows the corridor safety summaries for the Rock Creek Area.

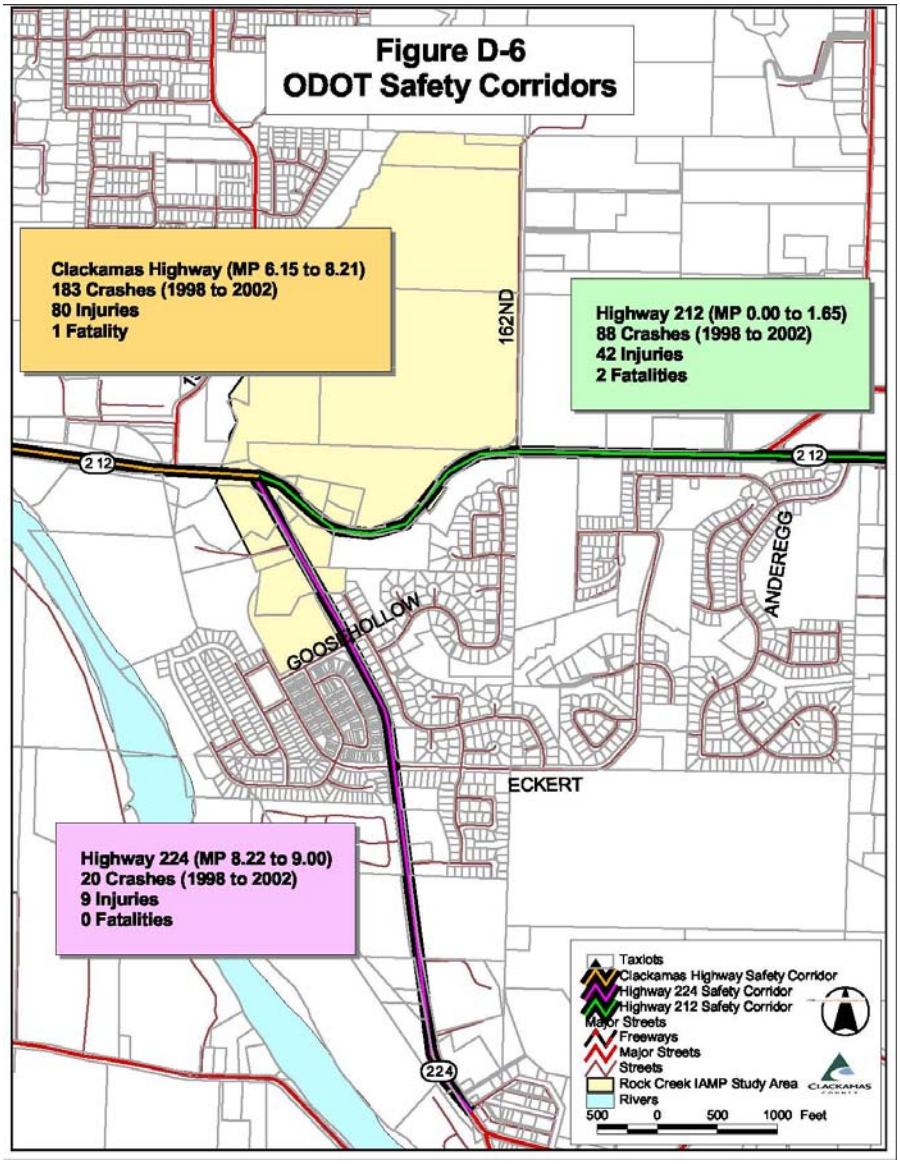
The crash rates for intersections in the Rock Creek IAMP area were each less than 0.9, so additional analyses were not performed.

- SPIS Crash rate was 0.22 at OR 212/224 @ 152nd Avenue;
- SPIS Crash rate was 0.53 at the Rock Creek Junction;
- SPIS Crash rate was 0.11 at OR 224 / Goosehollow Drive;
- SPIS Crash rate was 0.08 at OR 224 / Eckert Lane.

Effect of Traffic Operations on the Facilities System

The existing OR 212/224 corridor transportation system currently experiences unacceptable levels of congestion and delay during peak travel periods, which adversely affect system reliability, efficiency, safety, and performance.

Westbound congestion on OR 212/224 around 142nd Avenue during the AM peak period can impact the operation of Rock Creek Junction. During the PM peak hours, traffic eastbound from Rock Creek Junction on OR 212 experiences congestion due to the steep grade and curve of the highway as it approaches SE 162nd Avenue. The queue analysis showed that the Rock Creek Junction also has an at-capacity queue for the eastbound-right turn during the PM peak period.



Transit Services

TriMet Bus Route 31 serves the Rock Creek IAMP area with service between downtown Portland and the City of Estacada via OR 212/224 and OR 224. Route 31 is a regional bus route with service on weekdays and weekends. It has a 20-minute headways during the weekday morning commute and 30-minute headways the rest of the day. Weekend service provides 30-minute headways on Saturdays, from 7 AM to 6 PM, and 60-minute headways Saturday evenings and Sundays. The route accesses the Clackamas Town Center Transit Center, the Milwaukie Transit Center, and park-and-ride lots at the Clackamas Town Center, Carver and City of Estacada.

Just west of the IAMP Management area, TriMet Bus Route 156 operates along a section of OR 212/224, with service connecting the Highway to Sunnyside Road along SE 152nd Avenue. This route overlaps with Route 31 on OR 212/224 between SE 152nd Avenue and SE 135th Avenue ; it operates on 60-minute headways on weekdays and weekends.

Bike and Pedestrian Networks

OR 212/224 has bicycle lanes with riding conditions rated as "fair" due to the high volume of truck traffic, road debris and high traffic speeds.

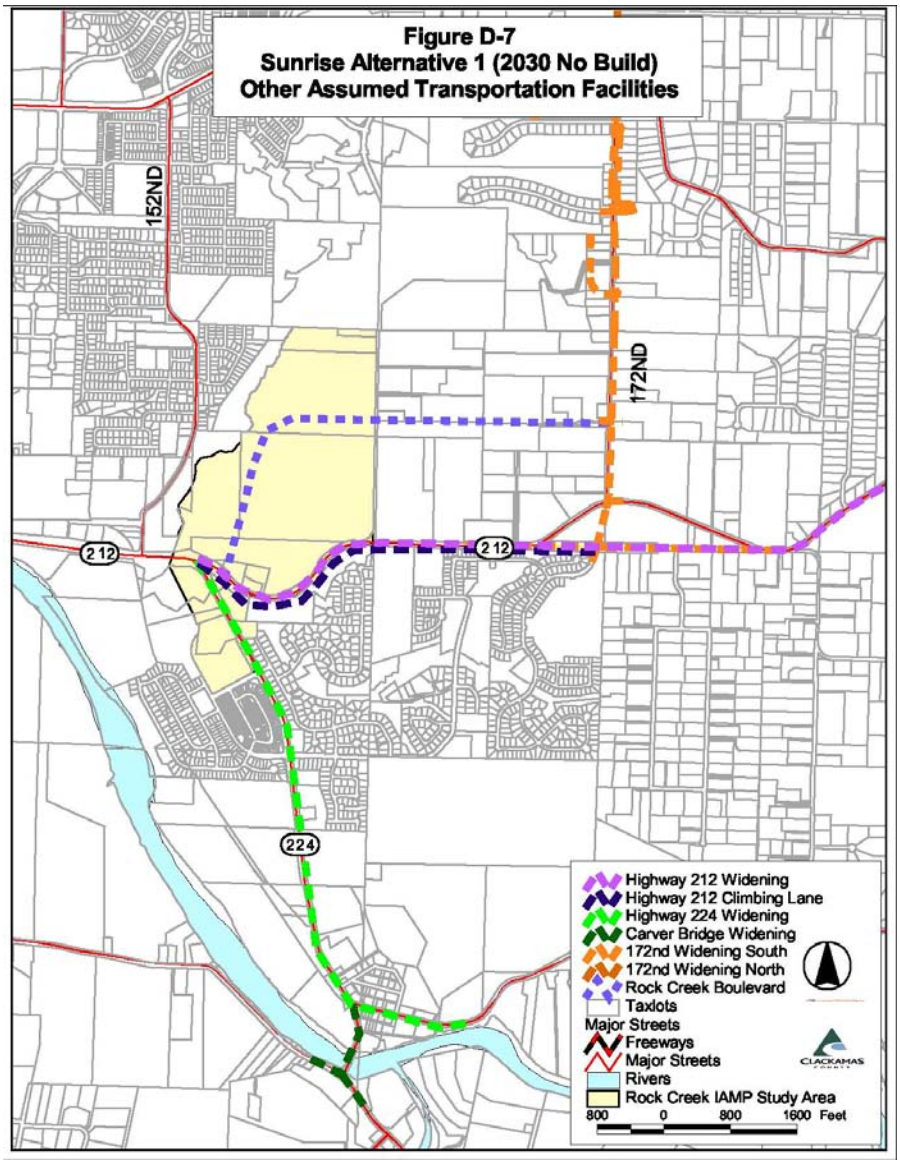
Bicycle counts taken at Rock Creek Junction in May 2004 found no bicyclists during the AM peak (6:00 – 9:00 AM), while 33 bicyclists were counted during the PM peak (3:30 – 4:30 PM). The technical analysis found that the bicycle counts compare favorably with PM Peak hour bicycle counts at intersections around Portland.

The walking conditions for sidewalks along OR 212/224 also are rated as "fair" due to the high volume of truck traffic, high traffic speeds, and traffic noise. Pedestrian counts were taken at Rock Creek Junction in May 2004; during the AM peak, 14 pedestrians were counted and during the PM peak there were 23 pedestrians.

Alternative 1: Year 2030 No-Build

Transportation Facilities

The 2030 No Build Alternative assumes the same road network that currently forms the Existing system plus the addition of programmed facilities. The planned improvements near the Rock Creek IAMP area, including those to serve the exception lands south of the Clackamas River, add the following projects:



OR 212, Rock Creek Junction east to Damascus: Widen with climbing lane. (RTP Financially Constrained Project #5007)

SE 172nd, OR 212 to Foster Road: Widen to five lanes. (RTP Financially Constrained Project #7000)

OR 224, Rock Creek Junction to Carver: Widen to five lanes. (State network)

OR 212, Rock Creek to 257th Avenue: Widen to five lanes. (State network)

Rock Creek Boulevard, Rock Creek Junction north / east to SE 172nd Avenue: Build five-lane road. (City of Happy Valley TSP)

Carver Bridge over Clackamas River (south of Management area on OR 224): Widen to five lanes. (Clackamas County CIP #135)

See **Figure D-7** showing the Sunrise Project Alternative 1 and Other Assumed Transportation Facilities.

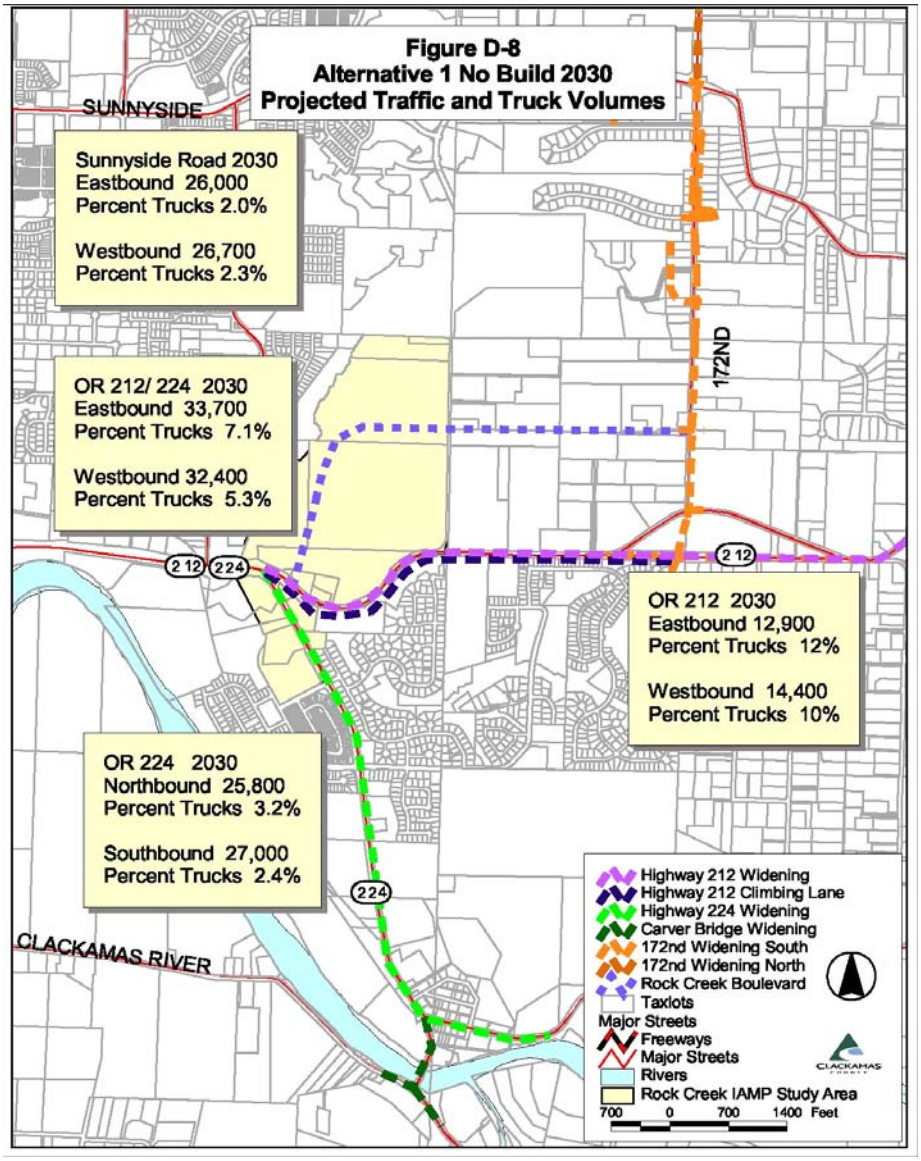
Alternative 1 - Traffic Forecast and System Operations

Arterial Forecast and Level of Service

To develop traffic forecasts, the regional Metro traffic model was calibrated to year 2005 conditions and then used to forecast year 2030 conditions. Forecasts of arterial, average daily traffic volumes, percentage truck traffic, and arterial level-of-service for the No Build road network are shown on **Table 4 and on Figure D-8**. The table also shows the percentage change in volumes from Existing Conditions to the future No Build.

TABLE 4 ALTERNATIVE 1 – NO BUILD YEAR 2030

AVERAGE DAILY TRAFFIC FORECAST (PERCENTAGE HEAVY TRUCKS) ARTERIAL LOS			
Direction	**OR 212/224, west of Junction, 135th to 142nd**	**OR 212, east of Junction at SE 172nd**	**OR 224, south of Junction at Eckert Lane**
Eastbound	33,700 (7.1% trucks)	12,900 (12% trucks)	
Westbound	32,400 (5.3% trucks)	14,400 (10% trucks)	
Northbound			25,800 (3.2% trucks)
Southbound			27,000 (2.4% trucks)
TOTAL	**66,100 (6.2% trucks)**	**27,300 (11% trucks)**	**52,800 (2.8% trucks)**
% Change in Volume from Existing	+105%	+67%	+247%
AM peak hours	LOS C (B)	LOS F (F)	LOS F (F)
PM peak hours	LOS F (F)	LOS B (D)	LOS F (E)



Although these arterial segments are outside the Rock Creek IAMP Management area, their traffic operations and congestion would impact traffic within the Management area. **Figure D-9** and **Figure D-10** show projected congestion and arterial level-of-service for the AM Peak and PM Peak periods under the No Build alternative.

The analysis showed that OR 212/224 would have westbound congestion during the AM peak, impacting traffic operations at Rock Creek Junction. OR 224 would have a northbound queue (LOS F) from Eckert Lane, and OR 212 would have a westbound queue (LOS F) extending well past SE 172nd.

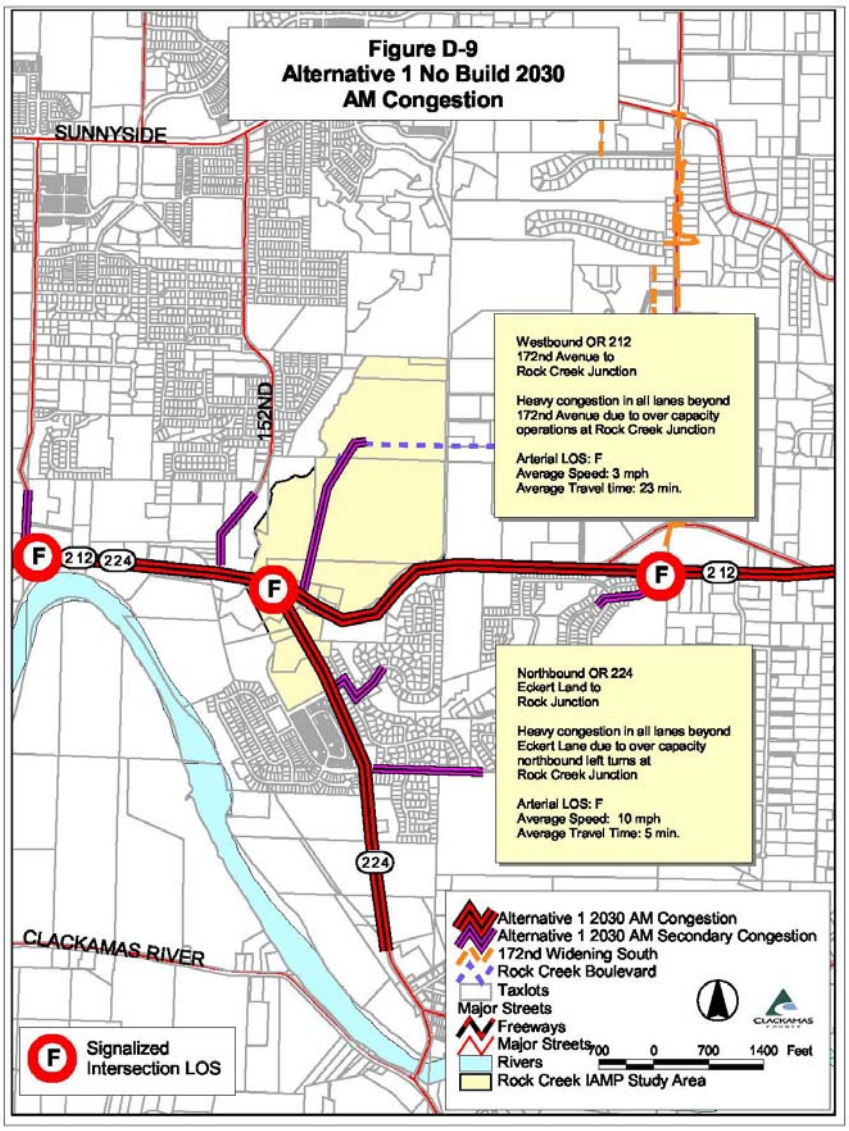
Secondary congestion also is forecasted during the AM period on intersecting streets, including SE 152nd Avenue at OR 212/224, Rock Creek Boulevard (the new road north from the Junction), Goosehollow Drive and Eckert Lane OR 224, and Anderegg Avenue on OR 212 near SE 172nd.

Westbound traffic congestions would persist on OR 212/224 during the PM peak period, impacting the Junction. OR 212 would have westbound congestion to about SE 162nd Avenue and OR 224 would have northbound congestion past Eckert Lane. Side streets had secondary congestion during the second hour of the PM commute.

No Build: Intersection Level of Service and Operations

The No Build alternative assumes the same intersection configurations as Existing conditions with the addition of the planned improvements listed previously.

See Intersection Operations Diagrams and **Table 9** for details about intersection operations, including lane delay, lane queue, intersection LOS, and intersection V/C ratio.



Alternative 1 - Access Densities and Types

No change from Existing Conditions

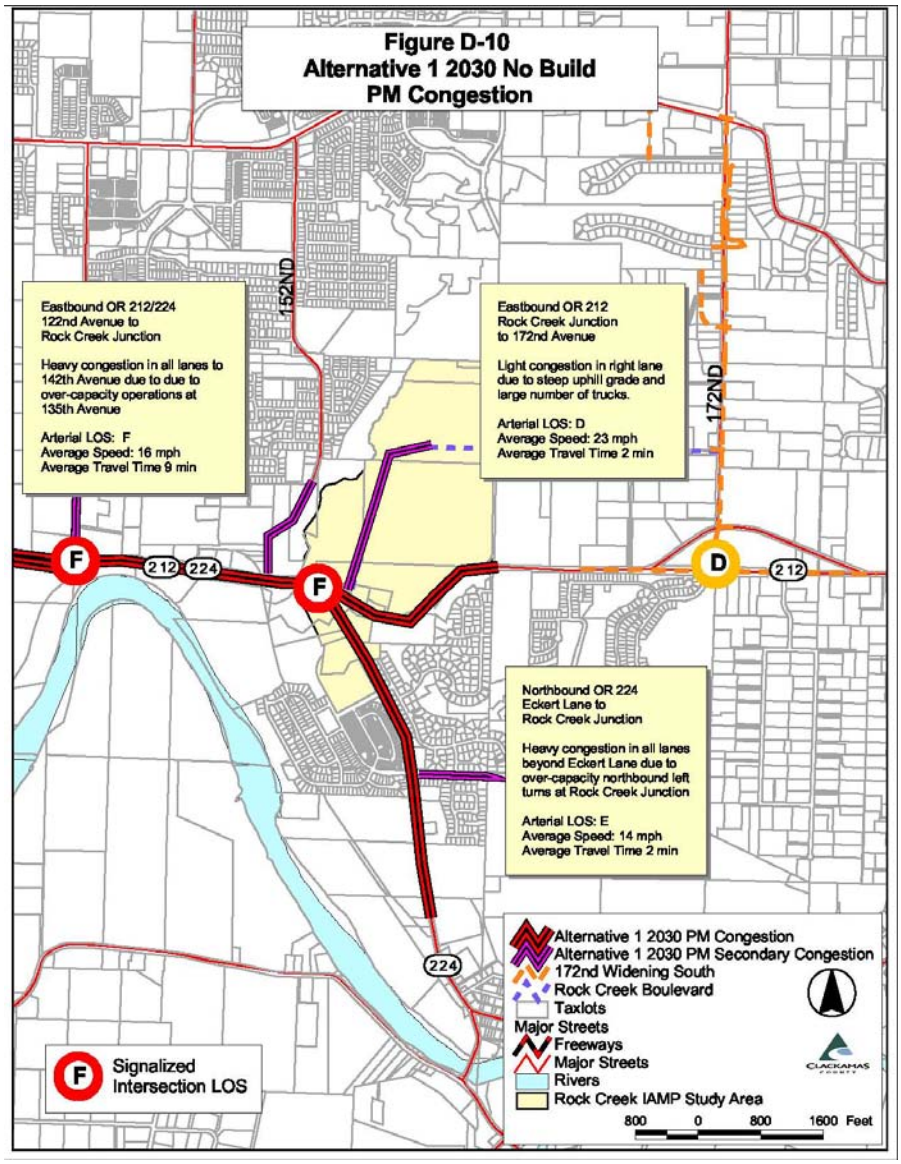
Alternative 1 - Traffic Control

No medians or turn restrictions are planned in the No Build Alternative.

Alternative 1 - Effect of Traffic Operations on the Facilities System

Traffic operations would be significantly degraded under the No Build alternative because it would provide the least east-west capacity and not address safety problems exacerbated by increased congestion along OR 212/224. The increased congestion also would deteriorate freight movement and contribute the least support for regional emergency management plans.

Even though all local roadway connections would be maintained, local circulation and access would not improve. The intersections with the state highways would incur more



delay than with either Build alternative.

The intersections reviewed for the Rock Creek IAMP area (OR 212/224 @ 152nd, Rock Creek Junction, OR 224/Goosehollow Drive, and OR 224/Eckert Lane) all would have LOS F during both the AM and PM peak hours. These intersection failures contribute to congestion and increased travel delays.

Alternative 1 - Transit

"Transit improvements included under the No Build alternative are limited to those in Alternative 1 - identified in Metro's RTP and include primarily modest increases in service hours."

Alternative 1 - Bike and Pedestrian

"The bicycle and pedestrian systems under the No Build Alternative would maintain the existing roadway system" plus the addition of any "committed improvements scheduled in ODOT's 6-year Statewide Transportation Improvement Program (STIP) and Metro's Financially Constrained Projects listed in the RTP."

The Rock Creek IAMP area has one such project, the extension of a climbing lane on Highway 212 from Rock Creek Junction to SE 172nd Avenue. It is anticipated that this project will include bike lanes and pedestrian facilities.

The County project to widen SE 152nd Avenue north of Highway 212 (Project #77 in the County CIP) ultimately will provide bike lanes and pedestrian facilities with that road improvement, but that project is likely more than ten years in the future.

Alternative 2: Year 2030 Build with Midpoint Interchange at SE 122nd

Transportation Facilities

Alternative 2 would provide a continuous, six-lane, limited access expressway from Rock Creek Junction on the east to I-205 on the west, and a midpoint interchange near SE 122nd Avenue to link the Expressway and OR 212/224.

The existing, at-grade Rock Creek Junction would be replaced with a grade-separated, full-access interchange aligned north of the Junction. Two Design Options for the interchange were analyzed. See page 23 for description of the design options.

The other changes to the arterial system in Alternative 2 include the following:

OR 212, from just west of its signalized intersection with SE 172nd, would transition to become the most easterly portion of the Expressway as it approaches the Rock Creek interchange.

The intersection of OR 224 and OR 212 would be reconfigured approximately 1,300 feet south of today's Junction with a signalized, T-intersection at Goosehollow Drive. (Access from Goosehollow Drive on the east would be eliminated.) This intersection would be the south end of the "Jug Handle."

The Jug Handle road would head west a short distance, then turn north to connect at the Junction location with a signalized, T-intersection.

From this intersection, OR 212 would continue east along its existing alignment, but end approximately 800 ft. east of SE 162nd Avenue.

Figure D-11 illustrates the road network assumed for Alternative 2 or Alternative 3. (Note: The figure shows Design Option 2 at the interchange.)

Rock Creek Interchange Design Options

Two design options for the Rock Creek interchange were analyzed:

Design Option D2, **shown in Figure D-12**, would be a folded-diamond interchange located north of the Junction and a prominent knoll. The interchange ramps would be accessed from OR 224 which would continue north from near Goosehollow Drive and cross over the existing Rock Creek Junction on a structure. The Highway would intersect the eastbound ramps (signalized intersection), continue under the elevated interchange, and connect to the westbound ramps (signalized intersection). This road would continue north as the proposed Rock Creek Boulevard. *(See Figure 15 in SDEIS)*

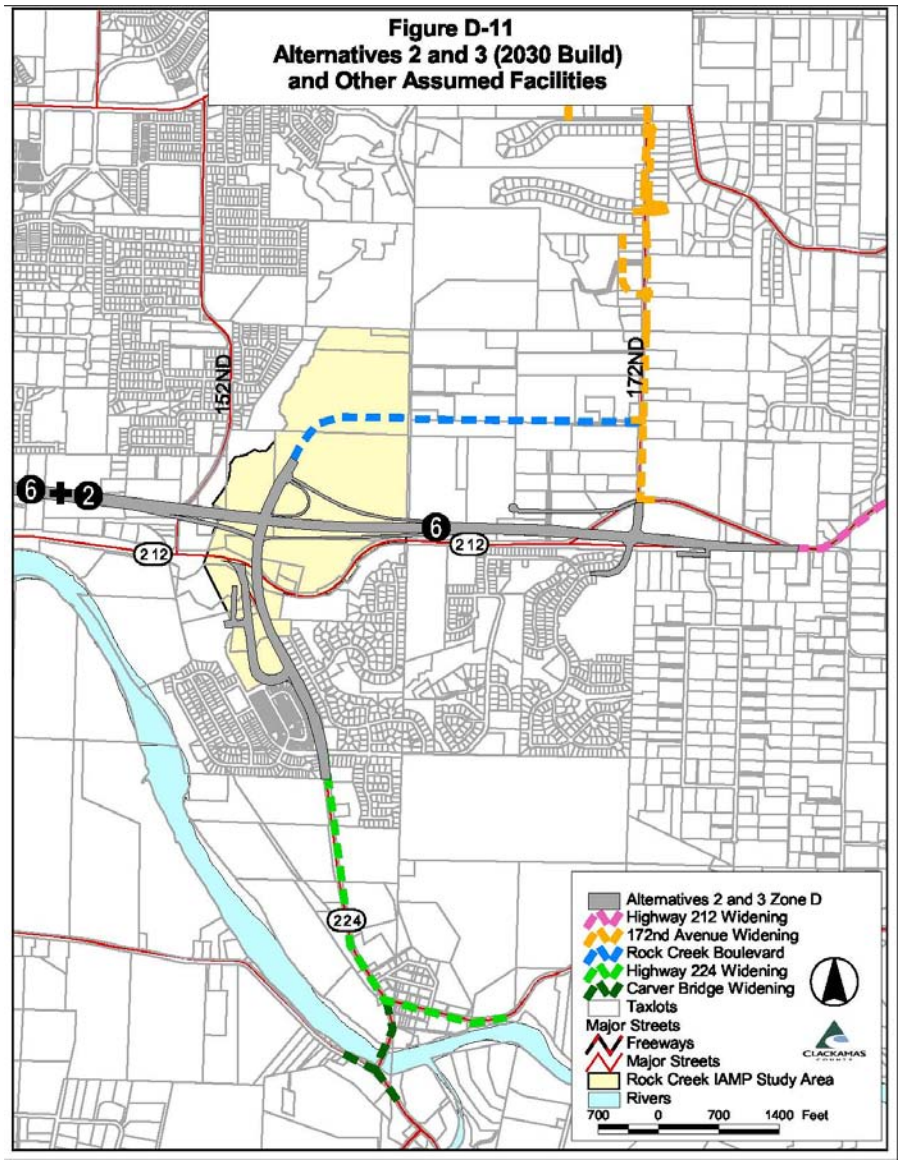
Design Option D3, **shown in Figure D-13**, would be a Single Point Urban Interchange (SPUI). The ramps would lead to a centrally located traffic signal on the extension of OR 224 underneath the interchange. This interchange also would require a signal at each ramp intersection to moderate traffic flow, especially to accommodate the high eastbound Sunrise off-ramp volumes. OR 224 would be aligned as in Design Option D-2, heading under the interchange and continuing north as Rock Creek Boulevard.

Alternative 2: Traffic Forecast and System Operations

Arterial Forecast and Level of Service

Traffic forecasts for year 2030 were analyzed for the Alternative 2 road network. Traffic forecasts, percentage heavy trucks, and arterial level-of-service are listed in Table 5, with the forecasts and truck percentages shown on **Figure D-14**.

During the AM peak hours, the analysis shows congestion on OR 212/224 for westbound traffic. Congestion also would continue along OR 212 east of the Junction and in the jug handle for northbound traffic. Secondary congestion would continue at SE 152nd Avenue and SE 172nd Avenue.



During the PM peak period, none of the highway segments had congestion.

Figure D-15 and **Figure D-16** show projected congestion and arterial level-of-service for the AM peak and PM peak periods.

Alternative 2: Intersection Level of Service and Operations

As described above, the Build Alternative would replace the at-grade intersection of OR 212 and OR 224 with a grade-separated interchange. Design Option D-2 would add two signalized intersections to the network at the interchange ramps. With Design Option D-3, three signalized intersection (the central signal and two ramp signals) would be added.

The former Junction would continue as an access point from OR 212 and OR 224 to the Clackamas Industrial area. This intersection would be the northerly part of the "jug handle."

A new signal would be added at the southerly intersection of the jug handle with OR 224 at Goosehollow Drive. The intersection of OR 224 with Eckert Lane also would be signalized.

Alternative 2 would experience delay at some intersections, typically lower delay than with Alternative 3, except for the OR 212/224 Jug Handle intersection.

SE 152nd Avenue at OR 212/224 also would gain a signal, but forecasted traffic volumes and queues still cause LOS F in the AM peak hour.

Details about the intersections are described in "Intersection Operations" and summarized in **Table 9**.

Alternative2: Access densities and types

See discussion under Future access

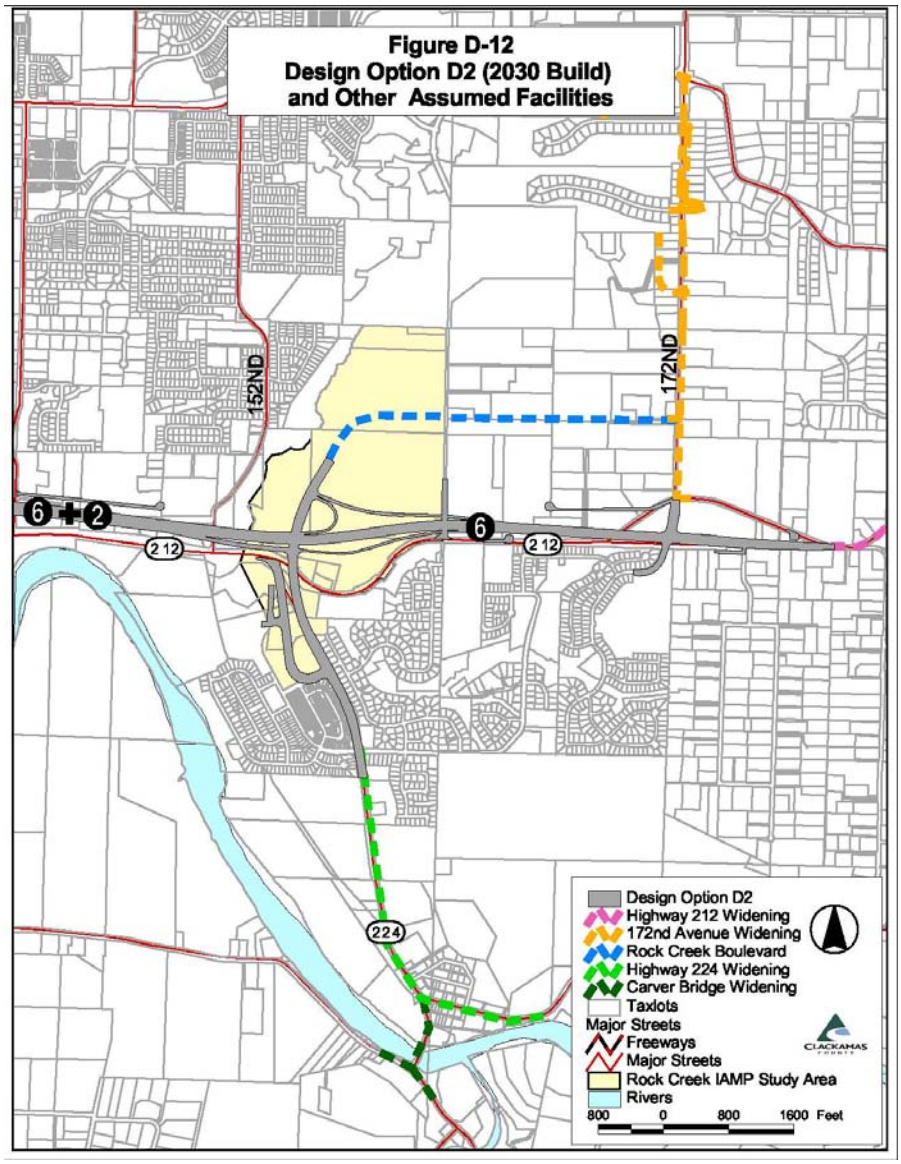
Alternative 2: Traffic Control

The interchange would not have medians or turn restrictions.

OR 212 would continue east from the Junction, but end approximately 800 feet east of SE 162nd Avenue.

Alternative 2: Effect of Operations on the Facilities System

Alternative 2 would provide the most east-west travel capacity of the three alternatives. With the midpoint interchange (west of the Rock Creek IAMP area), this option would allow for the most efficient freight travel and have the least queuing. A substantial portion of regional through trips would use the Expressway, reducing travel volumes on parallel roads and allowing the highway to better serve local travel needs in the industrial area.



Although congestion continues along some road segments during the peak commute hours, Alternative 2 would contain this peak period congestion to nearly existing levels.

Alternative 2: Transit

"The build alternative would allow more frequent service between Damascus and Gresham, more frequent service between Airport Way and Damascus, and new express bus service along the proposed Sunrise Project y between the Clackamas Transit Center and Damascus Town Center. Current regional plans identify Sunnyside Road as the east-west high capacity transit route within the larger area around the Sunrise Project.

Alternative 2: Bike and Pedestrian

The build alternative would provide a new multi-use path that parallels the proposed Sunrise Expressway until it connects to the existing on-street facilities at SE 122nd Avenue.

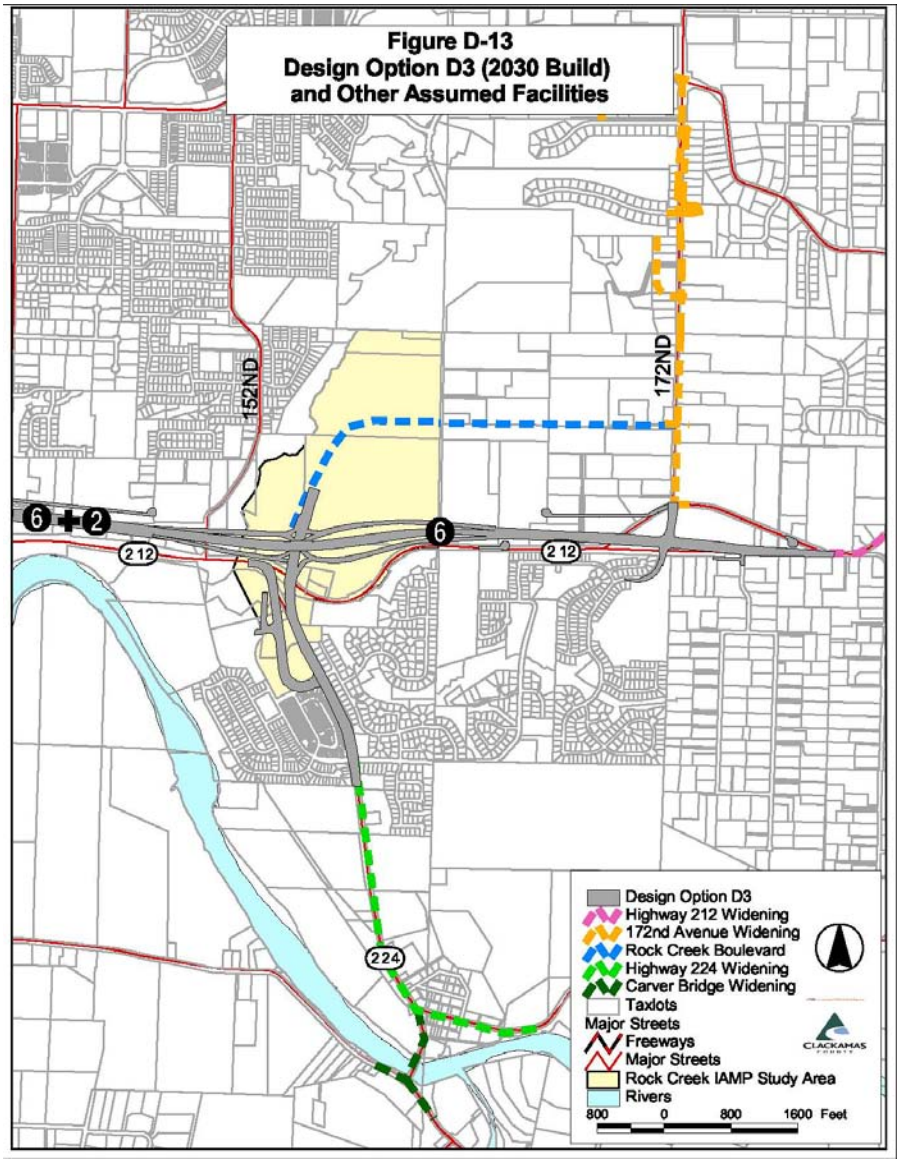


TABLE 5 ALTERNATIVE 2 – YEAR 2030

AVERAGE DAILY TRAFFIC FORECAST, (PERCENTAGE TRUCKS) ARTERIAL LOS				
Direction	**OR 212/224, west of Junction, 135th to 142nd**	**OR 212, east of Junction at SE 172nd**	**OR 224, south of Junction at Eckert**	**Expressway, west of 142nd**
Eastbound	13,300 (1.3% trucks)	30,000 (6.7% trucks)		49,700 (5.8% trucks)
Westbound	15,800 (1.5% trucks)	34,300 (6.2% trucks)		43,800 (5.8% trucks
Northbound			24,400 (3.2% trucks)	
Southbound			31,300 2.6% trucks)	
TOTAL	**29,100 (1.4% trucks)**	**64,300 (6.4% trucks)**	**55,700 (2.9% trucks)**	**93,500 (5.8% trucks)**
LOS - AM peak hours	LOS E (C)	N/A	LOS C (C)	No congestion
LOS - PM peak hours	LOS C (C)	N/A	LOS A (C)	No congestion

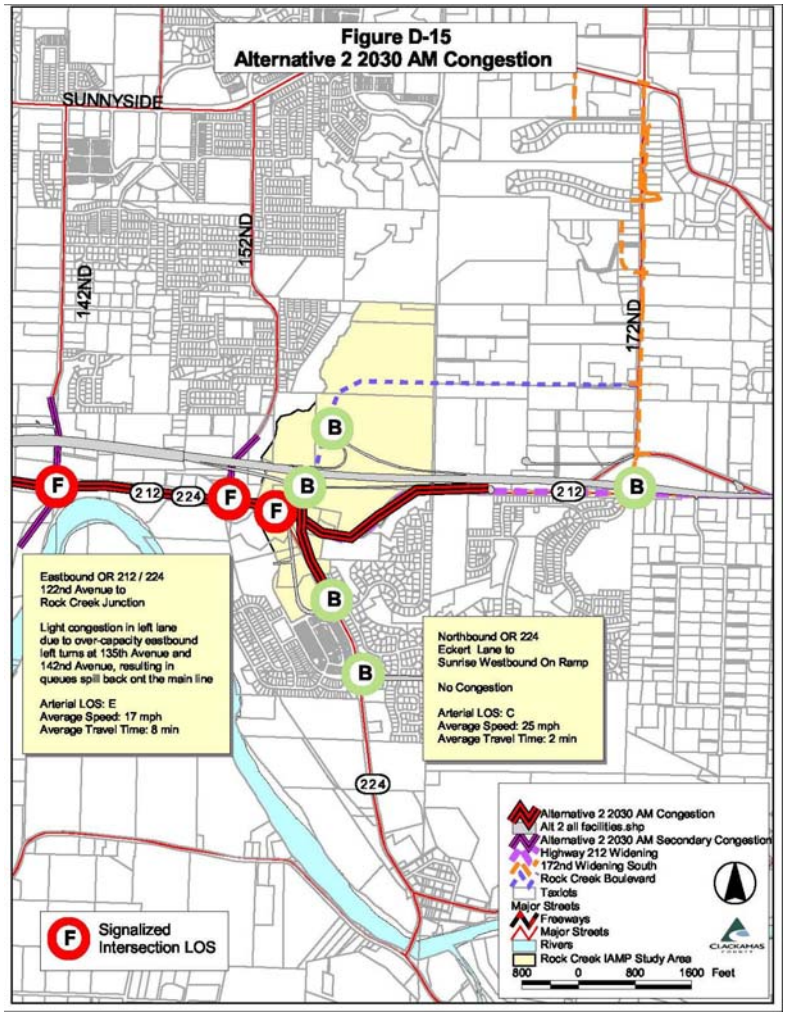


Figure D-15
Alternative 2 2030 AM Congestion
SUNNYSIDE
142ND
152ND
172ND
212
224
F
B
Eastbound OR 212 / 224
122nd Avenue to
Rock Creek Junction
Light congestion in left lane
due to over-capacity eastbound
left turns at 135th Avenue and
142nd Avenue, resulting in
queues spill back ont the main line
Arterial LOS: E
Average Speed: 17 mph
Average Travel Time: 8 min
Northbound OR 224
Eckert Lane to
Sunrise Westbound On Ramp
No Congestion
Arterial LOS: C
Average Speed: 25 mph
Average Travel Time: 2 min
Signalized
Intersection LOS
Alternative 2 2030 AM Congestion
Alt 2 all facilities.shp
Alternative 2 2030 AM Secondary Congestion
Highway 212 Widening
172nd Widening South
Rock Creek Boulevard
Taxlots
Major Streets
Freeways
Major Streets
Rivers
Rock Creek IAMP Study Area
800 0 800 1600 Feet

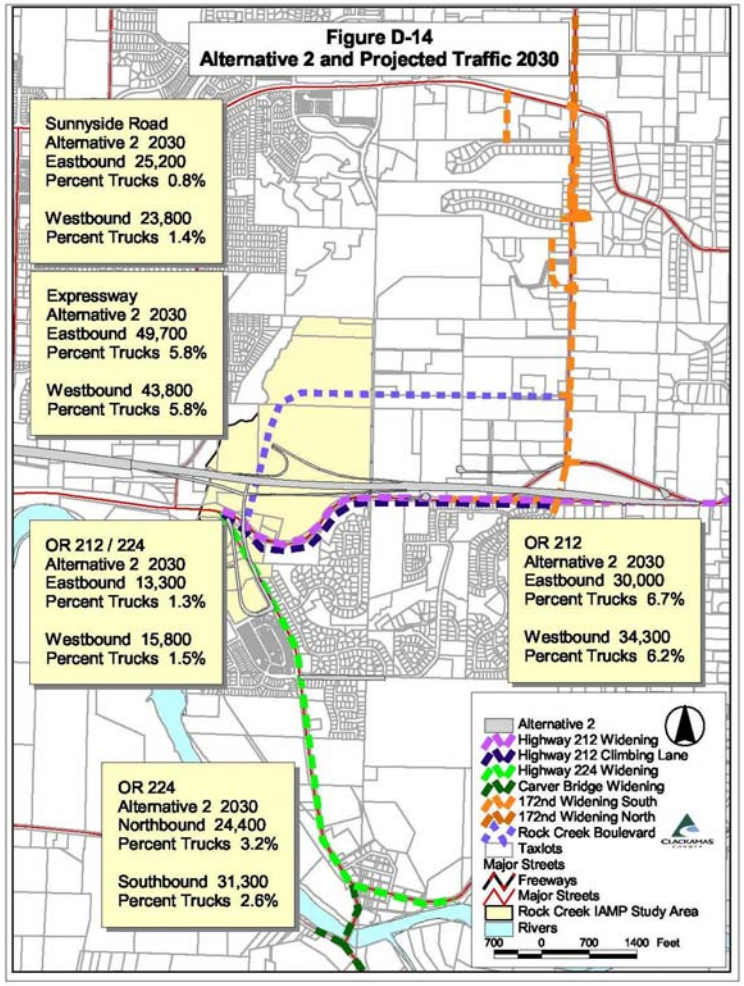


Figure D-14
Alternative 2 and Projected Traffic 2030
Sunnyside Road
Alternative 2 2030
Eastbound 25,200
Percent Trucks 0.8%
Westbound 23,800
Percent Trucks 1.4%
Expressway
Alternative 2 2030
Eastbound 49,700
Percent Trucks 5.8%
Westbound 43,800
Percent Trucks 5.8%
OR 212 / 224
Alternative 2 2030
Eastbound 13,300
Percent Trucks 1.3%
Westbound 15,800
Percent Trucks 1.5%
OR 212
Alternative 2 2030
Eastbound 30,000
Percent Trucks 6.7%
Westbound 34,300
Percent Trucks 6.2%
OR 224
Alternative 2 2030
Northbound 24,400
Percent Trucks 3.2%
Southbound 31,300
Percent Trucks 2.6%
Alternative 2
Highway 212 Widening
Highway 212 Climbing Lane
Highway 224 Widening
Carver Bridge Widening
172nd Widening South
172nd Widening North
Rock Creek Boulevard
Taxlots
Major Streets
Freeways
Major Streets
Rock Creek IAMP Study Area
Rivers
700 0 700 1400 Feet

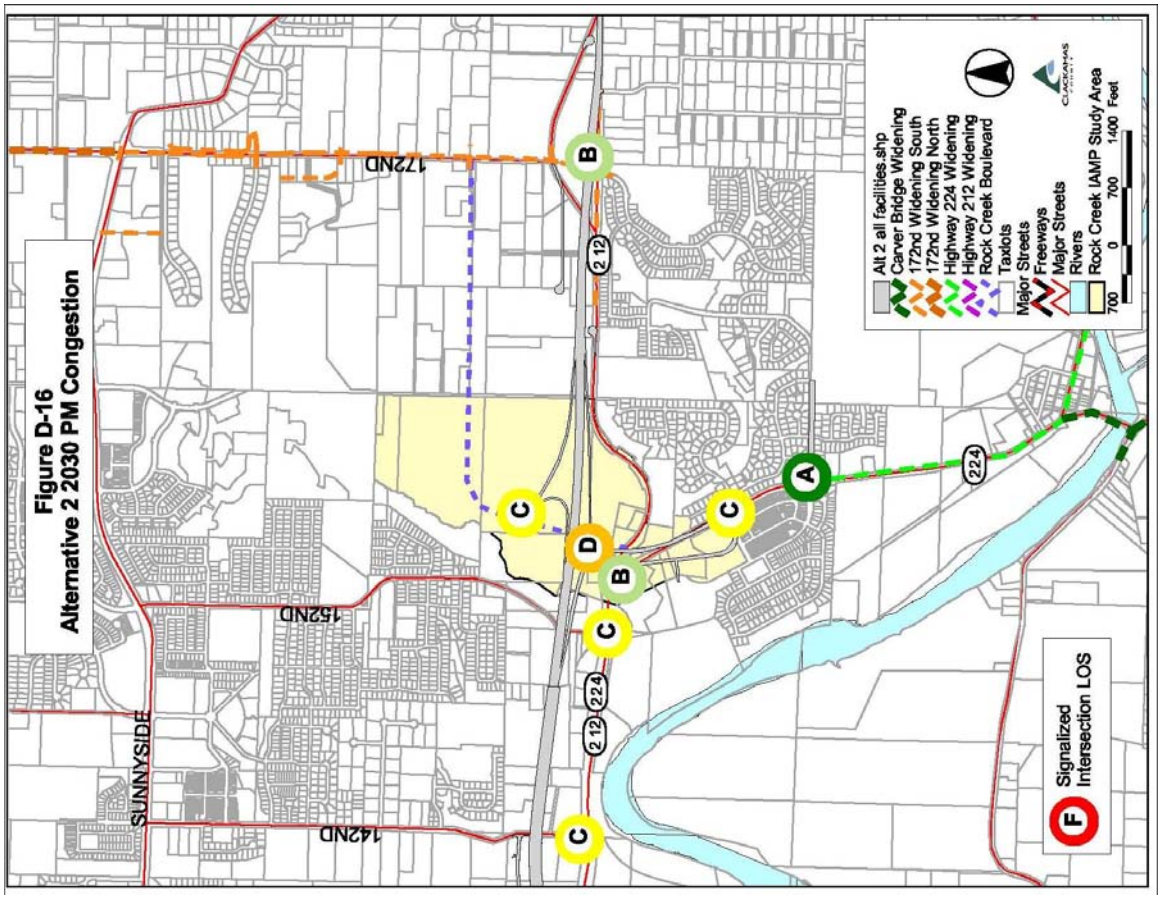


Figure D-16
Alternative 2 2030 PM Congestion
SUNNYSIDE
142ND
152ND
172ND
212
224
A
B
C
D
Alt 2 all facilities.shp
Carver Bridge Widening
172nd Widening South
172nd Widening North
Highway 224 Widening
Highway 212 Widening
Rock Creek Boulevard
Taxlots
Major Streets
Freeways
Major Streets
Rivers
Rock Creek IAMP Study Area
700 0 700 1400 Feet
Signalized
Intersection LOS

Alternative 3: Year 2030 Build with No Midpoint Interchange

Transportation Facilities

Alternative 3 would provide a continuous, six-lane, limited access expressway from Rock Creek Junction on the east to I-205 on the west as in Alternative 2, but Alternative 3 would not have a midpoint interchange near SE 122nd Avenue.

Alternative 3 also would have the two interchange Design Options as described for Alternative 2.

See **Figure D-12** and **Figure D-13** for the two interchange configurations.

Alternative 3: Traffic and System Operations

Arterial Forecast and Level of Service

Year 2030 traffic forecasts were analyzed for the Alternative 3 road network and the ADT, percentage trucks, arterials LOS and the percentage change in ADT between the Build alternatives are listed on **Table 5.** The ADT and Truck Usage for Alternative 3 are shown in **Figure D-17**.

TABLE 5 ALTERNATIVE 3 – YEAR 2030

AVERAGE DAILY TRAFFIC FORECAST, (PERCENTAGE TRUCKS) PERCENTAGE CHANGE IN VOLUME BETWEEN BUILD ALTERNATIVES ARTERIALS LOS				
Direction	**OR 212/224, west of Junction, 135th to 142r**	**OR 212, east of Junction at SE 172nd**	**OR 224, south of Junction at Ecker**	**Expressway, west o 142nd Avenue**
Eastbound	14,700 (1.3% trucks)	18,600 (8.8% trucks)		44,800 (5.0% trucks)
Westbound	17,100 (3.5% trucks)	26,400 (7.2% trucks)		50,900 (5.9% trucks)
Northbound			24,300 (3.9% trucks)	
Southbound			30,800 (3.2% trucks)	
TOTAL	**31,800 (2.5% trucks)**	**45,000 (7.9% trucks)**	**55,100 (3.5% trucks)**	**95,700 (5.5% trucks)**
% Change in Total Volume, Alt 2 to Alt 3	+ 9%	- 30%	- 1%	+ 2%
LOS - AM peak hour	LOS C (C)	N/A	LOS D (C)	No congestion
LOS – PM peak hour	LOS C (C)	N/A	LOS D (D)	No congestion

The analysis shows that the full length of OR 212/224 is congested for westbound traffic during the AM peak hours. Congestion would continue along OR 212 east of the Junction and in the jug handle for northbound traffic. Secondary congestion also would continue at SE 152nd Avenue. See **Figure D-18.**

In the PM peak period, westbound congestion would begin east of SE 142nd Avenue. OR 212 and OR 224 did not show congestion. See **Figure D-19.**

Alternative 3: Intersection Level of Service and Operations

Alternative 3 would have the same Design Options for the Rock Creek interchange as Alternative 2. However, without the Midpoint Interchange near 122nd, Alternative 3 would have somewhat higher traffic volumes than under Alternative 2, which cause lower lane LOS at intersections.

Signalized intersections that access the State Highway system would incur more delay under this alternative than under Alternative 2, but less delay than under the No Build alternative.

Details about the intersections are described in "Intersection Operations" and summarized in **Table 9**.

Alternative 3: Access densities and types

See discussion under Future access

Alternative 3: Traffic Control

Within the Rock Creek IAMP area, Alternative 3 would have the same traffic control measures as Alternative 2.

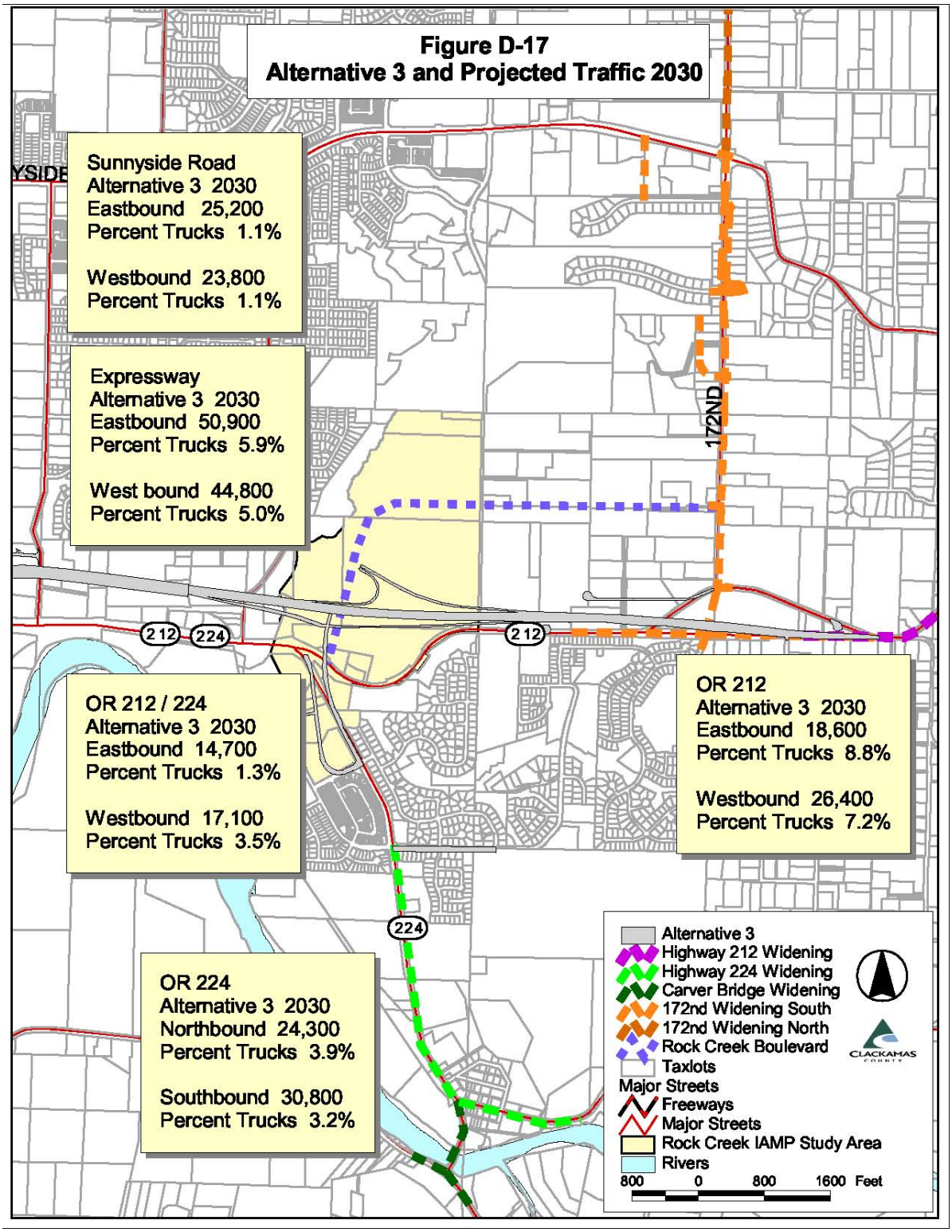


Figure D-17
Alternative 3 and Projected Traffic 2030
Sunnyside Road
Alternative 3 2030
Eastbound 25,200
Percent Trucks 1.1%
Westbound 23,800
Percent Trucks 1.1%
Expressway
Alternative 3 2030
Eastbound 50,900
Percent Trucks 5.9%
West bound 44,800
Percent Trucks 5.0%
OR 212 / 224
Alternative 3 2030
Eastbound 14,700
Percent Trucks 1.3%
Westbound 17,100
Percent Trucks 3.5%
OR 212
Alternative 3 2030
Eastbound 18,600
Percent Trucks 8.8%
Westbound 26,400
Percent Trucks 7.2%
OR 224
Alternative 3 2030
Northbound 24,300
Percent Trucks 3.9%
Southbound 30,800
Percent Trucks 3.2%
172ND
212
224
Alternative 3
Highway 212 Widening
Highway 224 Widening
Carver Bridge Widening
172nd Widening South
172nd Widening North
Rock Creek Boulevard
Taxlots
Major Streets
Freeways
Major Streets
Rock Creek IAMP Study Area
Rivers
800 0 800 1600 Feet
CLACKAMAS

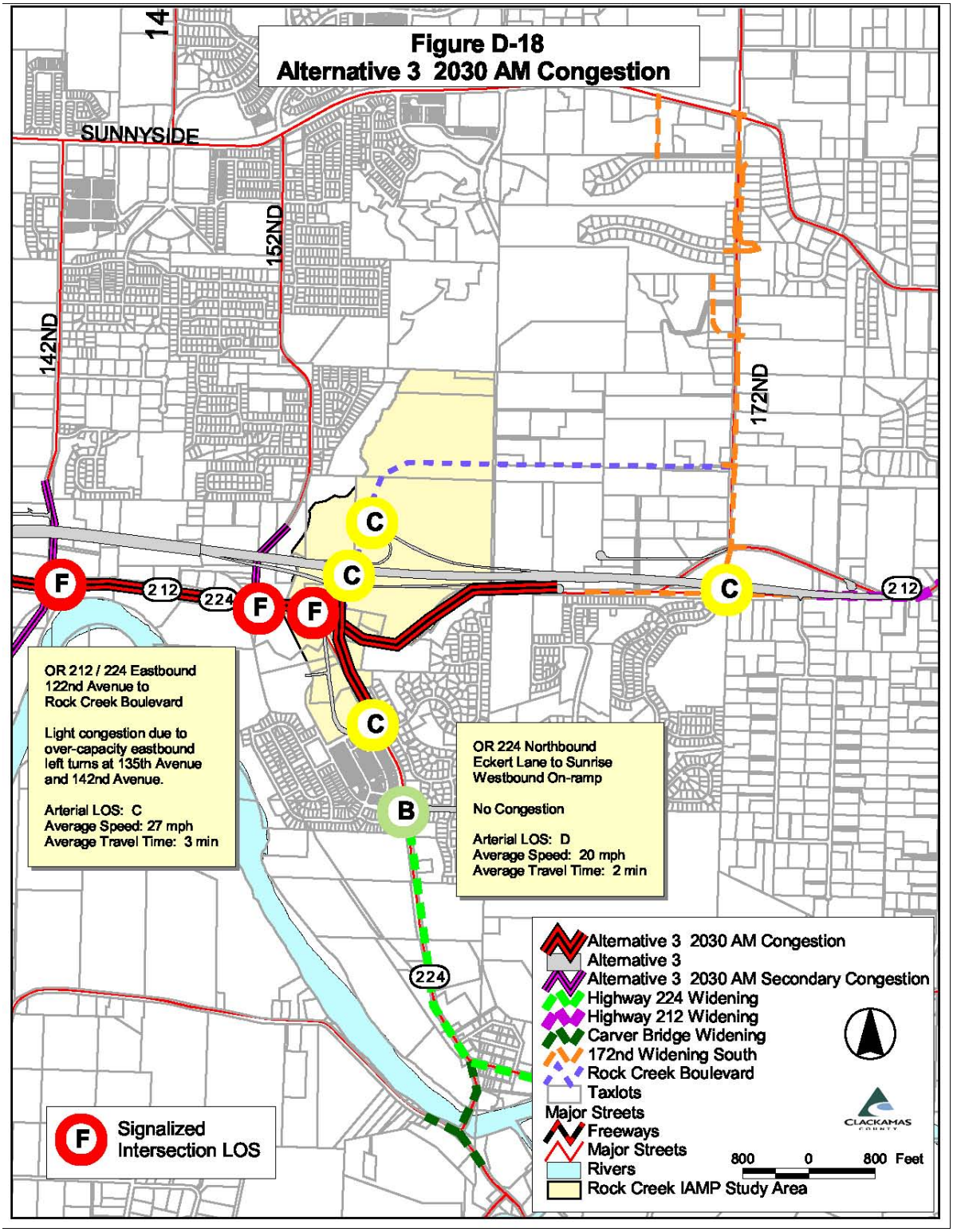


Figure D-18
Alternative 3 2030 AM Congestion
SUNNYSIDE
14
152ND
142ND
172ND
212
224
F
F
F
C
C
C
C
B
OR 212 / 224 Eastbound
122nd Avenue to
Rock Creek Boulevard
Light congestion due to
over-capacity eastbound
left turns at 135th Avenue
and 142nd Avenue.
Arterial LOS: C
Average Speed: 27 mph
Average Travel Time: 3 min
OR 224 Northbound
Eckert Lane to Sunrise
Westbound On-ramp
No Congestion
Arterial LOS: D
Average Speed: 20 mph
Average Travel Time: 2 min
Alternative 3 2030 AM Congestion
Alternative 3
Alternative 3 2030 AM Secondary Congestion
Highway 224 Widening
Highway 212 Widening
Carver Bridge Widening
172nd Widening South
Rock Creek Boulevard
Taxlots
Major Streets
Freeways
Major Streets
Rivers
Rock Creek IAMP Study Area
800 0 800 Feet
Signalized
Intersection LOS

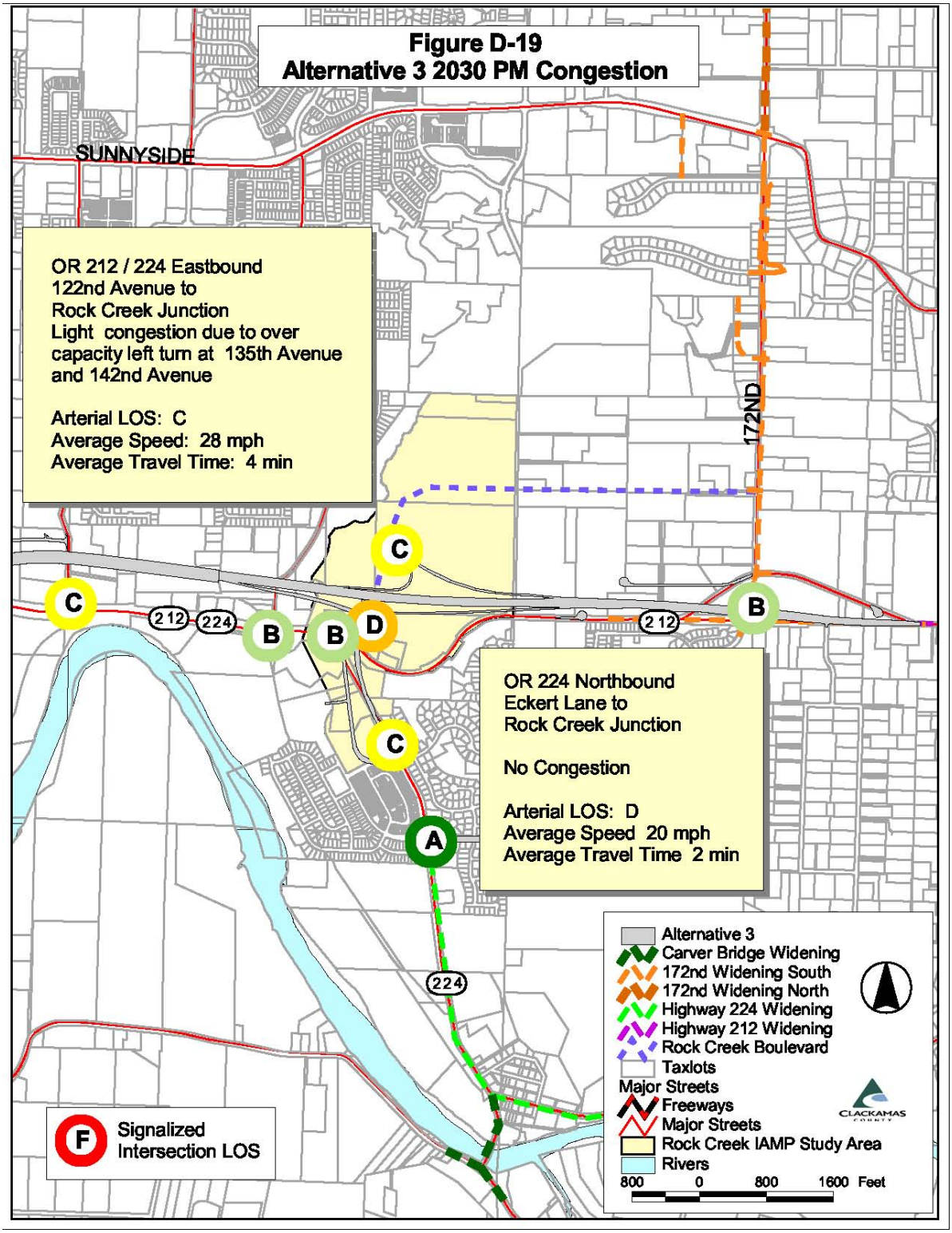


Figure D-19
Alternative 3 2030 PM Congestion
SUNNYSIDE
OR 212 / 224 Eastbound
122nd Avenue to
Rock Creek Junction
Light congestion due to over capacity left turn at 135th Avenue and 142nd Avenue
Arterial LOS: C
Average Speed: 28 mph
Average Travel Time: 4 min
172ND
C
C
212
224
B
B
D
212
B
OR 224 Northbound
Eckert Lane to
Rock Creek Junction
No Congestion
Arterial LOS: D
Average Speed 20 mph
Average Travel Time 2 min
C
A
224
Alternative 3
Carver Bridge Widening
172nd Widening South
172nd Widening North
Highway 224 Widening
Highway 212 Widening
Rock Creek Boulevard
Taxlots
Major Streets
Freeways
Major Streets
Rock Creek IAMP Study Area
Rivers
800 0 800 1600 Feet
CLACKAMAS COUNTY
F
Signalized Intersection LOS

Alternative 3: Effect of Traffic Operations on the Facilities System

With the same Rock Creek interchange design, Alternative 3 and Alternative 2 would have similar traffic operations. As noted, however, Alternative 3 would not have the Midpoint Interchange, causing somewhat higher lane volumes than in Alternative 2 to enter/exit the Expressway at the Rock Creek interchange.

During the AM and PM peak periods, the westbound ramps would have over-capacity queues in the southbound-left lanes. The Eastbound ramps would have over-capacity queues in the northbound-right lane during the AM peak hours and in the southbound-left and southbound-through lanes (rated as LOS F) in the PM peak period.

Alternative 3 would have an overall shorter delay than Alternative 2 at the new OR 212/224 intersection, although the intersection fails under either Alternative. Alternative 3 would have slightly more delay than Alternative 2 at other intersections with the highway system, but would operate better than the No Build alternative. Alternative 3 would have slightly less capacity than in Alternative 2 and a slightly higher total of vehicle hours of delay.

Alternative 3: Transit

"The build alternative would allow more frequent service between Damascus and Gresham, more frequent service between Airport Way and Damascus, and new express bus service along the proposed Sunrise Project y between the Clackamas Transit Center and Damascus Town Center. Current regional plans identify Sunnyside Road as the east-west high capacity transit route within the larger area around the Sunrise Project.

Alternative 3: Bike and Pedestrian Networks

The build alternative would provide a new multi-use path that parallels the proposed Sunrise Expressway until it connects to the existing on-street facilities at SE 122nd Avenue.

Future Accesses

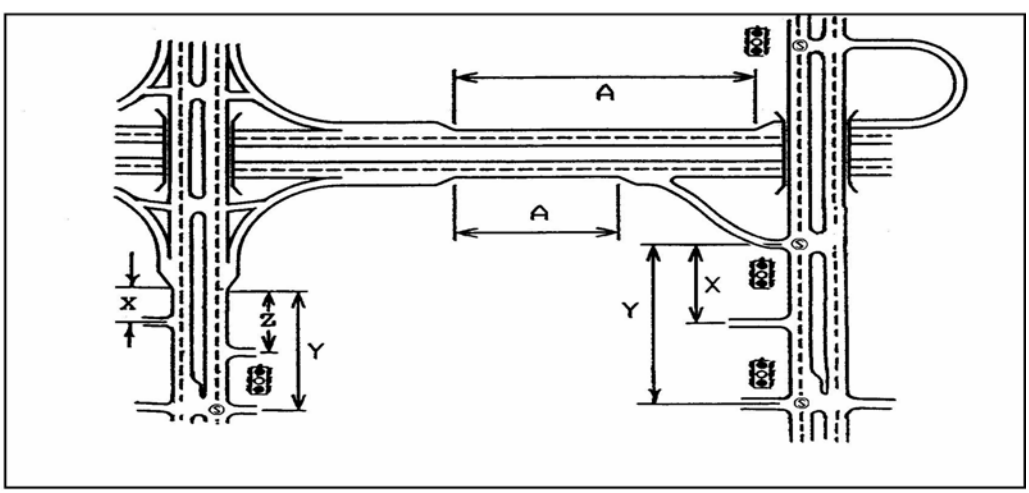
The Sunrise Project build alternatives, Alternative 2 and 3 and Design Options D-2 and D-3, will created a new local circulation systems in and around the Rock Creek IAMP Management Area that are very similar to one another. While the location of the on- and off-ramps will be moved to the north and south, depending on which alternative is chosen, the remainder of the local circulation system configuration is nearly identical for all of the alternatives and design options. Accordingly, the future access systems also are essentially identical for all alternative and design options.

The location of the three southern ramp terminals are within 300 feet of each other and the northern ramp terminals are with in 550 feet of each other. **Figure D-20** shows the future access system and the area within 1,320 feet of the ramp terminal where access to Highway 224 / Rock Creek Boulevard should be limited to meet the provisions of OAR 734 Division 51 as shown below.

Table 6 Minimum Spacing Standards Applicable to Freeway Interchanges with Multi-Lane Crossroads

Type of Area (OAR 734-051-0125)	Spacing Dimension			
	A = Distance between the start and end of tapers of adjacent interchanges	X = Distance to the first approach on the right; right in/right out only	Y= Distance to first intersections where left turns are allowed	Z = Distance between the last right in/right out approach road and the start of the taper for the on-ramp
Urban	1 mile	1320 feet	1320 feet	1320 feet

Measurement of Spacing Standards



The Sunrise Project does not propose any new access points within 1,320 of the proposed Rock Creek Interchange ramp terminals. Furthermore, it is unlikely that an access point would be requested by the future Providence Happy Valley Medical Center (PHVMC) due to the difference in the elevation between the hospital site and the proposed Rock Creek Boulevard connection to OR 224. It is possible that an access point may be requested by the local property north of the future PHVMC site. This lot is approximately 1,200 feet north of the northern most of the interchange ramp terminal options.

Future Local Street Intersections

Future Local Street Intersections West of OR 224

The Windswept Waters Subdivision is located west of OR 224 along the boundary of the Rock Creek IAMP Management Area.

New Arterial (Jug handle) and OR 224 (#42) is located approximately 1,400 feet south of the proposed Rock Creek Interchange ramp terminals. This signalized, three-legged intersection is planned to provide access from OR 224 to existing OR 212/224. It will also connect to the north access to the Windswept Waters subdivision at intersection #40. No direct access to this arterial from the adjoining lots to the west is planned for the area between intersections 40 and 42.

Windswept Water Northern Street Connection (#40) is expected to provide access to the last phases of this subdivision. It is located on the New Arterial (Jug handle), midway between OR 224 and the existing Rock Creek Junction. **Intersection #41** which is located on this street provides access to two commercial properties to the north of this street.

Goosehollow Drive and Pyrite Drive (#10), Goosehollow Drive and Eckert Lane (#11)-and Pebble Lane and Eckert Lane (#12) are existing local street access intersections with Windswept Waters subdivision, that are also located along the boundary of the Rock Creek IAMP Management Area. There is no planned connection between these streets and the New Arterial (Jug handle).

Eckert Lane and OR 224 (#14 and #15), existing intersection of a county collector and OR224, is located approximately 2,500 feet south of the proposed Rock Creek Interchange ramp terminals. This intersection is planned to be signalized and to be the southern access point to Windswept Waters and subdivisions to the east of OR 224.

Local Street Intersections East of OR 224

The Orchard Lake Subdivision, located east of OR 224, is along the boundary of the Rock Creek IAMP Management area or along OR 224. The Eckert Lane and OR 224 intersections (# 14 and #15) will become the access point OR 224 from Orchard Lake Subdivision and the other subdivision east of OR 224 and south of OR 212. Additional access to these subdivisions will be provided by future connection Eckert Lane to Maduros Way and by the future intersection at 162nd Avenue and existing Highway 212.

Local Street Intersections North of OR 212/224 or OR 212

Three other existing, local street, access points are either along the boundary of the Rock Creek IAMP Management area or along OR 212/224.

152nd Avenue and OR 212/224 (#1), located approximately 600 feet west of the existing Rock Creek Junction, is planned to be signalized. Although this intersection is outside of the Rock Creek IAMP Management Area, it is within the traffic signal influence area for the existing Rock Creek Junction intersection and affects the operation of this signalized intersection.

162nd Avenue and OR 212 (#22 and #23), located 2,700 feet east of the existing Rock Creek Junction intersection, is planned to be signalized. The intersection will be a primary southern access point onto OR 212 for the future Providence Medical Center and the two schools that are located along Rock Creek Boulevard east of the Rock Creek IAMP Management Area. This intersection will also provide future access to the residential areas to the south of OR 212 when this area is completely developed.

New Arterial (Jug handle) and OR 212 (#43) intersection is located in the same place as the existing Rock Creek Junction intersection and will be a signalized intersection.

162nd Avenue and Rock Creek Boulevard (#28) is a planned to be a signalized intersection between 162nd Avenue (a collector) and Rock Creek Boulevard (a major arterial). This intersection is being constructed and is located approximately 1,500 feet north of OR 212. This is the alternative access to the Providence Medical Center and the employment area located to the north.

Residential Driveway

15687 SE Highway 212 (#16 and #17) and 15690 SE Highway 212 (#18, #19 and #20) are located east of Rock Creek Junction on either side of OR 212. 15687 SE Highway 212 has two driveway access points on the inside of the curve on the north side of Highway 212. 15690 SE Highway 212 has three driveway access points on the outside of the curve on the south side of OR 212. These existing driveways represent an access management problem that does not have a simple solution.

Commercial Driveways

15252 SE Highway 224 (#44) is located at the end of a frontage road that is parallel to OR 224 and provides commercial access to Alice's Country Market via the Windswept Water northern street connection. This site has no direct access to the New Arterial (Jug handle). The new access replaces an existing driveway that does not meet ODOT standards.

15278 SE Highway 224 (#45) is located approximately in the middle of a frontage road that is parallel to OR 224 and provides commercial access to Bachman Paving. This site has no direct access to the New Arterial (Jug handle). The new access replaces an existing driveway that does not meet ODOT standards.

16410 SE Highway 212 (#25) The Sunnyside Community Church takes access to OR 212 at this point. While no anticipated direct project impacts to this access are anticipated, the Sunrise Project proposes to cul-de-sac OR 212 just to the east of this access point, changing the travel path to the church.

Agricultural Driveways

The agricultural driveways located identified as #3 (Highway 212 / 224) will probably need to be maintained as a limited access point to provide access to the sewer trunk lines that are located to the east of Rock Creek.

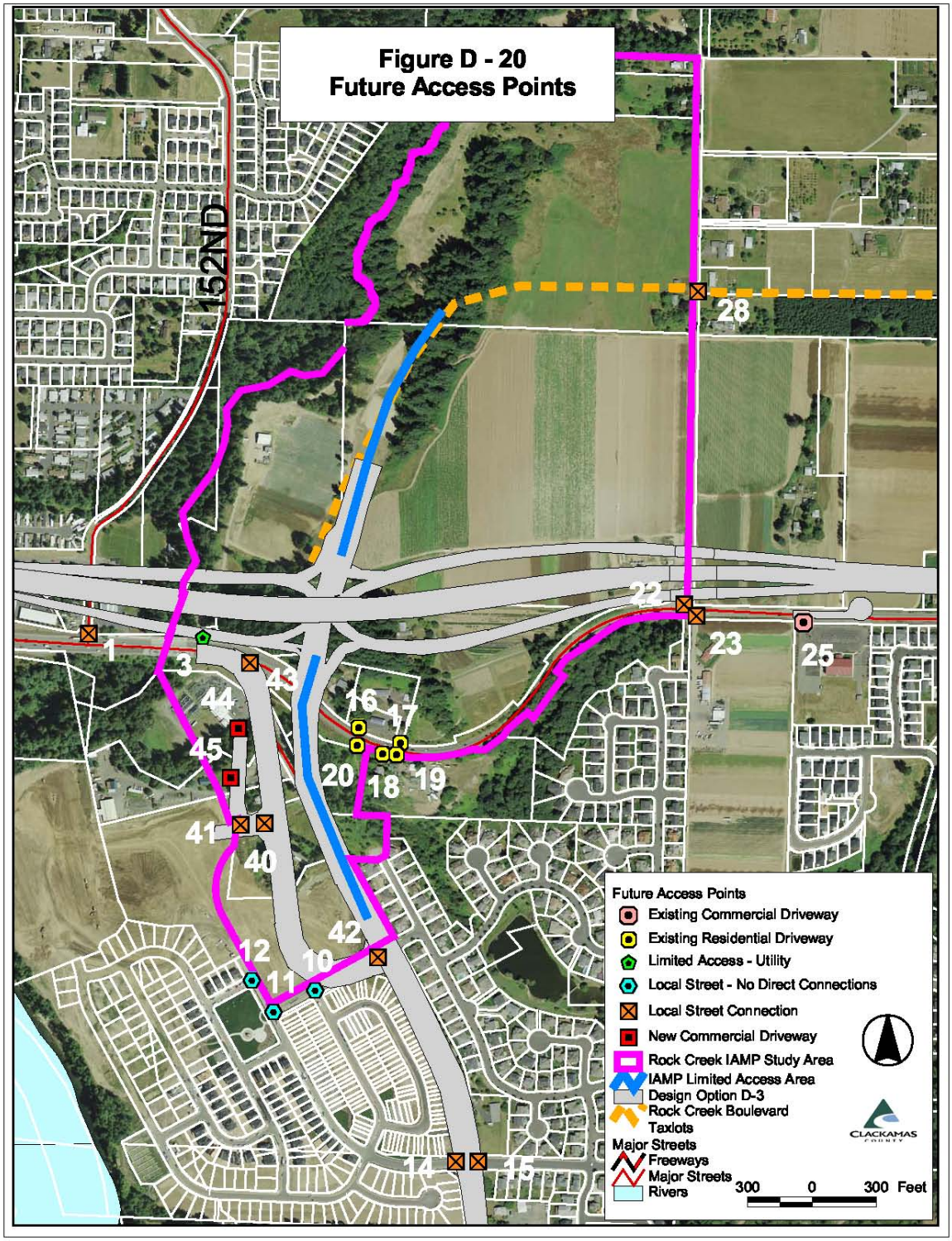


Figure D - 20
Future Access Points
152ND
1
3
43
44
45
41
40
42
12
10
11
14
15
16
17
20
18
19
22
23
25
28
Future Access Points
Existing Commercial Driveway
Existing Residential Driveway
Limited Access - Utility
Local Street - No Direct Connections
Local Street Connection
New Commercial Driveway
Rock Creek IAMP Study Area
IAMP Limited Access Area
Design Option D-3
Rock Creek Boulevard
Taxlots
Major Streets
Freeways
Major Streets
Rivers
300 0 300 Feet
CLACKAMAS COUNTY

Access Management Issues

A number of existing access points in the Rock Creek IAMP Management Area do not meet the ODOT Access Management standards set forth in OAR 734 Division 51. The process of building the Sunrise Project improvements will remove a substantial number of these problematic access points and replace them with access points that either meet the ODOT standard or are closer to the ODOT standards. The key to solving these problems is the construction of the built alternatives. The timing of these improvements is uncertain.

The implementation of access management improvements based on the Sunrise Project should be delayed until such time as project right-of-way is purchased and project construction is scheduled. Access management improvement (included in this list of improvements) should be undertaken as part of a development project.

Sunrise Project Design Exceptions

Table 1 summarizes the OHP and HDM criteria thresholds for the appropriate study period along freeway facilities, as well as summarizing Clackamas County arterial and collector thresholds. **Table 7** provides a list of the mobility design exceptions for the intersections in the Rock Creek IAMP Management Area. These design exceptions are all related to intersection LOS and v/c ratios.

Table 7 Intersection Mobility Design Exceptions

Sunrise Intersection Location (#)	Mobility Criteria	Potential 2030 Design Exceptions (v/c ratio)		
	Alt 1 (No-Build) Alt 2 & 3 (Build) (v/c ratio)	Alt 1 (2030 No-Build)	Alt 2 (2030 Build with Mid-Point)	Alt 3 (2030 Build Without Mid-Point)
22 - Clackamas Highway at 152nd Ave.	0.90 0.90	Yes (1.59) -AM & PM	Yes (0.97) -AM	-
23 Clackamas Highway at Hwy 212/Hwy 224 Split	0.90 0.75	Yes (1.88) -AM & PM	-	-
25 Highway 212 at 172nd Ave.	0.90 0.75	Yes (0.96) -AM	-	-
28 Highway 224 at Eckert Lane	0.90 0.75	Yes (0.96) -AM	Yes (0.76) -AM	-
39 Rock Creek Blvd. at Sunrise WB Ramps	n/a* 0.75		Yes (0.82) -PM	Yes (0.90) -PM
40 Rock Creek Blvd. at Sunrise EB Ramps	n/a* 0.75		Yes (0.85) -AM & PM	Yes (0.82) -PM
41 Highway 224 at Jughandle to Hwy 212	n/a* 0.75		Yes (0.81) -PM	Yes (0.84) -AM & PM

Design Option Descriptions

Design Option D-3 modifies the folded diamond Rock Creek interchange into a single point urban interchange (SPUI). This design option would condense the interchange on- and off-ramp volumes between two folded diamond intersections to a single intersection.

Table 8: Potential Design Option Design Exceptions

Intersection	Mobility	Potential 2030 Design Exceptions (v/c ratio)
Locations	**(v/c ratio) Criteria**	**Design Option D-3**
50 Rock Creek Blvd. at Sunrise EB Ramps	0.75	Yes (0.91) -PM

Notes

Existing and no-build requirements outlined in 1999 OHP (Policy 1F, Table 7)

Build Requirements outlined in 2003 ODOT HDM (Section 10.6, Table 10-1)

Intersection Operations Diagrams

Existing Transportation System and the 2030 Alternatives

The results of the intersection analyses allow comparisons of existing operations to future operations under each Alternative. Information includes lane delay and queue, intersection LOS and V/C ratios, and lane LOS and volumes for the AM peak hours and PM peak hours. The operational standards were listed previously in Table 2.

This section is organized by grouping two intersections with highlights of their operations under Existing Conditions, No Build, Alternative 2 and Alternative 3. The descriptions are followed by Figures with the traffic operations information. Each intersection has two figures, the first with AM peak period information and the second with PM peak information.

Following the descriptions and figures is **Table 9** that provides a summary of intersection operations for Existing Conditions and future Alternatives; the data include lane delay, lane queue, intersection LOS and intersection V/C ratios.

Intersection Operations in the Rock Creek IAMP Management Area

Intersection 22: OR 212/224 @ 152nd

At present, the OR 212/224 @ SE 152nd Avenue intersection rated an overall LOS B for both peak periods, but the southbound lane separately has LOS F (PM peak) for the stop-sign approach onto the highway.

Forecasted problems under the No Build alternative include both lane congestion and overall LOS F for both the AM and PM peak periods.

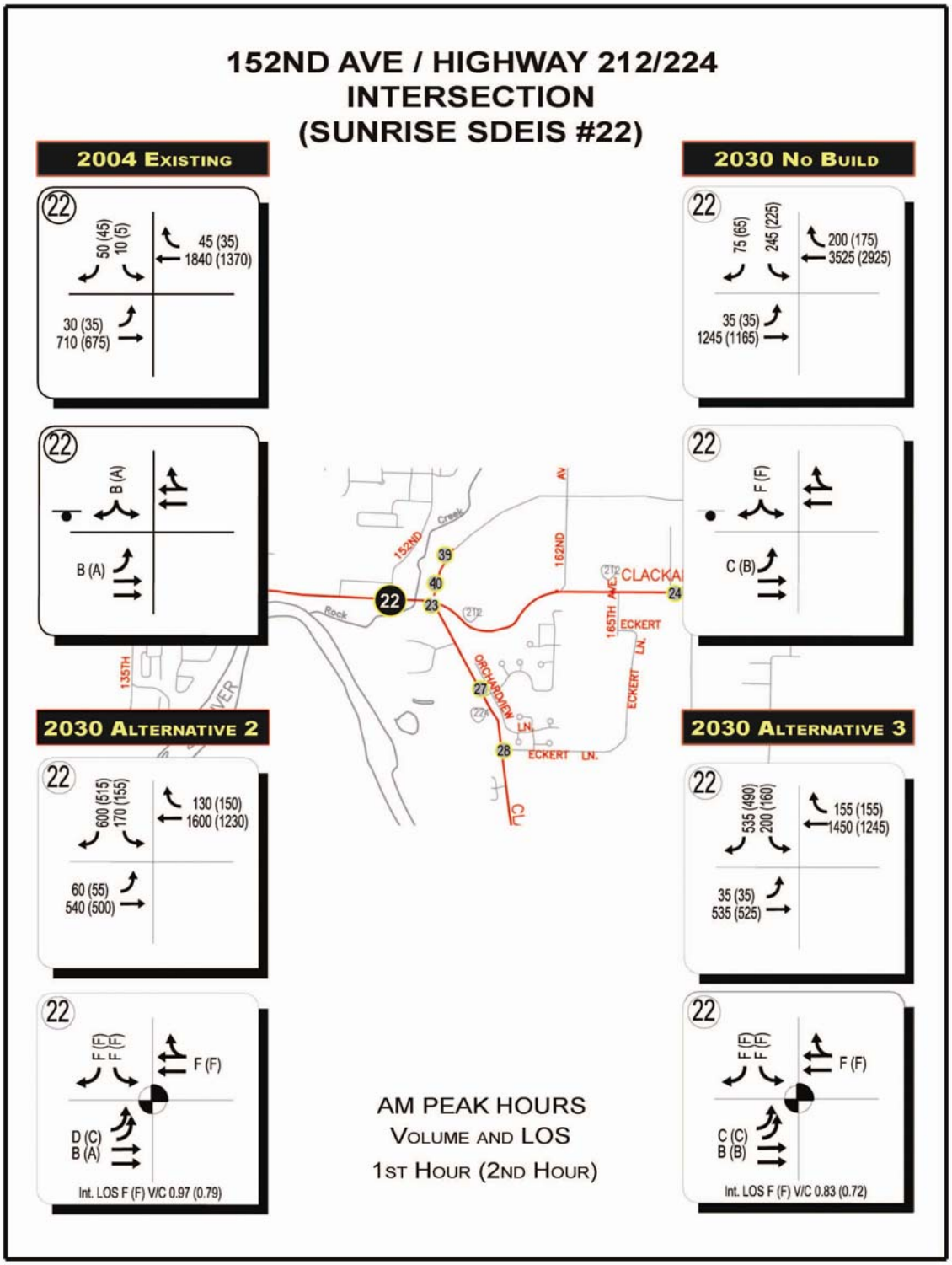
Alternatives 2 and 3 show LOS F during the AM peak based on delay. In the PM period, the intersection would have an overall LOS C, but still LOS F for the southbound lane.

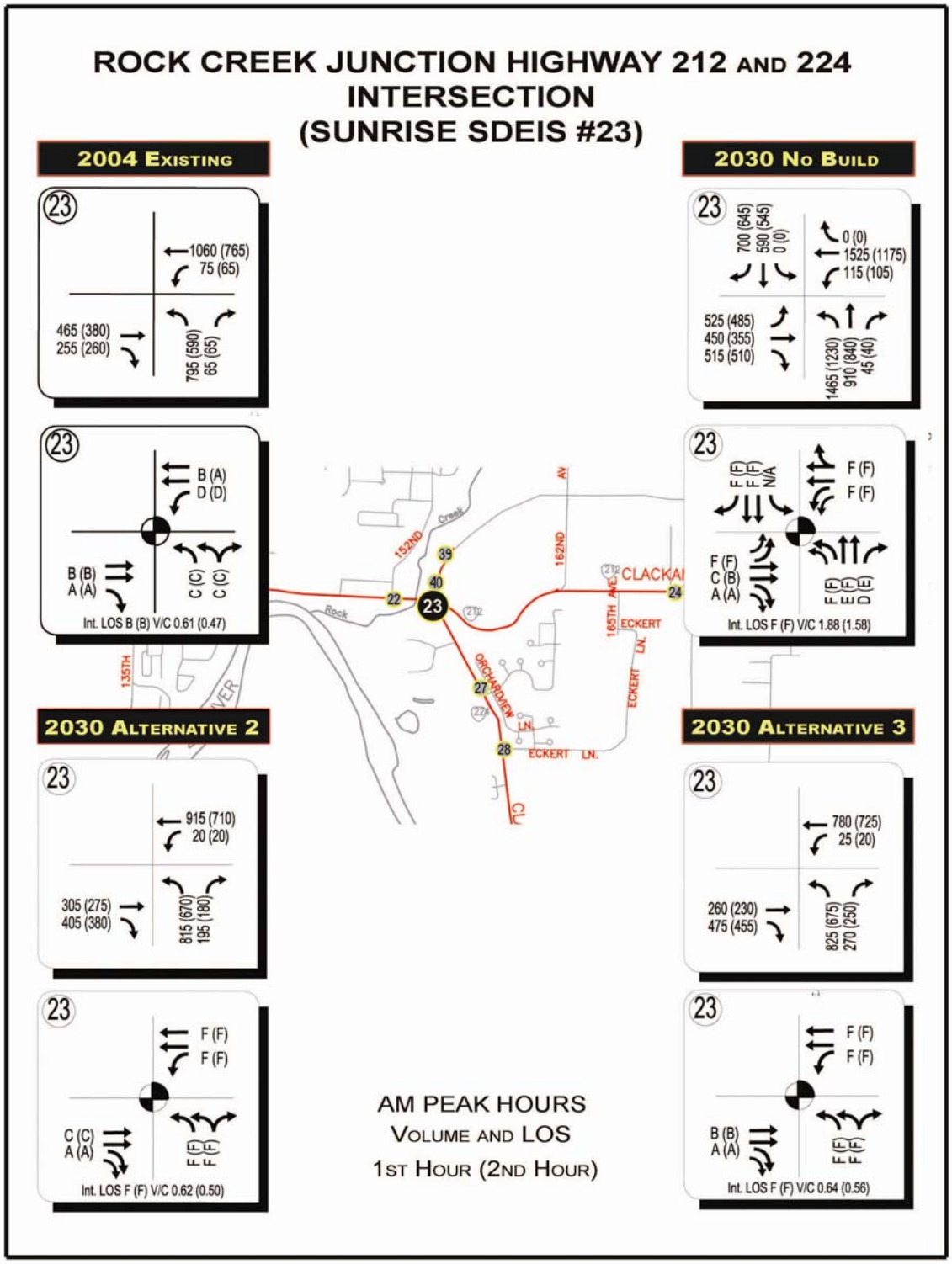
Intersection 23: Rock Creek Junction (Existing and No Build), replaced with OR 212/224 @ Jug Handle in Build Alternatives

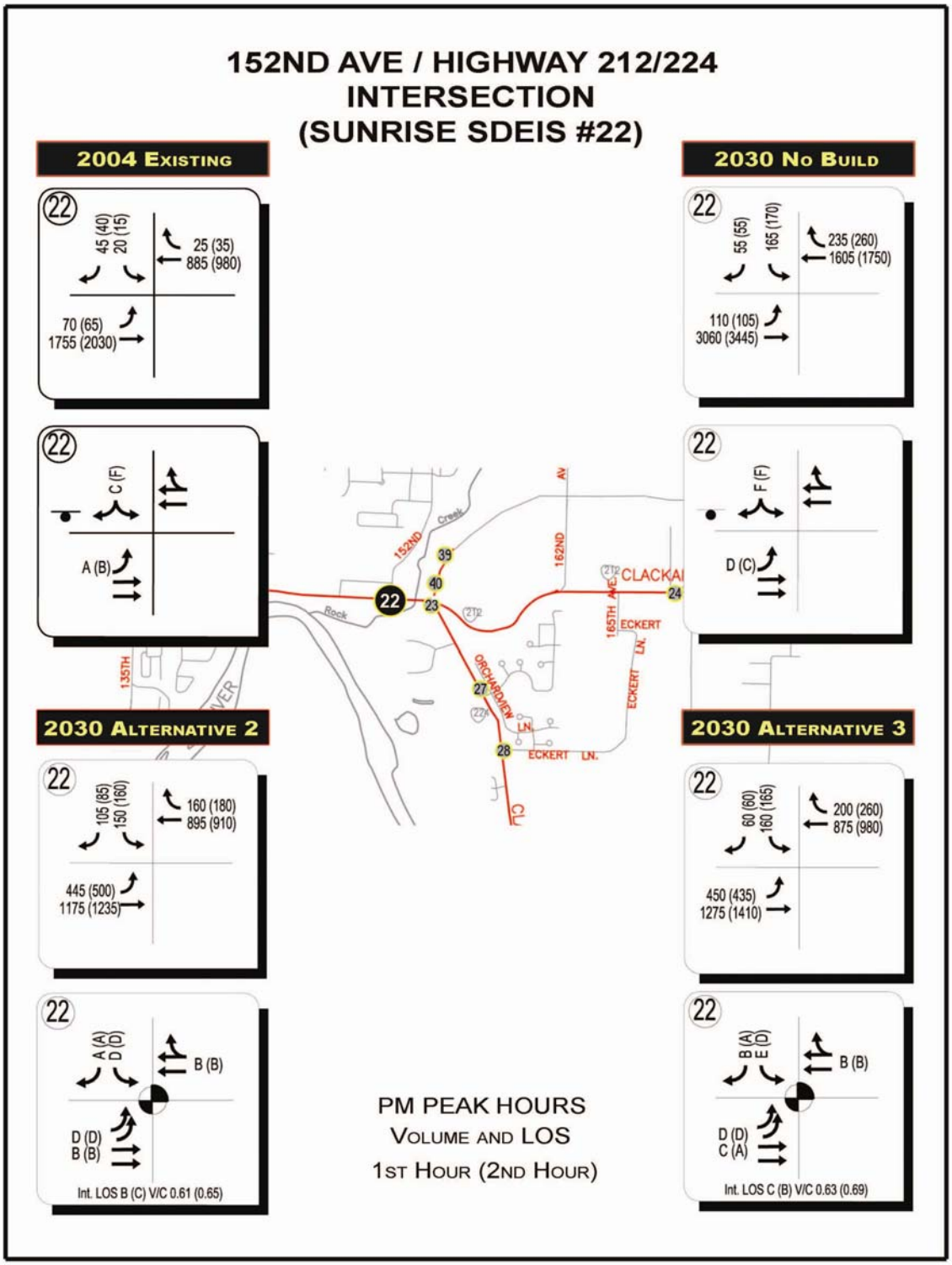
The Rock Creek Junction currently has LOS B for the AM peak hours and LOS C during the PM peak hours, with some individual lanes at LOS D. The intersection has a queue problem for the eastbound-right movement during the PM peak hour.

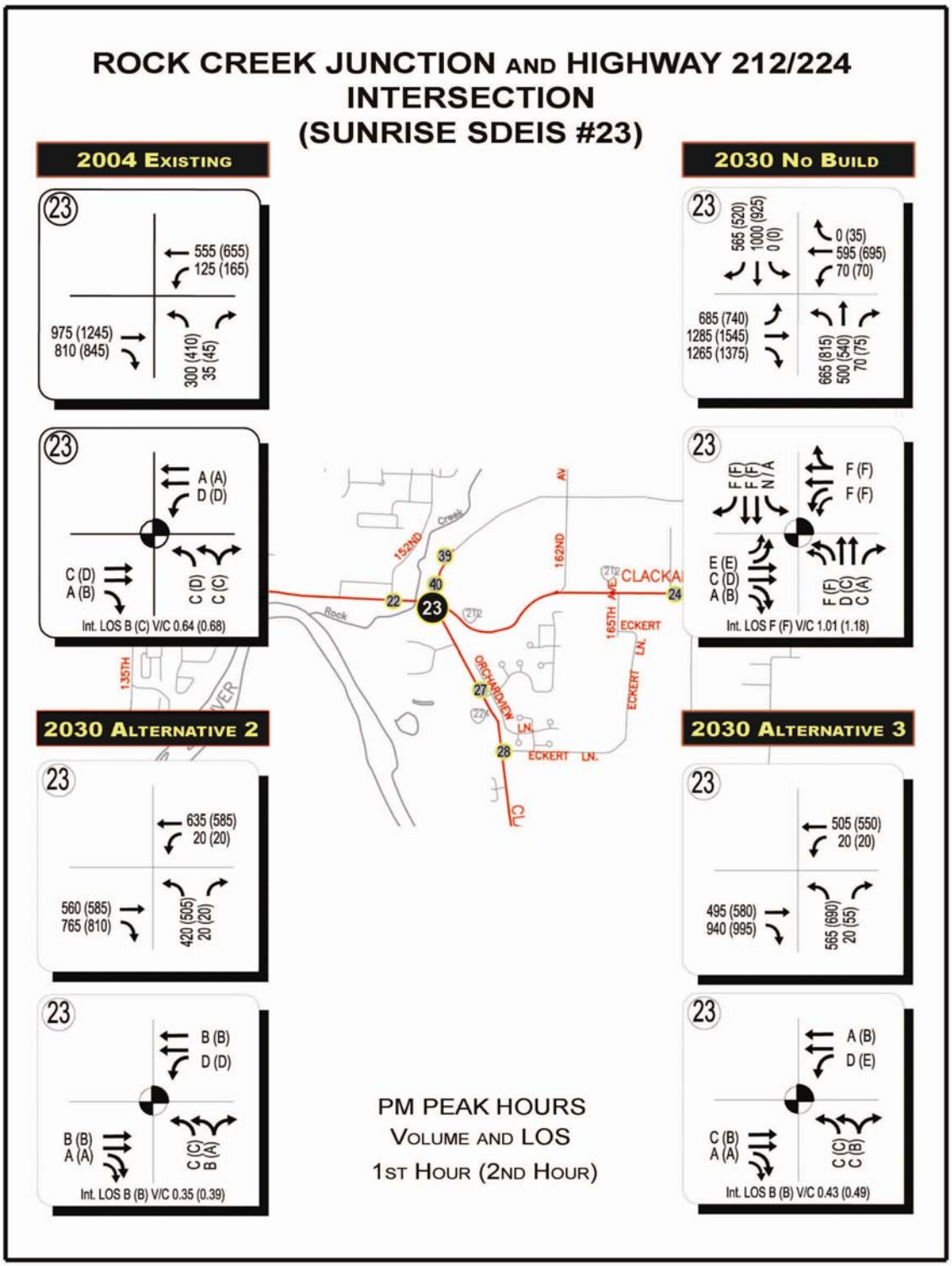
The No Build option with the existing configuration fails in both AM and PM peak hours under all standards (delay, queue, LOS or V/C).

Alternatives 2 and 3 fail in the AM peak hours due to long delays. The AM peak period also has over-capacity volumes for the westbound and northbound lanes under either Build Alternative. During the PM peak hours, both Build Alternatives have sufficient capacity and meet operational standards.


152ND AVE / HIGHWAY 212/224
INTERSECTION
(SUNRISE SDEIS #22)
2004 EXISTING
50 (45)
10 (5)
45 (35)
1840 (1370)
30 (35)
710 (675)
B (A)
B (A)
2030 NO BUILD
75 (65)
245 (225)
200 (175)
3525 (2925)
35 (35)
1245 (1165)
F (F)
C (B)
2030 ALTERNATIVE 2
600 (515)
170 (155)
130 (150)
1600 (1230)
60 (55)
540 (500)
F (F)
F (F)
F (F)
D (C)
B (A)
Int. LOS F (F) V/C 0.97 (0.79)
2030 ALTERNATIVE 3
535 (490)
200 (160)
155 (155)
1450 (1245)
35 (35)
535 (525)
F (F)
F (F)
F (F)
C (C)
B (B)
Int. LOS F (F) V/C 0.83 (0.72)
152ND
162ND
165TH AVE.
ECKERT
ECKERT LN.
ORCHARDVIEW LN.
ECKERT LN.
CLACKA
AM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)


ROCK CREEK JUNCTION HIGHWAY 212 AND 224 INTERSECTION (SUNRISE SDEIS #23)
2004 EXISTING
23
1060 (765)
75 (65)
465 (380)
255 (260)
795 (590)
65 (65)
2030 NO BUILD
23
700 (645)
590 (545)
0 (0)
0 (0)
1525 (1175)
115 (105)
525 (485)
450 (355)
515 (510)
1465 (1230)
910 (840)
45 (40)
23
B (A)
D (D)
B (B)
A (A)
C (C)
C (C)
Int. LOS B (B) V/C 0.61 (0.47)
23
F (F)
F (F)
N/A
F (F)
F (F)
F (F)
C (B)
A (A)
F (F)
E (F)
D (E)
Int. LOS F (F) V/C 1.88 (1.58)
152ND
162ND
AV
Creek
Rock
39
40
23
22
24
CLACKAI
165TH AVE.
ECKERT
ECKERT LN.
ORCHARDVIEW
LN.
27
28
ECKERT LN.
CL
135TH
2030 ALTERNATIVE 2
23
915 (710)
20 (20)
305 (275)
405 (380)
815 (670)
195 (180)
23
F (F)
F (F)
C (C)
A (A)
F (F)
F (F)
Int. LOS F (F) V/C 0.62 (0.50)
2030 ALTERNATIVE 3
23
780 (725)
25 (20)
260 (230)
475 (455)
825 (675)
270 (250)
23
F (F)
F (F)
B (B)
A (A)
F (F)
F (F)
Int. LOS F (F) V/C 0.64 (0.56)
AM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)


152ND AVE / HIGHWAY 212/224
INTERSECTION
(SUNRISE SDEIS #22)
2004 EXISTING
22
45 (40)
20 (15)
25 (35)
885 (980)
70 (65)
1755 (2030)
22
C (F)
A (B)
2030 NO BUILD
22
55 (55)
165 (170)
235 (260)
1605 (1750)
110 (105)
3060 (3445)
22
F (F)
D (C)
2030 ALTERNATIVE 2
22
105 (85)
150 (160)
160 (180)
895 (910)
445 (500)
1175 (1235)
22
A (A)
D (D)
B (B)
D (D)
B (B)
Int. LOS B (C) V/C 0.61 (0.65)
2030 ALTERNATIVE 3
22
60 (60)
160 (165)
200 (260)
875 (980)
450 (435)
1275 (1410)
22
B (A)
E (D)
B (B)
D (D)
C (A)
Int. LOS C (B) V/C 0.63 (0.69)
152ND
162ND
165TH AVE.
ECKERT
ECKERT LN.
ORCHARD VIEW LN.
ECKERT LN.
CLACKA
135TH
Rock
Creek
39
40
23
22
24
27
28
PM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)


ROCK CREEK JUNCTION AND HIGHWAY 212/224 INTERSECTION (SUNRISE SDEIS #23)
2004 EXISTING
555 (655)
125 (165)
975 (1245)
810 (845)
300 (410)
35 (45)
A (A)
D (D)
C (D)
A (B)
C (D)
C (C)
Int. LOS B (C) V/C 0.64 (0.68)
2030 NO BUILD
565 (520)
1000 (925)
0 (0)
0 (35)
595 (695)
70 (70)
685 (740)
1285 (1545)
1265 (1375)
665 (815)
500 (540)
70 (75)
F (F)
F (F)
N/A
F (F)
F (F)
E (E)
C (D)
A (B)
F (F)
D (C)
C (A)
Int. LOS F (F) V/C 1.01 (1.18)
2030 ALTERNATIVE 2
635 (585)
20 (20)
560 (585)
765 (810)
420 (505)
20 (20)
B (B)
D (D)
B (B)
A (A)
C (C)
B (A)
Int. LOS B (B) V/C 0.35 (0.39)
2030 ALTERNATIVE 3
505 (550)
20 (20)
495 (580)
940 (995)
565 (690)
20 (55)
A (B)
D (E)
C (B)
A (A)
C (C)
C (B)
Int. LOS B (B) V/C 0.43 (0.49)
152ND
162ND
165TH AVE
CLACKA
ECKERT
ECKERT LN.
ORCHARDVIEW LN.
135TH
Rock
Creek
PM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

Intersection 27: OR 224 @ Goosehollow Drive, replaced with OR 224 @ Jug Handle

The existing intersection does not have operational problems, with LOS A during both peak periods.

Under the No Build alternative, the intersection fails due to delay, westbound queuing, and turning problems for the westbound and southbound lanes.

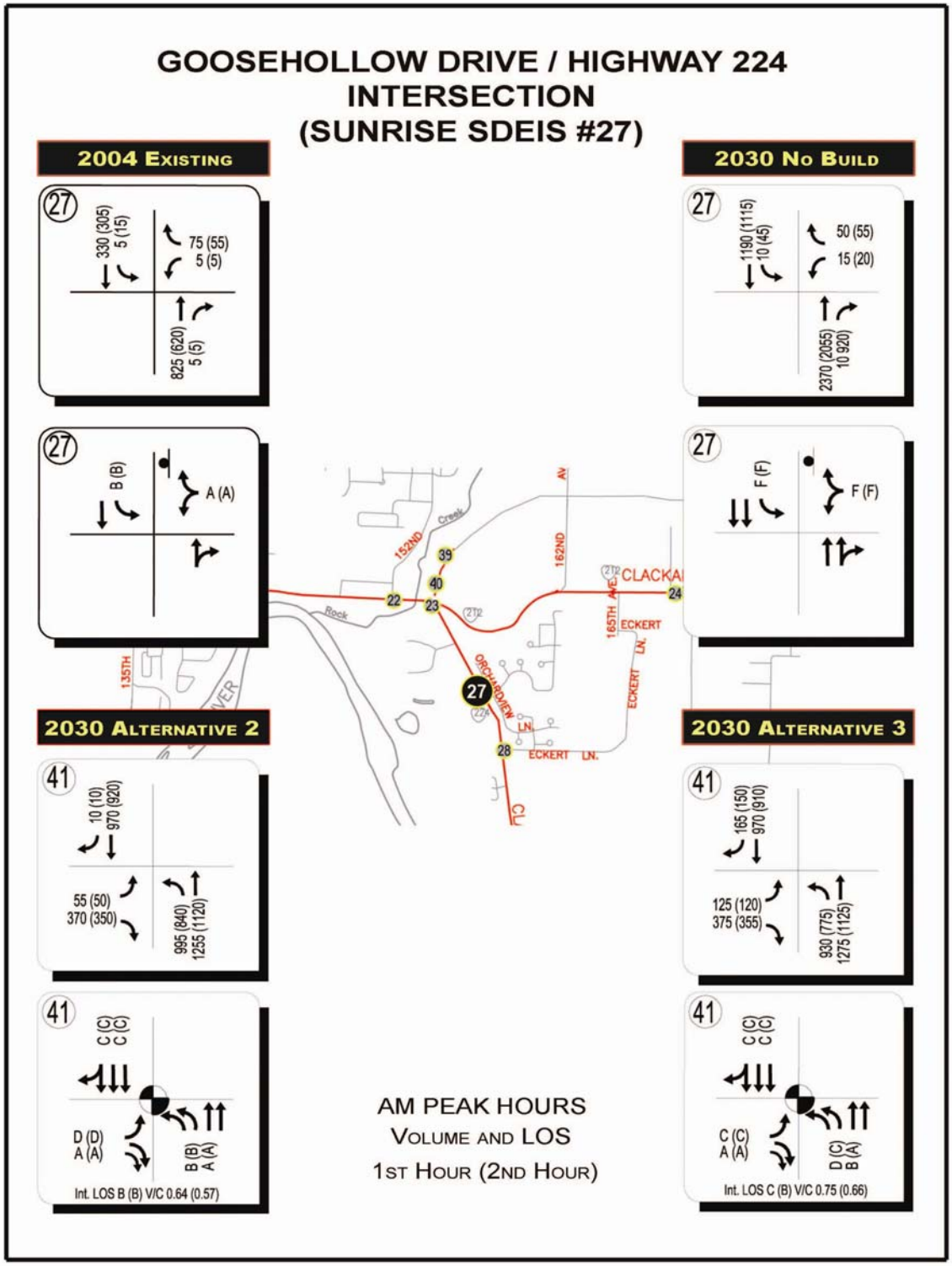
Under Alternative 2 or 3, the intersection would be reconfigured to be a 3-way intersection (Goosehollow Lane from the east would be closed at the highway). The intersection, the southerly part of the "Jug Handle," would meet operational standards for both AM and PM Peak hours under the Build Alternatives.

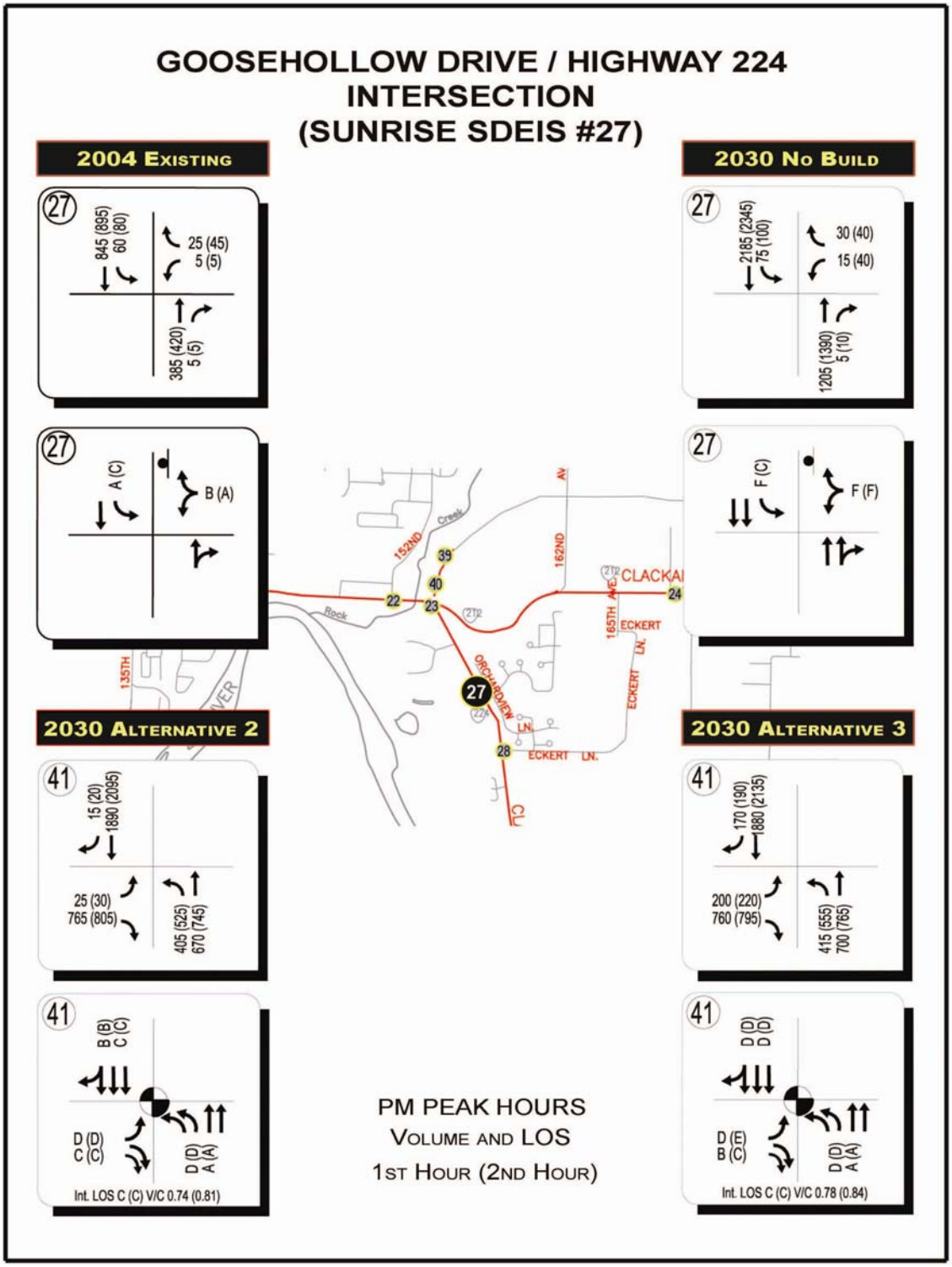
Intersection 28: OR 224 @ Eckert

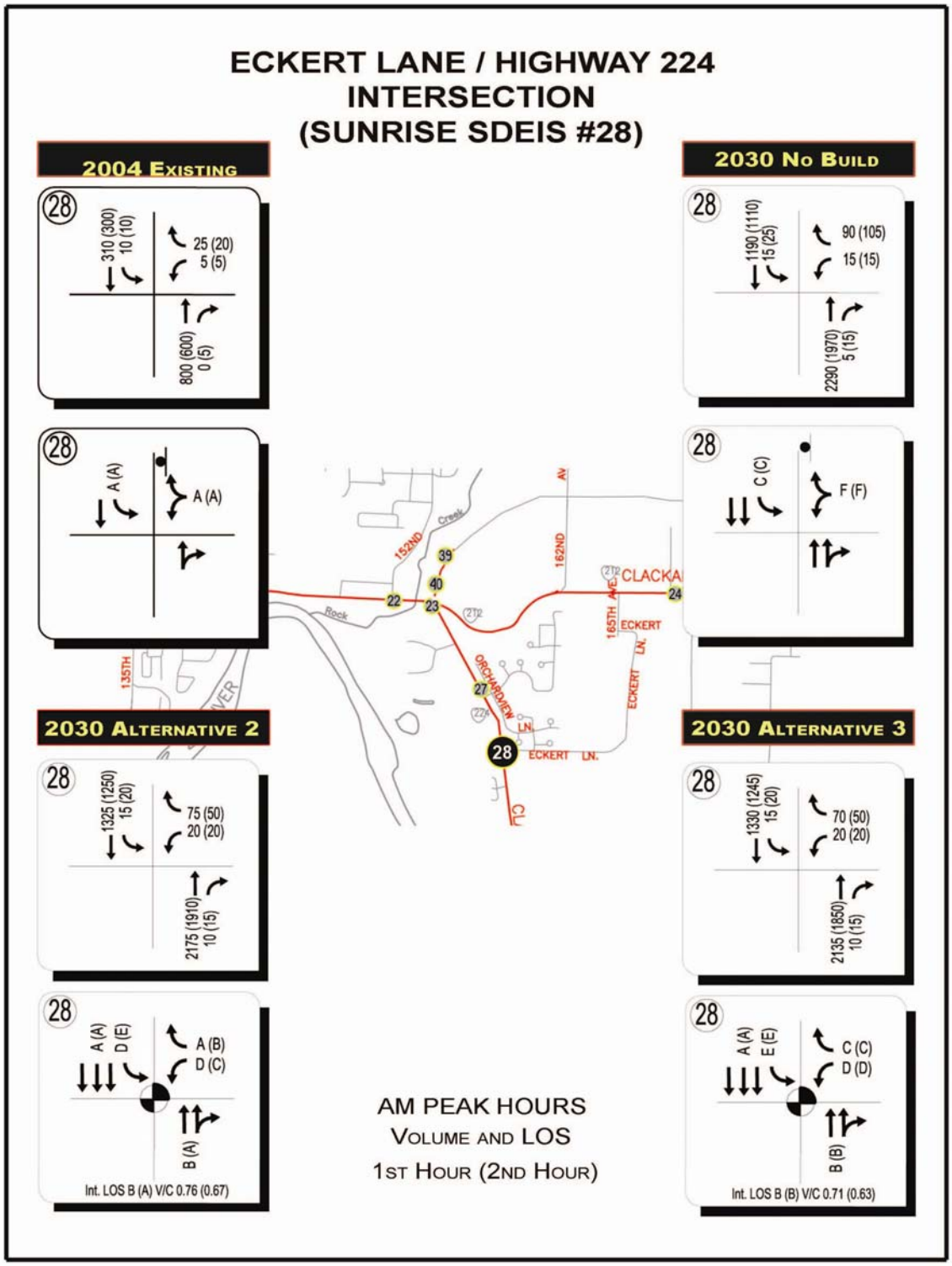
Eckert Lane does not have operational problems under Existing conditions, rating LOS A during the peak periods.

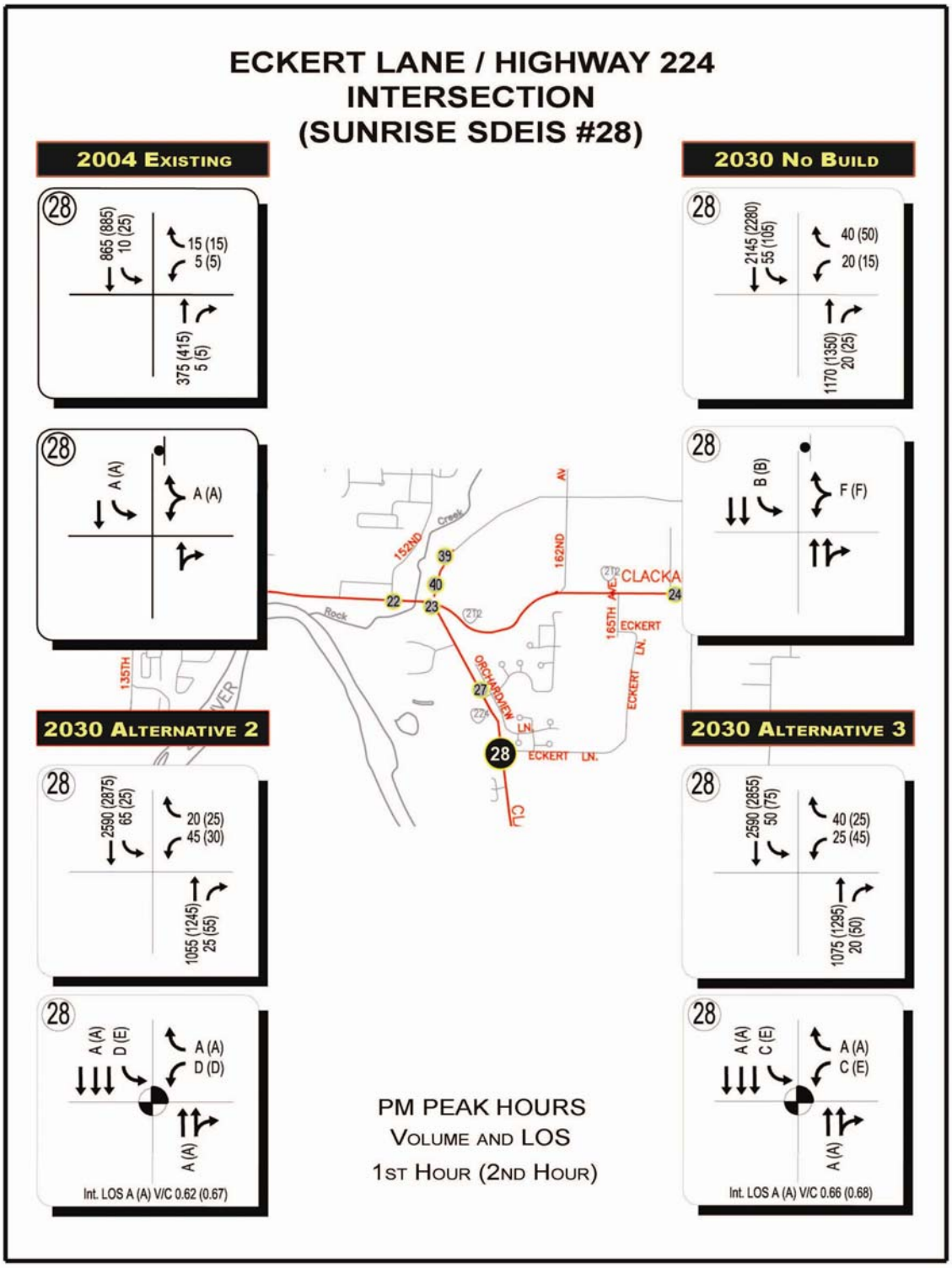
It fails in the Year 2030 No Build due to long delays, westbound queues during the AM period, and lane failure for westbound-left/right turns.

The intersection meets operational standards under either Build Alternative for the AM and PM Peak hours. In Alternative 2, the first AM peak hour has V/C=0.76 which is just over ODOT's 0.75 standard.


GOOSEHOLLOW DRIVE / HIGHWAY 224
INTERSECTION
(SUNRISE SDEIS #27)
2004 EXISTING
27
330 (305)
5 (15)
75 (55)
5 (5)
825 (620)
5 (5)
2030 NO BUILD
27
1190 (1115)
10 (45)
50 (55)
15 (20)
2370 (2055)
10 920)
27
B (B)
A (A)
27
F (F)
F (F)
2030 ALTERNATIVE 2
41
10 (10)
970 (920)
55 (50)
370 (350)
995 (840)
1255 (1120)
2030 ALTERNATIVE 3
41
165 (150)
970 (910)
125 (120)
375 (355)
930 (775)
1275 (1125)
41
C (C)
C (C)
D (D)
A (A)
B (B)
A (A)
Int. LOS B (B) V/C 0.64 (0.57)
41
C (C)
C (C)
C (C)
A (A)
D (C)
B (A)
Int. LOS C (B) V/C 0.75 (0.66)
AM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)
152ND
162ND
165TH AVE.
ECKERT LN.
ORCHARD VIEW LN.
135TH
Rock
Creek
39
40
23
22
24
28
27


GOOSEHOLLOW DRIVE / HIGHWAY 224
INTERSECTION
(SUNRISE SDEIS #27)
2004 EXISTING
27
845 (895)
60 (80)
25 (45)
5 (5)
385 (420)
5 (5)
2030 NO BUILD
27
2185 (2345)
75 (100)
30 (40)
15 (40)
1205 (1390)
5 (10)
27
A (C)
B (A)
27
F (C)
F (F)
152ND
162ND
CLACKA
ECKERT
ECKERT LN.
ORCHARD VIEW LN.
ECKERT LN.
135TH
27
2030 ALTERNATIVE 2
41
15 (20)
1890 (2095)
25 (30)
765 (805)
405 (525)
670 (745)
41
B (B)
C (C)
D (D)
C (C)
D (D)
A (A)
Int. LOS C (C) V/C 0.74 (0.81)
2030 ALTERNATIVE 3
41
170 (190)
1880 (2135)
200 (220)
760 (795)
415 (555)
700 (765)
41
D (D)
D (D)
D (E)
B (C)
D (D)
A (A)
Int. LOS C (C) V/C 0.78 (0.84)
PM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)


ECKERT LANE / HIGHWAY 224
INTERSECTION
(SUNRISE SDEIS #28)
2004 EXISTING
28
310 (300)
10 (10)
25 (20)
5 (5)
800 (600)
0 (5)
2030 NO BUILD
28
1190 (1110)
15 (25)
90 (105)
15 (15)
2290 (1970)
5 (15)
28
A (A)
A (A)
28
C (C)
F (F)
2030 ALTERNATIVE 2
28
1325 (1250)
15 (20)
75 (50)
20 (20)
2175 (1910)
10 (15)
2030 ALTERNATIVE 3
28
1330 (1245)
15 (20)
70 (50)
20 (20)
2135 (1850)
10 (15)
28
A (A)
D (E)
A (B)
D (C)
B (A)
Int. LOS B (A) V/C 0.76 (0.67)
28
A (A)
E (E)
C (C)
D (D)
B (B)
Int. LOS B (B) V/C 0.71 (0.63)
AM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)
152ND
162ND
165TH AVE.
CLACKA
ECKERT
ECKERT LN.
ORCHARDVIEW
LN.
ECKERT LN.
135TH
Creek
Rock
22
23
24
27
28
39
40


ECKERT LANE / HIGHWAY 224
INTERSECTION
(SUNRISE SDEIS #28)
2004 EXISTING
865 (885)
10 (25)
15 (15)
5 (5)
375 (415)
5 (5)
A (A)
A (A)
2030 NO BUILD
2145 (2280)
55 (105)
40 (50)
20 (15)
1170 (1350)
20 (25)
B (B)
F (F)
2030 ALTERNATIVE 2
2590 (2875)
65 (25)
20 (25)
45 (30)
1055 (1245)
25 (55)
A (A)
D (E)
A (A)
D (D)
A (A)
Int. LOS A (A) V/C 0.62 (0.67)
2030 ALTERNATIVE 3
2590 (2855)
50 (75)
40 (25)
25 (45)
1075 (1295)
20 (50)
A (A)
C (E)
A (A)
C (E)
A (A)
Int. LOS A (A) V/C 0.66 (0.68)
152ND
162ND
165TH AVE.
CLACKA
ECKERT
ECKERT LN.
ORCHARD VIEW
LN.
ECKERT LN.
135TH
Rock
Creek
39
40
22
23
24
27
28
PM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

Intersection 39: OR 224 @Sunrise Westbound Ramps (Design Option D2)

The new westbound ramps have overall good LOS in Alternative 2. During the second PM peak hour, the intersection V/C is 0.82 which is above the ODOT standard of 0.75.

Alternative 3 experiences over-capacity queues for the southbound-left turn (AM and PM peak hours). The overall intersection LOS is "C," but the southbound-left lane separately has a LOS F in the AM peak. V/C ratios are 0.76 and 0.90 during the PM peak hours.

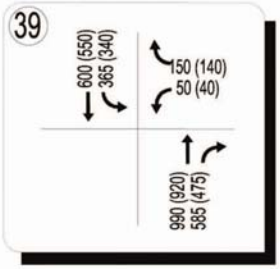
Intersection 40: OR 224 @ Sunrise Eastbound Ramps (Design Option D2)

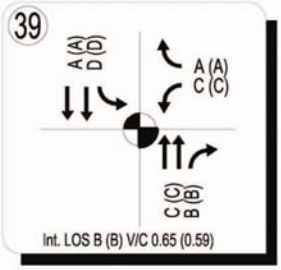
The eastbound ramps have an overall good LOS in Alternative 2. During the first AM peak hour, the intersection has V/C=0.79, just above the ODOT standard of 0.75. The PM peak hours experience slightly higher V/C ratios (0.77 and 0.85).

Alternative 3 shows over-capacity queues for northbound-right lane (AM peak hours) and for southbound-left and southbound-through lanes (PM peak hours). Southbound-left and southbound-through lanes are rated LOS F in the PM period. Overall V/C ratios during the PM peak (0.78 and 0.82) also are above the ODOT standard.

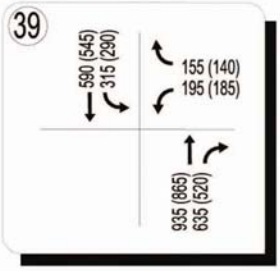
SUNRISE WB OFF AT ROCK CREEK INTERCHANGE INTERSECTION (SUNRISE SDEIS #39)

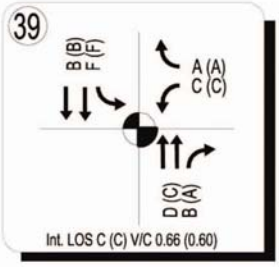
2030 ALTERNATIVE 2





2030 ALTERNATIVE 3





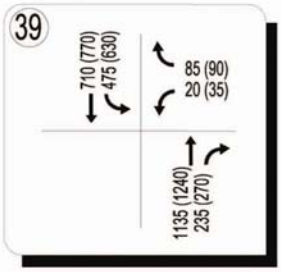
AM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

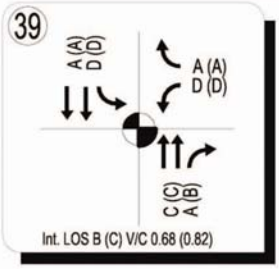
SUNRISE WB OFF AT ROCK CREEK INTERSECTION (SUNRISE SDEIS #39)

2004 EXISTING

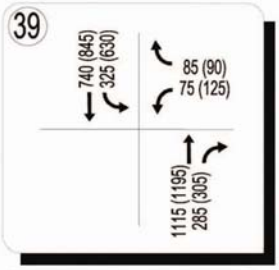
2030 NO BUILD

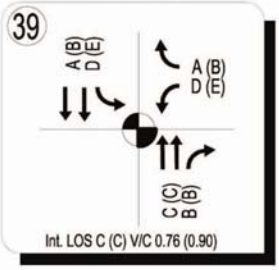
2030 ALTERNATIVE 2





2030 ALTERNATIVE 3

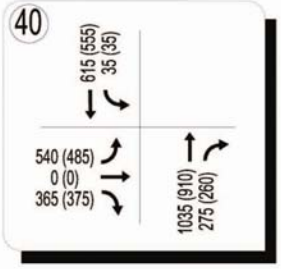


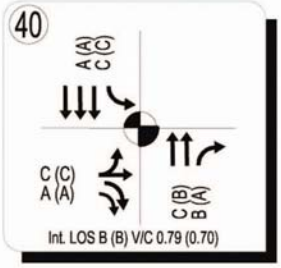


PM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

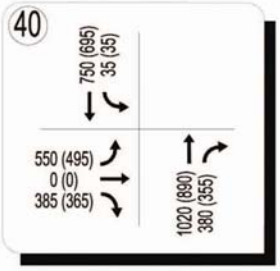
SUNRISE EB OFF AT ROCK CREEK INTERCHANGE INTERSECTION (SUNRISE SDEIS #40)

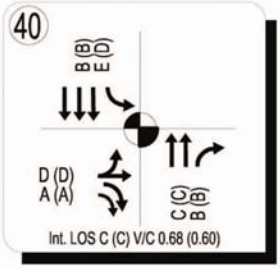
2030 ALTERNATIVE 2





2030 ALTERNATIVE 3

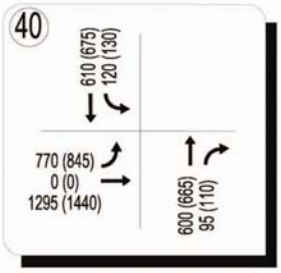


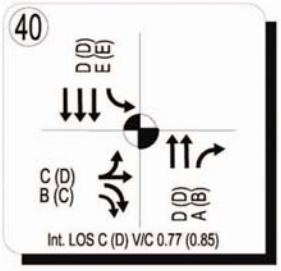


AM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

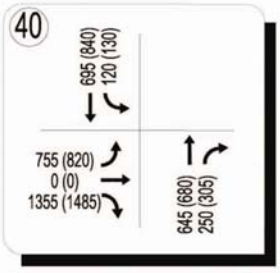
SUNRISE EB OFF AT ROCK CREEK INTERCHANGE INTERSECTION (SUNRISE SDEIS #40)

2030 ALTERNATIVE 2





2030 ALTERNATIVE 3



PM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

Design Option D3 Intersections

The Central Signal would have overall LOS C in both the AM and PM peak periods. During the AM peak hours, the intersection has V/C=0.63; the PM Peak period would have V/C=0.64.

The Westbound ramps would have overall LOS A for the AM and PM peak periods. The V/C ratios would be 0.38 for the AM peak period and 0.49 during the PM peak hours.

The Eastbound ramps would have LOS A for both the AM and PM peak periods, with the V/C ratios of 0.35 and 0.91 for the AM and PM peak hours respectively.

Intersection Operations Summary Tables

TABLE 9 SUMMARY OF INTERSECTION OPERATIONS FOR EXISTING AND FUTURE ALTERNATIVES

	Existing Conditions					
	LANE DATA		Intersection LOS		Intersection V/C	
	Delay	Queue[1]	*AM*	*PM*	*AM*	*PM*
	AM		1st Hour		1st Hour	
Intersection	(PM)		(2nd Hour)		(2nd Hour)	
22: Hwy 212/224 / 152nd	3.4 (9.1)	No info	B (B)	**F Sbnd**	unsig	unsig
23: Rock Creek Junction	19.7 (27.3)	0 **(1)**	B (B)	B (C)	0.61 (0.47)	0.64 (0.68)
27: Hwy 224 / Goosehollow	9.2 (7.6)	0 (0)	A (A)	A (C)	unsig	unsig
28: Hwy 224 / Eckert	7.3 (7.8)	0 (0)	A (A)	A (A)	unsig	unsig
23: Hwy 212/224 @ Jug Handle						
41: Hwy 224@ Jug Handle						
39: Westbound Ramps						
40: Eastbound Ramps						

	No Build, Alternative 1					
	LANE DATA		Intersection LOS		Intersection V/C	
	Delay	Queue[1]	*AM*	*PM*	*AM*	*PM*
	AM		1st Hour		1st Hour	
Intersection	(PM)		(2nd Hour)		(2nd Hour)	
22: Hwy 212/224 / 152nd	**569 (367.3)**	No info	**F Sbnd**	**F Sbnd**	unsig	unsig
23: Rock Creek Junction	**1,678 (367)**	**4 (3)**	**F (F)**	**F (F)**	**1.88 (1.56)**	**1.01 (1.18)**
27: Hwy 224 / Goosehollow	**3,600 (588)**	0 **(1)**	**F (F)**	**F (F)**	unsig	unsig
28: Hwy 224 / Eckert	**3,600 (115)**	**1** (0)	**F Wbnd**	**F Wbnd**	unsig	unsig
23: Hwy 212/224 @ Jug Handle						
41: Hwy 224@ Jug Handle						
39: Westbound Ramps						
40: Eastbound Ramps						

Information in **BOLD** indicates over-capacity or failing levels of service.

[1] **Queue: number of the 4 approaches (North, South, East, West) with forecasted queue lengths greater than available storage. Most approaches are multi-lane.**

LOSExAlt1

Table 9 continues on next page with results of analyses for Alternative 2 and Alternative 3

Intersection	Alternative 2					
	LANE DATA		Intersection LOS		Intersection V/C	
	Delay	Queue[1]	*AM*	*PM*	*AM*	*PM*
	AM (PM)		1st Hour (2nd Hour)		1st Hour (2nd Hour)	
22: Hwy 212/224 / 152nd	**384.5** (21.2)	No info	**F (F)**	B (C)	0.97 (0.79)	0.61 (0.65)
23: Rock Creek Junction	See 23 Jug Handle					
27: Hwy 224 / Goosehollow						
28: Hwy 224 / Eckert	10.6 (7.9)	0 (0)	B (A)	A (A)	0.76 (0.67)	0.62 (0.67)
23: Hwy 212/224 @ Jug Handle	**1,223** (14.4)	**2** (0)	**F (F)**	B (B)	0.62 (0.50)	0.35 (0.39)
41: Hwy 224@ Jug Handle	17.0 (23.9)	0 (0)	B (B)	C (C)	0.64 (0.57)	0.74 (0.81)
39: Westbnd Ramps	19.7 (24.3)	0 (0)	B (B)	B (C)	0.65 (0.58)	0.68 (0.82)
40: Eastbnd Ramps	17.3 (37.0)	0 (0)	B (B)	C (D)	0.79 (0.70)	0.77 (0.85)
Design Option 3: Single Point Intersection			C	C	0.63	0.64
D3: Westbnd Ramps			A	A	0.38	0.49
D3: Eastbnd Ramps			A	A	0.35	0.91

Intersection	Alternative 3					
	LANE DATA		Intersection LOS		Intersection V/C	
	Delay	Queue[1]	*AM*	*PM*	*AM*	*PM*
	AM (PM)		1st Hour (2nd Hour)		1st Hour (2nd Hour)	
22: Hwy 212/224 / 152nd	**460.1** (15.7)	No info	**F (F)**	C (B)	0.83 (0.72)	0.83 (0.69)
23: Rock Creek Junction						
27: Hwy 224 / Goosehollow						
28: Hwy 224 / Eckert	13.3 (7.8)	0 (0)	B (B)	A (A)	0.71 (0.63)	0.66 (0.68)
23: Hwy 212/224 @ Jug Handle	**739.0** (14.8)	**2** (0)	**F (F)**	B (B)	0.64 (0.56)	0.43 (0.49)
41: Hwy 224@ Jug Handle	24.8 (31.8)	0 (0)	C (B)	C (C)	0.75 (0.66)	0.78 (0.84)
39: Westbound Ramps	33.4 (34.7)	**1 (1)**	C [2] (C) [2]	C (C)	0.66 (0.60)	0.76 (0.90)
40: Eastbound Ramps	25.7 (50.1)	**1 (2)**	C (C)	D (D) [3]	0.68 (0.60)	0.78 (0.82)
Design Option 3: Same as Alt. 2						

Information in **BOLD** indicates over-capacity or failing levels of service.

[1] **Queue: number of the 4 approaches (North, South, East, West) with forecasted queue lengths greater than available storage. Most approaches are multi-lane.**

[2] **Alt. 3 Westbound ramps have Southbound left (from Rock Creek Blvd) LOS F in AM.**

[3] Alternative 3 Eastbound ramps have Southbound and Through Lanes LOS F in PM.