OR 66 Green Springs Highway

INTERCHANGE AREA MANAGEMENT PLAN

Klamath Falls, Oregon

Technical Appendices

October 2012

Kittelson & Associates, Inc.
Transportation Engineering/Planning

Angelo planning group

OR 66 Green Springs Highway IAMP

Technical Appendices

Klamath Falls, Oregon

Prepared For:
Oregon Department of Transportation
Region 4
63055 N. Highway 97
Bend, Oregon 97701
541-388-6180

Prepared By:
Kittelson & Associates, Inc.
354 SW Upper Terrace Drive Suite 101
Bend, Oregon 97702
(541) 312-8300

Project Manager: Hermanus Steyn, Pr Eng, PE
Project Engineer: Matt Kittelson, PE
Project Engineer: Jeff Whitman, PE

Angelo Planning Group
921 SW Washington Street, Suite 468
Portland, Oregon 97205

Darci Rudzinski, AICP
Shayna Rehberg, AICP

Project No. 11881

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Appendix A
Technical Memorandum #1: Review of Adopted Plans

Angelo planning group

LAND USE PLANNING • TRANSPORTATION PLANNING • PROJECT MANAGEMENT

Memorandum

Date: January 25, 2012

To: Project Team

From: Darci Rudzinski and Shayna Rehberg

Re: OR 66 Green Springs Interchange Area Management Plan (IAMP)
Technical Memorandum #1: Review of Adopted Plans (Task 2.1)

I. Introduction

Oregon's Administrative Rule governing access management (OAR 734-051) instructs that an Interchange Area Management Plan (IAMP) is required for new interchanges and should be developed for significant modifications to existing interchanges. An IAMP is being prepared for the Green Springs Highway (OR 66) interchange on The Dalles-California Highway (US 97) in anticipation of needed improvements to accommodate long-term regional and local traffic demand. Consistent with the OAR 734-051, one of the project objectives is to ensure that the plan is consistent with local and state transportation policies and standards. To meet this objective, this memorandum provides an overview of documents that regulate and effect land use and transportation planning in the vicinity of the Green Springs Interchange. Specifically, this review highlights the relationships between adopted regulations and potential implementation and management strategies that may be recommended in the IAMP. Understanding these relationships will also help identify any amendments that may need to be made to local policies and ordinances in order to be consistent with the recommendations of the IAMP.

The documents listed in Table 1 have been reviewed for policies and regulations applicable to land use and transportation planning in the vicinity of the Green Springs interchange and this IAMP. This table presents planning and regulatory elements that have bearing on IAMP development and indicates which of these elements are found in each document and consequently how each document influences the planning process.

It should be noted that Klamath County does not currently have capital improvement program (CIP) projects programmed in the interchange vicinity. In addition, Klamath County does not have a transportation system development charge (SDC) ordinance.

Table 1. Planning Elements in IAMP Development

	Transportation Policy	Transportation Design Standards	Transportation Improvement Project List	Land Use
State Documents Reviewed				
Oregon Highway Plan (1999, last amended 2006)	✓	✓		
Oregon Freight Plan (2011)	✓			
Access Management Rule (OAR 734-051)		✓		
State Transportation Improvement Program (2010-2013)			✓	
Statewide Planning Goal 9	✓			✓
Local Documents Reviewed				
Klamath County Comprehensive Plan (2010)	✓			✓
Klamath County Rural Transportation System Plan (2010)	✓	✓	✓	
Klamath County Land Development Code		✓		✓
City of Klamath Falls Comprehensive Plan (1981)	✓			✓
Klamath Falls Urban Area Transportation System Plan (2011)	✓	✓	✓	
Klamath Falls Urban Area Economic Opportunity Analysis (2009)				✓
Klamath Falls Community Development Ordinance		✓		✓
Klamath Falls Capital Improvement Program (FY 2011-2016)			✓	
Klamath Falls Systems Development Charge (SDC)			✓	

The following list includes page numbers to easily reference each reviewed document.

State Plans and Regulations 4
Oregon Highway Plan (1999, last amended 2006) 4
Oregon Freight Plan (2011) 11
Access Management Rule (OAR 734-051) 12
Statewide Transportation Improvement Program (2010-2013) 18
Statewide Planning Goal 9 19

County and City Plans and Regulations 19
Klamath County Comprehensive Plan (2010) 19
Klamath County Rural Transportation System Plan (2010) 21
Klamath County Land Development Code 24
City of Klamath Falls Comprehensive Plan (1981) 25
Klamath Falls Urban Area Transportation System Plan (2011/in progress) 26
Klamath Falls Urban Area Economic Opportunity Analysis (2009) 27
Klamath Falls Community Development Ordinance 29
Klamath Falls West Side Refinement Plan (2006) 29
Klamath Falls Capital Improvement Program (FY 2011-216) 31
Klamath Falls Systems Development Charge 32
Traffic Impact Studies 34

II. Plan and Policy Review

State Plans and Regulations

Oregon Highway Plan (1999, last amended 2006)

The Oregon Highway Plan (OHP), an element and modal plan of the state's comprehensive transportation plan (OTP), guides the planning, operations, and financing of ODOT's Highway Division. Policies in the OHP emphasize the efficient management of the highway system to increase safety and to extend highway capacity, partnerships with other agencies and local governments, and the use of new techniques to improve road safety and capacity. These policies also link land use and transportation, set standards for highway performance and access management, and emphasize the relationship between state highways and local road, bicycle, pedestrian, transit, rail, and air systems.

The Oregon Transportation Commission (OTC) adopted the Highway Plan on March 18, 1999. In July 2006, ODOT published an update that includes amendments made from November 1999 through January 2006. The IAMP will need to be consistent with the OHP and the planning process will review and reference the recent changes to the OHP, where applicable. Ultimately the IAMP will be reviewed by the OTC for adoption and, if adopted, will be an amendment to the OHP as a special facility plan. The following is a summary of each OHP policy that is relevant to the Green Springs IAMP.

<u>Policy 1A: State Highway Classification System.</u>

The OHP classifies the state highway system into four levels of importance: Interstate, Statewide, Regional and District. ODOT uses this classification system to guide management and investment decisions regarding state highway facilities. The system guides the development of facility plans, such as the Green Springs IAMP, as well as ODOT's review of local plan and zoning amendments, highway project selection, design and development, and facility management decisions including road approach permits.

The Green Springs interchange involves state highways with Statewide, Regional, and District Levels of Importance, as described on the following page. The purpose and management objectives of each of these classifications are summarized below.

- Statewide Highways typically provide inter-urban and inter-regional mobility and provide connections to larger urban areas, ports, and major recreation areas that are not directly served by Interstate Highways. A secondary function is to provide connections for intra-urban and intra-regional trips. The management objective is to provide safe and efficient, high-speed, continuous-flow operation. In constrained and urban areas, interruptions to flow should be minimal.

- Regional Highways typically provide connections and links to regional centers, Statewide or Interstate Highways, or economic or activity centers of regional significance. The management objective for these facilities is to provide safe and efficient, high-speed, continuous-flow operation in rural areas and moderate to high-speed operations in urban and urbanizing areas. A secondary function is to serve land uses in the vicinity of these highways.

- District Highways are facilities of county-wide significance and function largely as county and city arterials or collectors. They provide connections and links between small urbanized areas, rural centers and urban hubs, and also serve local access and traffic. The management objective is to provide for safe and efficient, moderate to high-speed continuous-flow operation in rural areas reflecting the surrounding environment and moderate to low-speed operation in urban and urbanizing areas for traffic flow and for pedestrian and bicycle movements.

ODOT also classifies certain state highways as "Expressways." Expressways are complete routes or segments of existing two-lane and multi-lane highways and planned multi-lane highways that provide for safe and efficient high speed and high volume traffic movements. Their primary function is to provide for interurban travel and connections to ports and major recreation areas with minimal interruptions. A secondary function is to provide for long distance intra-urban travel in metropolitan areas. In urban areas, speeds are moderate to high. In rural areas, speeds are high. Usually there are no pedestrian facilities, and bikeways may be separated from the roadway.

The classification of the state highways that pass through and around Klamath Falls is described below.

- The Dalles-California Highway (US 97) runs north-south through Klamath Falls, connecting the city with Bend in the north and connecting to I-5 south of the California border. Through Klamath Falls, US 97 is part of the National Highway System (NHS) and is designated with a Statewide Level of Importance.

- Oregon State Route 140 (OR 140) runs roughly northwest and southeast, skirting the southern edge of the city. Called Lake of the Woods northwest of the city, South Klamath Falls as it passes south of the city, and Klamath Falls-Lakeview to the southeast, OR 140 is also part of the NHS with a Statewide Level of Importance designation. Between its junction with OR 66 and its junction with OR 39, OR 140 is also classified as an Expressway.

- Oregon State Route 66 (OR 66), called the Green Springs Highway, runs southwest to northeast, and terminates at the junction with US 97 in the southwest corner of Klamath Falls. OR 66 is classified with District Level of Importance and is not part of the NHS, except where it briefly overlaps with OR 140, where it shares OR 140's Statewide Level of Importance and NHS designation.

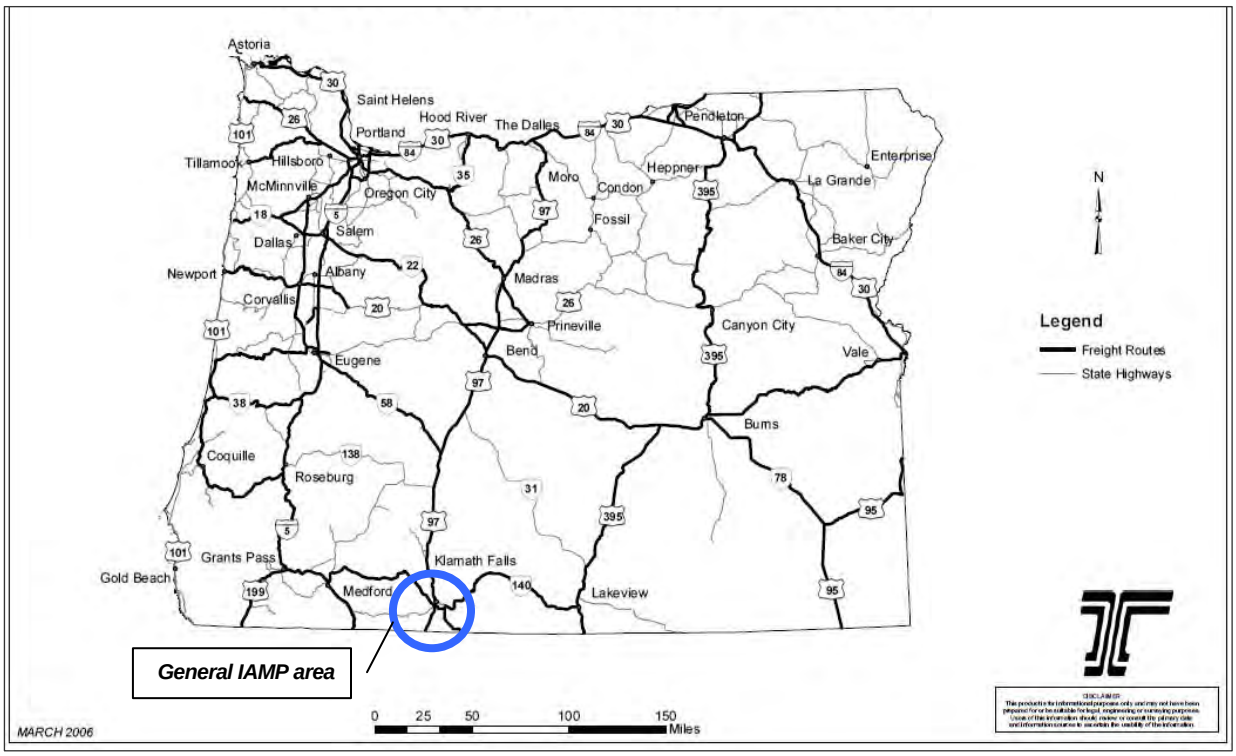
<u>Policy 1B: Land Use and Transportation</u>. Policy 1B applies to all state highways. It is designed to clarify how ODOT will work with local governments and others to link land use and transportation in transportation plans, facility and corridor plans, plan amendments, access permitting and project development. Policy 1B recognizes that state highways serve as the main streets of many communities and strives to maintain a balance between serving local communities (accessibility) and the through traveler (mobility). This policy recognizes the role of both the State and local governments related to the state highway system and calls for a coordinated approach to land use and transportation planning.

<u>Policy 1C: State Highway Freight System.</u> The primary purpose of the State Highway Freight System is to facilitate efficient and reliable interstate, intrastate, and regional truck movement through a designated freight system. This freight system, made up of the Interstate Highways and certain Statewide, Regional and District Highways, the majority of which are on the National Highway System, includes routes that carry significant tonnage of freight by truck and serve as the primary

interstate and intrastate highway freight connection to ports, intermodal terminals, and urban areas. Highways included in this designation have higher highway mobility standards than other Statewide Highways.

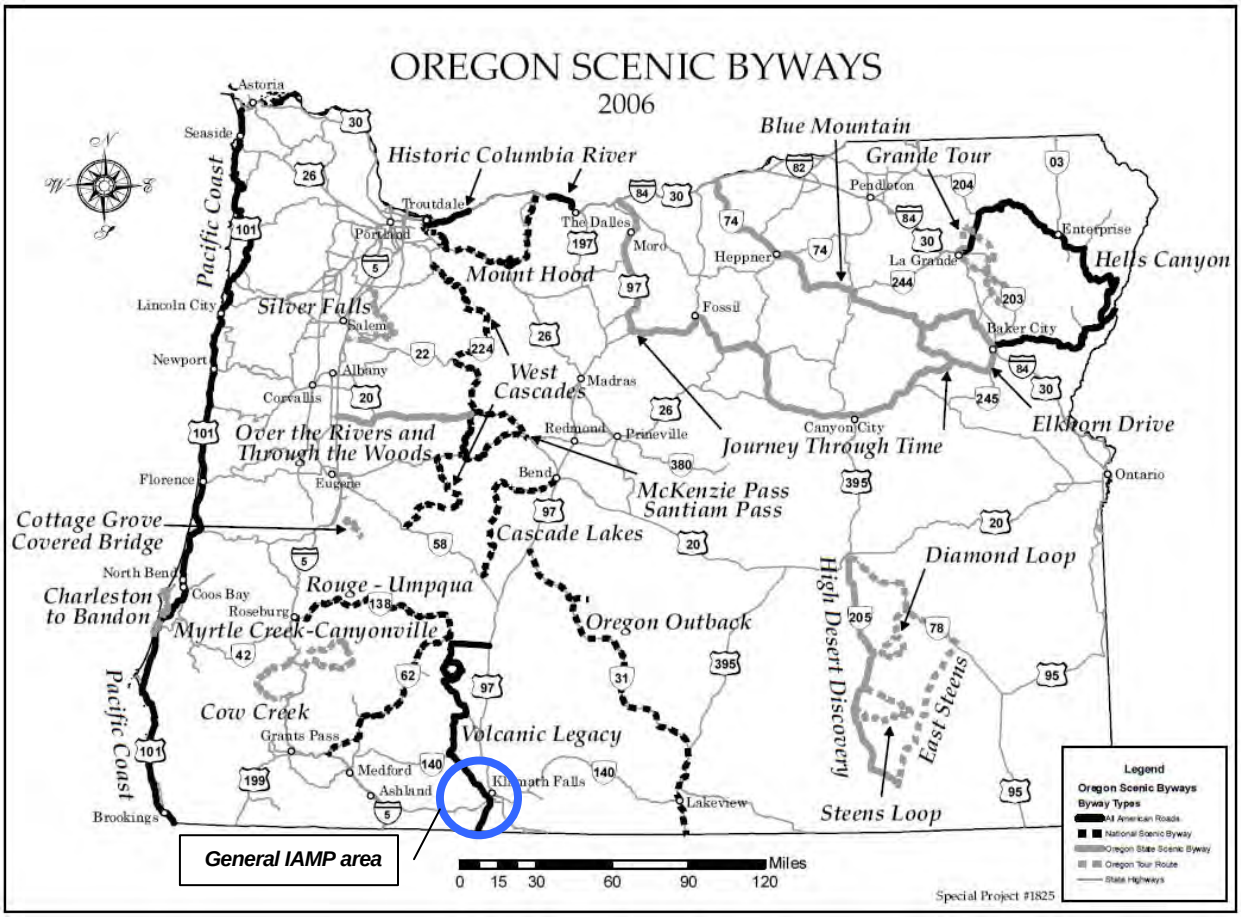
As shown in Figure 1, US 97 and OR 140 in Klamath Falls are classified as Freight Routes.

Figure 1. State Highway Freight System



<u>Policy 1D: Scenic Byways.</u> The Oregon Transportation Commission has designated Scenic Byways throughout the state on federal, state, and local roads which have exceptional scenic value. As shown in Figure 2, the Lake of the Woods highway (OR 140) and the small segment of OR 66 that connects OR 140 to US 97 are part of the "Volcanic Legacy" Scenic Byway, which is designated by the federal government as an "All American Road." For designated Scenic Byways, ODOT will consider aesthetic and design elements along with safety and performance considerations in managing and maintaining the roadway and will develop guidelines for aesthetic and design elements within the public right-of-way.

Figure 2. Oregon Scenic Byways



<u>Policy 1F: Highway Mobility Standards Access Management Policy</u>. Policy 1F sets mobility standards for ensuring a reliable and acceptable level of mobility on the highway system. The standards are used to assess system needs as part of long range, comprehensive planning transportation planning projects (such as this IAMP), during development review, and to demonstrate compliance with the Transportation Planning Rule (TPR).

Policy 1F has been revised and proposed amendments are currently available for public review. The Oregon Transportation Commission (OTC) is expected to adopt an updated Policy 1F on December 21, 2011. The draft Policy 1F standardizes a policy framework for considering measures other than volume-to-capacity (v/c) ratios. Background and actions in the draft policy language provide additional flexibility in developing and applying alternate mobility standards and generally address concerns on limitations of peak hour v/c ratio measures through new or amended policies that provide the opportunity to better balance multimodal transportation, land use, and economic development considerations. In addition, OHP Tables 6 has been amended and the v/c ratios are referred to as "targets." The targets in Table 6, Volume to Capacity Ratios for Peak Hour Operating Conditions, have all been modified to allow for a greater level of congestion in certain circumstances and locations. By defining targeted levels of highway system mobility, the policy provides direction for identifying (vehicular) highway system deficiencies, but does not prescribe what actions should be taken to address the deficiencies. With respect to plan amendments, the Highway Mobility Policy

continues to establish ODOT's mobility targets for state highways as the standards for determining compliance and compliance with the TPR (OAR 660-012-0060).

The IAMP will be developed according to the revised Policy 1F. The project team will work together to interpret the "targets" to be established for this interchange.

Policy 1G: Major Improvements. This policy requires maintaining performance and improving safety by improving efficiency and management on the existing roadway network before adding capacity. The state's highest priority is to preserve the functionality of the existing highway system. Tools that could be employed to improve the function of the existing interchange include access management, transportation demand management, improved traffic operations, and changes to local land use designations or development restrictions. After existing system preservation, the second priority is to make minor improvements to existing highway facilities such as adding ramp signals or making improvements to the local street network to minimize local trips on the state facility. The third priority is to make major roadway, or in this case, interchange, improvements. As part of this IAMP process, ODOT will work with the City of Klamath Falls and Klamath County to determine how future improvements at the interchange can implement this policy.

Policy 2B: Off-System Improvements. This policy recognizes that the state may provide financial assistance to local jurisdictions to make improvements to local transportation systems if the improvements would provide a cost-effective means of improving the operations of the state highway system. As part of this IAMP process, ODOT will work with the City and County to identify improvements to the local road system that support the planned land use designations in the vicinity of the interchanges and that will help preserve capacity and ensure the long-term efficient and effective operation of the interchanges.

Policy 2E: Intelligent Transportation Systems (ITS). This policy seeks to improve the safety and efficiency of transportation facilities, and to generally maximize operations in a cost-effective way. The policy requires coordination with the Oregon Intelligent Transportation Systems Strategic Plan.

Policy 2F: Traffic Safety. This policy emphasizes the state's efforts to improve safety of all users of the highway system. Action 2F.4 addresses the development and implementation of the Safety Management System to target resources to sites with the most significant safety issues. No intersection sites were identified as above the critical rate within the IAMP area. OR 140 west of the interchange was identified as a segment with a high rate of crashes.

The access management spacing standards established in the OHP are implemented by access management rules in OAR 734, Division 51. The rules have been updated given the passage of Senate Bill 264 in the 2011 Oregon Legislature. Pertinent to this project, there are new standards for unsignalized approaches to statewide roadways, effective January 2012. These standards are presented later in the memorandum as part of the review of OAR 734, Division 51.

Traffic signal spacing standards supersede access management spacing standards for approaches. If new signalized intersections on US 97 or OR 140 are included in IAMP recommendations, the desired minimum spacing between signalized intersections is ½ mile (2,640 feet) (OAR 734-020-470). The OR 140/OR 66 intersection is currently the only signalized intersection within the IAMP area.

Policy 3B: Medians. This policy establishes the state's criteria for the placement of medians, which can be used as part of access management plans or strategies to mitigate impacts on intersections and interchanges. It includes Action 3B.3 which requires the consideration of non-traversable

medians for modernization of all urban, multi-lane Statewide (NHS) Highways as well as all urban, multi-lane Regional Highways where posted speeds are 45 mph or greater. The criteria for consideration include:

- Forecasted average daily traffic greater than 28,000 vehicles per day during the 20-year planning period;
- A higher-than-average accident rate;
- Pedestrian crossing safety issues; and
- Topographic and alignment issues resulting in inadequate left-turn sight distances.

SB 264, effective January 2012, has amended approach permit and median regulatory language to say that ODOT: "may not impose nontraversable medians as a mitigation measure for approach permit applications unless the department first establishes that no other mitigation measures are effective or available under the circumstances."[1] The Senate bill also allows for reducing spacing standards by half for approaches on statewide, regional, and district highways that have a raised or depressed nontraversible medians.

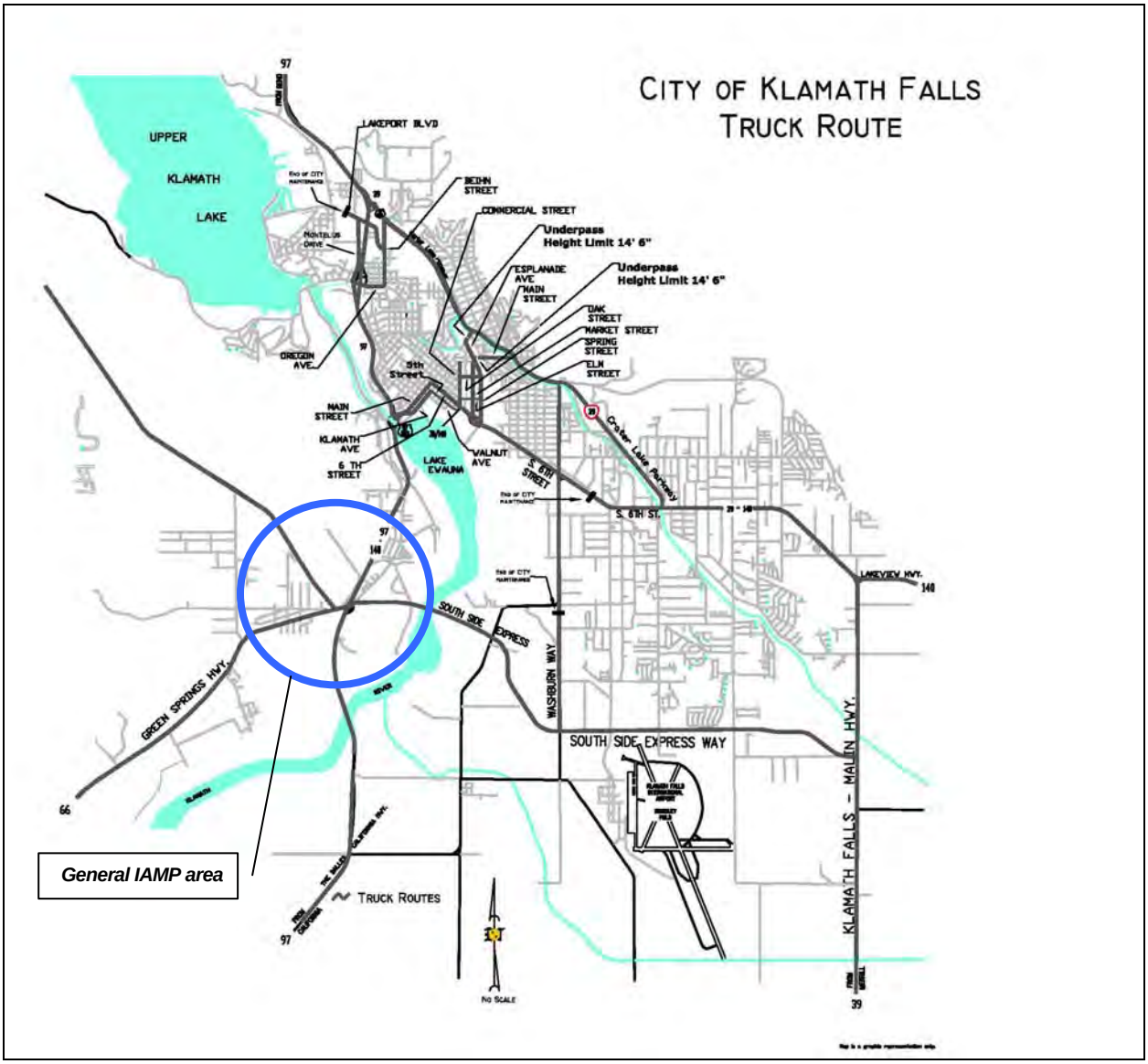
Policy 3C: Interchange Access Management Areas. This policy addresses management of grade-separated interchange areas to ensure safe and efficient operation between connecting roadways. Action items include developing interchange area management plans to protect the function of existing interchanges, provide safe and efficient operations between connecting roadways, and minimize the need for major improvements. Consistent with this policy, the Green Springs IAMP planning process will include developing and analyzing alternatives for optimizing the function and capacity of the existing interchange prior to selecting a package of improvements that will comprise the preferred alternative.

The local jurisdiction's role in access management is stated in Policy 3C as follows: "necessary supporting improvements, such as road networks, channelization, medians and access control in the interchange management area must be identified in the local comprehensive plan and committed with an identified funding source, or must be in place (Action 3C.2)." An outcome of this planning process will be local adoption of the recommendations in the IAMP, which will include an access management plan, identified funding, and, potentially, local street network improvements necessary to implement the preferred interchange design.

Policy 3D: Deviations. This policy provides the foundation for requests for state highway approach permits that require deviation(s) from access management standards. Such a request would be necessary if proposed interchange improvements cannot meet adopted State standards. Procedures for requesting deviations are included in OAR 734-051. Action 3D.5 identifies conditions to consider in evaluating requests for deviations: queuing that increases delays and unsafe operations, pedestrian and bicycle circulation, traffic controls, local road system requirements, improving connectivity to adjacent properties or local road system, potential use of channelization, or potential use of nontraversible medians.

[1] ORS 374.312(10)

Figure 3. City of Klamath Falls Designated Truck Routes



<u>Policy 4A: Efficiency of Freight Movement</u>. This policy emphasizes the need to maintain and improve the efficiency of freight movement on the state highway system. US 97 and OR 140 are designated State Highway Freight Routes. Action 4A.8 under this policy recognizes that local truck routes are important linkages in the movement of freight throughout the state and that truck routes can serve to detour trucks off the state highway system. This action obligates ODOT to coordinate with local jurisdictions when designating, managing and constructing a project on a local freight route. The local truck routes are shown in Figure 3.[2]

[2] This figure was developed by the Community Development Department in consultation from Public Works and the City Attorney, but has not been formally adopted.

Policy 4B: Alternative Passenger Modes. This policy encourages the development of alternative passenger services and systems as part of broader corridor strategies and promotes the development of alternative passenger transportation services located off the highway system to help preserve the performance and function of the state highway system. Basin Transit provides public transportation service in the interchange area (the Stewart Lennox route) and the Green Springs IAMP scope establishes the objective of improving safety, access, and mobility for pedestrians and bicyclists in the interchange area.

Oregon Freight Plan (2011)

The Oregon Transportation Commission adopted the Oregon Freight Plan (OFP) in June 2011. A modal plan of the Oregon Transportation Plan the OFP implements the State's goals, and policies related to freight. Its purpose statement is: "to improve freight connections to local, Native American, state, regional, national and global markets in order to increase trade-related jobs and income for workers and businesses." The objectives of the plan include prioritizing and facilitating investments in freight facilities (including rail, marine, air, and pipeline infrastructure) and adopting strategies to maintain and improve the freight transportation system.

The plan defines a strategic freight network by using the Oregon Statewide Integrated Model (SWIM) and SWIM2 models to identify regional commodity production and consumption for eight freight-dependent industries and corridors used to transport commodities for each industry.[3] The corridors that carry the largest value and tonnage of freight for each industry are designated as strategic corridors for those industries; US 97 is designated as a strategic corridor in the state. The US 97 corridor ranges between one and three percent for industry output flows by percent of value for the eight industries and between one and 15 percent for industry output flows by percent of total ton-miles for the eight industries. The corridor is the only major north-south freight route east of the Cascades and, though distant, can act as a parallel route and relief highway to I-5 in case of incidents on the freeway according to the OFP. A Burlington Northern Santa Fe (BNSF) and Union Pacific (UP) rail corridor runs parallel to the highway and serves as the major rail line that connects Oregon and California.

Policy and strategic direction is provided in Section 8.3, Issues and Strategies, of the OFP. The following strategies and actions relate most closely to the planning processes involved in developing the Green Springs IAMP. The recommendations included in the IAMP should be consistent with these strategies; the IAMP findings may ultimately support associated implementation (action) items in the OFP.

> ***Strategy 1.2****: Strive to support freight access to the Strategic Freight System. This includes proactively protecting and preserving corridors designated as strategic.*
>
> ***Action 1.2.1****. Preserve freight facilities included as part of the Strategic Freight System from changes that would significantly reduce the ability of these facilities to operate as efficient components of the freight system unless alternate facilities are identified or a safety-related need arises.*

[3] The corridors focus on the major state highways in the corridor but include all non-highway transportation modes such as rail, marine, air, and pipelines.

***Strategy 2.2**: Develop a process for identifying, measuring and monitoring system constraints and deficiencies.*

***Action 2.2.1**. Develop and use performance measures/factors to identify corridor performance constraints, system deficiencies and affected industries. Apply the criteria to identify system constraints on an ongoing basis. Base performance measures on research conducted by ODOT and reported in "Freight Performance Measures: Approach Analysis."*

***Strategy 2.3**: Identify and rank freight bottlenecks, corridor constraints or chokepoints, in particular those located on the strategic system. Update the ranked list periodically.*

***Action 2.3.1**. Create a set of freight planning guidelines to use for developing transportation system plans. Recommend the adoption of ranking and prioritization procedures for evaluating freight system performance as part of TSPs. In the guidelines, recommend that the TSPs detail how plans will eliminate or significantly reduce bottlenecks and constraints.*

***Strategy 2.4**: Coordinate freight improvements and system management plans on corridors comprising the Strategic Freight System with the intent to improve supply chain performance.*

***Action 2.4.1**. Define freight improvement projects specifically as those projects that support goods movement efficiency, using quantitative criteria*

***Strategy 7.1**: Work to better integrate freight into the land use planning process and to protect the existing supply of industrial (freight-dependent) land uses and freight terminals.*

***Action 7.1.1**. Support better integration of freight into the regional and local land use planning processes. Encourage local governments to integrate industrial land use planning into comprehensive plans and all other plans and actions relating to land use controls.*

Access Management Rule (OAR 734-051)

Oregon Administrative Rule 734-051 defines the State's role in managing access to highway facilities in order to maintain functional use and safety and to preserve public investment. The Rule includes spacing standards for varying types of state roadways and criteria for granting right of access and approach locations onto state highway facilities. OAR 734-051 is in the process of being amended given the passage of Senate Bill 264 in the 2011 Oregon Legislature. A temporary version of OAR 734-051 has been adopted and is in effect until the OTC considers approval of final amendments to the rule at its meeting on January 25, 2012.

SB 264 strives to allow more consideration for economic development when developing and implementing access management rules. The new laws will result in substantial changes in rules about how ODOT manages highway approach road permitting. Among the several changes, the new laws will change how ODOT deals with approach road spacing, highway improvements requirements with development, and traffic impact analyses requirements for approach road permits. The law's provisions take effect on January 1, 2012.

New spacing standards are established in temporary OAR 734-051 for unsignalized at-grade approaches to statewide highways, expressways, and district highways and in urban and rural areas where average daily traffic (ADT) is either less than or equal to 5,000 motor vehicles.[4] These standards are presented in Tables 2, 3, and 4 below. (See the discussion of state highway classifications under OHP Policy 1A on pp. 4-5 of this memorandum.)

Table 2. Spacing Standards for Highways, ADT < or = 5,000 (OR 270)

Posted Speed (mph)	**Spacing (feet)**			
	Regional and District Highways, Rural and Urban (feet)	Statewide Highways, Rural Areas (feet)	Statewide Highways, Urban Areas (feet)	Highways, Unincorporated Communities, Rural Areas (feet)
55 and higher	650	1,320	1,320	1,320
50	425	1,100	1,100	1,100
40-45	360	990	360	750
30-35	250	770	250	425
25 and lower	150	550	150	350

Table 3. Spacing Standards for Statewide Highways, ADT > 5,000 (US 97, OR 140, OR 66)

Posted Speed (mph)	**Spacing (feet)**			
	Expressway, Rural Area	Expressway, Urban Area	Rural Area	Urban Area
55 and higher	5,280	2,640	1,320	1,320
50	5,280	2,640	1,100	1,100
40-45	5,280	2,640	990	800

[4] Tables 3, 4, and 6 in 734-051-4020(8), Standards and Criteria for Approval of Private Approaches, Approach Spacing Tables

Posted Speed (mph)	**Spacing (feet)**			
30-35	-	-	770	500
25 and lower	-	-	550	350

Table 4. Spacing Standards for District Highways, ADT > 5,000 (OR 66)

Posted Speed (mph)	**Spacing (feet)**			
	Expressway, Rural Area	Expressway, Urban Area	Rural Area	Urban Area
55 and higher	5,280	2,640	700	700
50	5,280	2,640	550	550
40-45	5,280	2,640	500	500
30-35	-	-	400	350
25 and lower	-	-	400	250

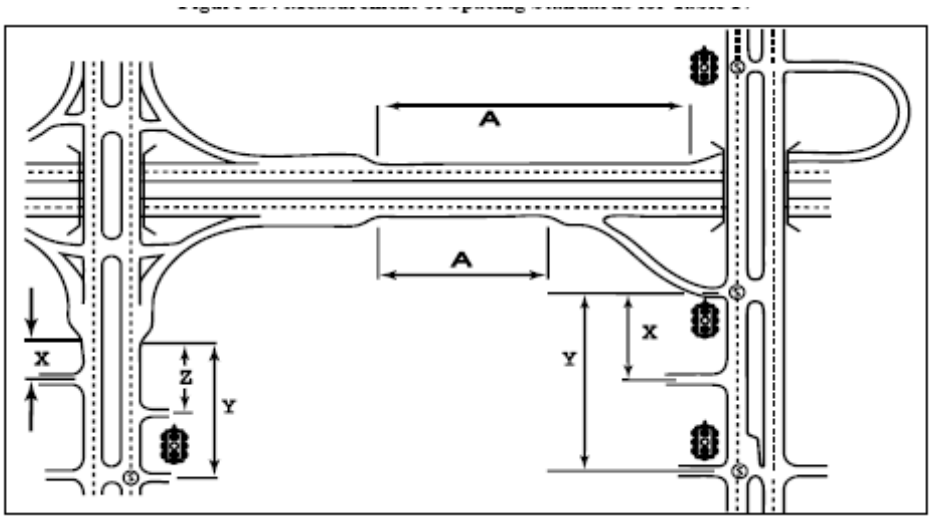
Temporary OAR 734-051-4020 (Table 5 and Figure 4) presents minimum spacing standards for the distance between the start and end of adjacent interchanges and the distances between interchange elements and approach roads.[5]

Table 5. Minimum Spacing Standards Applicable to Freeway Interchanges with Multi-Lane Crossroads

Type of Area	**Spacing Dimensions (feet)**			
	A	**X**	**Y**	**Z**
Fully Developed Urban	5,280	750	1,320	990
Urban	5,280	1,320	1,320	1,320
Rural	10,560	1,320	1,320	1,320

[5] Table 8 and Figure 2 in 734-051-4020(8), Standards and Criteria for Approval of Private Approaches, Approach Spacing Tables

Figure 4. Diagram of Spacing Standards for Table 2



Notes:
1) If the crossroad is a state highway, these distances may be superseded by the Access Management Spacing Standards, providing the distances are greater than the distances listed in the above table.
2) No four-legged intersections may be places between ramp terminals and the first major intersection.
3) No application will be accepted where an approach is in a restricted area as defined in OAR 734-051-3010(2).

Notes for Table 5 and Figure 4:
A = Distance between the start and end of tapers of adjacent interchanges.
X = Distance to 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.

However, SB 264 also includes the important following provision regarding spacing standards in IAMP management areas:

> *Special transportation areas, access management plans, corridor plans, interchange aea management plans or interchange management areas, as designated by the Oregon transportation Commission, may have spacing standards that take precedence over the spacing standards…*

Interchange improvements that are proposed in the IAMP will need to meet or improve, "by moving in the direction of the access management spacing standards" by means of an access management strategy, plan, or mitigation proposal.[6] Section -7010 of temporary 734-051 identifies when, how and why ODOT will develop access management plans and interchange area management plans for particular sections of a highway. The Rule states that:

> *(1) General Provisions. The department encourages the development of access management plans and interchange area management plans to maintain and*

[6] Temporary OAR 734-051-1070(2), (3), and (4)

improve highway performance and safety by improving system efficiency and management before adding capacity. Where adopted, access management plans and interchange area management plans:

(a) Must be used to evaluate development proposals; and

(b) May be used to determine mitigation for development proposals.

(c) Must be used in developing highway projects.

(2) Oregon Transportation Commission Adoption. Access management plans and interchange area management plans must be adopted by the commission as a transportation facility plan consistent with the provisions of OAR 731-015-0065. Prior to adoption by the commission, the department will work with local governments on any amendments to local comprehensive plans and transportation system plans and local land use and subdivision codes to ensure the proposed access management plan and interchange area management plan is consistent with the local plan and codes.

(3) Prioritization of Access Management Plans. The priority for developing access management plans should be placed on facilities with high traffic volumes or facilities that provide important statewide or regional connectivity where:

(a) Existing developments do not meet spacing standards;

(b) Existing development patterns, land ownership patterns, and land use plans are likely to result in a need for deviations; or

(c) An access management plan would preserve or enhance the safe and efficient operation of a state highway or interchange.

(4) Preparers of Access Management Plans. An access management plan may be developed:

(a) By the department;

(b) By local jurisdictions; or

(c) By consultants.

(5) Access Management Plan Criteria. An access management plan must comply with all of the following criteria, unless the plan documents why a criterion is not applicable:

(a) Include sufficient area to address highway operation and safety issues and development of adjoining properties including local access and circulation.

(b) Describe the roadway network, right of way, access control, and land parcels in the analysis area.

(c) Be developed in coordination with local governments and property owners in the affected area.

(d) Be consistent with any applicable interchange area management plan, corridor plan, or other facility plan adopted by the commission.

(e) Include polices, provisions and standards from local jurisdiction comprehensive plans, transportation system plans, and land use and subdivision codes that are relied upon for consistency and that are relied upon to implement the access management plan.

(f) Contain short, medium, and long-range actions to improve operations and safety and preserve the functional integrity of the highway system.

(g) Consider whether improvements to local street networks are feasible.

(h) Promote safe and efficient operation of the state highway consistent with the highway classification and the highway segment designation.

(i) Consider the use of the adjoining property consistent with the comprehensive plan designation and zoning of the area.

(j) Provide a comprehensive, area-wide solution for local access and circulation that minimizes use of the state highway for local access and circulation.

(6) Interchange Area Management Plans. Except as provided in section 8 of this rule, an interchange area management plan is required for new interchanges and should be developed for significant modifications to existing interchanges. The department encourages the development of an interchange area management plan to plan for and manage grade- separated interchange areas to ensure safe and efficient operation between connecting roadways:

(a) The department and local governmental agencies develop interchange area management plans to protect the function of interchanges by maximizing the capacity of the interchanges for safe movement from the mainline facility, to provide safe and efficient operations between connecting roadways, and to minimize the need for major improvements of existing interchanges;

(b) The department will work with local governments to prioritize the development of interchange area management plans to maximize the operational life and preserve and improve safety of existing interchanges not scheduled for significant improvements; and

(c) Priority should be placed on those facilities on the interstate highway system with cross roads carrying high volumes or providing important statewide or regional connectivity.

(7) Interchange Area Management Plan Criteria. An interchange area management plan must comply with the following criteria, unless the plan documents why compliance with a criterion is not applicable:

(a) Be developed no later than the time an interchange is designed or is being redesigned.

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

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

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

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

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

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

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

Statewide Transportation Improvement Program (2010-2013)

The State Transportation Improvement Program (STIP) is the programming and funding document for transportation projects and programs statewide. The projects and programs undergo a selection process managed by ODOT Regions or ODOT central offices. The document covers a period of four years and is updated every two years. The development of the Green Springs IAMP is included in the adopted STIP (2010-2013) and is funded for FY 2010 and 2011(see Table 6). No other projects in the vicinity of the interchange are listed. A draft STIP for 2012 through 2015 is under development and has not been adopted at this time.

Table 6. Green Springs IAMP STIP Projects

Section	Route	Highway Name	Total Cost	Description	Year (FFY)
OR66:GREEN SPRINGS INTERCHANGE AREA MANAGEMENT PLAN*	OR-66	GREEN SPRINGS	$425,000	PLANNING PROJECT	2010

Source: http://highway.odot.state.or.us/cf/STIPSrch/index.cfm

* Projects within the Klamath Falls Urban Growth Boundary (UGB).

Statewide Planning Goal 9

The intent of Goal 9, Economic Development, is to "provide adequate opportunities throughout the state for a variety of economic activities vital to the health, welfare, and prosperity of Oregon's citizens." Local comprehensive plans must support this goal and should include an assessment of the jurisdiction's existing economic conditions and comparative advantages and policies that both generally and specifically address economic development and development opportunities. Local jurisdictions must provide an adequate supply of sites with characteristics suitable for a variety of employment and economic development and limit development around identified industrial sites to that which is compatible with uses allowed on the sites. The goal suggests implementation measures such as tax incentives and disincentives, preferential assessments, land use regulations, capital improvement planning and programming, and fee or partial fee acquisition.

Ultimately, findings prepared for adoption of the IAMP should demonstrate how the preferred alternative for future interchange area improvements supports this goal and the City's economic development goals. The City has designated land southwest and northeast of the interchange for commercial and industrial uses. Transportation analysis performed for the IAMP will rely on existing land use designations (i.e. planned land uses).[7] Any future proposals for intensification of land uses in the area that may require re-zoning will depend on the transportation and land use implementation measures adopted as part of the IAMP, and will need to comply in particular with Goal 12 and the Transportation Planning Rule (TPR) so that employment development in the area can occur in a way that protects the capacity and safe function of the interchange and any future state transportation investments. An overview of an economic opportunity analysis performed for the Klamath Falls Urban Area in 2009 is presented later in this memorandum.

County and City Plans and Regulations

Klamath County Comprehensive Plan (2010)

The Klamath County Comprehensive Plan was originally adopted in 1984 and last updated in January 2010. The Comprehensive Plan includes general transportation policies in the Goal 12 chapter; more detailed transportation policies are included in the Klamath County Rural Transportation System Plan, reviewed separately in this memorandum. Relevant policies from the Comprehensive Plan are listed below by Goal.

[7] Land use assumptions will be documented in Technical Memorandum #3.

Goal 10 – Housing:

11. POLICY: The County will encourage the use of planned unit development (PUDs) and other forms of clustered housing that introduce innovative and cost-effective approaches to siting, block layout, design and landscaping.

Goal 9 – County Economy:

1. POLICY: The County shall work with local governments to coordinate and compile appropriate industrial and commercial site availability in order to develop a common regional economic development strategy.

13. POLICY: The County shall maintain a sufficient amount of industrial land in large parcels in order to encourage economic diversity and development in the community.

Goal 11 – Public Facilities:

1. POLICY: In order to achieve the requirements of State-wide Planning Goal 11, the County shall, in cooperation with the City of Klamath Falls, prepare and adopt a public facilities plan describing the water, sewer, transportation, and other urban facilities and services which are to support land uses within the Klamath Falls UGB.

2. POLICY: The County may encourage the development of a public facility or service in an urbanizable area only when there is provision for the coordinated development of all other urban facilities and services appropriate to the area.

Goal 12 – Transportation:

5. POLICY: The width and spacing of driveways along arterials shall be restricted. Where necessary, turning lanes cut out of abutting property or the construction of parallel frontage roads shall be required, if adequately proven to be necessary by the governing body or agency.

Implementation: The Land Development Code establishes development standards regulating ingress and egress of land uses abutting major arterials.

6. POLICY: Higher density residential development should when feasible, be located within walking distance (1,000 feet to one quarter mile) of major arterials.

Implementation: The land use plan should locate, when feasible, higher density residential development near major arterials, and the Land Development Code shall require pedestrian walkway along future streets.

7. POLICY: The County shall encourage local governments to improve the convenience and safety of pedestrian and bicycle transportation.

11. POLICY: A safe, convenient and economic transportation system, adequate to serve anticipated growth, shall be developed that will minimize adverse social, economic and environmental impacts and costs of the transportation systems.

Goal 14 – Urbanization:

> *3. POLICY: During partitioning or subdividing of urban land, the County shall encourage parcels of adequate dimension so as to maximize the utility of land resources and enable the logical and efficient extension of services to such parcels.*
>
> *Implementation: The land use plan designates residential densities that follow a hierarchy of high to low densities from central to outer areas.*

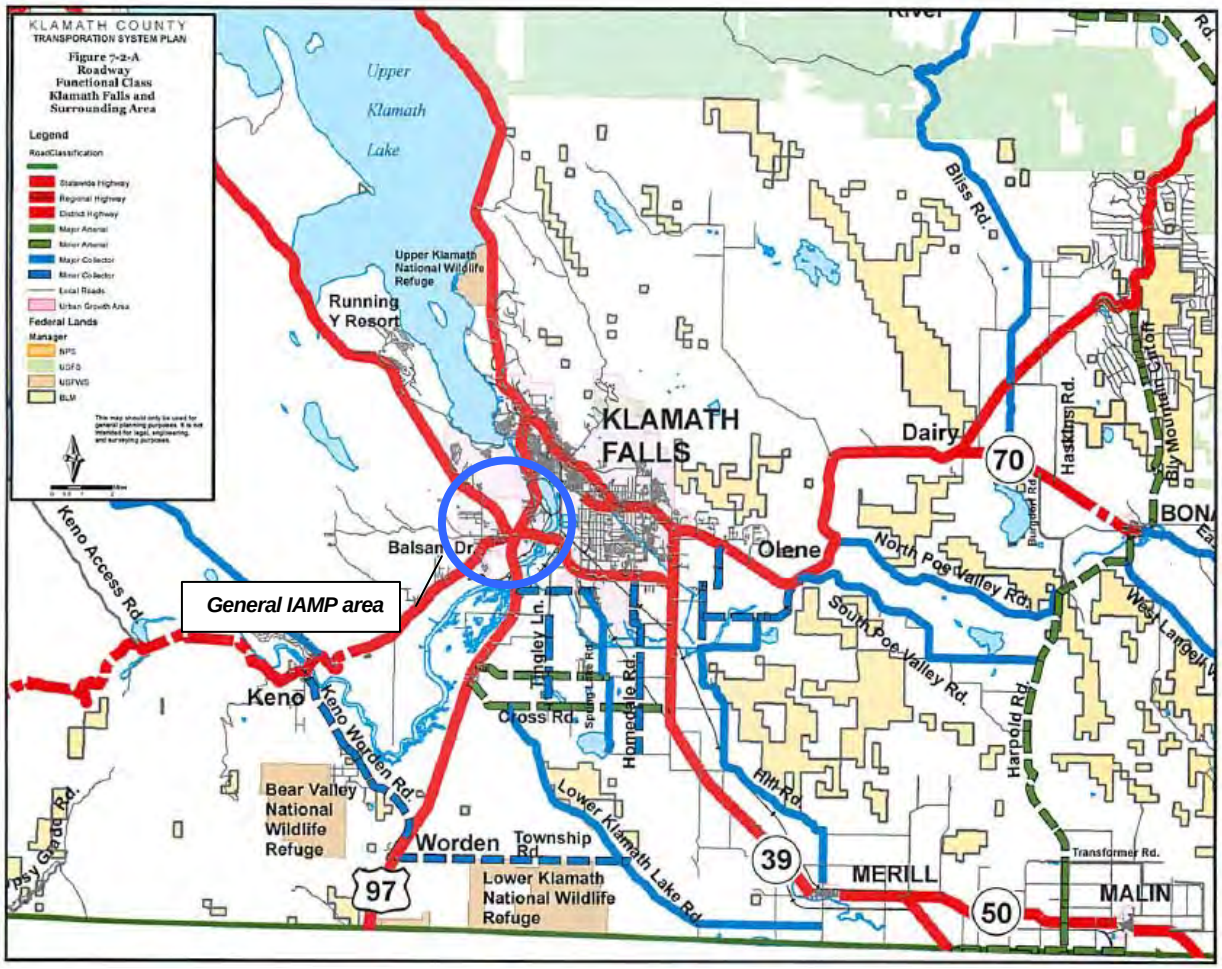
IAMP goals and policies will need to be found consistent with relevant County goals and policies. In cases where the existing County goals and policies are not consistent with recommended implementation measures, additions or amendments to the Comprehensive Plan may be prepared and proposed.

Klamath County Rural Transportation System Plan (2010)

The Klamath County Rural Transportation System Plan ("County TSP") provides for transportation development in the rural areas of the County. The planning area for the Klamath County TSP is generally outside the Klamath Falls UGB. Overall, the TSP includes transportation issues related to state and county facilities, and not urban facilities, and while land to the northwest of the interchange is outside of city limits and under County jurisdiction, it is within the UGB and considered urban.

Chapter 7 includes sections addressing roads, transit, bicycle and pedestrian facilities. The Roadway Element includes a map of roadway functional classification around Klamath Falls, Figure 5 below, and a description of each classification.

Figure 5. Klamath County Roadway Functional Classification Map



The purpose and management objectives of each of these classifications are summarized below.

- Rural Principal Arterials (State Highways) serve as the primary gateways in and out of the Klamath County area. These highways are critical to the county because they generally serve the highest traffic volumes and longest trips between major attractors. Access control is critical on these facilities to ensure that they operate safely and efficiently.

- The Rural Minor Arterial System, in conjunction with the rural principal arterial system, links cities, larger towns, and other traffic generators that are capable of attracting travel over longer distances; provides routes for interstate and inter-county travel; runs within a reasonable distance of all developed areas of the state; and provide for relatively high travel speeds and minimum interference to through movement.

- Rural Collector routes generally serve intra-county rather than statewide travel with predominant travel distances shorter than on arterial routes and more moderate speeds.

    - Major Collector Roads serve county seats not on arterial routes, larger towns not directly served by the higher systems, and other traffic generators of equivalent intra-

county importance; link these places with nearby larger towns or cities, or with routes of higher classifications; and serve the more important intra-county travel corridors.

  - Minor Collector Roads accumulate traffic from local roads and bring all developed areas within reasonable distances of collector roads; provide service to smaller communities; and link locally important traffic generators with their rural hinterland.

- The rural local road system primarily provides access to land adjacent to the collector network and serves travel over relatively short distances. The local road system constitutes all rural roads not classified as principal arterials, minor arterials, or collector roads.

Table 7-1 of the TSP (Table 7 below) summarizes the design standards that are found in the *Klamath County Department of Public Works Standard Drawing,* which is Appendix "A" to the Land Development Code. Proposed improvements to local roadways under County jurisdiction that are recommended as part of the preferred alternative for the Green Springs interchange will need to be designed to these standards.

Table 7. Recommended Design Standards for Klamath County Road Department

Roadway Design Standards	
Vehicle Lane Widths: (minimum widths)	Truck Route = 12 feet Arterial = 12 feet Collector = 12 feet Local = 10-11 feet Turn Lane = 10-14 feet
On-Street Parking:	Not Applicable
Bicycle Lanes: (minimum widths)	Arterials = 4' paved shoulder Collectors = 4' paved shoulder Curb & Gutter Streets = 5' Standard Bike Lane = 6'
Sidewalks:	Shoulder or separated pathway
Landscape Strips:	Optional
Medians:	Optional
Neighborhood Traffic Management / Traffic Calming:	None
Turn Lanes:	When warranted
Maximum Grade:	Arterials = 6 % Collectors = 6 % Local Streets = 10 %

In Klamath County, rural roadways generally do not require separate bicycle or pedestrian facilities. Bicyclists and pedestrian are generally accommodated on the shared roadway or on a shoulder, depending on traffic volumes. Bike lanes or shared roadway facilities may be provided on arterials and collectors in areas where forecasted traffic volumes and bicycle use warrant their consideration. In areas with high bicycle and/or pedestrian activity, the standards suggest a pathway, preferably located on both sides of the roadway, separated from the roadway by at least five feet of greenbelt or a drainage ditch.

The Roadway Element also addresses access management, acknowledging ODOT's standards for state roadways, and lists proposed access management guidelines by roadway functional classification for county roads in Table 7-5, reproduced in Table 8. These access management

guidelines are generally not intended to eliminate existing intersections or driveways; they are intended to be applied as new development occurs.

Table 8. Klamath County Access Management Standards by Functional Classification

Functional Class	System Spacing	Minimum Spacing	Corner Clearance
Rural Major Arterial	1 mile	1,000	1,000
Rural Minor Arterial	1 mile	500	600
Rural Major Collector	¼ mile	250	100
Rural Minor Collector	¼ mile	250	50
Rural Local Street	200-400 feet	75	25

The project list included in Chapter 7 for roadways and freight includes several projects in the vicinity of Klamath Falls urban area. Projects within the Interchange Management Study Area (Technical Memorandum #2: IAMP Goals, Objectives, and Evaluation Criteria) include the following:

- 140-4. (High priority) Ridge Water Drive-OR 66/OR 140 Jct.: {Mileposts 65.25-68.76} Widen highway to four lanes with median and median barrier, guardrail, signs.
- 140-5. (High priority) Orindale Interchange: {Milepost 67.22} Construct an Interchange to connecting Orindale Road and new developments, access management, frontage roads.
- 66-1. (Medium priority) OR 66/OR140/US 97 at Green Spring Interchange: {Milepost 58.99} Interchange improvement - add south bound on and off loop ramps to eliminate left turns.
- 66-2. (Low priority) Orindale Road – OR 66/OR 140/US 97 Jct.: {Mileposts 57.81-58.99} Construct four lanes highway with continuous left turn refuge, curbs and sidewalks, drainage, and access management.

The Green Spring interchange is also identified as projects for further consideration but are beyond the planning horizon of the TSP.

> *Interchange at Highways 97/140/66: The current configuration of this interchange is inefficient and substandard; however, it will also be very costly to upgrade to a grade-separated, free-flowing highway interchange. Options for funding this project should be explored and studied in the years to come and this project should be prioritized in future updates of this Plan. (The Access Management Plan for this project is in the 2008-2011 STIP).*

Klamath County Land Development Code

The Land Development Code (LDC) regulates all land development within Klamath County that is not within an incorporated city, including land within the Klamath Falls Urban Growth Boundary (UGB) that is not inside city limits. Requirements pertaining specifically to the Klamath Falls Urban Area are located throughout the LDC. An assessment of LDC compliance with the requirements of the Transportation Planning Rule, as code requirements relate to the Urban Area, is found in Section II, Table 2 of this memorandum.

Chapter 10 includes general provisions about the use of the code. Chapter 20 establishes uniform procedures for reviewing permit applications and for making decisions on matters pertaining to the use and development of lands within Klamath County; Chapter 30 prescribes procedures for public hearings, public notice and appeal of decisions reached as a result of the review procedures described in Chapter 20. Chapter 40 provides standards and criteria for development permit and change of land use applications. Chapter 50 establishes land use zones to implement the goals and policies of the Comprehensive Plan, defines the purpose of each zone, and specifies the types of land uses appropriate for each zone.

Chapter 60 and 70 establish site development standards including those that pertain to transportation. Chapter 60 includes planning standards, such as Lot Size and Shape (Article 61); Building Heights and Setbacks (Article 62); and Parking (Article 68). Chapter 70 has public works standards addressing vehicular access and circulation and other infrastructure requirements. Section 71.050, Improvements in the Klamath Falls Urban Area, establishes required right-of-way improvements for the Urban Area.

Implementation measures for the Green Springs IAMP located on land or facilities under County jurisdiction will be developed in compliance with the transportation and zoning standards established in the Klamath County Land Development Code. Where the existing regulations are not consistent with recommended implementation measures or need to be otherwise augmented in order to most effectively implement the IAMP, an outcome of this planning process will be proposed amendments to the code.

City of Klamath Falls Comprehensive Plan (1981)

The IAMP is intended to be adopted as a refinement to the City of Klamath Falls Transportation Systems Plan and, as such, will also be an element of the City's Comprehensive Plan. The City of Klamath Falls Comprehensive Plan was adopted in 1981 and the document itself has not been updated since that time.[8] Most of the background documentation describing existing transportation conditions dates back to the late 1970s and is not relevant to planning the future transportation system. Despite the age of the document, the adopted Comprehensive Plan remains the City's policy basis on which to make decisions. However, because of the age of the document, the fact that the City adopted updated transportation goals in the 1998 TSP, and is in the process of reviewing an update of the TSP update that is based on more recent conditions and analysis, the goals and policies from the Comprehensive Plan Transportation Element are not included in this memorandum. The following goals and policies also have bearing on transportation planning and are from other elements of the Comprehensive Plan.

[8] In September 2003 the City of Klamath Falls convened a stakeholder committee to participate in a Comprehensive Plan and Code Audit funded by the Transportation and Growth Management (TGM) Program. The Final Audit Report (Angelo Eaton & Associates, 2004) contains recommendations for Comprehensive Plan and Community Development Ordinance amendments that are consistent with "smart development" principles, which are also described in that Report. A Comprehensive Plan update followed the audit, resulting in a May 2005 draft document that included updated land use and transportation policies. The 2005 Draft City of Klamath Fall Comprehensive Plan was not adopted by the City.

K. HOUSING ELEMENT

Housing - Policies

97. The interrelationship of transportation, job sites, shopping sites, recreation, open space and scenery, education, and similar activities will be emphasized to provide maximum and efficient use of public facilities and service.

U. LAND USE ELEMENT

Land Use - Policies

231. Residential densities adjacent to major arterials will be increased.

233. Core area residential densities will be as high as practical for energy and transportation advantages.

234. Maintenance and improvement of established residential areas will be promoted.

238. Strip commercialism will be avoided, due to its adverse effects on traffic, energy, safety, and convenience.

V. URBANIZATION ELEMENT

Urbanization - Policies

153. Coordination of comprehensive planning with State and County officials will be promoted.

Transportation goals and policies adopted as part of the IAMP will be additive to the goals and policies adopted as part of the TSP update if the TSP is adopted and replaces the Transportation Element in the Comprehensive Plan.

Klamath Falls Urban Area Transportation System Plan (2011/in progress)

The City of Klamath Falls Urban Area Transportation System Plan (TSP) serves as the management document for existing and future transportation facilities within the city and its UGB. The TSP contains an inventory of exiting facilities and transportation conditions, as well as forecasted transportation demands for the area over an approximately 20-year planning horizon. Recommended designations and standards for and improvements to the transportation system are provided along with a funding plan and implementation measures. The Green Springs IAMP will serve as a refinement plan for the TSP.

The TSP is in the process of being updated; City and County adoption hearings are scheduled for early 2012. The following transportation planning goals currently being considered for adoption apply to developing the Green Springs IAMP.

Goal 1 – Ensure a safe and efficient transportation system for all users.

Goal 2 – Provide access to the transportation system for all users.

Goal 3 – Integrate adequate bicycle and pedestrian pathways, sidewalks, and bicycle lanes through the community, particularly to connect residential areas with schools and activity centers.

Goal 4 – Improve the local circulation system to reduce the community's reliance on State Highways to travel to local destinations.

Goal 5 – Build and maintain the transportation system to facilitate economic development in the region.

Goal 6 – Improve system performance by balancing mobility and access, particularly along main travel routes.

Goal 7 – Minimize the impacts of transportation system development on the natural and built environment.

Planned Roadway projects section (p. 66, September 2011 Draft TSP): "Similarly, no improvements are shown for the intersection in the vicinity of the OR 66/US 97 interchange because of a forthcoming Interchange Area Management Plan (IAMP) for the vicinity. The IAMP will define the specific improvements that will subsequently be amended into the TSP.

Proposed improvements to local roadways that are recommended as part of the preferred alternative for the Green Springs interchange will need to be designed to these standards.

Table 9. City and County Access Spacing Standards

Functional Classification	Intersection Spacing	Minimum Driveway Access Spacing
Major arterial	¼ mile	300 feet
Collector	¼ mile	100 feet
Local street	Minimum 400 feet Maximum 600 feet	None

Implementation (code) language being recommended through the TSP update process that affects or addresses the interchange area includes proposed traffic impact studies (TISs) and access management measures. Traffic impact study requirements would be established in the City of Klamath Falls Community Development Ordinance (CDO) Section 14.051 and referenced as needed elsewhere in the code. Access measures, such as shared access and reciprocal access, are proposed in CDO Chapter 14 (Private Site and Public Facility Standards) , Section 14.050 (Access and Driveways).

Klamath Falls Urban Area Economic Opportunity Analysis (2009)

The 2009 Economic Opportunities Analysis and Long-Term Urban Land Need Assessment prepared by the firm Johnson and Gardner is referred to as the Klamath Falls Urban Area Economic

Opportunity Analysis (KFEOA). The analysis of potential urban growth scenarios is intended to assist the City in determining urban reserves needs over 20-year and 50-year planning periods. The analysis used Statewide Planning Goal 9 Economic Opportunities Analysis methodology and documentation requirements to forecast employment land demand.

The KFEOA has been adopted by the City and includes goals and policies for the Klamath Falls Urban Area (i.e., land within the Klamath Falls UGB) that will guide the City's future economic development and employment land decisions. Related to the City's goal to ensure an adequate land supply to accommodate economic growth (Goal 3, p. 70), the City will: "Consider the transportation infrastructure needs of target industry opportunities when preparing Transportation System Plan updates and corridor plans to implement the City's Goal 9 objectives (Implementation 3-5(c))."

The KFEOA presents national, regional, and local economic trend analysis and explores the area's regional competitiveness in specific industry sectors including wood products, educational and vocational training, medical services and bioscience, and emerging sectors (renewable energy and regional retail). A baseline forecast of total employment for Klamath Falls between 2008 and 2028 estimates an increase of 6,418 jobs, reflecting an average annual growth rate (AAGR) of 1.2% (Figure 16, KFEOA). Employment is estimated to grow in the retrial trade sector, the education and health services sector, and, at an accelerating rate, the professional and business service sector. The wood product sector is not forecasted for significant growth, adding less than 100 new manufacturing jobs in the Klamath Falls urban area by 2028.

The KFEOA also includes alternative growth scenarios that assume a higher average annual growth rate than the baseline scenario. These scenarios assumptions result in 883 to 1,766 new jobs in emerging industry and 4,856 to 8,238 jobs in the other industry sectors more than the baseline scenario over the planning period. The 20-Year Supply/Demand Reconciliation section includes the estimates of gross demand and need for employment land by type ("site category"). In summary, the city has a surplus of commercial and retail land under the baseline scenario, but a deficit of such land, particularly retail commercial, under the high growth alternative.

The KFEOA includes a subregional commercial land analysis (Appendix G) that divides the urban area into four subregions (North, South, East, and West), the West subregion encompassing the Interchange Management Study Area (Technical Memorandum #2: IAMP Goals, Objectives, and Evaluation Criteria). The report documents that currently the majority of Klamath Falls' commercial activity occurs along its major transportation corridors on the east side of the river and that little commercial activity occurs west of the Klamath River. However, an analysis of commercial land needs on a subregional basis forecasts that only the West subregion will have a short-term deficit of commercial land with a net deficit range of 27.1 to 37.9 acres.

While the KFEOA does not include a full locational analysis indicating where land needs may be satisfied in the future, it presents findings from a Buildable Lands Inventory that identify vacant and redevelopable sites that are potential employment sites (Figures 27-29, KFEOA). A large commercial site identified in the southwest quadrant of the Green Springs interchange is considered developable over the long-term with the understanding that: "access constraints and potential reconciliation with long-term transportation plans for the aforementioned intersection makes the site short-term constrained (pp. 53-54)."

Klamath Falls Community Development Ordinance

The Community Development Ordinance (CDO) consists of Chapters 10 through 14 of the City's Code. The CDO regulates all land development within the City Limits. Chapter 10 establishes the application and hearings procedures for land use decisions within the City. Chapter 11 governs land development review and includes procedures and requirements for Design Review, Conditional Use Permits, land division, variances, and zone changes. Chapter 12 establishes the zoning in the City, including the uses permitted and the site standards for each zone. City boundary amendments and annexation procedures are governed by Chapter 13, which details procedures and provides the equivalency table of County/City land use and zoning classification to determine what zone should be applied to property upon annexation.

Site development standards are contained in Chapter 14. Chapter 14 includes requirements for access, parking, landscaping, and bicycle facilities. Ordinance provisions that implement the City's TSP are reviewed in Table 1 of this memorandum.

The following sections of the CDO contain provisions that regulate transportation facilities and improvements in the city:

- Sections 12.360-12.395 Planned Unit Development
- Section 14.010 Off-Street Parking Requirements.
- Section 14.050 Access and Driveways
- Section 14.390 Vision Clearance
- Sections 14.450-14.490 Bikeways.

A possible outcome of the IAMP planning process is the need for local development requirements related to preserving the function and capacity of the interchange and ensuring the safety of those who use the facility. The updated TSP that will soon be adopted includes proposed development code amendments that will help meet these objectives, such as proposed TIS, access management requirements, and coordination with ODOT.

Klamath Falls West Side Refinement Plan (2006)

The West Side Refinement Plan (Refinement Plan) was developed to address transportation needs for approximately 2,000 acres west of Highway 97, south of Lakeshore Drive, and north of Oregon 140/Oregon 66 (see figure on p. 2 of the Refinement Plan). The Refinement Plan addresses recent growth and planned development in the West Side, including the Southview PUD and the Castle Ridge Destination Resort. The Refinement Plan includes an assessment of the existing (2006) transportation system, provides an evaluation of the impacts of growth, and identifies a package of improvement projects that comprises the preferred alternative.

The stated objectives for the Refinement Plan include planning the transportation system to accommodate future build-out of the area (approximately the year 2025), maintaining the functional classification of Lakeshore Drive (collector), and access management for OR 140 that is consistent with state requirements (p. 4). Traffic conditions were evaluated for 2005 and 2025; level-of-service (LOS) and volume-to-capacity (v /c) ratios were generated for study area intersections to assess traffic operations (Table 2). The Refinement Plan shows that several intersections and highway interchange ramps will not meet operational standards by 2025 if no improvements or new facilities are constructed (p. 6-7).

Seventeen "packages" of transportation system alternatives to mitigate future traffic impacts were developed and analyzed for the Refinement Plan. With input from the public, these alternatives were refined, and then analyzed using ODOT modeling techniques to find a combination of improvements (the "preferred alternative") that could be phased to meet the development demands of the area.

The modeling assumed approximately 3,827 single-family homes in the West Side. The results of the modeling confirmed that both highway and collector street improvements are needed to optimally disperse traffic throughout the transportation network. A future collector street would provide a direct connection between population centers in the West Side, would delay needed capacity improvements on OR 140, and would help moderate the cost and complexity of the future US 97/OR 140/US 66 interchange replacement project (p. 10 in the plan). The Refinement Plan evaluated six different collector street options, concluding one where the Cypress Avenue connection attracted the most trips to and from the West Side, making it the top-ranked corridor for connecting the West Side to downtown Klamath Falls. Due to possible technical engineering issues, and at the direction of the Technical Advisory Committee, the Refinement Plan recommended a second option for the collector street connection, one north of Lindley Way as an "alternate connection for connecting the West Side to Klamath Fall's regional transportation network (p. 12 and Figure 3 of the Refinement Plan)." The recommended TSP project list is provided in Table 6 of the Refinement Plan plan, Table 10 below, and the proposed improvements are shown in Figure 2 of the Refinement Plan.

Table 10. Transportation Improvements Recommended for the West Side Refinement Plan Area

Roadway Improvement Projects	Cost Estimate	Priority
IAMP and interchange reconstruction project – single-point urban interchange (SPUI) at US 97 and Oregon 140, traffic signalization of SPUI ramps at OR 140. Closure of Balsam Drive at OR 66. Closure of Delap Pit Road at OR 140. Improve a local street connection between Balsam Drive and OR 66. Close Green Springs at existing OR 140 location. Modified access for Delap Pit Road, Balsam Drive, and Green Springs.	$ 30 million	Short term for IAMP / Long term for project construction
OR 140 widen – 5 lanes with bike lanes from Pine Valley to OR 66	$ 10 million	Short term
OR 140 realignment to the west at OR 66	$ 5 million	Long term
Green Springs Drive/Memorial Drive Under-Crossing (right-in/right-out only access to Oregon 140)	$ 6 million	Long term
Main Street Interchange Improvements including traffic signalization at ramps and relocation of US 97 southbound ramps to Riverside Drive, and left turn channelization on Riverside Drive.	$ 12 million	Long term
Green Springs Drive/Riverside Drive at Dover – intersection reconstruction including channelization and left turn lanes. Closure of Riverside at Green Springs north of Lindley Way (Green Springs to function as main street).	$ 2 million	Long term
Pine Valley PUD – local street (not gated) connection from OR 140 to Lakeshore Drive – *potential future connection*		
Local street connection between Pine Valley PUD and Southview		
OR 140 at Orindale Road – full interchange	$ 8 million	Long term
OR 140 at Pine Valley – interchange or left turn fly-over ramps	$ 5 million	Long term
Option #1 - Cypress Connection with sidewalks and multi-use path	$ 6 million	Long term
Option #2 – Collector Street north of Lindley with bike lanes and sidewalks	$ 8 million	Long term
Multi-Use Path connections	$ 10 million	Long term
Intersection Improvement Projects	**Cost Estimate**	**Priority**
OR 140 at Orindale Road – traffic signalization (interim only)	$ 150,000	Short term
OR 66 at Orindale Road – traffic signalization	$ 150,000	Short term
Orindale Road at Balsam Drive – construct NB and SB left turn lanes – review traffic control (potential signalization)	$ 250,000	Long term
Nevada – Oregon Avenue at US 97 ramps – traffic signalization	$ 300,000	Short term
Nevada Avenue at Montelius – intersection reconstruction to a right-in/right-out only for Montelius access to Nevada Avenue	$ 100,000	Short term
Total *	**$ 95 million**	

* Total assumes Option #1 connection as part of the improvements package
Note: Short term defined as 1 to 5 years and long term as 6 to 20 years

Development of the Green Springs IAMP will involve re-visiting these proposed improvements, and refining and incorporating the projects as needed.

Klamath Falls Capital Improvement Program (FY 2011-216)

The City of Klamath Falls Capital Street Program (CIP) manages the following three programs, each with their own dedicated funding source: the Federal Forest Receipts Program; the Oregon State Transportation Program (STP); and the Congestion Mitigation Air Quality (CMAQ) Program. The Federal Forest Receipts and the STP are currently ongoing programs where funds are awarded to the City to fund capital improvement projects. There are no specific projects proposed in FY 2011-

2012 that are located in the Interchange Management Study Area (Technical Memorandum #2: IAMP Goals, Objectives, and Evaluation Criteria). Rather, there is $350,000 worth of guardrail replacement/repair and street chip seal projects that are generally programmed in the CIP with no specific identification of location.

Klamath Falls Systems Development Charge

The City of Klamath Falls does not have a citywide systems development charge (SDC) for transportation. However, a transportation SDC has been adopted in conjunction with Orindale/Balsam Sub-Area Master Plan, which includes area that constitutes the western portion of the Green Springs Interchange Management Study Area (Technical Memorandum #2: IAMP Goals, Objectives, and Evaluation Criteria). The SDC methodology and project list was developed and presented in a May 2007 report prepared by Kittelson and Associates, Inc. (KAI).

The development assumptions on which the trip generation and SDC methodology and project list are based estimate that build-out of generally the existing zoning would yield approximately 2,005 housing units (1,625 units in the north and 380 units in the south) and approximately 644,000 square feet of commercial land and 70 acres of industrial land could be developed. The corresponding estimated trip generation for the plan area was approximately 36,455 new trips daily with 2,270 occurring during the weekday a.m. peak hour and 3,600 occurring during the weekday p.m. peak hour. It is worth noting that the commercial property in the southwest quadrant of the interchange did not participate in the Orindale/Balsam Sub-Area study.

The following requirements were adopted for a transportation SDC (TSDC) in the plan area:

- *TSDCs are to be collected at the point in time when the water hook-up is processed for each new development.*
- *The TSDC is to be phased in, with an initial fee of half of the total SDC in 2007. This amount will increase by 10 percent of the total SDC each year for the five successive years. This results in the total SDC charged in 2012 and beyond.*
- *An annual increase in the TSDC will also be applied to account for inflation and will be tied to the City's adopted price index for construction related projects.*

The project list is provided in Table 11.

Table 11. Proposed Orindale/Balsam Sub-Area TSDC Improvements

#	Improvement	Estimated Cost	Cost Per Trip			
			Alt. A	Alt. B	Alt. C	Alt. D
	Link Improvements: State Roads					
1	*OR-66:* 5-lane Major Arterial between Hwy 97 and Orindale	$6,681,000	$183		$336	
	*OR-66 right-of-way acquisition**	$2,139,000	$59		$108	
	SUBTOTAL	$8,820,000	$242		$444	
	Link Improvements: Local Roads					
2	*Orindale Road:* 3-lane Major Collector between OR-140 and Balsam	$4,487,000	$123	$123	$226	$226
	Orindale Road: 3-lane Major Collector between Balsam and OR-66	$1,342,000	$37	$37	$68	$68
3	*Emerald Street:* 3-lane Minor Collector between Balsam and south end	$530,000	$15	$15	$27	$27
	Emerald Street Extension: 3-lane Minor Collector between OR-66 and industrial property	$1,555,000	$43	$43	$78	$78
4	*Balsam Drive:* 3-lane Minor Collector between Orindale and Balsam	$1,882,000	$52	$52	$95	$95
5	*OR-140/Commercial Extension:* 3-Lane Major Collector between OR-66 and new collector	$1,968,000	$53	$53	$99	$99
6	*New East-West Collector:* 3-lane Minor Collector between Emerald and Commercial Collector	$1,101,000	$30	$30	$55	$55
	SUBTOTAL	$12,865,000	$353	$353	$648	$648
	Intersection Improvements					
	Orindale / OR-140: Provide EB RT lane and NB LT lane	$89,000	$2	$2	$4	$4
	Orindale / Balsam: Single-lane Roundabout	$500,000	$14	$14	$25	$25
	OR-66 / Orindale Road:: Signalize	$336,000	$9	$9	$17	$17
	OR-66 / Orindale Road: Signal modifications, provide WB RT lane, second SB LT lane	$248,000	$7	$7	$13	$13
	OR-66 / Emerald Street: Signalize, provide WB RT lane	$399,000	$11	$11	$20	$20
	OR-66 / OR-140: Provide NB, EB, and WB RT; SB, EB, and WB second LT lanes; second SB receiving lane and taper; signal modification (70% of $618,000)	$433,000	$12	$12	$22	$22
	SUBTOTAL	$2,005,000	$55	$55	$101	$101
	Orindale/Balsam System Development Charge Transportation Study					
		$81,500	$2	$2	$4	$4
	Total					
	Total Cost	$23,771,500	$652		$1,197	
	Total Cost (no OR-66 Link Improvements)	$14,951,500		$410		$753

*Based on discussions with the City of Klamath Falls and ODOT, the cost of acquiring right-of-way was estimated using an estimate of $15 per square foot. The cost is considered to be volatile; however, this was agreed to be a conservative order-of-magnitude estimate.

Traffic Impact Studies

Traffic studies for development proposals in the vicinity of the interchange primarily address residential and commercial development in the area. Developing the Orindale/Balsam Sub-Area Master Plan and transportation SDC (described in the previous section of this memorandum) involved traffic studies. The master plan area lies north and south of OR 66 west of OR 140 and US 97.

Similarly, the West Side Refinement Plan relied on traffic studies to select a preferred alternative and a corresponding list of recommended transportation improvements (discussed on pp. 29-31 of this memorandum). This area is located north of OR 66 between US 97 and OR 140.

One other traffic study for the interchange area is in the process of being completed. This study is for the Klamath Crossroads Commercial Development for land south of OR 66, west of US 97. The City expects that analysis to be complete by mid-February 2012.

Appendix B
Technical Memorandum #2: IAMP Goals, Objectives, & Evaluation Criteria

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING
354 SW Upper Terrace Drive, Suite 101, Bend, Oregon 97702 P 541.312.8300 F 541.312.4585

TECHNICAL MEMORANDUM #2

Date:	March 28, 2012	Project #: 11881
To:	Project Team	
From:	Hermanus Steyn, PE, and Matt Kittelson	
Project:	OR 66 Green Springs Highway Interchange Area Management Plan (IAMP)	
Subject:	Technical Memorandum #2: IAMP Goals, Objectives, and Evaluation Criteria	

The purpose of this memorandum is to provide an overview of the OR 66 Green Springs Highway Interchange Area Management Plan (IAMP) project including the purpose and intent of the project, goals, objectives, and evaluation criteria, and proposed study area. The project will result in the development of an IAMP that will ensure safe and efficient connections between The Dalles-California Highway (US 97), Lake of the Woods-South Klamath Falls Highway (OR 140), and Green Springs Highway (OR 66) into the future.

Purpose and Intent

The IAMP is intended to protect the function of the US 97/OR 66 Green Springs interchange and provide safe and efficient connections between all roadways within the vicinity of the interchange. The IAMP will identify land use management strategies, short-term and long-term transportation improvements, access management, and strategies to fund identified improvements.

The intent is that the IAMP planning efforts will result in policies, ordinances, and other provisions to be adopted into the Klamath Falls Urban Area Transportation System Plan (TSP) and the City of Klamath Falls and Klamath County Comprehensive Plans. The IAMP will be considered for adoption by the Oregon Transportation Commission (OTC) as an amendment to the Oregon Highway Plan.

As defined in the scope of the project:

A. The interchange must improve highway-to-highway connectivity, safety, mobility, and provide bicyclists and pedestrians a better way to navigate through a rural, high-speed area.

B. Identify current accesses to the highways that will need to be relocated, consolidated, or closed,

C. Provide a design level of sufficient detail for the future interchange and associated street and intersection improvements to allow efficient local street connectivity,

D. Prepare for right of way purchases and easements during land use approval for any affected properties in the area,

E. Link appropriate land uses in the surrounding area to the capacity of the improved transportation system, and

F. Identify a funding strategy and cost sharing for needed improvements.

Interchange Function

The interchange is located near the southwestern edge of the Klamath Falls area urban growth boundary (UGB). The function of the interchange is to:

- serve local and long distance freight movements by providing a connection between US 97 and the shared alignment of OR 66 and OR 140,
- provide access to existing local businesses as well as a large amount of developable lands near the interchange, and
- provide a connection to greater Klamath Falls for residents living near the interchange.

Given these wide range of interchange functions, the long term vision for the US 66 Green Springs Highway Interchange needs to take into account the many different users expected to rely about the interchange for commerce or personal travels.

Below is a description of the roadways in the vicinity of the interchange.

- US 97 is designated as a Statewide Highway (Expressway) and serves as a major north-south connection from California to Washington through Central Oregon. The route serves a variety of regional traffic and has historically been a major freight route.

- OR 140 is designated as a Statewide Highway west of the interchange and a Statewide Highway (Expressway) east of the interchange. This highway originates in the west in Medford, Oregon and serves as a mountain pass between Mt. McLoughlin and Brown Mountain. Within Klamath Falls, the highway serves as the Southside Expressway, a southern bypass around the urban core of Klamath Falls. The highway then extends generally east and serving a variety of small communities in Southern Oregon, eventually terminating at US 95 in Nevada. OR 140 shares an alignment with OR 66 in the vicinity of the interchange.
- OR 66 is designated as a District Highway. This facility serves as a connection between Ashland, Oregon in the west and Klamath Falls in the east. OR 66 terminates at an intersection with OR 140 approximately 550 feet west of the interchange. OR 66 shares an alignment with OR 140 in the vicinity of the interchange.
- Delap Road intersects with the shared alignment of OR 140 and OR 66 just west of the interchange. This facility is a local road operated by Klamath County. It servers a small number of uses northwest of the interchange before terminating.
- Greenspring Drive is designated as a collector and is operated by Klamath County. This facility intersects with OR 140 just east of the interchange. To the north, the road serves a mixture of industrial and residential uses before terminates at Riverside Drive, serving as a local street alternative to US 97 to access downtown Klamath Falls.
- Memorial Drive is an extension of a second northbound US 97 off-ramp just north of the interchange and intersects with Greensprings Drive. It terminates just north of the Southside Expressway (no access is provided to the Southside Expressway from Memorial Drive from the north). However, Memorial Drive does intersect with the Southside Expressway on the south side and extends south to serve industrial uses and single-family homes.
- Balsam Drive is designated as a collector and has portions of the roadway operated by both the City of Klamath Falls and Klamath County within the study area. The facility serves as a major east/west connection for residents within the Orindale-Balsam area.
- Orindale Road is north/south collector that serves as a connection between OR 66 and OR 140 west of the interchange. This facility provides Orindale-Balsam residents access to OR 66 and OR 140 and provides an alternative for area residents to make local connections other than using the state highway system.

The area to the west of the interchange was the subject of the Orindale/Balsam Sub-Area Master Plan, which was completed in 2007 (see Exhibit 1 below). It is worth nothing that the large commercial

property in the southwest quadrant of the interchange was not part of this sub-area study. This plan evaluated the long-term development potential of the area located west of US 97 and OR 140 to the western UGB boundary. The area is currently mostly comprised of residential uses with supporting commercial land. The area has a large inventory of developable lands, including, but not limited to, lands in the following subdivisions; Southview, Badger Flats, and Stewart Lenox.

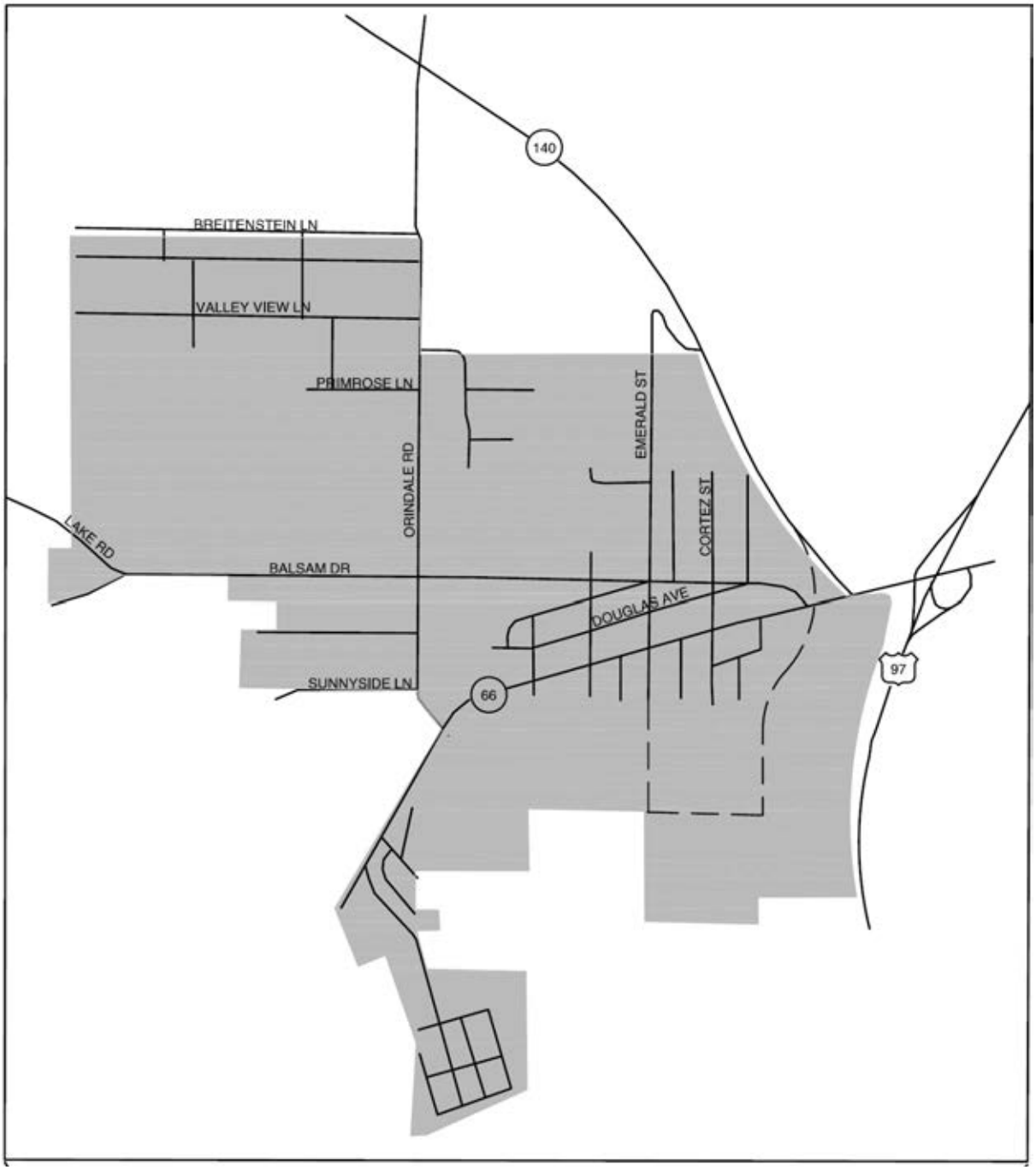


Exhibit 1 – Orindale/Balsam Sub-area Master Plan Area

To the east, development is largely sporadic. A country club, with few residences, comprises most of the development in the southeast quadrant though industrial uses currently exist along Lake Ewauna. The northeast quadrant has low density industrial and retail development near the interchange, including an active fueling station on Greensprings Drive, and transitions to an established residential neighborhood farther to the north.

To the north, Delap Road serves a small number of residential units and the Forestry center.

Goals and Objectives

The IAMP process is intended to protect the function of the interchange for the next 20 years while accounting for changes in land use and traffic patterns. The project area has a large amount of developable lands, highlighting the need to a document vision for the transportation system in the vicinity of the interchange. As stated in Policy 3C of the 1999 Oregon Highway Plan, "it is the policy of the State of Oregon to plan for and manage grade-separated interchange areas to ensure safe and efficient operation between connecting roadways." To this end working collaboratively with the Project Team (PT) and public, the goals, objectives, and priorities of the OR 66 Green Springs Highway IAMP are to:

1. Identify a safe, functional design of the future interchange
2. Protect the function and operation of the OR 66 Green Springs Interchange as a local service facility and US 97 as a facility of statewide significance
3. Improve highway-to-highway connectivity (US 97, OR 66, and OR 140), safety, and mobility
4. Provide adequate bicyclists and pedestrian facilities and integration with public transportation services
5. Provide for efficient local street connectivity
6. Ensure that the interchange will function to support future local economic development while being respectful of existing developments.
7. Manage the allowed land uses within the vicinity of the interchange to provide for future economic growth over the next 20 years.
8. Identify current accesses to the highways that will need to be relocated, consolidated, or closed by defining access locations for developed and undeveloped parcels
9. Prepare for right-of-way purchases and easements during land use approval for any affected properties in the area

10. Collaborate throughout the planning process with design professionals, jurisdictional representatives, developers, local property owners, and the general public.
11. Identify a funding strategy and cost sharing for needed improvements
12. Identify a phased implementation approach to construct fundable interim improvements that lead to the ultimate interchange configuration.
13. Comply with the intent of Statewide Planning Goal 1: Public Involvement, 2: Land Use Planning, 5: Natural Resources, 6: Air, Water and Land Resources Quality, 7: Areas Subject to Natural hazards, 8: Recreation Needs, 9: Economic Development, 12: Transportation, and 14: Urban Growth Boundaries.
14. Develop implementation policies to be adopted into the City and County comprehensive plans, transportation system plans, interchange access standards, and zoning ordinances, as appropriate.

Evaluation Criteria

Based on the above objectives, the following draft evaluation criteria were assembled to ensure that each concept would be evaluated for consistency with the overall intent of the community and the project. The eight evaluation criteria are as outlined in Table 1 (next page).

Table 1 Evaluation Criteria

Evaluation Criteria	Description	Purpose & Intent Met (Page 2)	Goal & Objectives Addressed (Page 5 & 6)
Transportation Operations	• Safety • Local connectivity and mobility • Freight mobility	A, C	1, 2, 3, 4, 5
Multimodal Accessibility	• Pedestrian mobility • Bicycle mobility • Transit mobility	A, C	1, 2, 4, 5
Land Use	• Right-of-way impacts • Consistency with adopted land use and economic development plans • Transportation capacity impacts of changes in land use intensity • Impacts to utilities	D, E	6, 7, 8, 9, 13
Economic Development	• Near-term growth (1-5 years) • Mid-term growth (5-15 years) • Long-term growth (15-25 years)	F	6, 7, 13
Environmental, Social, and Equity factors	• Environmental impacts • Socio-economic impacts	D	6, 8, 9, 10, 11
Accessibility and Connectivity	• Access spacing requirements • Future access for undeveloped properties • Local roadway connectivity	A, B, C	3, 4, 5, 6, 7, 8
Cost	• Cost relative to other alternatives	F	11, 12
Implementation	• Ability to construct in phases • Local impacts during construction • Impacts to existing and proposed developments	F	1, 6, 7, 8, 9, 10, 12, 14

Interchange Management Study Area (IMSA)

To provide a comprehensive study and to achieve effective results, the IMSA needs to include developable and re-developable properties and major roadways that would significantly affect the interchange function over the next 20 years. At a minimum, the IMSA should include properties, as well as all access points within ½ mile from the existing interchange as defined by the IAMP Guidelines. The study area should also take into account facilities and properties that will impact the operations of the interchange and any natural or cultural resources in the vicinity of the interchange.

A draft Interchange Management Study Area (IMSA) map is shown in Figure 1 and Figure 2. As shown, two study boundaries are identified: the IAMP Operations and Access Study Area and the Land Use Study Area. The following describes the criteria used to create the IMSA map.

Operations and Access Study Area

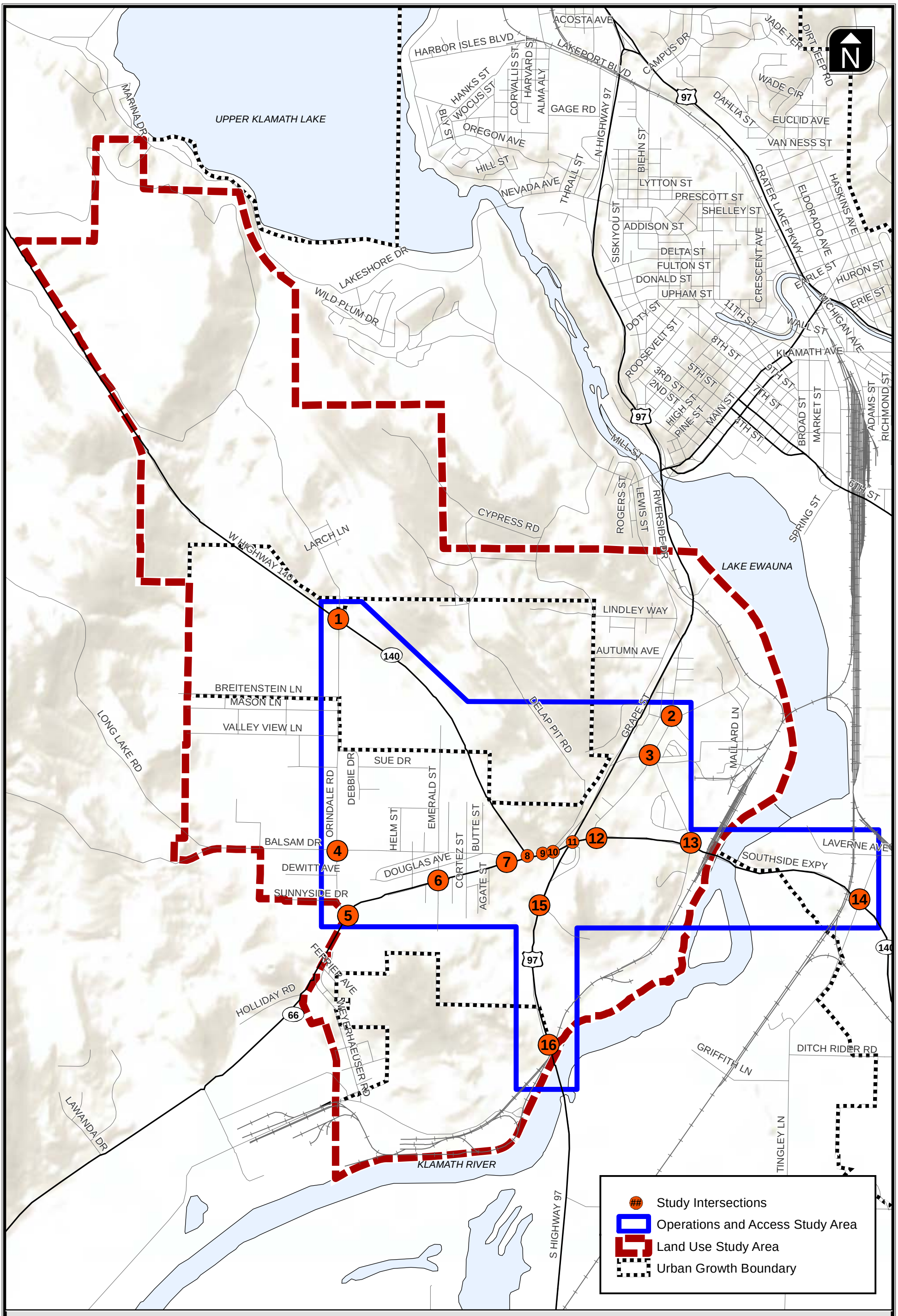
The Operations and Access Study Area includes all access points and intersections within the study area and encompass key intersections that have potential to affect traffic operations in the interchange area over the planning period. This study boundary identifies the area for which operational analysis will be completed and the area that will be considered for the Access Management Plan (although access spacing requirements from the interchange are only ¼ mile). The proposed study intersections include:

1. OR 140/Orindale Road
2. Green Springs Drive/Riverside Drive
3. Green Springs Drive/Memorial Drive
4. Orindale Road/Balsam Drive
5. OR 66/Orindale Road
6. OR 66/Emerald Road
7. OR 66/Balsam Street
8. OR 66/OR 140
9. OR 140/Delap Road
10. OR 140/US 97 Southbound Ramps
11. OR 140/US 97 Northbound Ramps
12. OR 140/Green Springs Drive
13. OR 140/Memorial Drive
14. OR 140/Midland Road/Tingley Lane
15. US 97/Reames Country Club
16. US 97/Columbia Plywood

Land Use Study Area

The Land Use Study Area includes all properties located roughly within the study area and beyond in places to incorporate developable and re-developable properties that are expected to significantly

affect the interchange function. Properties identified with potential to affect the interchange include those that are expected to utilize the OR 66 Green Springs Interchange as the primary connection to US 97 or those that may be necessary to improve local circulation.



Oregon Department of Transportation

IAMP Study Areas

Figure 1

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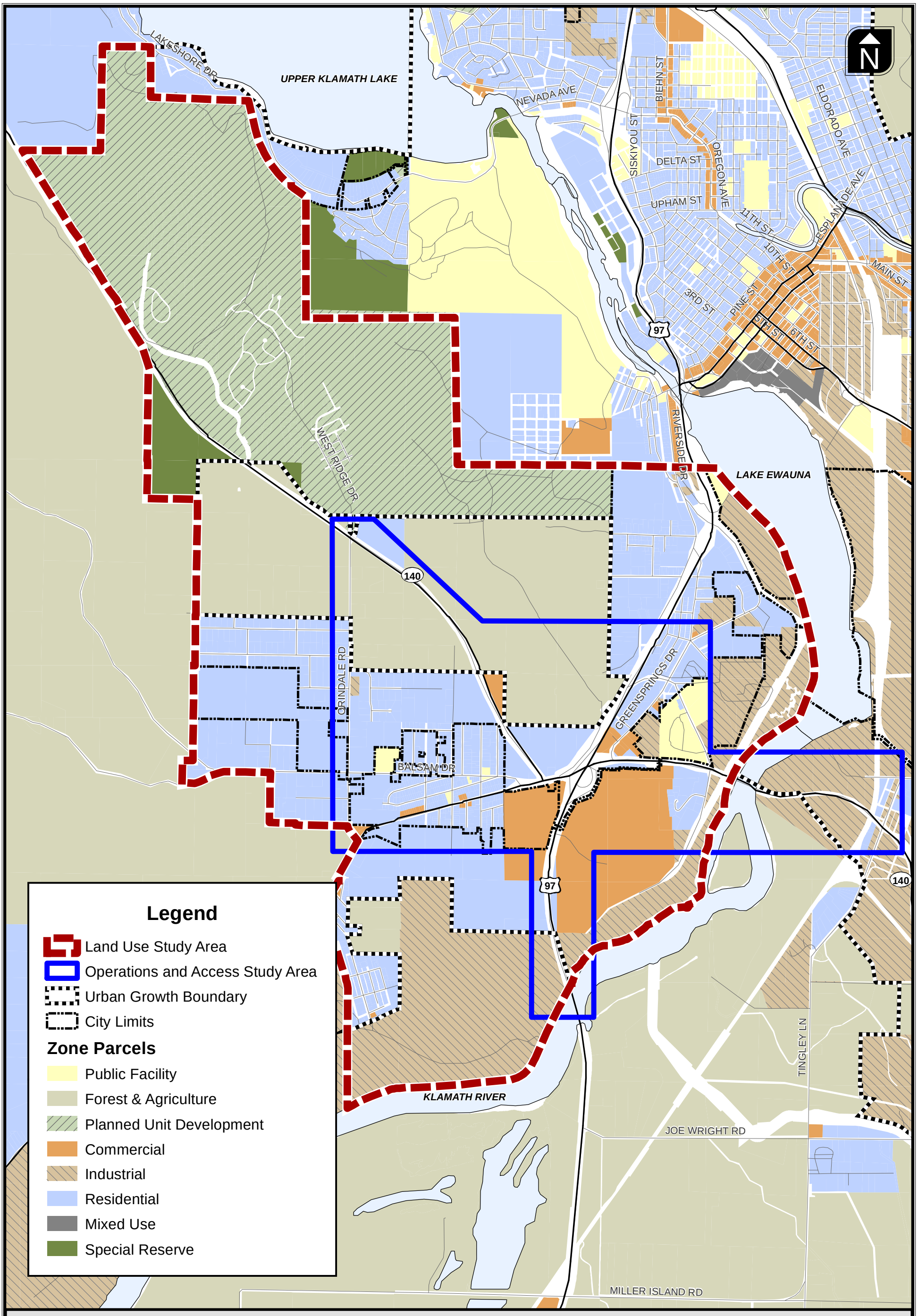

Land Use Zoning Designations

Figure 2

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Appendix C
Technical Memorandum #3: Existing Conditions Analysis

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING
610 SW Alder Street, Suite 700, Portland, OR 97205 P 503.228.5230 F 503.273.8169

TECHNICAL MEMORANDUM

OR 66 Green Springs Highway IAMP

Technical Memorandum #3: Existing Conditions Analysis

Date: May 31, 2012 Project #: 11881
To: Project Team
From: Hermanus Steyn, PE & Matt Kittelson, Kittelson & Associates
Shayna Rehberg, Darci Rudzinski, Angelo Planning Group

INTRODUCTION

This memorandum documents the existing conditions analysis conducted for the OR 66 Green Springs Highway Interchange Area Management Plan (IAMP). The following sections detail the interchange study area, existing land use, and existing roadway details relating to form, operations, safety, and access.

INTERCHANGE MANAGEMENT STUDY AREA (IMSA)

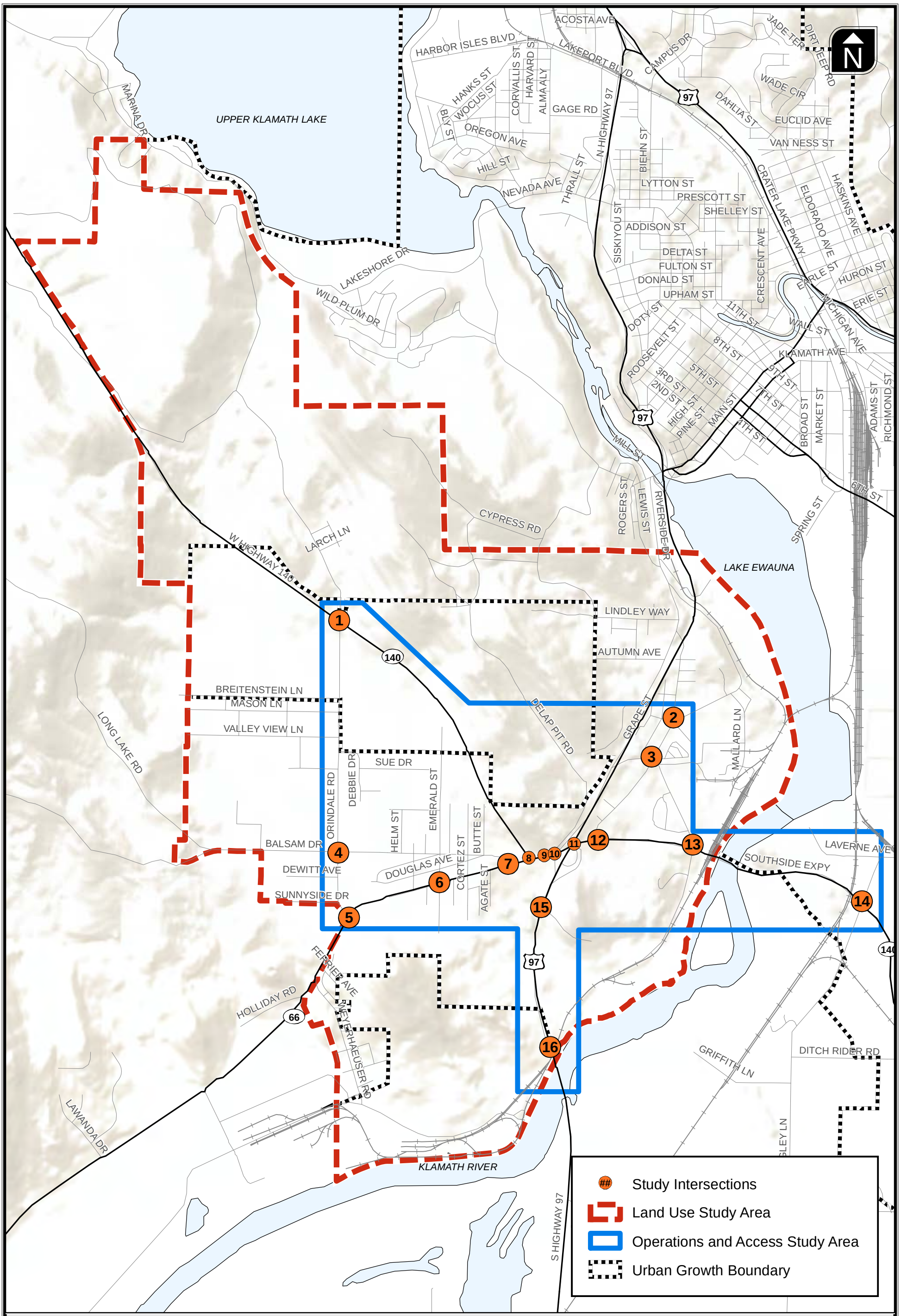
The OR 66 Green Springs Highway IAMP will evaluate the long-term development potential of the area in the vicinity of the existing interchange, identify the preferred interchange functional form alternative, and identify funding mechanisms to construct the preferred alternative. To accomplish these tasks, a study area was developed for both the land use and operational perspectives.

Figure 1 and Figure 2 show the area in the vicinity of the interchange and IMSA extents for the operational and land use study area, respectively. As shown, two study boundaries are identified: the IAMP Operations and Access Study Area and the Land Use Study Area. The following describes the criteria used to create the IMSA map.

Operations and Access Study Area

The Operations and Access Study Area includes all access points and intersections within the study area and encompass key intersections that have potential to affect traffic operations in the interchange area over the planning period. This study boundary identifies the area for which operational analysis will be completed and the area that will be considered for the Access Management Plan (although access spacing requirements from the interchange are only ¼ mile). The proposed study intersections include the locations listed below and are shown on Figure 1.

1. OR 140/Orindale Road
2. Green Springs Drive/Riverside Drive
3. Green Springs Drive/Memorial Drive
4. Orindale Road/Balsam Drive
5. OR 66/Orindale Road
6. OR 66/Emerald Road
7. OR 66/Balsam Street
8. OR 66/OR 140
9. OR 140/Delap Road
10. OR 140/US 97 Southbound Ramps
11. OR 140/US 97 Northbound Ramps
12. OR 140/Green Springs Drive
13. OR 140/Memorial Drive
14. OR 140/Midland Road/Tingley Lane
15. US 97/Reames Country Club
16. US 97/Columbia Plywood



Oregon Department of Transportation

Site Vicinity / IAMP Study Areas

Figure 1

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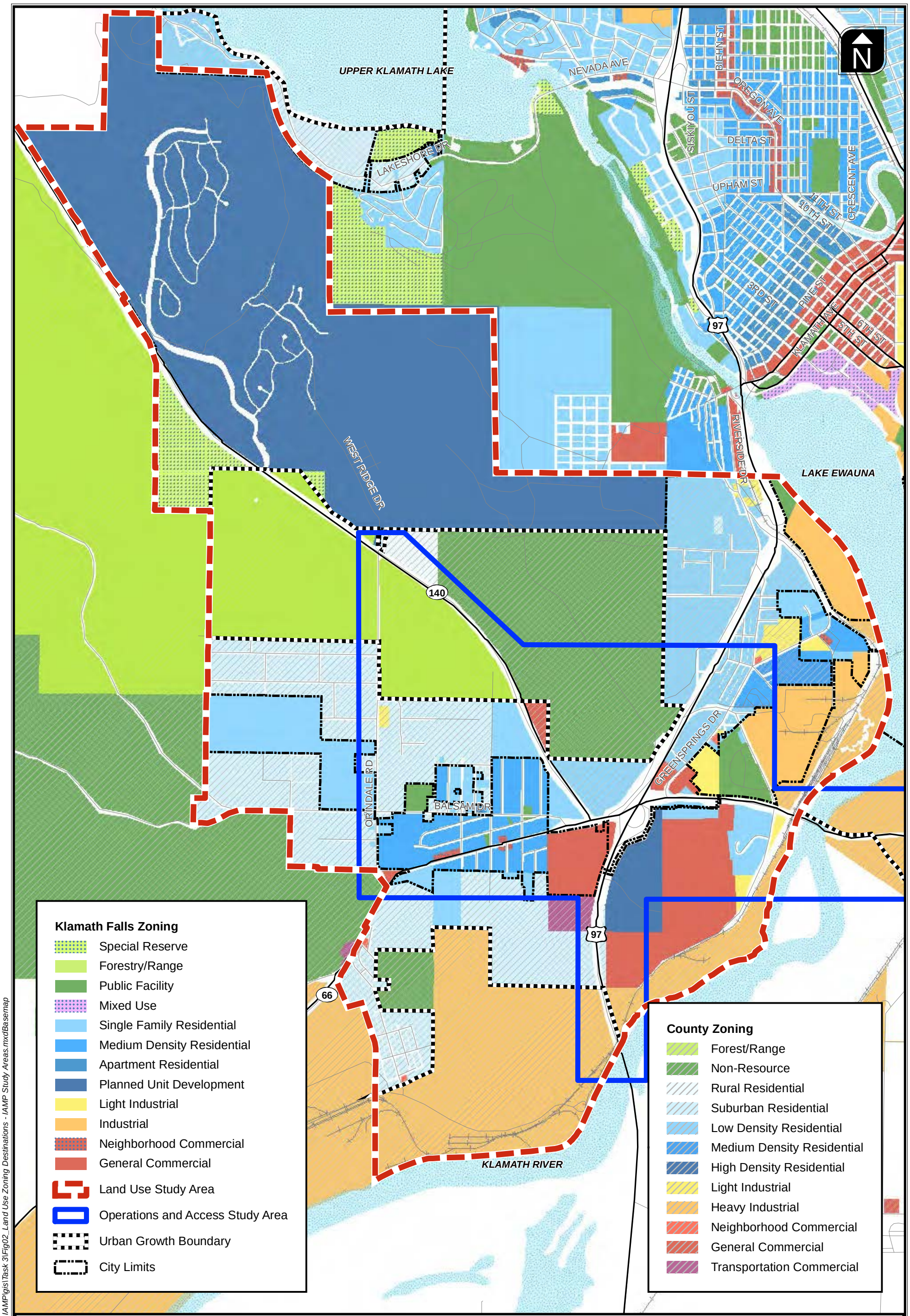

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Land Use Zoning Designation / IAMP Study Area

Figure 2

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EXISTING LAND USE

Pursuant to the requirements stated in the Oregon Administrative Rule 734-051-0155 for the preparation of an IAMP, a land use inventory has been prepared for the OR 66 Green Springs Highway IAMP study area. This section provides a description of the existing land-use patterns and zoning regulations that currently exist within the IMSA.

The Land Use Study Area was delineated to include land in the immediate vicinity of the interchange as well those properties that have the potential to develop or re-develop over the planning period. The study area includes properties that are expected to use the Green Springs Interchange as a primary connection to US 97 as well as those that properties that may be involved or affected by recommended improvements to local traffic circulation in the interchange area.

The land use study area is roughly 5,660 acres. Being on the southwest edge of the City of Klamath Falls, the area can generally be described as either undeveloped or developed at low densities. Existing development is predominantly residential with some instances of supporting commercial services, industrial uses, and special uses such as a country club/golf course and cemetery.

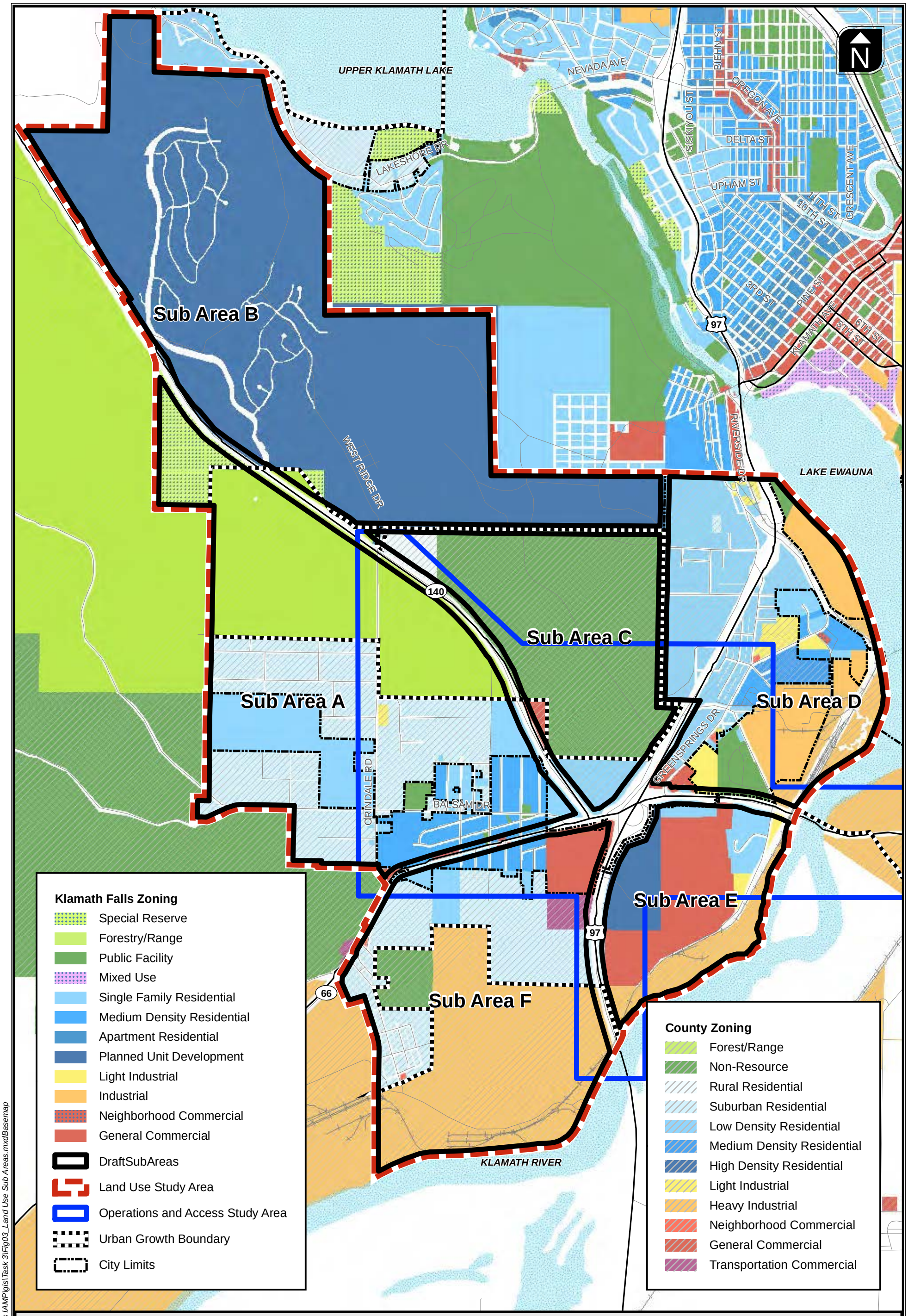
The Land Use Study Area includes land both inside and outside of the Klamath Falls urban growth boundary (UGB). The land inside the UGB includes areas both inside and outside the city limits. Land outside the UGB is under Klamath County jurisdiction. An intergovernmental agreement establishes jurisdiction and procedures in the area outside the city limits but inside the UGB. According to the Klamath County Comprehensive Plan[1], this land is subject to the Klamath County Land Development Code and Urban Growth Boundary Management Agreement with the City.

Sub-Areas

The Land Use Study Area has been divided into sub-areas for the purpose of organizing and discussing information about land uses. It is important to note that the use of sub-areas is simply an organization tool for purposes of describing land uses in the vicinity of the interchange and does not necessarily define areas for future transportation and land use management strategies, which have yet to be developed through the IAMP process. The sub-areas have been determined based on man-made and natural landscape features: major roadways in the interchange area, the UGB, hillsides and slopes, and areas of similar zoning. A map of the sub-areas is shown in Figure 3.

[1] Klamath County Comprehensive Plan, Goal 2, Land Use Planning, Policy 6, and Goal 14, Urbanization, General Discussion

The sub-areas roughly correspond to – and in some cases are aggregated from – the Transportation Analysis Zone (TAZ) areas that have already been established by ODOT and will be used for operational analysis in this project.



Oregon Department of Transportation

Land Use Sub Areas

Figure 3

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Existing Land Use Summary

Table 1 provides an overview of land uses in the Land Use Study Area by sub-area. Information in the table includes jurisdiction, zoning, and existing uses, and highlights special circumstances that indicate the potential for significant development over the planning period.

Table 1 Existing Land Uses in the Green Spring IAMP Land Use Study Area

Sub-Area	Jurisdiction	Zoning	Existing Uses	Significant Land Uses or Opportunities
A TAZs in Sub-Area: TAZ 364, TAZ 365, TAZ 366 (partial)	City and County	*City zoning:* General Commercial Neighborhood Commercial Single Family Residential Medium Density Residential Apartment Residential Public Facility Special Reserve *County zoning:* Forest/Range (FR) Suburban Residential (RS) Low Density Residential (RL) Medium Density Residential (RM) High Density Residential (RH)	Areas within the city are developed mainly as single-family homes with some supporting commercial uses along the highway. Areas outside the city but within the UGB area have some low density (rural) residential development and fields. Areas outside the UGB are largely undeveloped and some appear to be in light agricultural use (e.g., grazing).	ODOT owns approximately 10.75 acres in the northwest corner of the intersection of OR 140 and OR 66 in this sub-area. An application for a rural subdivision called Badger Flats has been submitted to the County for residential development in this sub-area on land outside the UGB.
B TAZs in Sub-Area: TAZ 147, TAZ 153	City	*City zoning:* Planned Unit Development (PUD) (Note: There is a very small section of County Forest/Range (FR) zoning that extends across from the south side of OR 140)	This sub-area is designated for Planned Unit Development (PUD). Residential development in the Ridgewater Subdivision was begun in the north portion of the PUD.	Development in the Ridgewater Subdivision has been suspended during the economic downturn of the last few years.

Sub-Area	Jurisdiction	Zoning	Existing Uses	Significant Land Uses or Opportunities
C TAZs in Sub-Area: TAZ 363	County	*County zoning:* Non-Resource (NR) Rural Residential (R10) General Commercial (CG) Low Density Residential (RL)	Land in this sub-area is sloped and either undeveloped or sparsely developed. There are a few scattered homes (with good views) that are part of a rural subdivision known as Castle Ridge. The Oregon Department of Forestry has offices in this sub-area near the interchange.	There is a lot of undeveloped land in this sub-area but, as noted, it is mostly steeply sloped and outside of the UGB. A rural subdivision called Badger Flats has been working on an application applied to the County for residential development in this sub-area on land outside the UGB. A potential developer is considering to propose convenience commercial uses at the entrance to Southview PUD.
D TAZs in Sub-Area: TAZ 300, TAZ 301, TAZ 302 (partial)	City and County	*City zoning:* General Commercial (GC) Neighborhood Commercial (DC) Single Family Residential (SF) Medium Density Residential (MD) Public Facility (PF) Industrial (I) Light Industrial (LI) *County zoning:* Low Density Residential (RL) Medium Density Residential (RM) Transportation Commercial (CT) General Commercial (CG) Light Industrial (IL) Neighborhood Commercial (CN) Heavy Industrial (IH)	This sub-area is basically evenly split between being inside and outside city limits, and between residential and non-residential or undeveloped uses. A motel in the northeast quadrant of the interchange is no longer operates as a motel. It is now is other residential use. A cemetery is located east of the motel. The rest of the land use in the area is a mixture of low-density residential, industrial (the Northern Santa Fe (NSF) railroad borders the east and lake/river side of the sub-area), and vacant land or buildings.	As noted, the motel directly adjacent to the interchange is vacant. There is also a weigh station between the motel and cemetery.

Sub-Area	Jurisdiction	Zoning	Existing Uses	Significant Land Uses or Opportunities
E TAZs in Sub-Area: TAZ 361	City and County	*City zoning:* General Commercial (GC) Light Industrial (LI) Single Family Residential (SF) Planned Unit Development (PUD) *County zoning:* Heavy Industrial (IH)	The Reames Country Club and golf course are the predominant land use in this sub-area. There are a few homes in the sub-area and industrial uses adjacent to the railroad and Klamath River, including a quarry on the west side of Memorial Drive.	As discussed later, the land where the country club and golf course is located is zoned a combination of commercial, PUD, and single family residential. This indicates that there is additional development possible for that site.
F TAZs in Sub-Area: TAZ 368 (partial)	City and County	*City zoning:* General Commercial (GC) Neighborhood Commercial (NC) Single Family Residential (SF) Medium Density Residential (MD) *County zoning:* Transportation Commercial (CT) Suburban Residential (RS) Heavy Industrial (IH) Non-Resource (NR)	There are residential and limited commercial uses inside the city limits along OR 66 west of the interchange and the intersection with OR 140 that are essentially an extension of the Stewart-Lennox community north of OR 66. There is a large undeveloped commercial site in the southwest quadrant of the interchange. There is also vacant industrial land outside UGB in the southern half of this sub-area.	Development applications for commercial and employment uses have been submitted for the site (Crossroads) site owned by Terry McDonald. There have been industrial uses proposed for the County industrial land in the southern part of this sub-area.

Zoning and Development Standards

Any development in the vicinity of the interchange will have some impact on the facility, so it is important to review the existing zoning and permitted uses for parcels surrounding the interchange and connecting roads. Permitted land uses and the applicable standards associated with the zone designations are an indicator of the potential for growth in the area. Recommendations for restricting uses or modifying development standards (e.g. restricting uses with high traffic generation rates or limiting building size) could play a key role in the outcome of the IAMP process. Zoning for areas within the Land Use Study Area were shown in Figure 2. This map includes both City and County zoning, as the Land Use Study Area includes land that is inside the city limits and

UGB, outside the city limits but inside the UGB, and outside the city limits and UGB. For viewing purposes, the zoning in Figure 2 has been generalized.

Klamath County Zoning

Klamath County zoning is found primarily in Sub-Areas A, C, D, and F in the Land Use Study Area.

- Sub-Area A – County zoning is predominantly rural and low density residential on land outside the city limits and inside the UGB, and then farm/forestry on land outside both the city limits and UGB.
- Sub-Area C – This sub-area is made up of land mostly outside the UGB and the zoning on this land is farm/forestry.
- Sub-Area D – Land outside the city limits but inside the UGB is found along the US 97 corridor in this sub-area. County zoning here is largely low density residential with a small amount of industrial.
- Sub-Area F – The southern half of this sub-area is land outside the UGB, zoned mostly heavy industrial.

County zoning regulations are established in the Klamath County Land Development Code, Ordinance Series 45. Table 2 shows the County zones found within the IAMP Land Use Study Area, along with the purpose, the types of uses permitted outright and conditionally, and the density of development allowed in each zone.

Table 2 Klamath County Zoning Regulations in the Green Spring IAMP Land Use Study Area

Zone	Purpose	Uses Permitted Outright	Uses Permitted Conditionally	Allowed Densities
Rural Residential (R10)	The zone is intended for large lot residential uses and small-scale hobby farming. The zone also serves as a buffer between urban uses and natural resource areas.	Uses permitted outright include single-family homes, care facilities, emergency and essential services, community parks, and accessory buildings and uses.	Uses permitted conditionally include specialty animal raising, bed and breakfasts, churches, schools, cemeteries, kennels, and high impact services and utilities.	Minimum lot size – 10 acres One dwelling per lot/parcel
Suburban Residential (RS)	This zone helps implement the Comprehensive Plan calling for use of 1 to 4 dwellings units per acre, with lots large enough to maintain domesticated animals.	Similar to the R10 zone, uses permitted outright include single-family homes, care facilities, essential services, community parks, and accessory buildings and uses.	Similar to the R10 zone, uses permitted conditionally include churches, schools, cemeteries, kennels, high impact services and utilities, as well as manufactured home parks, additional homes for lots that are at least 20,000 square feet, and emergency services.	Minimum Lot Size – 10,000 square feet One dwelling per lot/parcel, or one dwelling per 10,000 square feet

Zone	Purpose	Uses Permitted Outright	Uses Permitted Conditionally	Allowed Densities
Low Density Residential (RL)	This zone is intended to implement the Comprehensive Plan designation calling for an optimum residential density between 1 and 6 dwellings per acre.	Uses permitted outright include single-family homes, care facilities, essential services, community parks, and accessory buildings and uses.	Uses permitted conditionally include churches, schools, cemetery, high impact services and utilities, and emergency services.	Minimum lot size – 7,000 square feet One dwelling per lot
Medium Density Residential (RM)	The zone is intended to establish and maintain areas for single-family and duplex residences and implement the Comprehensive Plan calling for an optimum residential density up to 8 dwelling units per acre.	Uses permitted outright include single-family homes, duplexes, mobile home parks, care facilities, essential services, community parks, and accessory buildings and uses.	Uses permitted conditionally include multi-family dwellings, churches, schools, cemeteries, high impact services and utilities, and emergency services.	Minimum lot size – 5,000 square feet One single-family dwelling unit per lot, or one duplex or multi-family dwelling per 8,000 square feet
High Density Residential (RH)	The purpose of this zone is to provide and maintain higher densities of dwelling units where urban levels of public services can accommodate such development. The zone is appropriate in areas near schools, recreation, employment, and transportation services.	Uses permitted outright include multi-family dwellings, care facilities, community parks, essential services, and accessory buildings and uses	Uses permitted conditionally include single-family dwellings, duplexes, churches, schools, cemeteries, emergency services, and high impact services and utilities.	Minimum lot size – 10,000 square feet, 10-24 units per acre One single-family dwelling per lot, or one multi-family dwelling unit per 2,000 square feet
Neighborhood Commercial (CN)	The purpose of this zone is to establish and maintain places for limited retail sales and services that are accessible and convenient to nearby residents, without creating impacts that are incompatible with nearby residential uses.	Uses permitted outright include offices, retail sales, personal services, medical services, repair services, community parks, essential services, parking, and accessory buildings and uses.	Uses permitted conditionally include food and beverage services, auto service stations, churches, schools, emergency services, and high impact services and utilities.	Minimum lot size – 10,000 square feet Maximum building gross floor area per use – 3,000 square feet (The gross floor area for one structure or group of structures treated shall not exceed 15,000 square feet.)

Zone	Purpose	Uses Permitted Outright	Uses Permitted Conditionally	Allowed Densities
General Commercial (CG)	The purpose of this zone is to establish and maintain places for a full range of retail goods and services available to a large area.	Uses permitted outright include offices, retail and general merchandise sales, personal services, repair services, medical services, food and beverage sales and services, parking, auto repair and services stations, entertainment facilities, farm supplies, farm and heavy equipment sales and rentals and services, building and garden sales, warehouse storage and distribution (light), custom manufacturing, hotel/motel (in UGB), essential services, emergency services, and accessory buildings and uses.	Uses permitted conditionally include Churches, schools, indoor sports and recreation, truck stop, heavy equipment repairs, manufactures home park, RV park, and high impact services and utilities.	Minimum lot size – 5,000 square feet Building size maximum – 8,000 square feet in an urban unincorporated community. Building size maximum – 4,000 square feet outside of an urban unincorporated community.
Transportation Commercial (CT)	The purpose of this zone is to establish and maintain places for sales and services primarily related to transportation and utility industries. The zone is appropriate for commercial uses associated with highway, rail, or air transportation.	Uses permitted outright include the same uses allowed in general commercial with the exception of allowing truck stops outright and not allowing farm supplies and equipment, building and garden sales, and entertainment facilities outright.	Uses permitted conditionally include indoors sports and recreation, farm equipment sales and rentals and service, warehouse storage and distribution (heavy), and high impact services and utilities.	Minimum lot size – 5,000 square feet Building size maximum – 8,000 square feet in an urban unincorporated community. Building size maximum – 4,000 square feet outside of an urban unincorporated community.

Zone	Purpose	Uses Permitted Outright	Uses Permitted Conditionally	Allowed Densities
Light Industrial (LI)	The purpose of this zone is to establish and maintain places where manufacturing, storage and wholesale distribution can be undertaken in close proximity to one another without encroaching upon the character of the adjacent land uses.	Uses permitted outright include custom and general manufacturing, warehouse storage and distribution (light and heavy), building and garden sales, parking, auto sales and rentals and service and repairs, heavy equipment sales and rentals and service and repairs, farm supplies and services, agricultural processing and packing, mineral processing, essential services, emergency services, and accessory buildings and uses.	Uses permitted conditionally include stockyards, auto wrecking and scrap operations, food and beverage services, and high impact services and utilities.	No further partition or subdivision of lots Lot size and shape pursuant to Article 61 – Minimum width 50 feet Minimum depth 100 feet Standards may be modified where property is zoned/ deeded for business or industrial use. Bu shall be adequate to provide for the off-street parking and service facilities required for the type of proposed use and development.
Heavy Industrial (IH)	The purpose of this zone is to establish and maintain places where large areas of land are needed for the fabrication, processing, and movement of raw materials and where the potential impacts of noise, odor, vibration, glare, and/or heat are least likely to affect adjacent land uses.	Uses permitted outright include warehouse storage and distribution (light and heavy), custom and general manufacturing, agricultural packing and processing and waste processing, stockyards, auto wrecking and scarp operations, and essential services.	Uses permitted conditionally include mining and mineral processing, explosive and hazardous materials, food and beverage service, and high impact services and utilities.	Same regulations as in Light Industrial (IL)
Forestry/Range (FR)	The purpose of this zone is to promote management and conservation of lands of mixed farm and forest use. This productive potential of this land is considered to be greater than that of Non-Resource (NR) zoned lands, but less than that of Farm (EFU) or Forestry (F) zoned lands. This zone has no forest productivity rating or is predominantly rated as Class VII forest lands.	Uses permitted outright and conditionally are not explicitly listed in the zoning code. Permitted uses are assumed to be farm and forestry uses.		Minimum lot size – 80 acres

Zone	Purpose	Uses Permitted Outright	Uses Permitted Conditionally	Allowed Densities
Non-Resource (NR)	This zone includes lands that have been found to have a low Forest Site Class value, are predominantly SCS Soil Capability Class VII and VIII, are not identified as important fish and wildlife habitat, are not necessary for watershed protection or recreational use, are not irrigated or irrigable, or are not necessary to permit farm or forest practices to be undertaken on adjacent or nearby lands.	Uses permitted outright include single-family homes, one additional dwelling for family members if the lot or parcel size is equal to or greater than 20 acres, animal raising (small and large), and all uses permitted in Exclusive Farm Use, Forestry, and Forestry/Range zones (such as farm and forest uses, resource industry operations, transportation facilities, wetland mitigation, wineries, destination resorts, and schools and churches subject to other provisions.)	Uses permitted conditionally include specialty animal raising, kennels, cemeteries, and all uses permitted conditionally in the Exclusive Farm Use, Forestry, and Forestry/range zones (such as farm and forest product and waste processing, stockyards, kennels, other natural resource uses, waste storage/disposal, private parks and campgrounds, golf courses, private airports, utilities, transportation improvements.)	Minimum lot size – 20 acres

Special standards and approval criteria are specified for dwellings, conditional uses, and land divisions in permitted in Exclusive Farm Use, Forestry, Forestry/Range, and Non-Resource Zones, Articles 54-56 in the County Land Development Code.

City of Klamath Falls Zoning

City of Klamath Falls zoning is focused in the parts of Sub-Areas A, D, E, and F nearest the interchange, with the exception of Sub-Area B, where there is a large area of city zoning about one to two miles northwest of the interchange.

- Sub-Area A – City zoning in this sub-area largely covers the Stewart-Lennox neighborhood and is mostly low and medium density residential with very small sections of public facility, general commercial, and neighborhood commercial zoning.
- Sub-Area B – This sub-area is zoned Special Reserve (SR) and Planned Unit Development (PUD), including the Ridgewater Subdivision. Even though it is more distant from the interchange than other sub-areas, this area takes access off of OR 140 and, as it develops, is expected to heavily use the Green Springs interchange in order to reach points north and south on US 97.
- Sub-Area D –This sub-area is set away from US 97 and closer to Lake Ewauna. While there is some City residential zoning in this area, City zoning is predominantly industrial and public facility (cemetery) here.
- Sub-Area E – Most of this sub-area is within the city limits and is zoned a mix of PUD, commercial, and residential.
- Sub-Area F – The part of this sub-area within the city limits is an extension of the Stewart-Lennox community from across OR 66 to the north and, like that neighborhood, is zoned mainly low and medium density residential. Otherwise, a large piece of land exactly in the southwest quadrant of the interchange is zoned commercial.

City zoning regulations are established in the City of Klamath Falls Community Development Ordinance (CDO). The CDO consists of Chapters 10 through 14 of the City's Code. The CDO regulates all land development within the city limits.

Table 3 provides a list of the City zones found in the IAMP Land Use Study Area and their permitted uses and development densities. Purpose statements are not established for standard base zones in the city as they are in Klamath County, with the exception of PUD zoning.[2]

[2] The purpose of the Planned Unit Development zone is: "to provide for the classification and development of parcels of land as coordinated, comprehensive projects so as to take advantage of the superior environment which can result from large scale community planning. The Planned Unit Development authorization serves to encourage developing as one project tracts of land that are sufficiently large to allow a site design for a group of structures. Furthermore, the Planned Unit Development provides the flexibility necessary to facilitate the desired mixing of residential, commercial and industrial uses in accordance with appropriate development and use standards." (CDO 12.360) The City has master plans of PUDs showing all proposed uses.

Table 3 Klamath Falls Zoning Regulations in the Green Spring IAMP Land Use Study Area

Zone	Uses Permitted Outright	Uses Permitted Conditionally	Development Standards
Single Family Residential (SF)	Residential uses permitted outright include single-family homes, home occupations, residential homes, and accessory uses. Public uses permitted outright include parks and recreation facilities.	Service uses permitted conditionally include bed & breakfasts, care and treatment facilities, and private schools. Public uses permitted conditionally include churches, government offices, hospitals, schools, and public utilities.	Maximum lot coverage – 35% Minimum lot size – 7,000 square feet
Medium Density Residential (MD)	Residential uses permitted outright include single-family homes, home occupations, residential homes, and accessory uses. Service uses permitted outright include residential facilities. Public uses permitted outright include parks and recreation facilities.	Residential uses permitted conditionally include tri plexes, four plexes, and manufactured home parks. Service uses permitted conditionally include bed & breakfasts, care and treatment facilities, and private schools. Public uses permitted conditionally include churches, government offices, hospitals, schools, and public utilities.	Maximum lot coverage – 40% Minimum lot size – 5,000 square feet
Apartment Residential (A)	Residential uses permitted outright include single-family homes, duplexes, tri plexes, four plexes, apartments, manufactured homes, home occupations, and accessory uses. Service uses permitted outright include residential facilities. Public uses permitted outright include parks and recreation facilities.	Residential uses permitted conditionally include manufactured home parks. Service uses permitted conditionally include bed & breakfasts, business and professional offices, care and treatment facilities, private schools, telecommunication facilities. Public uses permitted conditionally include churches, government offices, hospitals, schools, and public utilities.	Maximum lot coverage – 60% Minimum lot size – 5,000 square feet (Multi-family homes with more than four units must provide an additional 1,000 square feet per unit over four units.)
General Commercial (GC)	Residential uses permitted outright include duplexes, tri plexes, four plexes, apartments, and accessory uses. Trade uses permitted outright include retail, vehicle sales and service and rental, and wholesale. Service uses permitted outright include athletic clubs, auto repair/maintenance and service stations, bed & breakfasts, offices, personal services, residential facilities, restaurants, and vet clinics. Public uses permitted outright include parks and recreation facilities.	Residential uses permitted conditionally include manufactured home parks. Service uses permitted conditionally include care and treatment facilities, hotels/motels, private schools, RV parks, and telecommunications facilities. Public uses permitted conditionally include churches, government offices, hospitals, schools, and public utilities.	Maximum lot coverage – 100% Minimum lot size – 5,000 square feet

Zone	Uses Permitted Outright	Uses Permitted Conditionally	Development Standards
Neighborhood Commercial (NC)	Residential uses permitted outright include single family homes, duplexes, tri plexes, four plexes, apartments, manufactured homes, home occupations, residential homes, and accessory uses. Trade uses permitted outright include retail (indoor), resale, and wholesale. Service uses permitted outright include adult businesses, athletic clubs, auto repair/maintenance and service stations, bed & breakfasts, offices, day care, hotels/motels, personal services, printing services, residential facilities, restaurants, and vet clinics. Public uses permitted outright include parks and recreation facilities.	Residential uses permitted conditionally include manufactured home parks. Service uses permitted conditionally include child care and treatment facilities, private schools, telecommunications facilities. Public uses permitted conditionally include churches, government offices, hospitals, schools, and public utilities.	Maximum lot coverage – 75% Minimum lot size – 5,000 square feet (Dwellings shall conform to setbacks established in the Apartment Residential zone.)
Light Industrial (LI)	Trade uses permitted outright include vehicle sales and service and rental, and wholesale. Service uses permitted outright include athletic clubs, auto repair/maintenance and service stations, bed & breakfasts, offices, personal services, residential facilities, restaurants, and vet clinics. Industrial uses permitted outright include repair/maintenance, storage/warehousing, manufacturing/assembly, and light industrial.	Services uses include hotels/motels and telecommunications facilities. Public uses permitted conditionally include churches, government offices, hospitals, schools, and public utilities.	Maximum lot coverage – 100% Minimum lot size – 5,000 square feet
Industrial (I)	Trade uses permitted outright include vehicle sales and service and rental, and wholesale. Service uses permitted outright include athletic clubs, auto repair/maintenance and service stations, bed & breakfasts, offices, personal services, residential facilities, restaurants, and vet clinics. Industrial uses permitted outright include repair/maintenance, storage/warehousing, manufacturing/assembly, and light industrial. Public uses permitted outright include public utilities.	Service uses permitted conditionally include hotels/motels. Public uses permitted conditionally include churches.	Maximum lot coverage – 100% Minimum lot size – 5,000 square feet
Public Facility (PF)	Public uses permitted outright include churches, government offices, hospitals, schools, and public utilities, and parks and recreation facilities.	Services uses permitted conditionally include RV parks and telecommunications facilities.	Maximum lot coverage – 100% Minimum lot size – 5,000 square feet

Zone	Uses Permitted Outright	Uses Permitted Conditionally	Development Standards
Planned Unit Development (PUD)*	Uses permitted outright include: (1) Those uses designated on the development plan for the particular Planned Unit Development zone as approved by the Council. (2) The continuation of land uses including agricultural and forestry that existed in the district at the time of adoption of the development plan, except as otherwise provided.	Uses permitted conditionally include public facilities and telecommunication facilities.	As set out in a Master Plan that is approved by City Council
Special Reserve (SR)	Accessory uses permitted outright include garages, antenna and dishes, sheds, and pools.	Residential uses permitted conditionally include single family homes, duplexes, tri plexes, four plexes, apartments, manufactured homes and parks, home occupations, residential homes, and accessory uses. Trade uses permitted conditionally include retail and wholesale. Service uses permitted conditionally include adult businesses, athletic clubs, auto repair/maintenance and service stations, bed & breakfasts, offices, child care and treatment facilities, day care, hotels/motels, personal services, residential facilities, restaurants, vet clinics, and telecommunications facilities. Public uses permitted conditionally include churches, hospitals, parks and recreation facilities, schools, and public utilities. Industrial uses permitted conditionally include repair and maintenance, manufacturing and assembly, storage and warehousing, and light industrial	Maximum lot coverage – 20% Minimum lot size – 20,000 square feet Proposed uses are subject to Sections 12.415 to 12.445, Special Reserve Development Standards

EXISTING TRANSPORTATION INVENTORY

This section details the conditions of the roadways within the operational study area. This analysis includes a description of major roadways in the vicinity of the interchange, an operational and safety analysis of the study intersections, and a documentation of access points along the highways served by the interchange.

Roadway Facilities

The roadways within the study area include state, county, and city roadways. A description of each of the roadway facilities is summarized below and in Table 4.

US 97 is designated as a Statewide Highway (Expressway) and serves as a major north-south connection from California to Washington through Central Oregon east of the Cascade mountains. The route serves a variety of regional traffic and has historically been a major freight route.

OR 140 is designated as a Statewide Highway west of the interchange and a Statewide Highway (Expressway) east of the interchange. This highway originates in the west in Medford, Oregon and serves as a mountain pass between Mt. McLoughlin and Brown Mountain. Within Klamath Falls, the highway serves as the Southside Expressway, a southern bypass around the urban core of Klamath Falls. The highway then extends generally east and serves a variety of small communities in Southern Oregon, eventually terminating at US 95 in Nevada. OR 140 shares an alignment with OR 66 in the vicinity of the interchange.

OR 66 is designated as a District Highway. This facility serves as a connection between Ashland, Oregon in the west and Klamath Falls in the east. OR 66 terminates at an intersection with OR 140 approximately 550 feet west of the interchange. OR 66 shares an alignment with OR 140 in the vicinity of the interchange.

Delap Road intersects with the shared alignment of OR 140 and OR 66 just west of the interchange. This facility is a local road operated by Klamath County. It servers a small number of uses northwest of the interchange before terminating.

Greensprings Drive is designated as a collector and is operated by Klamath County. This facility intersects with OR 140 approximately 540 feet east of the interchange. To the north, the road serves a mixture of industrial and residential uses before terminating at Riverside Drive, serving as a local street alternative to US 97 to access downtown Klamath Falls.

Memorial Drive is an extension of a second northbound US 97 off-ramp just north of the interchange and intersects with Greensprings Drive. It terminates just north of the Southside Expressway (no access is provided to the Southside Expressway from Memorial Drive from the

north). However, Memorial Drive does intersect with the Southside Expressway (OR 140) on the south side and extends south to serve industrial uses and single-family homes.

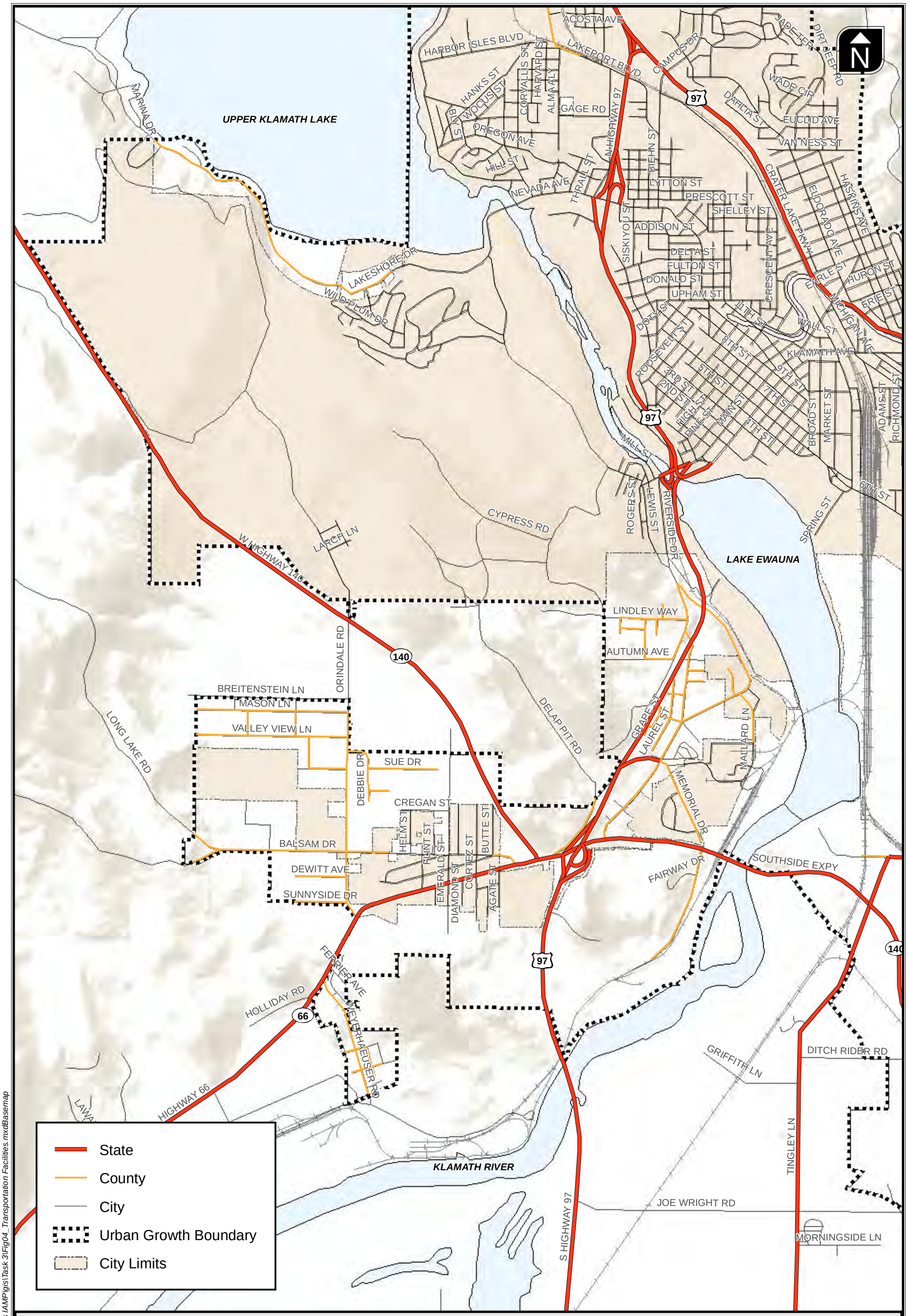
Balsam Drive is designated as a collector and has portions of the roadway operated by both the City of Klamath Falls and Klamath County within the study area. The facility serves as a major east/west connection for residents within the Orindale-Balsam area.

Orindale Road is north/south collector that serves as a connection between OR 66 and OR 140 west of the interchange. This facility provides Orindale-Balsam residents access to OR 66 and OR 140 and provides an alternative for area residents to make local connections other than using the state highway system.

Table 4 Existing Transportation Facilities and Roadway Designations

Roadway	Functional Classification	Cross-section	Surface Type	Posted Speed (mph)	Side-walks?	Bicycle Lanes?	On-Street Parking?
US 97	Statewide Highway (Expressway)	4 lanes	Paved	55	No	No	No
OR 140	Statewide Highway/ Statewide Highway (Expressway)	2-3 lanes	Paved	55	No	No	No
OR 66	District Highway	2-4 lanes	Paved	35/45/55	No	No	No
Delap Road	Local Road/ Klamath County	2 lanes	Paved	Not posted	No	No	No
Greensprings Drive	Collector/ Klamath County	2-lanes	Paved	35	No	No	No
Memorial Drive	Local Road/ Klamath County	2-lanes	Paved	Not posted	No	No	No
Balsam Drive	Collector/ Klamath County	2-lanes	Paved	35/55	No	No	No
Orindale Road	Collector/ Klamath County	2-lanes	Paved	45	No	No	No

Roadways in the vicinity of the interchange are managed and maintained by ODOT, the City of Klamath Falls, or Klamath County. Figure 4 shows jurisdictional control of roadways near the interchange. Figure 5 shows the functional classification of area roadways based on the pending update to the Klamath Falls Urban Area Transportation System Plan.



Oregon Department of Transportation

Transportation Facilities by Jurisdiction

Figure 4

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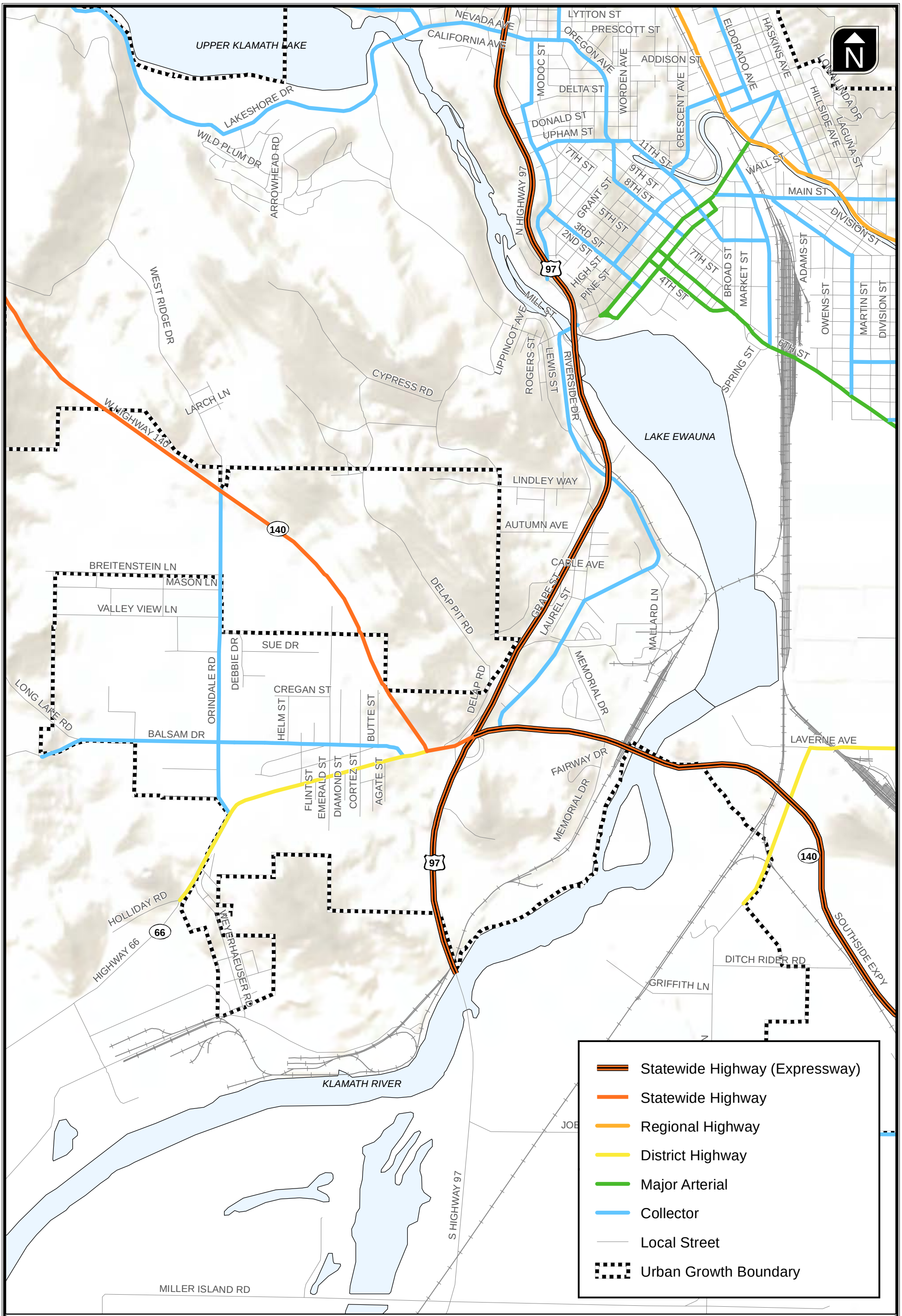

Oregon Department of Transportation

Functional Classification Map

Figure 5

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Public Transportation Facilities

The area in the vicinity of the interchange is served by the Basin Transit Service, the transit provider for the Klamath Falls urban area. Specifically, the area is served by Route 3 which provides service between the Stewart-Lennox area and downtown Klamath Falls via OR 66 and Greensprings Drive. The route provides fixed route service from 6:00 a.m. to 6:00 p.m. Monday-Friday on 1 hour headways. Saturday service is provided from approximately 10:00 a.m. to 4:00 p.m. No service is provided on Sunday.

Pedestrian and Bicycle Facilities

Pedestrian and bicycle facilities in the vicinity of the interchange are limited. No defined sidewalks or bicycle lanes exist on the state highway system or collector network within the study area. However, the signalized intersection of OR 140/OR 66 does have push-button activated pedestrian signals on three of the four approach legs. In addition, OR 140 and OR 66 has shoulders but these are not designated bike lanes.

Analysis Methodology and Performance Standards

All operations analysis described in this report were performed in accordance with the procedures in the *2000 Highway Capacity Manual* (Reference 1).

Per the ODOT *Analysis Procedures Manual* (APM – Reference 2), intersection operational evaluations were conducted based on the peak 15-minute flow rate observed during the weekday p.m. peak hour. Using the peak 15-minute flow rate ensures this analysis is based on a reasonable worst-case scenario. For this reason, the analysis reflects conditions that are likely to occur for 15 minutes out of each average weekday p.m. peak hour. The transportation system will likely operate under conditions better than those described in this report during other typical time periods.

The operational analysis results were compared with mobility standards used by the local agencies to assess performance and potential areas for improvement.

Klamath County Intersection Traffic Operations Performance Standards

Klamath County has established LOS "E" for the poorest operating approach as the performance standard for unsignalized intersections. No Klamath County controlled study intersections are signalized. The performance of the study intersections under control of the County will be compared to this performance standard.

ODOT Intersection Traffic Operations Performance Standards

ODOT uses volume-to-capacity (v/c) ratio standards to assess intersections operations. Table 6 of the *Oregon Highway Plan* (OHP - Reference 3) provides the maximum volume-to-capacity ratios for all signalized and unsignalized intersections outside the Metro area. The OHP ratios are used to evaluate existing conditions.

Intersection Performance Standards

Table 5 below shows the applicable governing jurisdiction, intersection control, and performance standard for each study intersection.

Table 5 Study Intersection Performance Standard

Intersection	Jurisdiction	Control	Performance Standard	
			HDM	Control
1. Orindale Road & OR 140	ODOT	Stop-Controlled	0.70 v/c	0.90 v/c
2. Greensprings Drive & Riverside Drive	Klamath County	Stop-Controlled	-	LOS "E"
3. Greensprings Drive/Memorial Drive	Klamath County	Stop-Controlled	-	LOS "E"
4. Orindale Road & Balsam Drive	Klamath County	Stop-Controlled	-	LOS "E"
5. Orindale Road & OR 66	ODOT	Stop-Controlled	0.75 v/c	0.90 v/c
6. Emerald Street & OR 66	ODOT	Stop-Controlled	0.75 v/c	0.90 v/c
7. Balsam Drive & OR 66	ODOT	Stop-Controlled	0.75 v/c	0.90 v/c
8. OR 140 & OR 66	ODOT	Signalized	-	0.70 v/c
9. Delap Road & OR 66	ODOT	Stop-Controlled	0.70 v/c	0.90 v/c
10. US 97 Southbound Ramp Terminal & OR 140	ODOT	Stop-Controlled	0.70 v/c	0.85 v/c
11. US 97 Northbound Ramp Terminal & OR 140	ODOT	Stop-Controlled	0.70 v/c	0.85 v/c
12. Greensprings Drive & OR 140	ODOT	Stop-Controlled	0.70 v/c	0.90 v/c
13. Memorial Drive & OR 140	ODOT	Stop-Controlled	0.70 v/c	0.90 v/c
14. Tingley Lane & OR 140	ODOT	Signalized	0.70 v/c	0.70 v/c
15. US 97/Reames Country Club Access	ODOT	Stop-Controlled	0.65 v/c	0.80 v/c
16. US 97/Columbia Plywood Access	ODOT	Stop-Controlled	0.65 v/c	0.80 v/c

Traffic Volumes

The following sub-sections discuss the weekday evening (PM) peak hour traffic volume development and the seasonal adjustment factor used to adjust the 2010 traffic counts.

Weekday Evening (PM) Peak Hour Development

Because the travel demand model that will be used to generate the future conditions analysis will produce traffic volumes representative of a 1-hour weekday p.m. peak that is assumed to occur between 4:00 and 6:00 p.m., intersections were assumed to peak within this time frame. A system-

wide peak hour factor was found to occur between 4:30 and 5:30 p.m. As such, the analysis for this study considers traffic volumes for each intersection during that time period. Table 6 summarizes the total entering volume for a sample of major study intersections for each hour from 4:00 p.m. to 6:00 p.m. As shown, the intersections in the vicinity of the interchange were observed to peak during the 4:30-5:30 p.m. hour.

Table 6 Total Entering Volume For All Study Intersections

Sample of Major Study Intersections		
Time	**Total Entering Volumes**	**% Difference from Peak**
4:00-5:00	7,360	-5.93%
4:15-5:15	7,626	-2.53%
4:30-5:30	**7,824**	0.00%
4:45-5:45	7,704	-1.53%
5:00-6:00	7,541	-3.62%

Seasonal Adjustment Factor

30th Hour Volumes (30 HV) for Klamath Falls were calculated based on the traffic counts collected over the period from February to September in 2010 and some in winter 2011/2012 and the application of a seasonal adjustment factor. The APM identifies three methods for identifying seasonal adjustment factors for highway traffic volumes. All three methods utilize information provided by Automatic Traffic Recorders (ATR) located in select locations throughout the State Highway System that collect traffic data 24-hours a day/365 days a year. Each method was evaluated to determine the most appropriate method for the study area.

The *On-Site ATR Method* requires that the ATR be located within or near the project area. If the ATR is located outside the project area, there should be no major intersections between the ATR and the project area. *Information on AADT for highway segments throughout Oregon can be found in ODOT's Transportation Volume Tables.* One ATR station exists near the project study area. That station (18-018) is located on the Klamath Falls-Malin Highway 0.46 miles south of Main Street in Klamath Falls. However, this station is located on a different highway with potentially different seasonal characteristics. As such, the *On-Site ATR Method* was not used.

Other season adjustment methods, including using the *Seasonal Trend Table Method* or the *Characteristic Table Method* were evaluated for use on this project. The *Characteristic Table Method* was not used because representative ATR stations for the study area were not located. Since neither the *On-Site ATR Method* or the *Characteristic Table Method* provide suitable adjustment factors, the *Seasonal Trend Table Method* was used. Specifically, the commuter trend line and the summer trend line were averaged to develop a seasonal profile consistent with the characteristics of the study area.

Table 7 below shows the monthly Seasonal Adjustment values used for this analysis.

Table 7 Seasonal Trend Table Adjustment Values

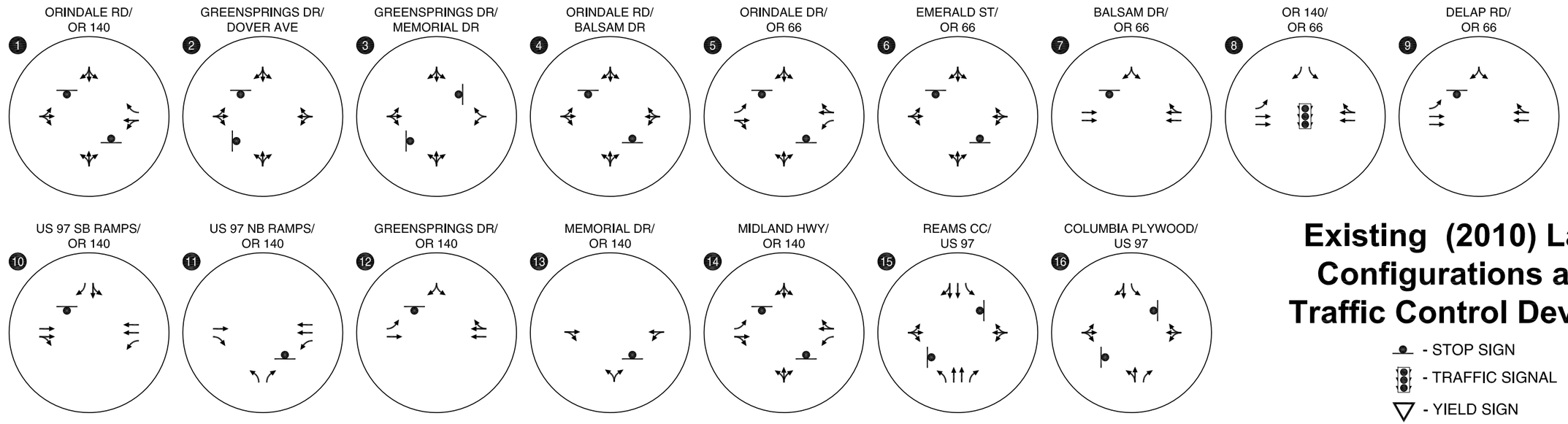
ATR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
18-018	1.28	1.22	1.17	1.14	1.10	1.04	1.00	1.00	1.06	1.10	1.21	1.23

The traffic counts for this study were collected over a number of months. As such, a singular Seasonal Adjustment value cannot be used. Rather, the values from the table above were used to adjust each traffic count based upon the month it was collected.

Traffic Operations Analysis Results

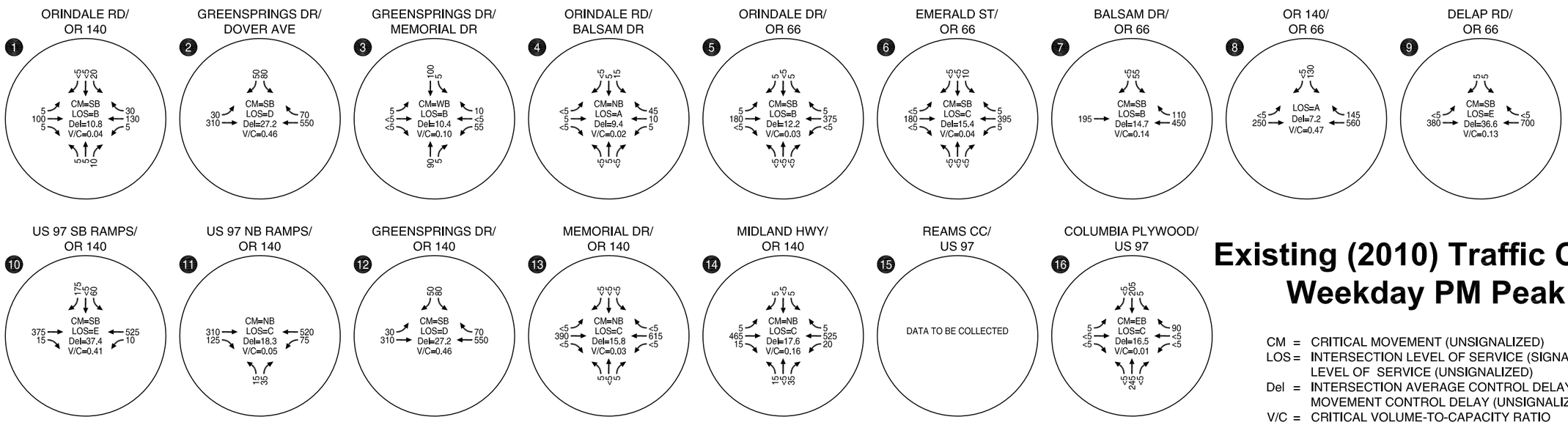
Level-of-service (LOS) and volume-to-capacity (v/c) ratios were calculated for each of the study intersections based on the parameters described previously.

Figure 6 shows the existing lane configurations, traffic control, and operational analysis results of the study intersections. As shown, all study intersections were observed to operate acceptably during the analysis period.



Existing (2010) Lane Configurations and Traffic Control Devices

- STOP SIGN
- TRAFFIC SIGNAL
- YIELD SIGN



Existing (2010) Traffic Conditions Weekday PM Peak Hour

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO
STD = OPERATIONAL STANDARD

Oregon Department of Transportation

Existing (2010) Lane Configurations and Traffic Control Devices / **Existing (2010) Traffic Conditions Weekday PM Peak Hour**

Figure 6

H:\profile\11881 - Greenspring IAMP\dwgs\figs\11881_Fig02.dwg May 01, 2012 - 10:57am - jsommerville Layout Tab: b

Traffic Safety

This section documents the crash history of the study intersections from 2006-2010. The data used for this analysis was obtained from the ODOT Crash Analysis and Reporting Unit.

Intersection Historical Crash Inventory

Table 8 summarizes the crash data by study intersection. The table summary provides the number of crashes, type of crashes, and severity of crashes reported from 2006 through 2010.

Segment Historical Crash Inventory

Table 9 summarizes the crash data collected by study segment, which includes the state highways within the study area. The table summary provides the number of crashes, type of crashes, and severity of crashes reported from 2006 through 2010. The crash rates for these segments were compared to similar facilities in the state based on rates contained in ODOT Crash Table II, which publishes such information.

Table 8 Summary of Reported Crashes at Study Intersections

Intersection	Total	Crash Rate	Crash Type					Severity		
			Angle	Rear-end	Turning	Head On	Other	PDO[1]	Injury	Fatal
1. Orindale Road & OR 140	2	0.38	0	1	1	0	0	0	2	0
2. Green Springs Drive & Riverside Avenue	0	0.00	0	0	0	0	0	0	0	0
3. Green Springs Drive/Memorial Drive	0	0.00	0	0	0	0	0	0	0	0
4. Orindale Road & Balsam Drive	0	0.00	0	0	0	0	0	0	0	0
5. Orindale Road & OR 66	0	0.00	0	0	0	0	0	0	0	0
6. Emerald Street & OR 66	0	0.00	0	0	0	0	0	0	0	0
7. Balsam Drive & OR 66	0	0.00	0	0	0	0	0	0	0	0
8. OR 140 & OR 66	5	0.26	0	4	0	0	1	4	1	0
9. Delap Road & OR 66	0	0.00	0	0	0	0	0	0	0	0
10. US 97 SB Ramps & OR 140	5	0.25	0	2	3	0	0	2	3	0
11. US 97 NB Ramps & OR 140	1	0.05	0	0	1	0	0	1	0	0
12. Green Springs Drive & OR 140	7	0.37	1	1	5	0	0	4	3	0
13. Memorial Drive & OR 140	1	0.06	0	1	0	0	0	0	1	0
14. Midland Highway & OR 140	3	0.16	0	0	2	0	1	1	2	0
15. US 97/Reames Country Club Access	1	-	1	0	0	0	0	1	0	0
16. US 97/Columbia Plywood Access	2	0.20	1	0	0	0	1	1	1	0

Note: [1]PDO – Property Damage Only

Table 9 Summary of Reported Crashes on Roadway Segments

Roadway Section	Segment Length (Miles)	Number of Crashes	Crash Type					Severity			Crash Rate	Statewide Comparison	
			Fixed Object	Rear-End	Sideswipe	Turning	Other	PDO[1]	Injury	Fatality			
OR 66: Agate Street to OR 140	1.50	22	1	11	2	6	2	11	10	1	1.14	Rural Cities: Minor Arterials	1.41
OR 140: Orindale Road to OR 66	1.50	7	2	1	1	0	3	2	5	0	1.28	Rural Cities: Minor Arterials	1.41
OR 140: OR 66 to Memorial Drive	0.65	17	1	5	1	7	3	10	7	0	1.04	Rural Cities, Other Principal Arterials	1.28
US 97: Columbia Plywood to Greensprings Drive Off-ramp	1.70	22	13	0	1	3	5	10	12	0	1.69	Rural Cities, Other Principal Arterials	1.28

Note: [1]PDO - Property Damage Only
Shading indicates the calculated crash rate exceeds comparison to similar statewide facilities

As shown, no crashes were reported for the following study intersections:

- Greensprings Drive & Dover Avenue
- Greensprings Drive/Memorial Drive
- Orindale Road & Balsam Drive
- Orindale Road & OR 66
- Emerald Street & OR 66
- Balsam Drive & OR 66
- Delap Road & OR 66

No fatal crashes were reported at the study intersections during the analysis period. Further, crash rates were reported to be less than 0.38 crashes per million entering vehicles (MEV) for all locations. In addition, crash patterns were reviewed at each intersection. Based on these observations, no discernible trends in crash occurrences have been observed at those locations.

The segment crash analysis found that all segments were observed to have a lower crash rate than other facilities within the state with the exception of US 97. This facility was observed to have a crash rate of 1.69 crashes/MEV where similar facilities were observed to have a rate of 1.28 crashes/MEV. This rate is driven by a relatively high number of fixed object crashes along the segment. These crashes were overwhelmingly contributed to drivers driving too fast for conditions.

One fatal crash was reported along OR 66. In this case, a vehicle traveling eastbound on OR 66 near Diamond Street was stopped to turn left. Another eastbound vehicle failed to stop, causing a rear-end collision. The driver of the striking vehicle was killed. The driver of the stopped vehicle was not injured. The crash occurred during daylight hours on a clear day.

Existing Roadway Access Conditions

Figure 7 shows the existing and planned access locations within the OR 66 Green Springs IAMP study area. As shown, several roadways have access points relatively close to the existing OR 66/US 97 ramp terminals. The roadways include (measured from nearest ramp terminal intersection):

- OR 140, 725 feet
- Delap Road, 350 feet
- Greensprings Drive, 540 feet

The required access spacing based on OAR 734-051 for this location is 1,320 feet (1/4 mile). Based on this requirement, these existing access points do not meet the required minimum spacing standards.

Two access points along US 97 are also closely spaced to the existing OR 66/US 97 interchange. These include (measured from end of entrance ramp taper):

- Reames Country Club Access Road, 450 feet
- Greensprings Drive off-ramp, 975 feet

Based on OAR 734-051, the required access spacing for these locations is 2,640 feet (1/2 mile).

Further, many existing access locations along OR 140, OR 66, and US 97 in the vicinity of the interchange do not meet current access spacing standards. Many of these are existing residential driveways. In particular, the area along OR 66 west of Agate Street has many closely spaces access locations. However, this area developed some time ago and, as a result, documentation on these locations does not exist. Further investigation is needed to more clearly understand these existing spacing conditions in that area.

Specific roadway spacing standards for the study area are included in Technical Memorandum #1 and shown on Figure 7.

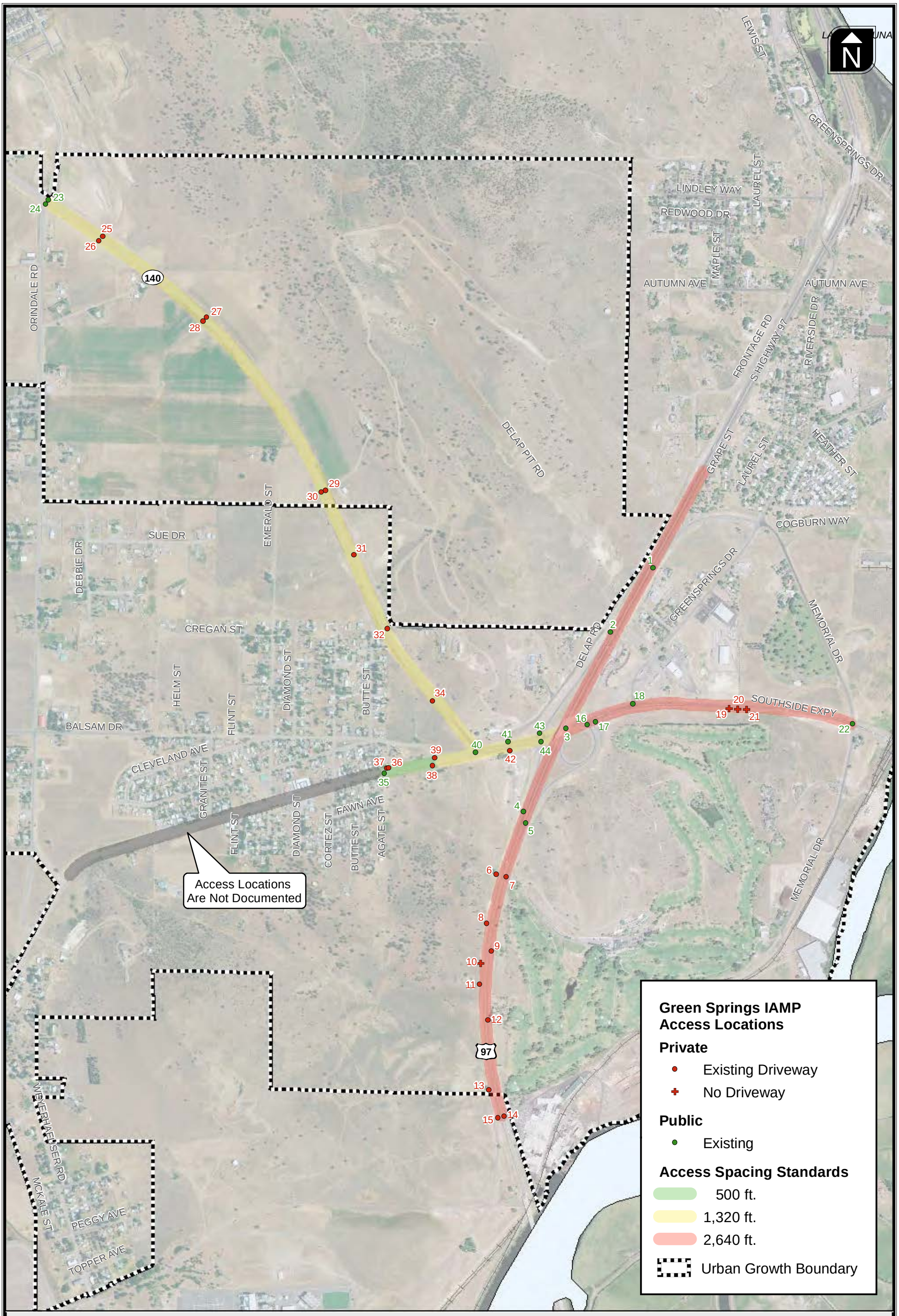
Existing and planned access locations within the study area are shown on Figure 7. Specific information about each access location is included in Table 10.

Table 10 Approach Inventory

Access Number	Mile Point	RoA Station	Permit #, Year	Highway Side	Use	Note
US 97 (The Dalles-California Highway No. 004)						
1	276.74	-		E	Public Road	Northbound off-ramp, ODOT
2	276.88	-		W	Public Road	Southbound off-ramp, ODOT
3	277.07	-		E	Public Road	Northbound on-ramp, ODOT
4	277.33	-		W	Public Road	Southbound on-ramp, ODOT
5	277.36	-		E	Public Road	Northbound off-ramp, ODOT
6	277.47	255+00	35159, '92	W	Vacant	McDonald Property, Permitted Agricultural Use
7	277.47	30+85	16938, '68	E	Reames Golf & Country Club	Frontage Road Language
8	277.59	261+75		W	Vacant	Frontage Road Language
9	278.06	39+50		E	Vacant	Frontage Road Language
10	278.10	266+25		W	Vacant	Frontage Road Language
11	278.13	267+68		W	Vacant	Frontage Road Language
12	278.21	271+75		E	Residential	Frontage Road Language
13	278.36	279+55	29875, '87	W	Vacant	Frontage Road Language, Permitted Residence/Auto Shop
14	278.42	283+10	30126, '87	E	Columbia Plywood	Frontage Road Language
15	278.42	285+00	35481, '99	W	CoGen	Frontage Road Language, Approach & Permit not at RoA station
OR 140 (South Klamath Falls Highway No. 424)						
16	0.04	-		S	Public Road	Northbound on-ramp, ODOT
17	0.08	-		S	Public Road	Northbound off-ramp, ODOT
18	0.16	-		N	Public Road	Greensprings Drive, CKFO
19	0.16	95+32		S	Serves only 400	Owned by Sarah Drier
20	0.25	100+00		S	Serves only 1100	Owned by High Desert LLC
21	0.42	109+00		S	Serves 12 & 1500	Owned by Reames Golf & Country
22	0.64	-		S	Public Road	Memorial Drive, CKFO
OR 140 (Lake of the Woods Highway No. 270)						
23	67.23	369+05	51867, *	N	Public Road	West Ridge Drive, Southview Access
24	67.23	369+00		S	Public Road	Orindale Road, K. Co.
25	67.37	377+00		N	Emergency Access only	Frontage Road Language, Emergency access for Southview
26	67.37	377+00		S	Agricultural	Frontage Road Language
27	67.66	392+00		N	Agricultural	Frontage Road Language
28	67.66	392+00		S	Agricultural	Frontage Road Language
29	68.11	416+00		N	Agricultural	Frontage Road Language
30	68.11	416+00		S	Agricultural	Frontage Road Language
31	68.26	424+00	C#3337, *	N	Residential	Frontage Road Language Castle Ridge PUD
32	68.43	433+30		N	Residential	Frontage Road Language
33	68.61	443+00		S	Vacant	ODOT owns TL 701 & 800, on the west side, at the intersection

Table continued on next page

Access Number	Mile Point	RoA Station	Permit #, Year	Highway Side	Use	Note
OR 66 (Green Springs Highway No. 021)						
35	58.67	-		S	Public Road	Agate Street, CKFO
36	58.66	13+68		N	Residential	Frontage Road Language
37	58.68	14+50		N	Residential	Frontage Road Language
38	58.77	19+25	35160, '92	S	Private Property	Frontage Road Language Permitted Use: Field Use
39	58.79			N	Public Road	Balsam Drive, CKFO
40	58.86			N	Public Road	OR 140, ODOT
41	58.94	80+58		N	Public Road	Delap Pit Road, CKFO
42	58.94			S	Material Site, ODOT	Gravel Road
43	58.97	-		S	Public Road	Leg to southbound on-ramp, ODOT
44	58.99	-		N	Public Road	Leg from southbound off-ramp, ODOT
45	59.01	-		S	Public Road	Southbound off-ramp, ODOT
46	59.01	-		N	Public Road	Southbound on-ramp, ODOT



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Current / Planned Access Locations

Figure 7

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Existing Roadway Deficiencies

The existing traffic operational analysis does not highlight any major issues at the study intersections. In addition, the safety evaluation did not discover safety issues at the study intersections. There are numerous access points as well as intersections at undesirable locations, but due to the relative low traffic volumes these have not had any major issues and deficiencies.

From a roadway perspective, the interchange has an intersection angle of approximately 50 degrees, which influences the following:

- The southbound ramp terminal has an intersection angle of approximately 50 degrees and motorist turning onto OR 140 have challenges identifying a gap in oncoming traffic as they need to look over the shoulder, especially the southbound right-turners.
- OR 140 has a combination of horizontal and vertical curves through the interchange. This geometry impacts the southbound left-turn movement at the US 97 Southbound Ramp Terminal and the driver's ability to identify a gap in the westbound approaching vehicles.
- The southbound off-ramp as it approaches OR 140 does not have a landing area for cars to queue along a flatter grade. Observations have shown that some drivers (especially right-turning vehicles) tend to roll through the intersection rather than come to a complete stop.
- The loop ramp in the southeast quadrant of the interchange has a series of curves and spirals (i.e., arrangement of compound curves) that is undesirable from a driver perspective.
- The northbound ramp terminal and the Greensprings Drive intersections are closely spaced with overlapping back-to-back left-turn lanes. Future traffic growth combined with a lack of area for queuing and deceleration may become problematic.

Other geometric observations within the IMSA include:

- The Greensprings Drive/Riverside Drive intersection as an acute intersection angle and significantly different longitudinal approaching grades, which complicates intersection sight distance (especially for the northbound right-turn from Riverside Drive to Greensprings Drive).
- The Greensprings Drive/Riverside Drive/Dover Avenue/Heather Street is a five-legged unconventional intersection. This configuration is less than ideal for accommodating long-term traffic growth.
- The second US 97 Northbound Off-ramp that provides access directly to Greensprings Drive is closely spaced to the OR 66/US 97 interchange. This ramp was observed to serve minimal trips during the p.m. peak hour.

- The location of the Reames Country Club access south of the US 97/OR 140-OR66 interchange provides insufficient spacing to merge and weave from the US 97 Southbound On-Ramp to the southbound left-turn at the Reames Country Club access.
- The OR 140/Memorial Drive intersection is located immediately west of the two-lane bridge across the Klamath River on OR 140 (Southside Express Bypass). This spacing may make it challenging to add a future westbound left-turn (if warranted by future traffic growth).
- The roads with the Stewart-Lennox neighborhood are still striped with a skip yellow line along the center line to allow for passing. The character of this neighborhood has changed and a double yellow center line stripe would be more appropriate.
- The road network in the Stewart-Lennox neighborhood adjacent to OR 66 does not have a typical grid layout; therefore, resulting in numerous intersections with acute intersection angles, as well as different approach angles through the intersections.
- The multiple intersections and private driveways along OR 66 west of OR 140 have resulted in a higher concentration of conflict points.

Natural and Cultural Resources

Based on the PT meetings and follow-up with the respective agencies it appears there are no natural and cultural resources of concern within the IMSA. Special attention will be given to any proposed improvements within the vicinity of the cemetery in the northeast quadrant of the intersection.

Utilities

Natural gas lines and electrical lines are documented within the County GIS system. These utilities that exist within the vicinity of the OR 66/US 97 interchange are shown in Figure 8.

References

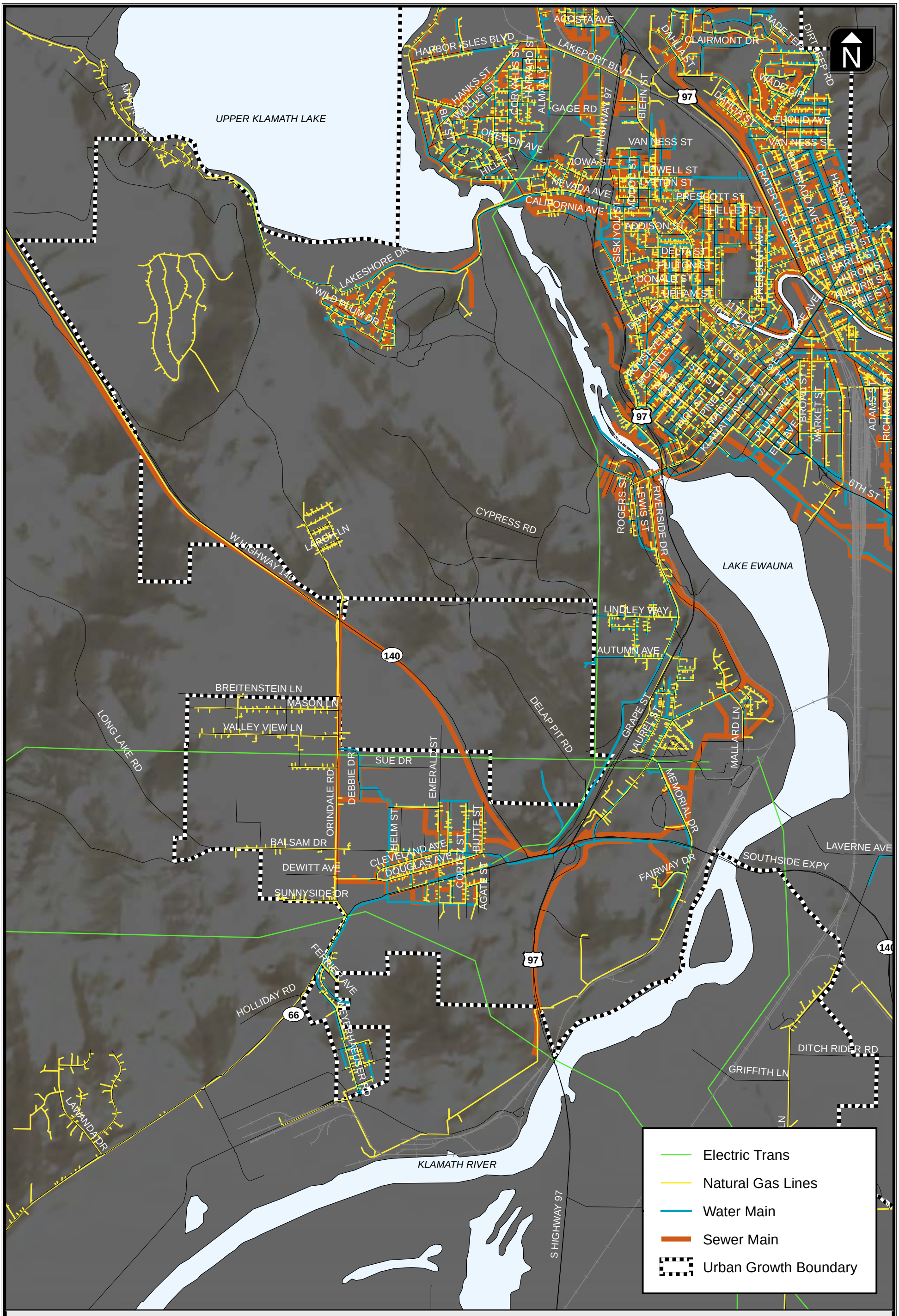
1. Transportation Research Board. Highway Capacity Manual. 2000.
2. Oregon Department of Transportation. Analysis Procedures Manual. 2006.
3. Oregon Department of Transportation. 1999 Oregon Highway Plan. 1999.

Attachments

A. Traffic Counts

B. Existing Conditions Worksheets

C. Crash Data



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Utility Map

Figure 8

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Transportation Development Division
Transportation System Monitoring Unit
Vehicular Volume

Time settings

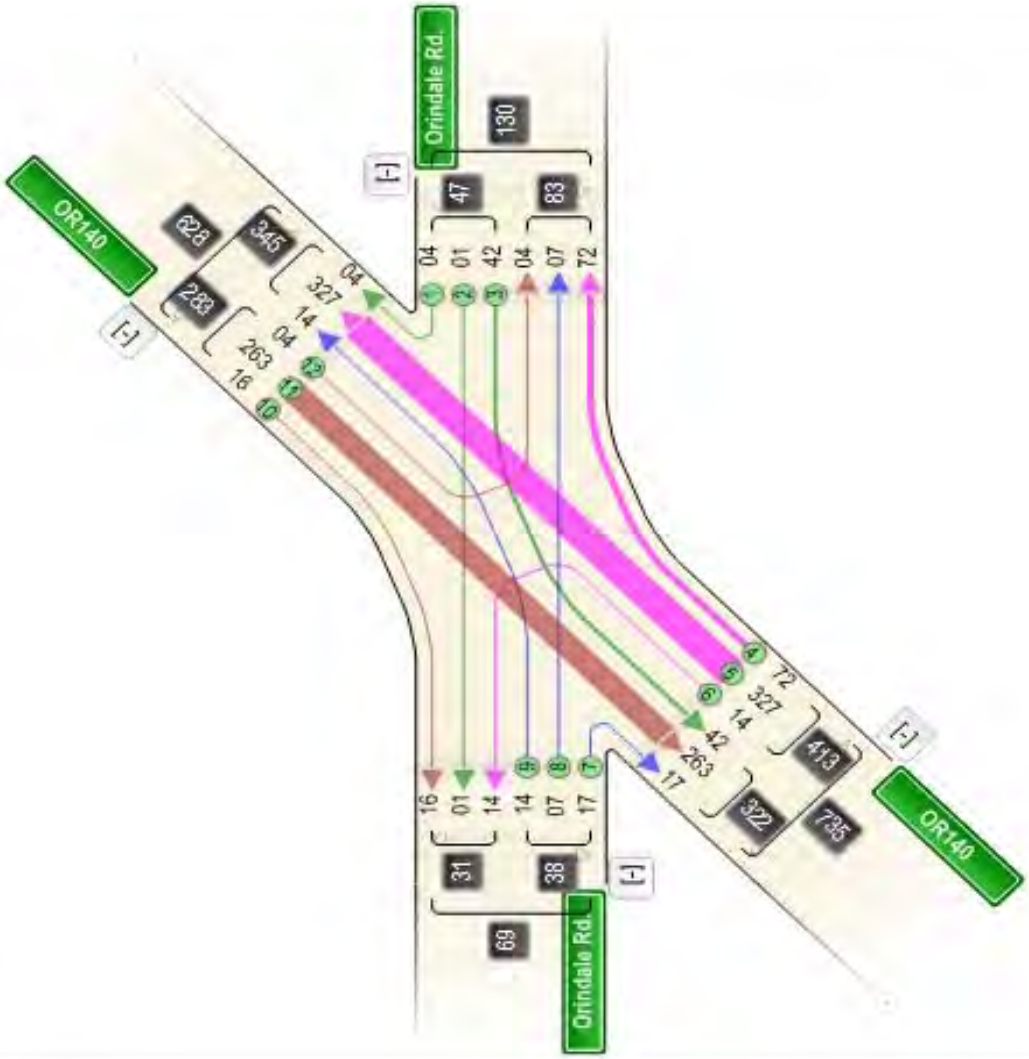
Date: 5/5/2010
Hours: 3:00 PM-6:00 PM
Weather: Cloudy

Source

Site Number: 18502010
Mile Point: 67.22
Street Number: 270
Vehicle Type: Vehicles
Crossing Flow: Pedestrians

Source Description

Location Description: OR140 @ Orindale Rd. - 3 hr count site 4045- west leg
County: Klamath
City: Klamath Falls



Transportation Development Division
Transportation System Monitoring Unit
Vehicular Volume

Time settings

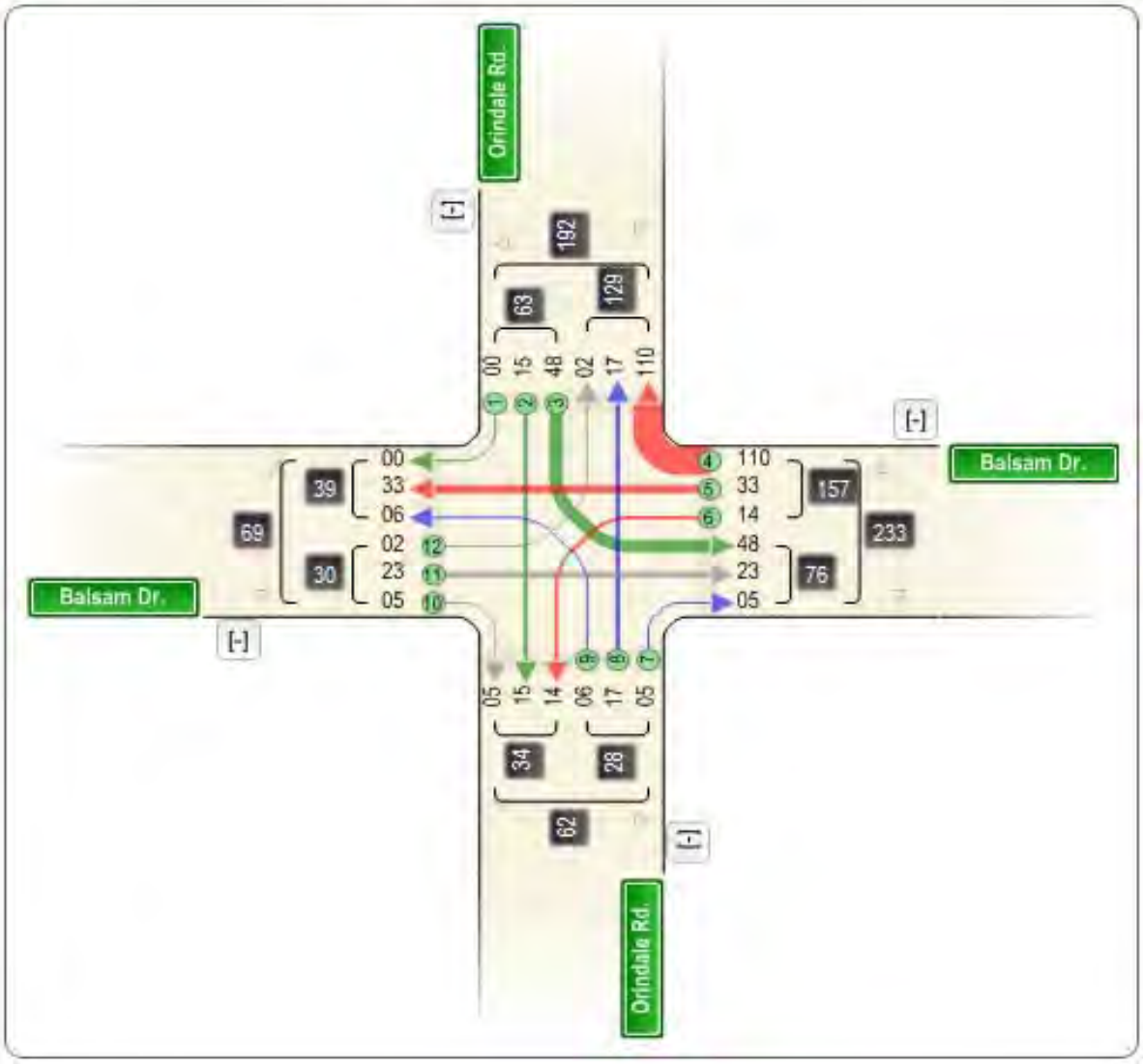
Date: 4/12/2010
Hours: 3:00 PM-6:00 PM
Weather: Cloudy

Source

Site Number: 18492010
Street Number: 3963
Vehicle Type: Vehicles
Crossing Flow: Pedestrians

Source Description

Location Description: Orindale Rd. @ Balsam Dr. 3 hr count
County: Klamath
City: Klamath Falls



Transportation Development Division
Transportation System Monitoring Unit
Vehicular Volume

Time settings

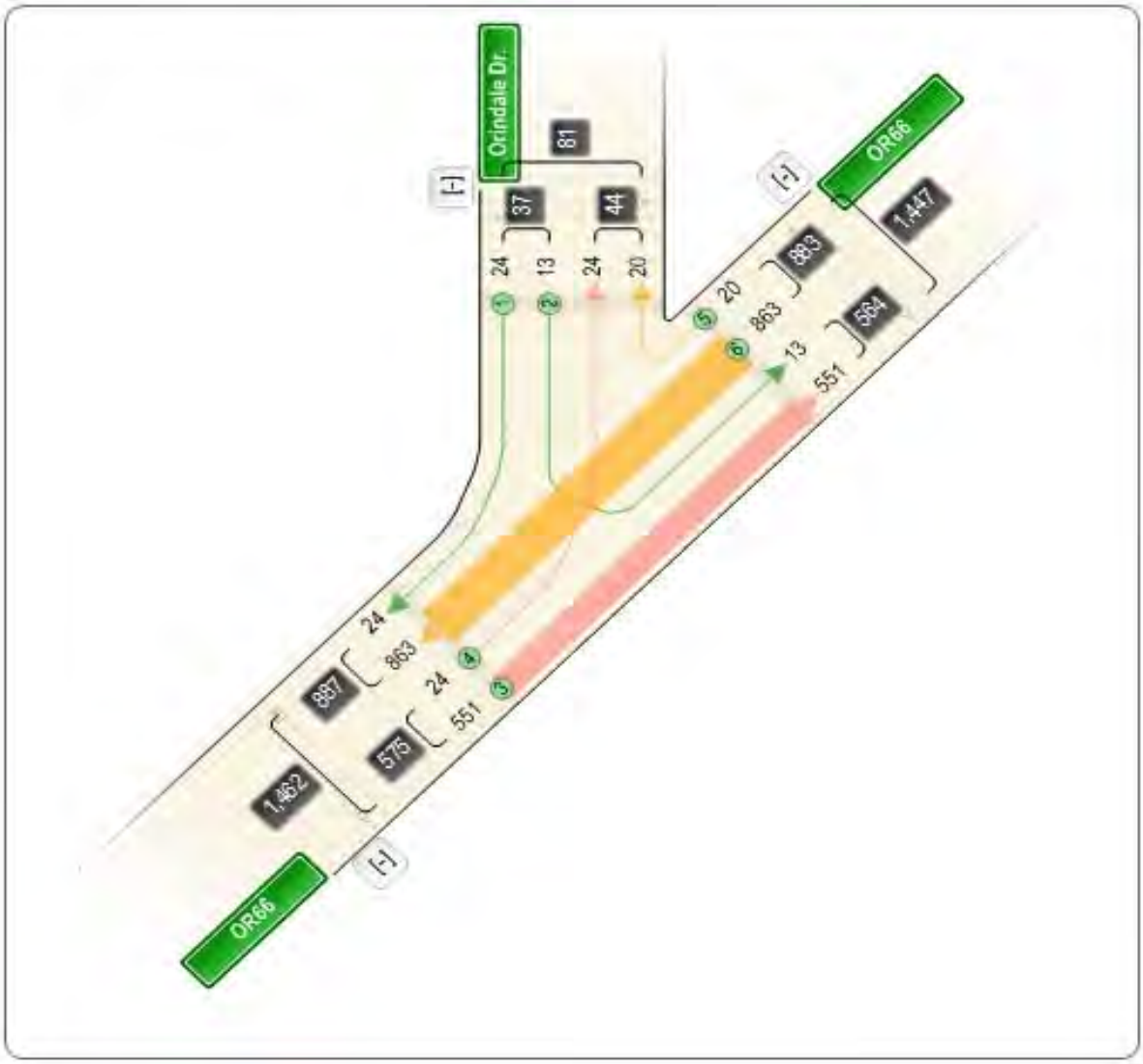
Date: 5/5/2010
Hours: 3:00 PM-6:00 PM
Weather: Cloudy

Source

Site Number: 18702010
Mile Point: 57.81
Street Number: 021
Vehicle Type: Vehicles
Crossing Flow: Pedestrians

Source Description

Location Description: OR66 @ Orindale Dr. 3 hr count
County: Klamath
City: Klamath Falls



Transportation Development Division
Transportation System Monitoring Unit
Vehicular Volume

Time settings

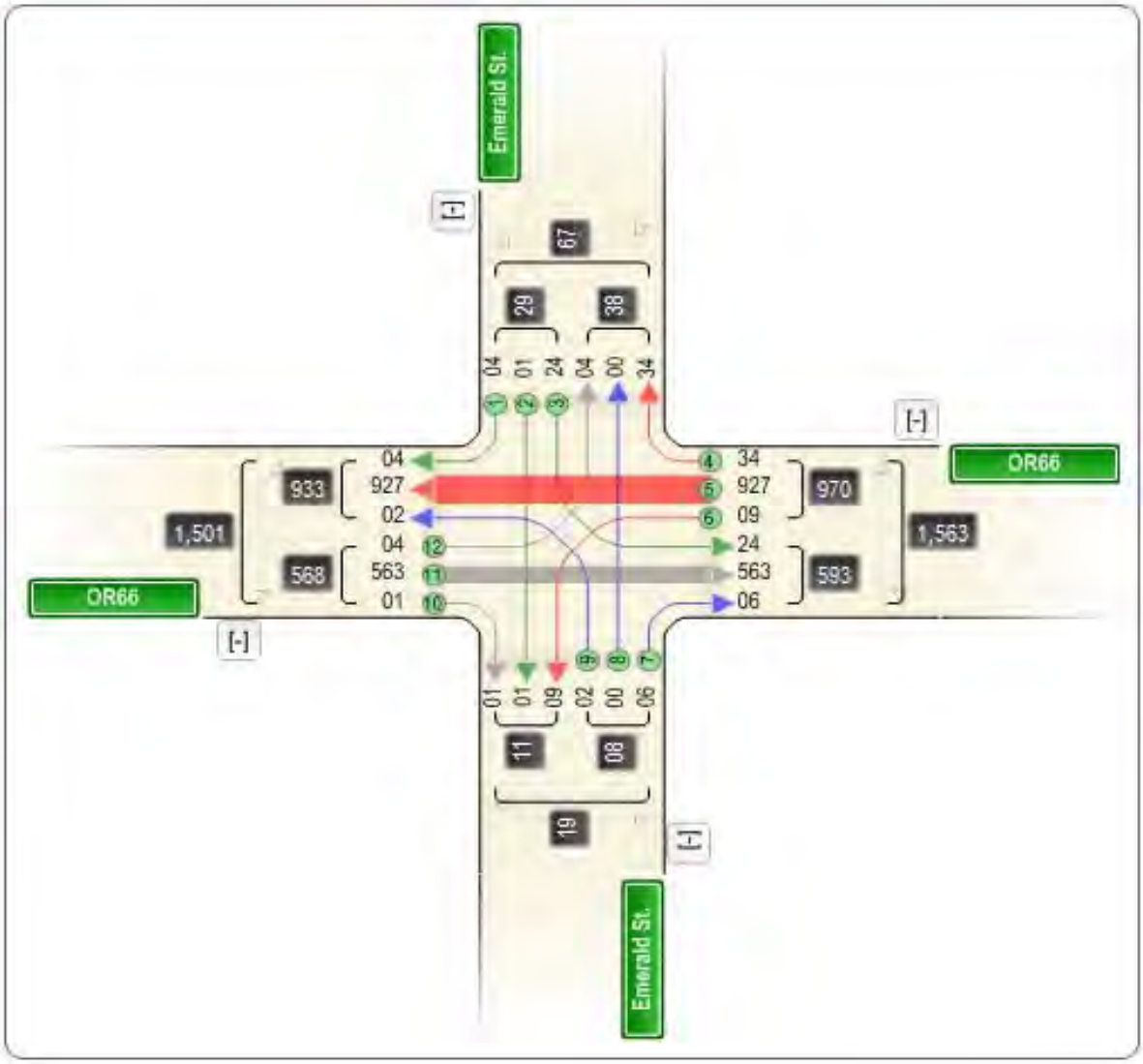
Date: 4/28/2010
Hours: 3:00 PM-6:00 PM
Weather: Cloudy

Source

Site Number: 18412010
Mile Point: 58.41
Street Number: 021
Vehicle Type: Vehicles
Crossing Flow: Pedestrians

Source Description

Location Description: OR66 @ Emerald St.
3hr count site 1264 west leg
County: Klamath
City: Klamath Falls



Transportation Development Division
Transportation System Monitoring Unit
Vehicular Volume

Time settings

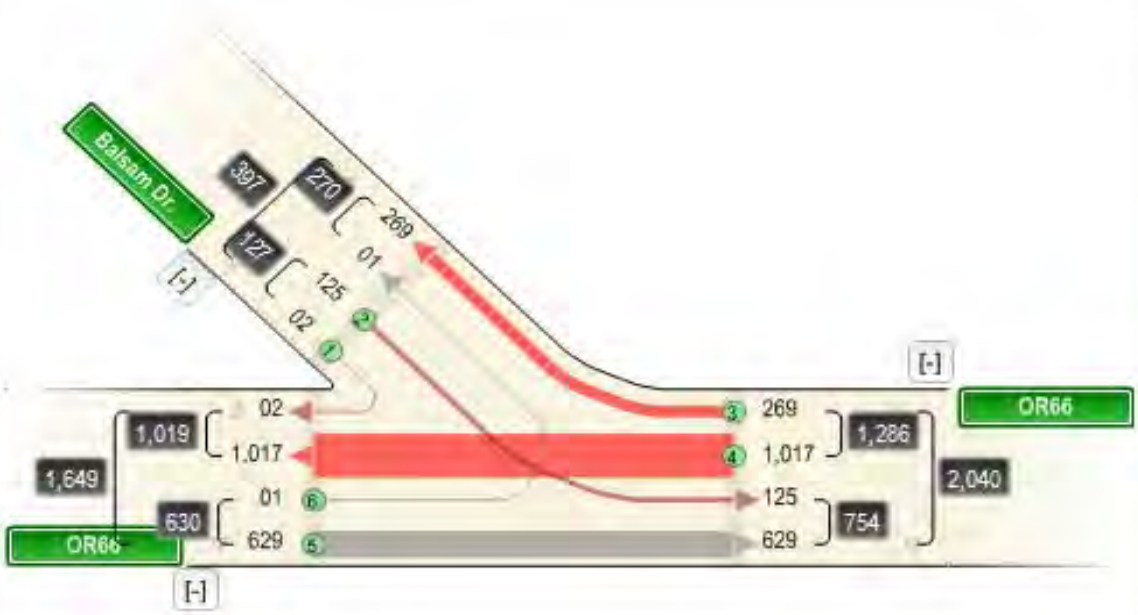
Date: 4/28/2010
Hours: 3:00 PM-6:00 PM
Weather: Cloudy

Source

Site Number: 18692010
Mile Point: 58.79
Street Number: 021
Vehicle Type: Vehicles
Crossing Flow: Pedestrians

Source Description

Location Description: OR66 @ Balsam Dr. - 3 hr count
County: Klamath
City: Klamath Falls



Transportation Development Division
Transportation System Monitoring Unit
Vehicular Volume

Time settings

Date: 2/23/2010
Hours: 6:00 AM-10:00 PM
Weather: Clear;Snow

Source

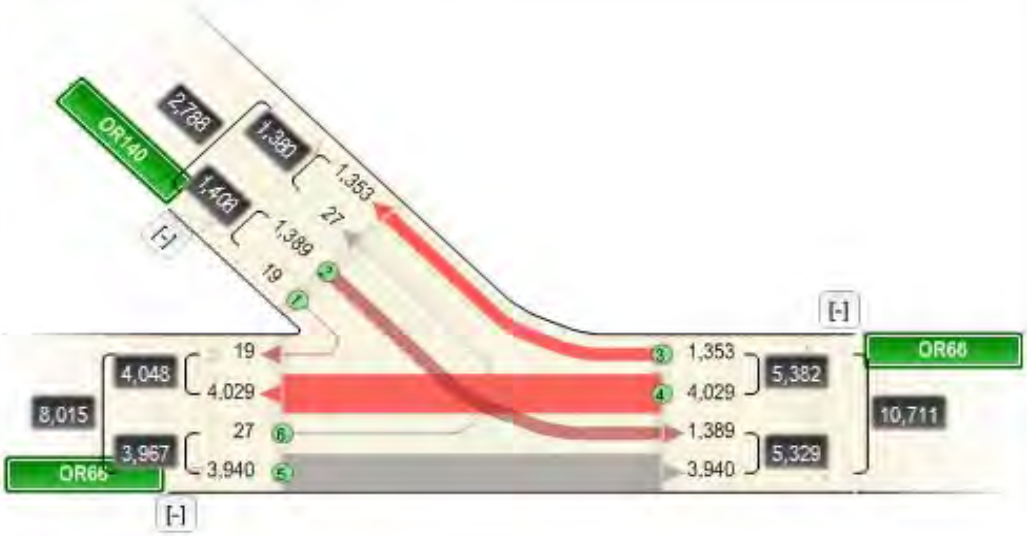
Site Number: 18032010
Mile Point: 58.86
Street Number: 021
Vehicle Type: Vehicles
Crossing Flow: Pedestrians

Source Description

Location Description: Green Springs Hwy(OR66) @ Lake of The Woods Hwy(OR140)

hwy 21 = site 1622 - east leg
hwy 270 = site 4045 north leg

County: Klamath
City: Klamath Falls



Transportation Development Division
Transportation System Monitoring Unit
Vehicular Volume

Time settings

Date: 2/24/2010
Hours: 6:00 AM-10:00 PM
Weather:

Source

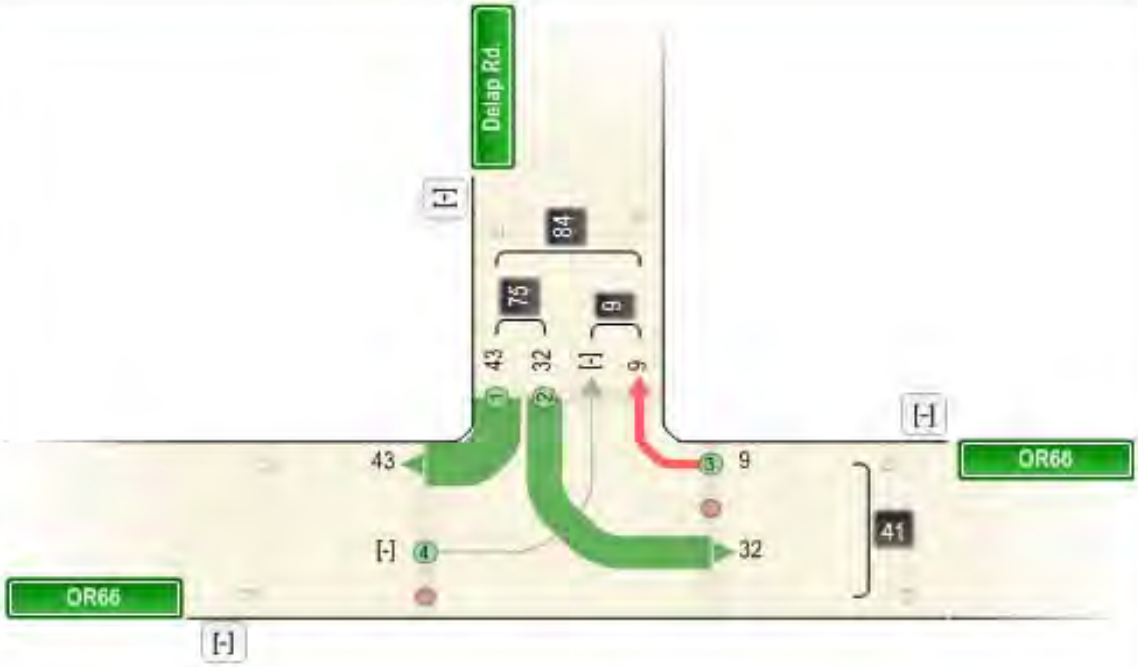
Site Number: 18132010
Mile Point: 58.94
Street Number: 021
Vehicle Type: Vehicles
Crossing Flow: Pedestrians

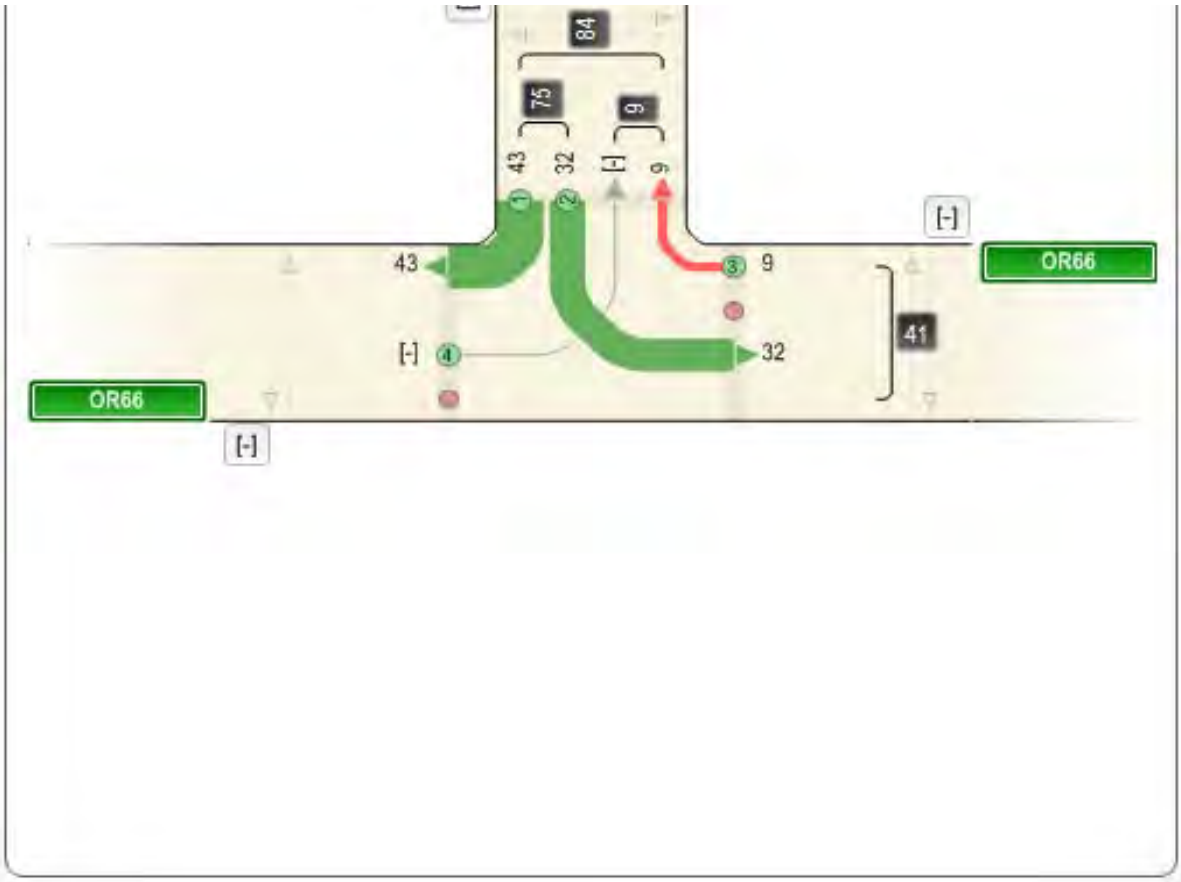
Source Description

Location Description: OR66 @ Delap Rd.

turning movements only
site 1264 - east leg

County: Klamath
City: Klamath Falls




84
75
9
43
32
[-]
9
[-]
OR66
43
9
41
[-]
32
OR66
[-]

Transportation Development Division
Transportation System Monitoring Unit
Vehicular Volume

Time settings

Date: 2/24/2010
Hours: 6:00 AM-10:00 PM
Weather: Clear;Snow

Source

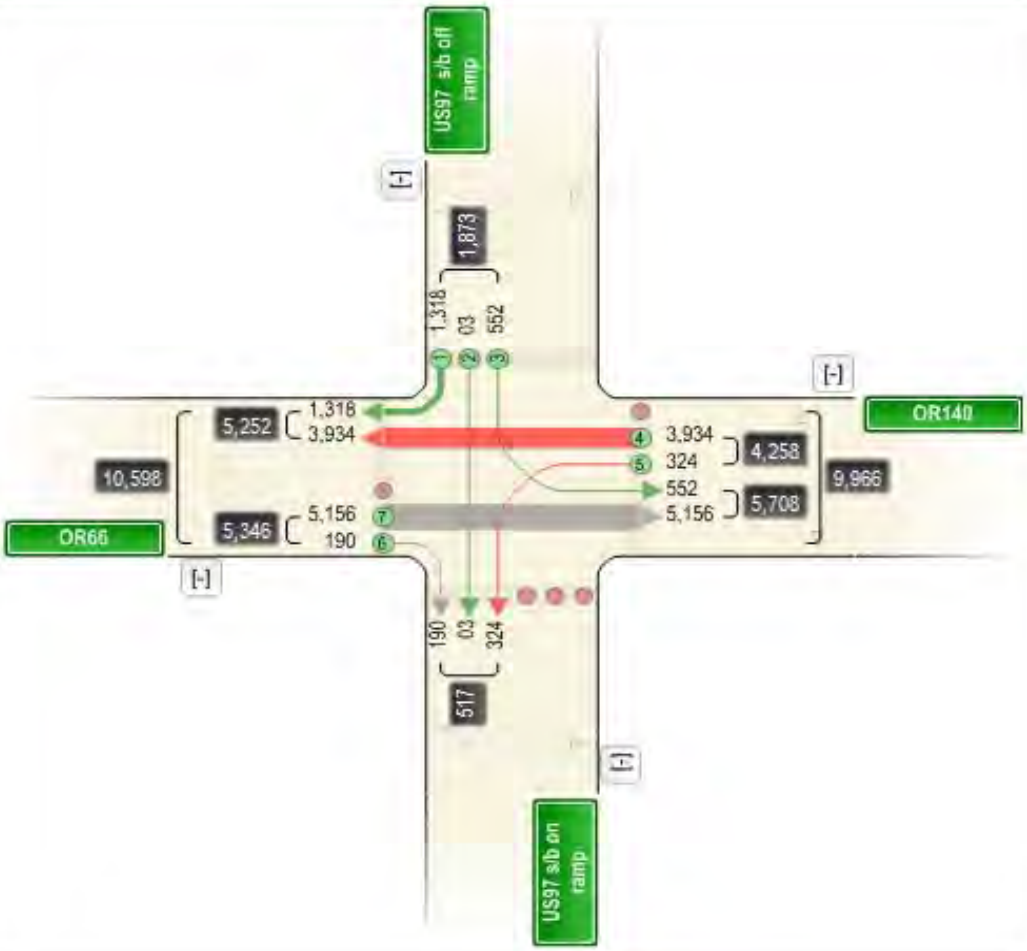
Site Number: 18012010
Mile Point: 276.88
Street Number: 004
Vehicle Type: Vehicles
Crossing Flow: Pedestrians

Source Description

Location Description: The Dalles- California Hwy(US97) s/b ramps @ Green Springs Hwy (OR66) &
S Klamath Falls Hwy(OR140)

s/b off ramp = site16828
s/b on ramp - site 16831 0021AC

County: Klamath
City: Klamath Falls



Transportation Development Division
Transportation System Monitoring Unit
Vehicular Volume

Time settings

Date: 6/16/2010
Hours: 6:00 AM-10:00 PM
Weather: Clear

Source

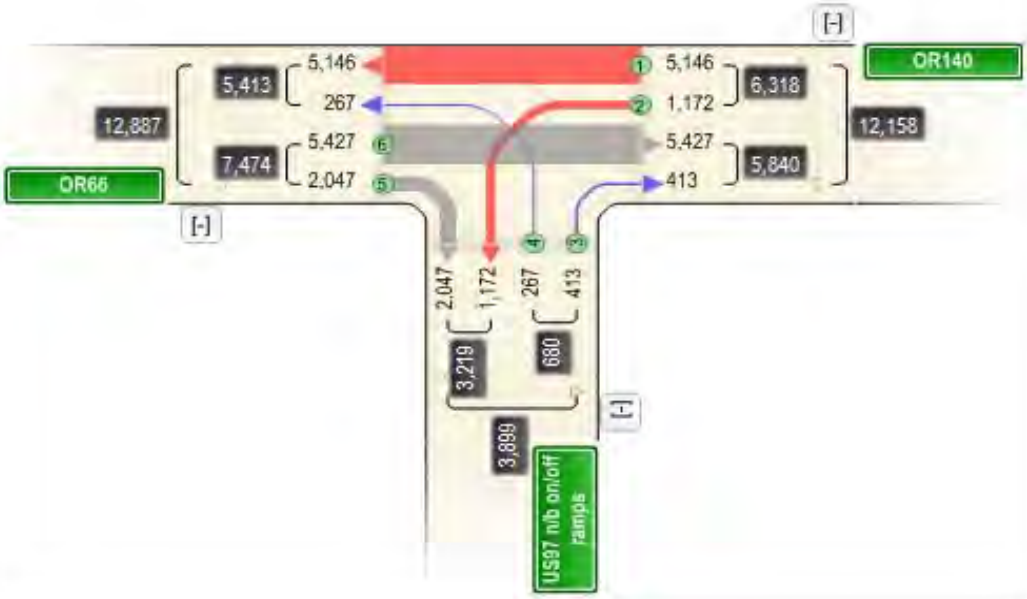
Site Number: 18022010
Mile Point: 276.88
Street Number: 004
Vehicle Type: Vehicles
Crossing Flow: Pedestrians

Source Description

Location Description: The Dalles-California hwy(US97) n/b ramps at OR66 & OR140

n/b on ramp site 16394 004BC
n/b off ramp site 16394 004BB

County: Klamath
City: Klamath Falls



Transportation Development Division
Transportation System Monitoring Unit
Vehicular Volume

Time settings

Date: 4/27/2010
Hours: 6:00 AM-10:00 PM
Weather: Cloudy

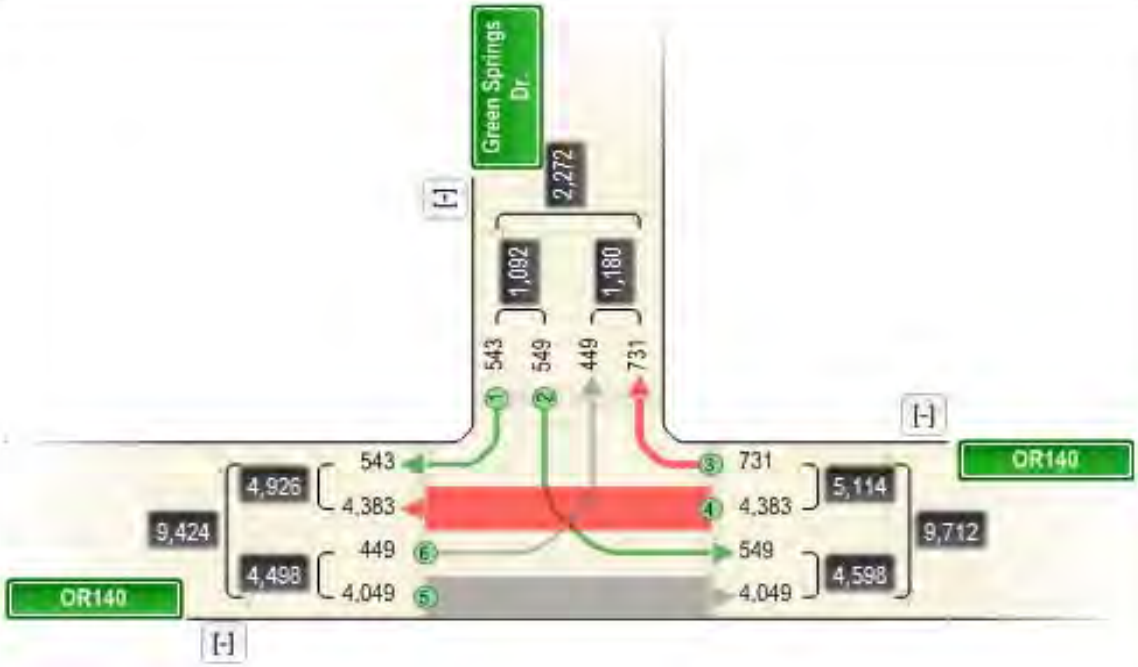
Source

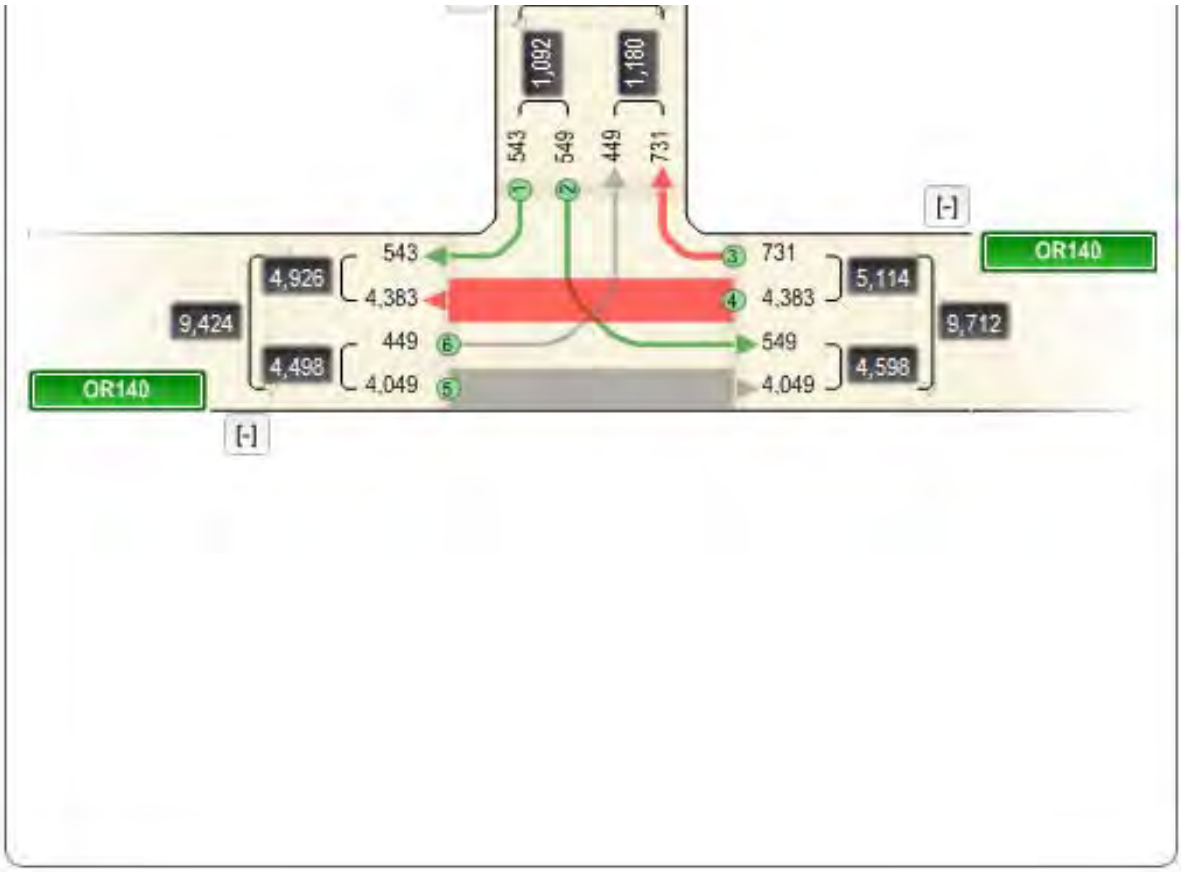
Site Number: 18342010
Mile Point: 0.16
Street Number: 424
Vehicle Type: Vehicles
Crossing Flow: Pedestrians

Source Description

Location Description: OR140 @ Green Springs Dr.

site 4545 - west leg
County: Klamath
City: Klamath Falls




1,092
1,180
543
549
449
731
[-]
OR140
543
4,926
4,383
9,424
449
4,498
4,049
731
5,114
4,383
9,712
549
4,598
4,049
OR140
[-]

Transportation Development Division
Transportation System Monitoring Unit
Vehicular Volume

Time settings

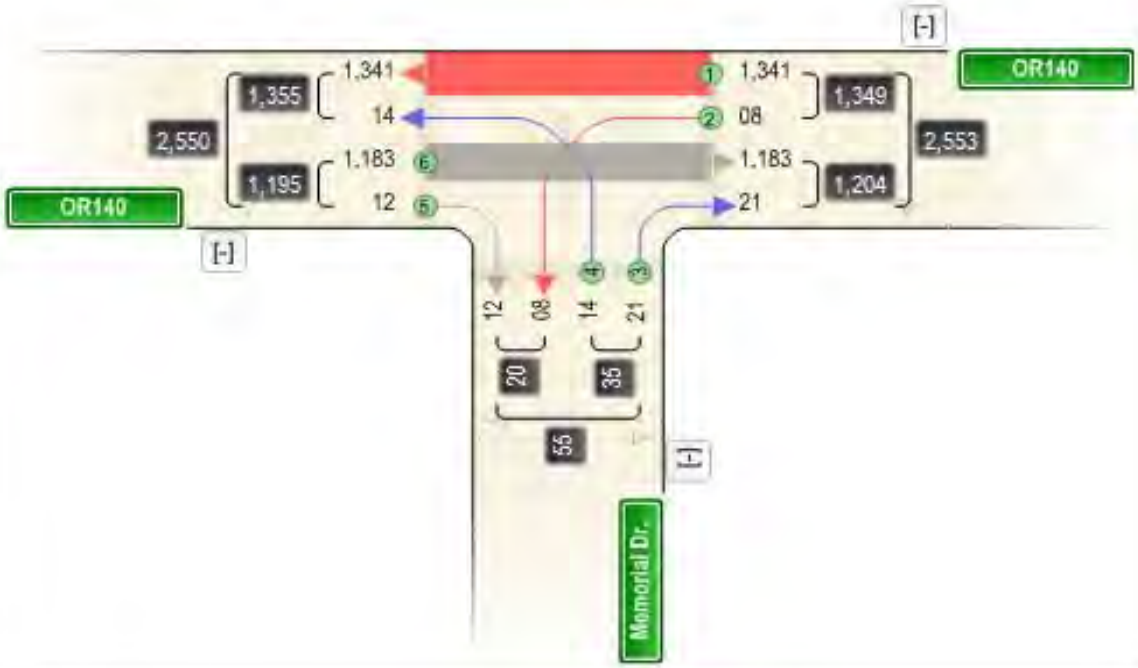
Date: 4/28/2010
Hours: 3:00 PM-6:00 PM
Weather: Cloudy

Source

Site Number: 18752010
Mile Point: 0.64
Street Number: 424
Vehicle Type: Vehicles
Crossing Flow: Pedestrians

Source Description

Location Description: OR140 @ Memorial Dr. 3 hr count site 4545 west leg
County: Klamath
City: Klamath Falls



HCM Unsignalized Intersection Capacity Analysis
1: OR 140 & Orindale Rd

10/19/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	101	4	3	132	28	3	3	10	19	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	4	122	5	4	159	34	4	4	12	23	0	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	193			127			299	331	124	311	300	159
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	193			127			299	331	124	311	300	159
tC, single (s)	4.1			4.4			7.4	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.5			3.8	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	99	99	96	100	100
cM capacity (veh/h)	1393			1289			593	588	932	631	612	891

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	130	163	34	19	24
Volume Left	4	4	0	4	23
Volume Right	5	0	34	12	1
cSH	1393	1289	1700	766	640
Volume to Capacity	0.00	0.00	0.02	0.03	0.04
Queue Length 95th (ft)	0	0	0	2	3
Control Delay (s)	0.2	0.2	0.0	9.8	10.8
Lane LOS	A	A		A	B
Approach Delay (s)	0.2	0.2		9.8	10.8
Approach LOS				A	B

Intersection Summary				
Average Delay	1.4			
Intersection Capacity Utilization	22.9%	ICU Level of Service	A	
Analysis Period (min)	15			

Intersection Sign configuration not allowed in HCM analysis.

HCM Unsignalized Intersection Capacity Analysis
3: Memorial Drive & Greensprings Drive

10/19/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	2	0	55	0	11	0	90	6	7	101	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	6	2	0	62	0	12	0	102	7	8	115	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	249	240	115	238	236	106	115			109		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	249	240	115	238	236	106	115			109		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.9		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.9		
p0 queue free %	99	100	100	91	100	99	100			99		
cM capacity (veh/h)	696	660	943	705	663	954	1487			1100		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	8	75	109	123
Volume Left	6	62	0	8
Volume Right	0	12	7	0
cSH	685	737	1700	1100
Volume to Capacity	0.01	0.10	0.06	0.01
Queue Length 95th (ft)	1	8	0	1
Control Delay (s)	10.3	10.4	0.0	0.6
Lane LOS	B	B		A
Approach Delay (s)	10.3	10.4	0.0	0.6
Approach LOS	B	B		

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	23.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
4: Balsam Dr & Orindale Rd

10/19/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	7	2	5	12	46	2	7	2	17	6	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66
Hourly flow rate (vph)	0	11	3	8	18	70	3	11	3	26	9	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	88			14			85	115	12	89	82	53
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	88			14			85	115	12	89	82	53
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	99	100	97	99	100
cM capacity (veh/h)	1521			1618			895	775	1074	886	808	1020

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	14	95	17	35
Volume Left	0	8	3	26
Volume Right	3	70	3	0
cSH	1521	1618	838	865
Volume to Capacity	0.00	0.00	0.02	0.04
Queue Length 95th (ft)	0	0	2	3
Control Delay (s)	0.0	0.6	9.4	9.3
Lane LOS		A	A	A
Approach Delay (s)	0.0	0.6	9.4	9.3
Approach LOS			A	A

Intersection Summary				
Average Delay		3.4		
Intersection Capacity Utilization		19.7%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
5: OR 66 & Orindale Rd

10/19/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	179	0	0	374	5	0	0	0	6	0	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	5	190	0	0	398	5	0	0	0	6	0	7
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	403			190			606	604	190	602	602	401
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	403			190			606	604	190	602	602	401
tC, single (s)	4.3			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.4			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	98	100	99
cM capacity (veh/h)	1065			1395			405	413	856	413	414	654

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	5	190	0	403	0	14
Volume Left	5	0	0	0	0	6
Volume Right	0	0	0	5	0	7
cSH	1065	1700	1700	1700	1700	515
Volume to Capacity	0.00	0.11	0.00	0.24	0.00	0.03
Queue Length 95th (ft)	0	0	0	0	0	2
Control Delay (s)	8.4	0.0	0.0	0.0	0.0	12.2
Lane LOS	A				A	B
Approach Delay (s)	0.2		0.0		0.0	12.2
Approach LOS					A	B

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	31.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	181	0	6	394	6	1	0	1	10	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	2	218	0	7	475	7	1	0	1	12	0	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	482			218			717	719	218	717	716	478
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	482			218			717	719	218	717	716	478
tC, single (s)	4.1			4.3			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.4			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	100	100	97	100	100
cM capacity (veh/h)	1091			1267			345	354	827	345	356	591

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	220	489	2	13
Volume Left	2	7	1	12
Volume Right	0	7	1	1
cSH	1091	1267	486	358
Volume to Capacity	0.00	0.01	0.00	0.04
Queue Length 95th (ft)	0	0	0	3
Control Delay (s)	0.1	0.2	12.4	15.4
Lane LOS	A	A	B	C
Approach Delay (s)	0.1	0.2	12.4	15.4
Approach LOS			B	C

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	36.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	197	448	112	53	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	214	487	122	58	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			570			
pX, platoon unblocked	0.97				0.97	0.97
vC, conflicting volume	609				655	304
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	531				578	216
tC, single (s)	4.1				6.9	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				87	100
cM capacity (veh/h)	1014				427	769

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	107	107	325	284	59
Volume Left	0	0	0	0	58
Volume Right	0	0	0	122	1
cSH	1700	1700	1700	1700	431
Volume to Capacity	0.06	0.06	0.19	0.17	0.14
Queue Length 95th (ft)	0	0	0	0	12
Control Delay (s)	0.0	0.0	0.0	0.0	14.7
Lane LOS					B
Approach Delay (s)	0.0		0.0		14.7
Approach LOS					B

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	27.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	0	250	560	145	132	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)		5.0	5.0		4.5	
Lane Util. Factor		0.95	0.95		1.00	
Frt		1.00	0.97		1.00	
Flt Protected		1.00	1.00		0.95	
Satd. Flow (prot)		3137	3128		1484	
Flt Permitted		1.00	1.00		0.95	
Satd. Flow (perm)		3137	3128		1484	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	0	301	675	175	159	0
RTOR Reduction (vph)	0	0	19	0	0	0
Lane Group Flow (vph)	0	301	831	0	159	0
Heavy Vehicles (%)	0%	6%	2%	7%	12%	0%
Turn Type	Prot					Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)		26.9	26.9		11.0	
Effective Green, g (s)		26.9	26.9		11.0	
Actuated g/C Ratio		0.57	0.57		0.23	
Clearance Time (s)		5.0	5.0		4.5	
Vehicle Extension (s)		3.0	3.0		3.0	
Lane Grp Cap (vph)		1780	1775		344	
v/s Ratio Prot		0.10	c0.27		c0.11	
v/s Ratio Perm						
v/c Ratio		0.17	0.47		0.46	
Uniform Delay, d1		4.9	6.0		15.7	
Progression Factor		1.00	1.00		1.00	
Incremental Delay, d2		0.0	0.2		1.0	
Delay (s)		4.9	6.2		16.6	
Level of Service		A	A		B	
Approach Delay (s)		4.9	6.2		16.6	
Approach LOS		A	A		B	

Intersection Summary			
HCM Average Control Delay	7.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	47.4	Sum of lost time (s)	9.5
Intersection Capacity Utilization	37.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	382	702	0	6	3
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.55	0.55	0.55	0.55	0.55	0.55
Hourly flow rate (vph)	0	695	1276	0	11	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		320				
pX, platoon unblocked					0.99	
vC, conflicting volume	1276				1624	638
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1276				1607	638
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				89	99
cM capacity (veh/h)	551				97	424

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	0	347	347	851	425	16
Volume Left	0	0	0	0	0	11
Volume Right	0	0	0	0	0	5
cSH	1700	1700	1700	1700	1700	130
Volume to Capacity	0.00	0.20	0.20	0.50	0.25	0.13
Queue Length 95th (ft)	0	0	0	0	0	10
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	36.6
Lane LOS						E
Approach Delay (s)	0.0			0.0		36.6
Approach LOS						E

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	31.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
10: OR 140 & US 97 SB Ramps

10/19/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	375	13	10	525	0	0	0	0	58	0	177
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	0	500	17	13	700	0	0	0	0	77	0	236
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		760										
pX, platoon unblocked												
vC, conflicting volume	700			500			885	1235	259	977	1227	350
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	700			500			885	1235	259	977	1227	350
tC, single (s)	4.1			4.8			7.5	6.5	6.9	7.8	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.5			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	100			98			100	100	100	59	100	64
cM capacity (veh/h)	906			871			153	175	746	186	177	649

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	SB 1	SB 2
Volume Total	333	184	13	350	350	77	236
Volume Left	0	0	13	0	0	77	0
Volume Right	0	17	0	0	0	0	236
cSH	1700	1700	871	1700	1700	186	649
Volume to Capacity	0.20	0.11	0.02	0.21	0.21	0.41	0.36
Queue Length 95th (ft)	0	0	1	0	0	47	42
Control Delay (s)	0.0	0.0	9.2	0.0	0.0	37.4	13.7
Lane LOS			A			E	B
Approach Delay (s)	0.0		0.2			19.5	
Approach LOS						C	

Intersection Summary			
Average Delay	4.0		
Intersection Capacity Utilization	34.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	310	123	74	522	13	33
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	337	134	80	567	14	36
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			337		782	337
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			337		782	337
tC, single (s)			4.3		7.1	7.1
tC, 2 stage (s)						
tF (s)			2.3		3.6	3.4
p0 queue free %			93		95	94
cM capacity (veh/h)			1163		285	639

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	337	134	80	284	284	14	36
Volume Left	0	0	80	0	0	14	0
Volume Right	0	134	0	0	0	0	36
cSH	1700	1700	1163	1700	1700	285	639
Volume to Capacity	0.20	0.08	0.07	0.17	0.17	0.05	0.06
Queue Length 95th (ft)	0	0	6	0	0	4	4
Control Delay (s)	0.0	0.0	8.3	0.0	0.0	18.3	11.0
Lane LOS			A			C	B
Approach Delay (s)	0.0		1.0			13.0	
Approach LOS						B	

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	35.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	31	312	548	69	78	48
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	33	335	589	74	84	52
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	663				1028	332
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	663				1028	332
tC, single (s)	4.2				6.9	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				62	92
cM capacity (veh/h)	908				220	664

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	33	335	393	271	135
Volume Left	33	0	0	0	84
Volume Right	0	0	0	74	52
cSH	908	1700	1700	1700	295
Volume to Capacity	0.04	0.20	0.23	0.16	0.46
Queue Length 95th (ft)	3	0	0	0	57
Control Delay (s)	9.1	0.0	0.0	0.0	27.2
Lane LOS	A				D
Approach Delay (s)	0.8		0.0		27.2
Approach LOS					D

Intersection Summary			
Average Delay	3.4		
Intersection Capacity Utilization	40.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	388	2	0	614	0	3	0	6	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	431	2	0	682	0	3	0	7	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	682			433			1114	1114	432	1121	1116	682
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	682			433			1114	1114	432	1121	1116	682
tC, single (s)	4.1			4.1			7.1	6.5	6.4	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.5	3.5	4.0	3.3
p0 queue free %	100			100			98	100	99	100	100	100
cM capacity (veh/h)	920			1137			187	210	593	183	210	453

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	433	682	10	0
Volume Left	0	0	3	0
Volume Right	2	0	7	0
cSH	920	1137	344	1700
Volume to Capacity	0.00	0.00	0.03	0.00
Queue Length 95th (ft)	0	0	2	0
Control Delay (s)	0.0	0.0	15.8	0.0
Lane LOS			C	A
Approach Delay (s)	0.0	0.0	15.8	0.0
Approach LOS			C	A

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	45.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	6	464	13	21	523	5	15	1	35	7	0	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	6	483	14	22	545	5	16	1	36	7	0	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	550			497			1091	1096	490	1088	1101	547
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	550			497			1091	1096	490	1088	1101	547
tC, single (s)	4.6			4.3			7.2	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.7			2.3			3.6	4.0	3.3	3.6	4.0	3.3
p0 queue free %	99			98			91	100	94	96	100	99
cM capacity (veh/h)	818			999			177	209	576	167	208	540

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	6	497	22	550	53	10
Volume Left	6	0	22	0	16	7
Volume Right	0	14	0	5	36	3
cSH	818	1700	999	1700	340	211
Volume to Capacity	0.01	0.29	0.02	0.32	0.16	0.05
Queue Length 95th (ft)	1	0	2	0	14	4
Control Delay (s)	9.4	0.0	8.7	0.0	17.6	22.9
Lane LOS	A		A		C	C
Approach Delay (s)	0.1		0.3		17.6	22.9
Approach LOS					C	C

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	40.2%	ICU Level of Service	A
Analysis Period (min)	15		

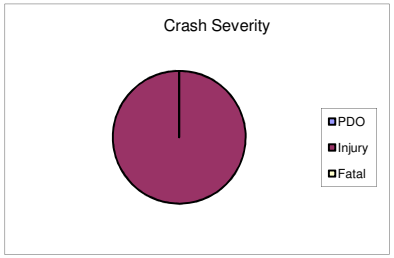
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	0	0	2	0	89	0	243	2	6	206	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Hourly flow rate (vph)	4	0	0	3	0	124	0	338	3	8	286	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	640	643	286	640	640	338	286			340		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	640	643	286	640	640	338	286			340		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	99	100	82	100			99		
cM capacity (veh/h)	318	389	753	386	391	705	1276			1219		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	4	126	338	3	8	286
Volume Left	4	3	0	0	8	0
Volume Right	0	124	0	3	0	0
cSH	318	692	1276	1700	1219	1700
Volume to Capacity	0.01	0.18	0.00	0.00	0.01	0.17
Queue Length 95th (ft)	1	17	0	0	1	0
Control Delay (s)	16.5	11.4	0.0	0.0	8.0	0.0
Lane LOS	C	B			A	
Approach Delay (s)	16.5	11.4	0.0		0.2	
Approach LOS	C	B				

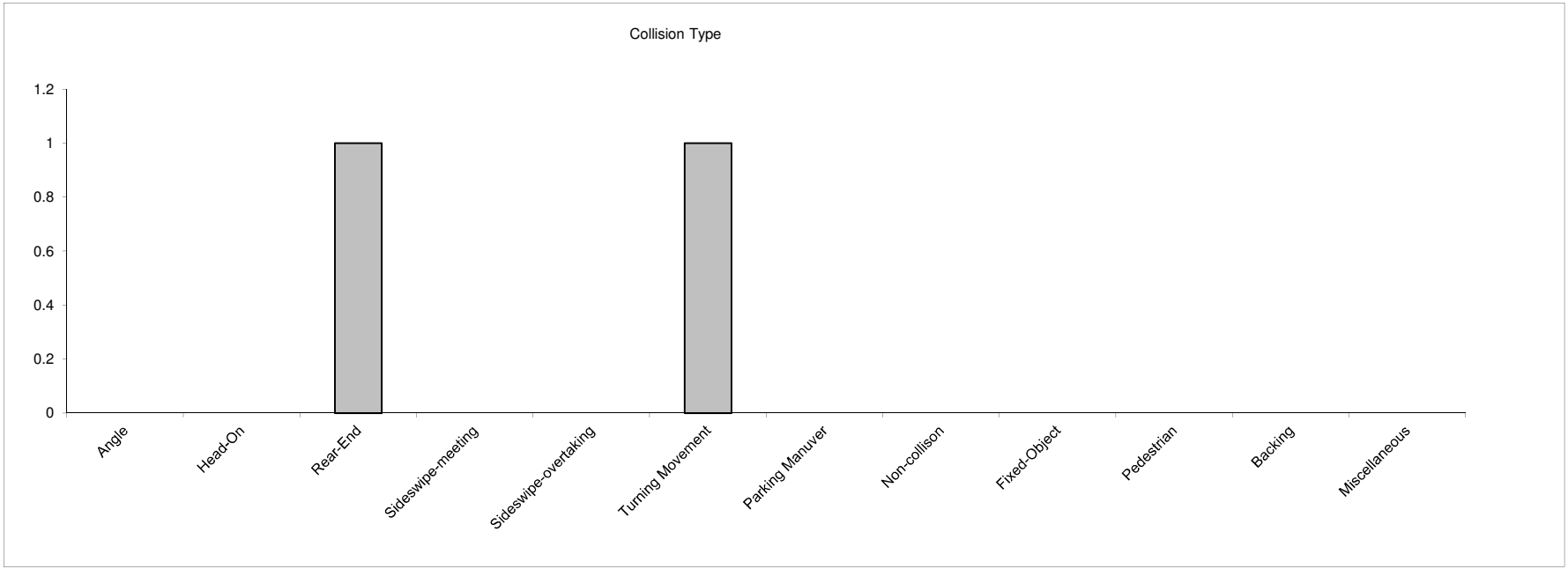
Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	28.4%	ICU Level of Service	A	
Analysis Period (min)	15			

Intersection: OR 140/Orindale Road

		Crash Severity		
Year	**# of Crashes**	**PDO**	**Injury**	**Fatal**
2006	1		1	0
2007	1	0	1	0
2008	0	0	0	0
2009	0	0	0	0
2010	0	0	0	0
Total	2	0	2	0
% of Total	100%	0%	100%	0%

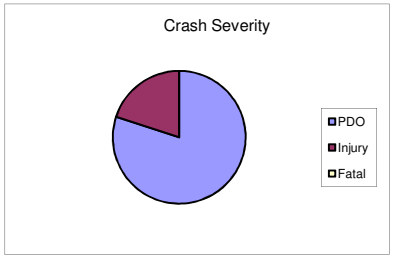


	Collison Type											
Year	**Angle**	**Head-On**	**Rear-End**	**Sideswipe-meeting**	**Sideswipe-overtaking**	**Turning Movement**	**Parking Manuver**	**Non-collison**	**Fixed-Object**	**Pedestrian**	**Backing**	**Miscellaneous**
2006	0	0	0	0	0	1	0	0	0	0	0	0
2007	0	0	1	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	1	0	0	1	0	0	0	0	0	0
% of Total	0%	0%	50%	0%	0%	50%	0%	0%	0%	0%	0%	0%

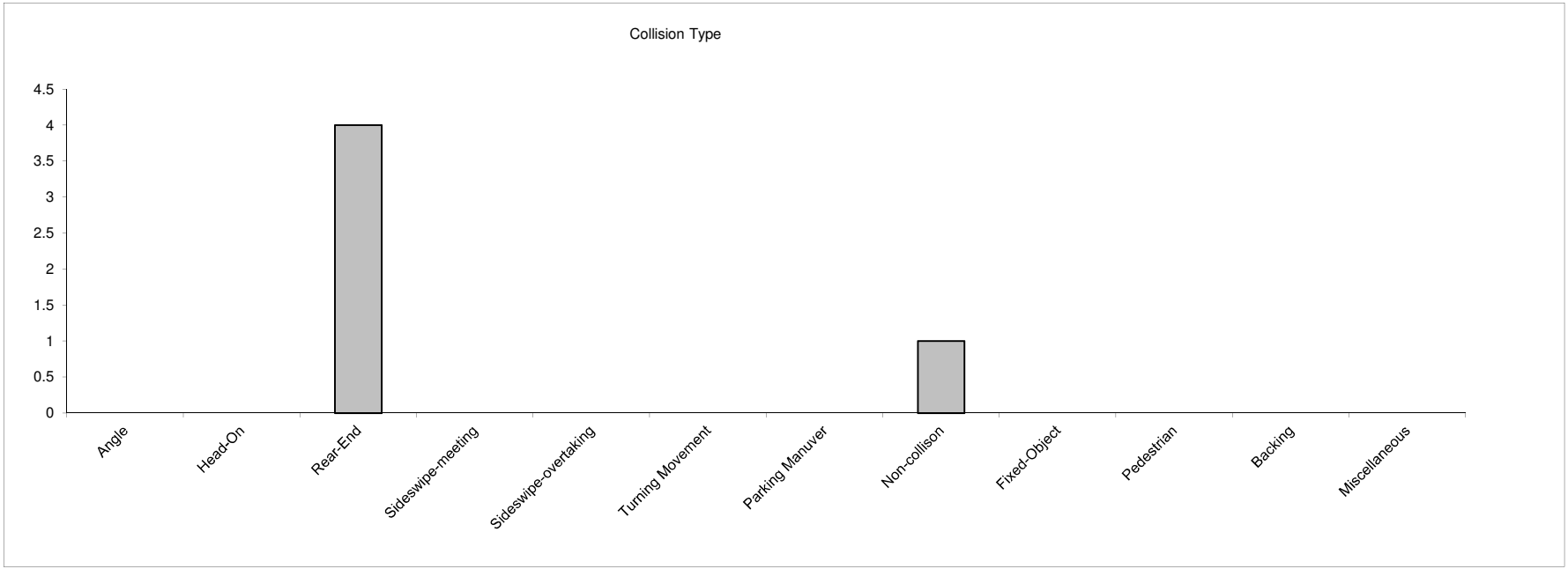


Intersection: OR 140/OR 66

		Crash Severity		
Year	**# of Crashes**	**PDO**	**Injury**	**Fatal**
2006	1	1	0	0
2007	1	1	0	0
2008	2	1	1	0
2009	1	1	0	0
2010	0	0	0	0
Total	5	4	1	0
% of Total	100%	80%	20%	0%

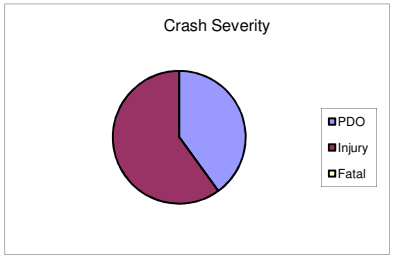


	Collison Type											
Year	**Angle**	**Head-On**	**Rear-End**	**Sideswipe-meeting**	**Sideswipe-overtaking**	**Turning Movement**	**Parking Manuver**	**Non-collison**	**Fixed-Object**	**Pedestrian**	**Backing**	**Miscellaneous**
2006	0	0	1	0	0	0	0	0	0	0	0	0
2007	0	0	1	0	0	0	0	0	0	0	0	0
2008	0	0	2	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	1	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	4	0	0	0	0	1	0	0	0	0
% of Total	0%	0%	80%	0%	0%	0%	0%	20%	0%	0%	0%	0%

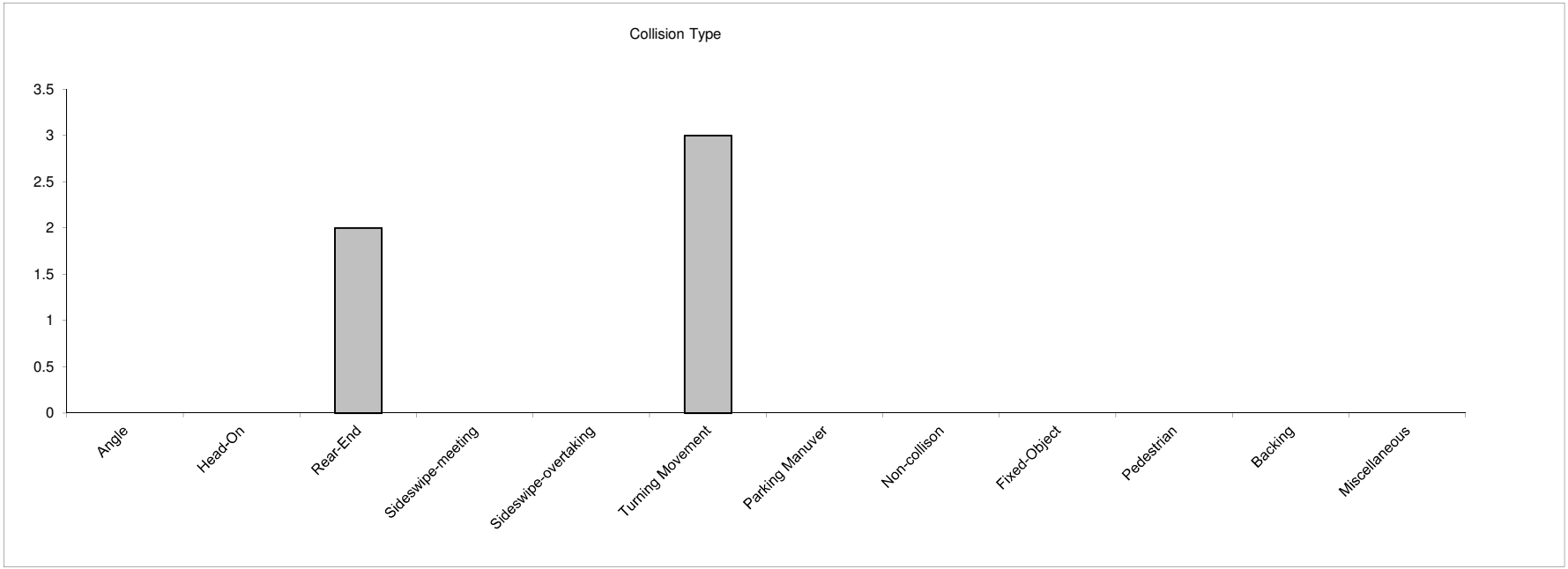


Intersection: OR 140/US 97 SB Ramps

		Crash Severity		
Year	**# of Crashes**	**PDO**	**Injury**	**Fatal**
2006	1	1	0	0
2007	0	0	0	0
2008	1	1	0	0
2009	1	0	1	0
2010	2	0	2	0
Total	5	2	3	0
% of Total	100%	40%	60%	0%

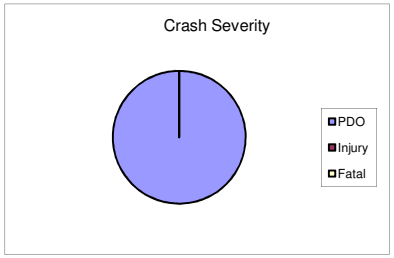


	Collison Type											
Year	**Angle**	**Head-On**	**Rear-End**	**Sideswipe-meeting**	**Sideswipe-overtaking**	**Turning Movement**	**Parking Manuver**	**Non-collison**	**Fixed-Object**	**Pedestrian**	**Backing**	**Miscellaneous**
2006	0	0	1	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	1	0	0	0	0	0	0
2009	0	0	0	0	0	1	0	0	0	0	0	0
2010	0	0	1	0	0	1	0	0	0	0	0	0
Total	0	0	2	0	0	3	0	0	0	0	0	0
% of Total	0%	0%	40%	0%	0%	60%	0%	0%	0%	0%	0%	0%

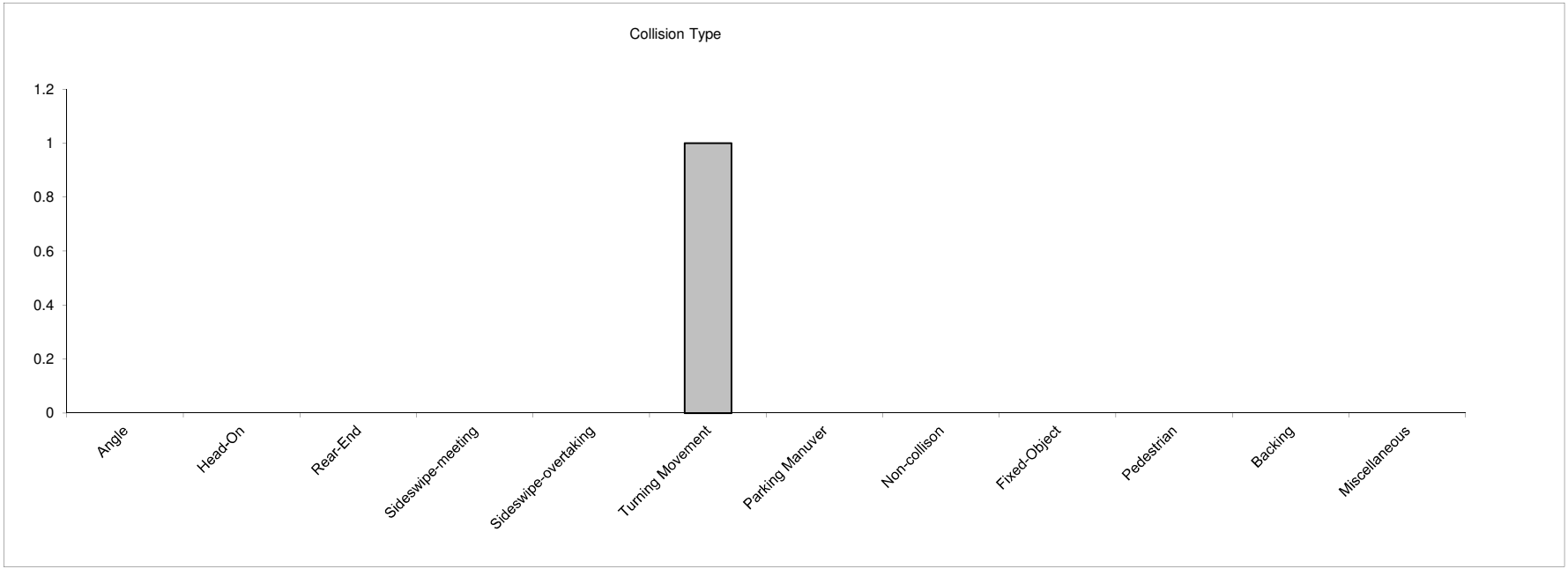


Intersection: OR 140/US 97 NB Ramps

		Crash Severity		
Year	**# of Crashes**	**PDO**	**Injury**	**Fatal**
2006	0	0	0	0
2007	1	1	0	0
2008	0	0	0	0
2009	0	0	0	0
2010	0	0	0	0
Total	1	1	0	0
% of Total	100%	100%	0%	0%

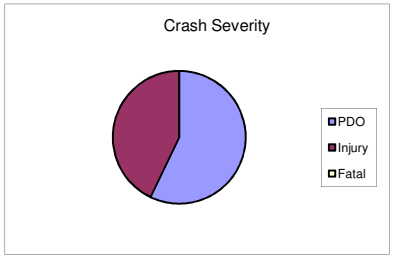


	Collison Type											
Year	**Angle**	**Head-On**	**Rear-End**	**Sideswipe-meeting**	**Sideswipe-overtaking**	**Turning Movement**	**Parking Manuver**	**Non-collison**	**Fixed-Object**	**Pedestrian**	**Backing**	**Miscellaneous**
2006	0	0	0	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	1	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	1	0	0	0	0	0	0
% of Total	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%

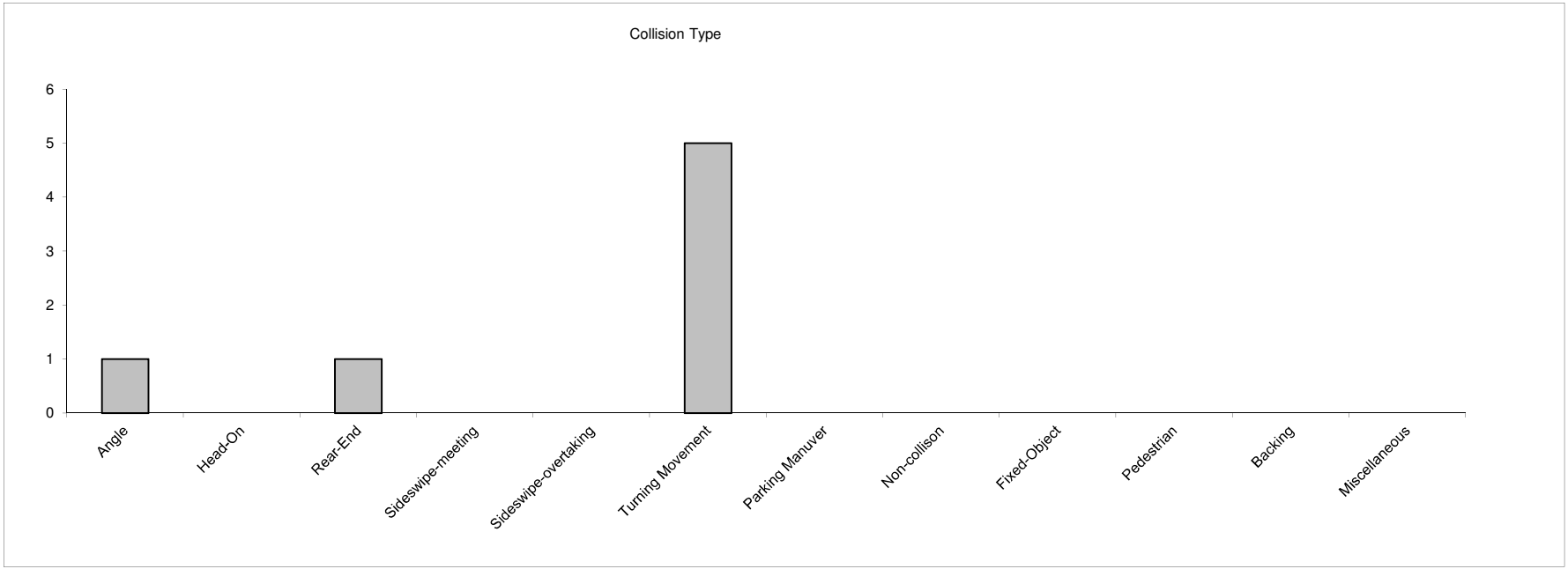


Intersection: OR 140/Greensprings Drive

		Crash Severity		
Year	**# of Crashes**	**PDO**	**Injury**	**Fatal**
2006	1	1	0	0
2007	0	0	0	0
2008	2	1	1	0
2009	2	2	0	0
2010	2	0	2	0
Total	7	4	3	0
% of Total	100%	57%	43%	0%

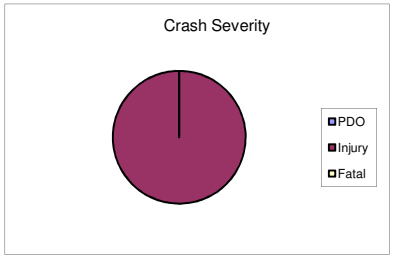


	Collison Type											
Year	**Angle**	**Head-On**	**Rear-End**	**Sideswipe-meeting**	**Sideswipe-overtaking**	**Turning Movement**	**Parking Manuver**	**Non-collison**	**Fixed-Object**	**Pedestrian**	**Backing**	**Miscellaneous**
2006	0	0	1	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	2	0	0	0	0	0	0
2009	1	0	0	0	0	1	0	0	0	0	0	0
2010	0	0	0	0	0	2	0	0	0	0	0	0
Total	1	0	1	0	0	5	0	0	0	0	0	0
% of Total	14%	0%	14%	0%	0%	71%	0%	0%	0%	0%	0%	0%

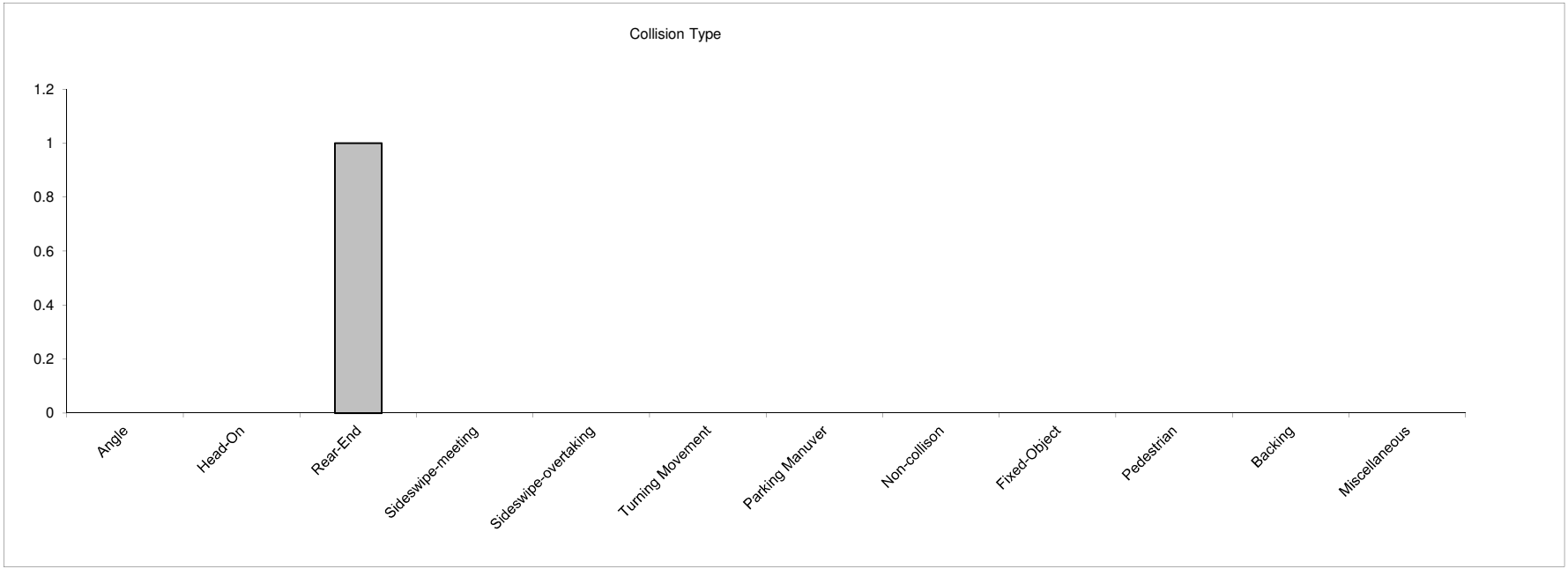


Intersection: OR 140/Memorial Drive

		Crash Severity		
Year	**# of Crashes**	**PDO**	**Injury**	**Fatal**
2006	0	0	0	0
2007	0	0	0	0
2008	0	0	0	0
2009	1	0	1	0
2010	0	0	0	0
Total	1	0	1	0
% of Total	100%	0%	100%	0%

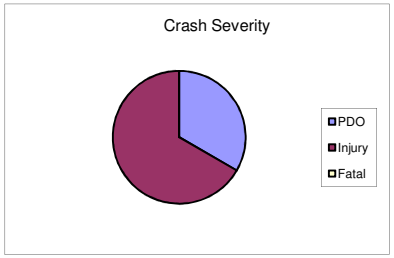


	Collison Type											
Year	**Angle**	**Head-On**	**Rear-End**	**Sideswipe-meeting**	**Sideswipe-overtaking**	**Turning Movement**	**Parking Manuver**	**Non-collison**	**Fixed-Object**	**Pedestrian**	**Backing**	**Miscellaneous**
2006	0	0	0	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	1	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	1	0	0	0	0	0	0	0	0	0
% of Total	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%

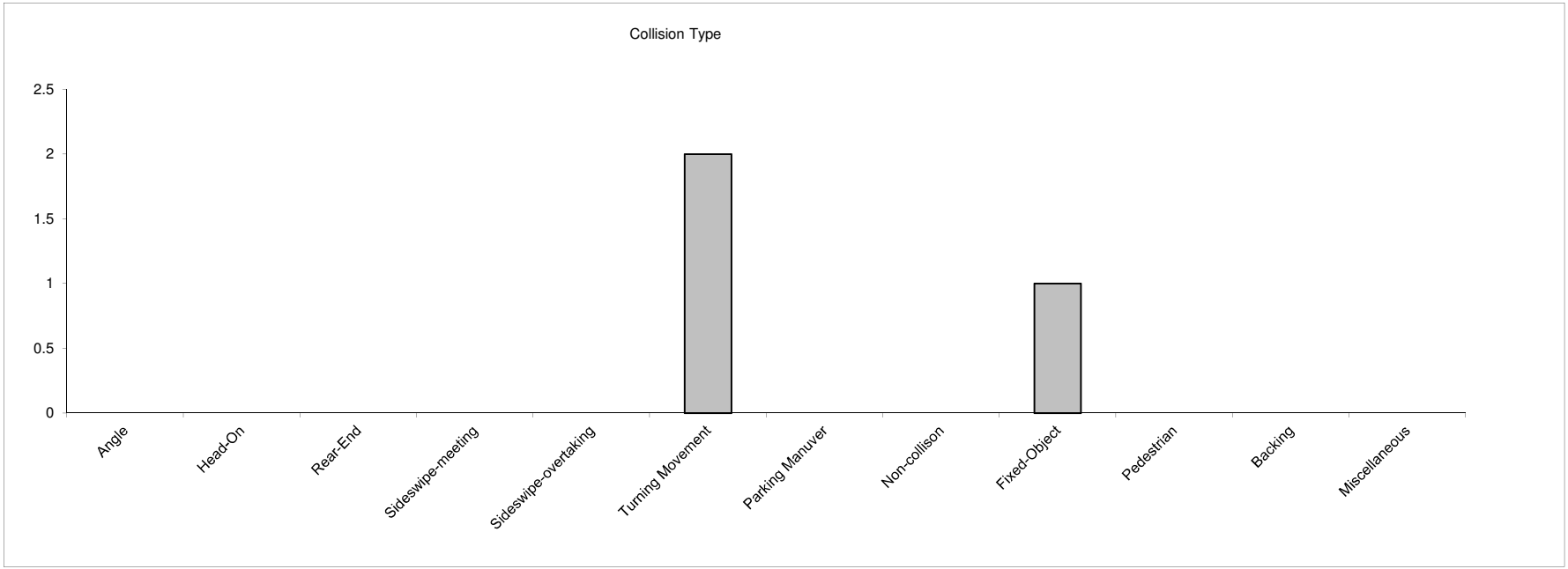


Intersection: OR 140/Midland Highway

		Crash Severity		
Year	**# of Crashes**	**PDO**	**Injury**	**Fatal**
2006	1	0	1	0
2007	2	1	1	0
2008	0	0	0	0
2009	0	0	0	0
2010	0	0	0	0
Total	3	1	2	0
% of Total	100%	33%	67%	0%



	Collison Type											
Year	**Angle**	**Head-On**	**Rear-End**	**Sideswipe-meeting**	**Sideswipe-overtaking**	**Turning Movement**	**Parking Manuver**	**Non-collison**	**Fixed-Object**	**Pedestrian**	**Backing**	**Miscellaneous**
2006	0	0	0	0	0	0	0	0	1	0	0	0
2007	0	0	0	0	0	2	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	2	0	0	1	0	0	0
% of Total	0%	0%	0%	0%	0%	67%	0%	0%	33%	0%	0%	0%



Appendix D
Technical Memorandum #4: Future Conditions Land Use Assumptions & Operational Analysis

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING
610 SW Alder Street, Suite 700, Portland, OR 97205 P 503.228.5230 F 503.273.8169

TECHNICAL MEMORANDUM

OR 66 Green Springs Highway IAMP

FINAL Technical Memorandum #4: Future Conditions Land Use Assumptions and Operational Analysis

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Date: May 14, 2012 Project #: 11881
To: Project Team
From: Hermanus Steyn, PE & Matt Kittelson, Kittelson & Associates
Shayna Rehberg, Darci Rudzinski, Angelo Planning Group

The purpose of this memorandum is to outline the land use conditions assumed for the future conditions analysis of the OR 66 Green Springs Highway Interchange Access Management Plan (IAMP) and document the future year analysis results. In addition, the memorandum contains documentation of initial concepts submitted to-date from the project team, agency staff and the general public. This memorandum is an expansion of Technical Memorandum #4a which focused only on the future land use assumptions.

FUTURE YEAR LAND USE APPROACH

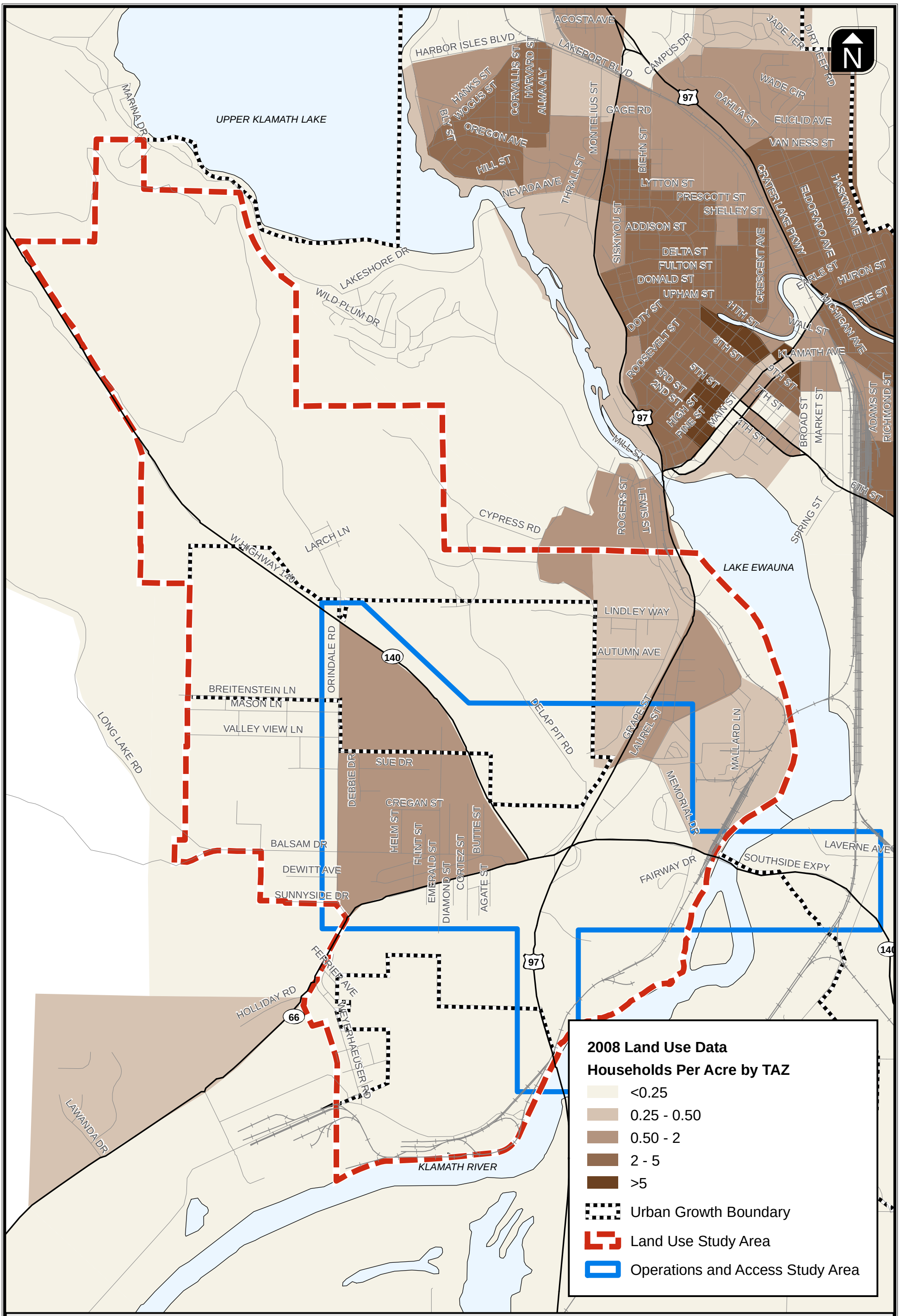
The future year land use was based on a 25-year horizon period for assumed development. This analysis was informed by the land use assumed in the Klamath Falls Urban Area Travel Demand Model. This model and the land use assumptions included within it were recently updated by a process that included input from ODOT, Klamath County representatives, and City of Klamath Falls representatives. As such, the future land use scenario has been previously informed by local representatives. In addition, this scenario was reviewed by the OR 66 Green Springs IAMP Project Team (PT) and confirmed as a reasonable future year analysis approach. These scenarios are the basis of the future year analysis.

The resulting land use assumptions for the base and future year in the vicinity of the IAMP study area are shown in subsequent figures. Specifically, the following assumptions from Klamath Falls Urban Area Travel Demand Model are summarized:

- Figure 1 – 2008 household density (HH/acre)
- Figure 2 – 2037 household density (HH/acre)
- Figure 3 – 2008-2037 household change (gross change)
- Figure 4 – 2008 employment density (employees/acre)

- Figure 5 – 2037 employment density (employees/acre)
- Figure 6 – 2008-2037 employment change (gross change)

The model does not reflect potential redevelopments through zone changes, and/or urban growth boundary (UGB) expansions. This IAMP provides a 25-year analysis and not a build-out scenario of the IMSA. Coordination with ODOT staff determined that such potential developments will go to through the formal land use application processes to obtain approval, which will include the required amendments to the transportation system plan (TSP) and comprehensive plans.



Oregon Department of Transportation

2008 Household Density

Figure 1

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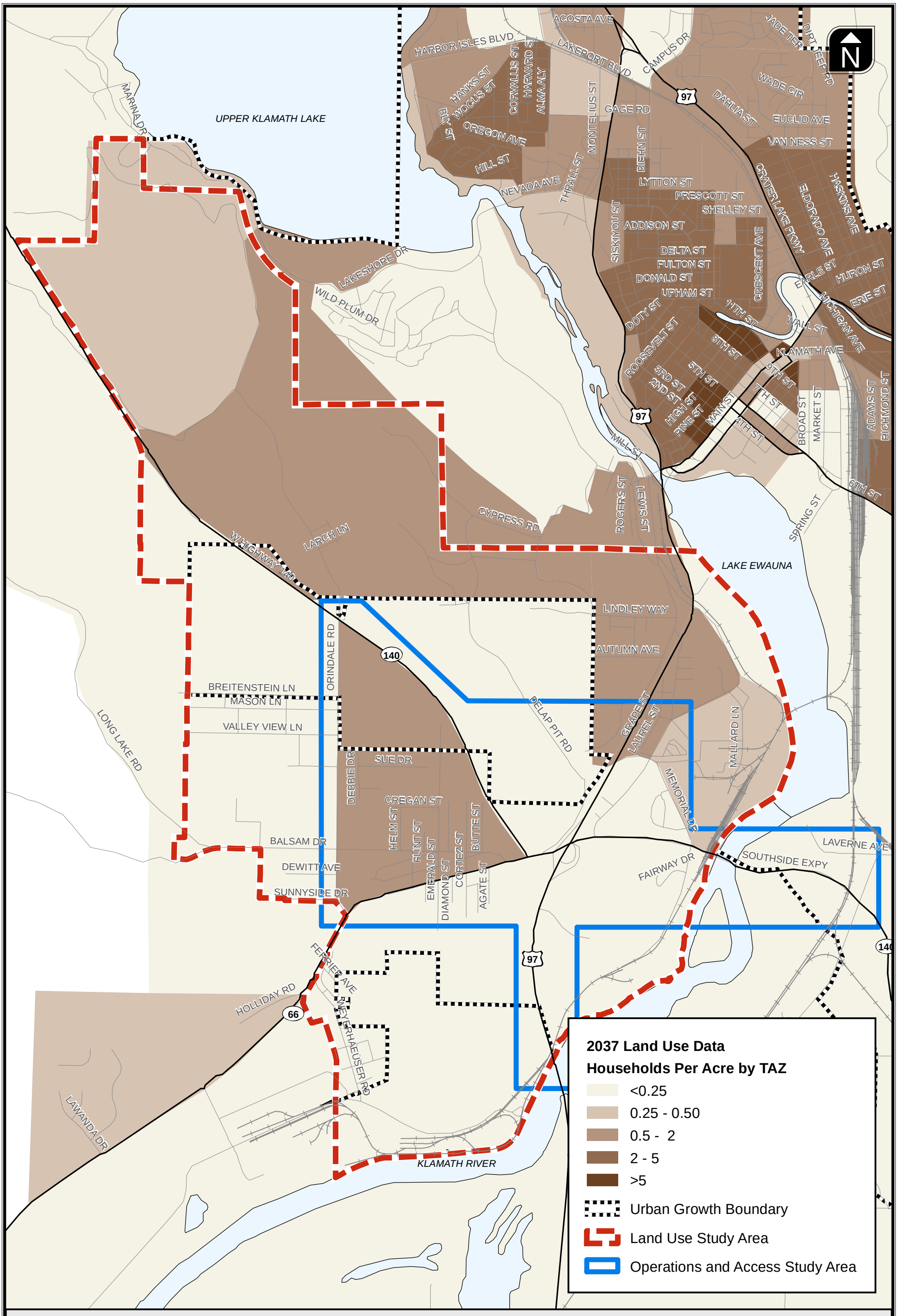

Oregon Department of Transportation

2037 Household Density

Figure 2

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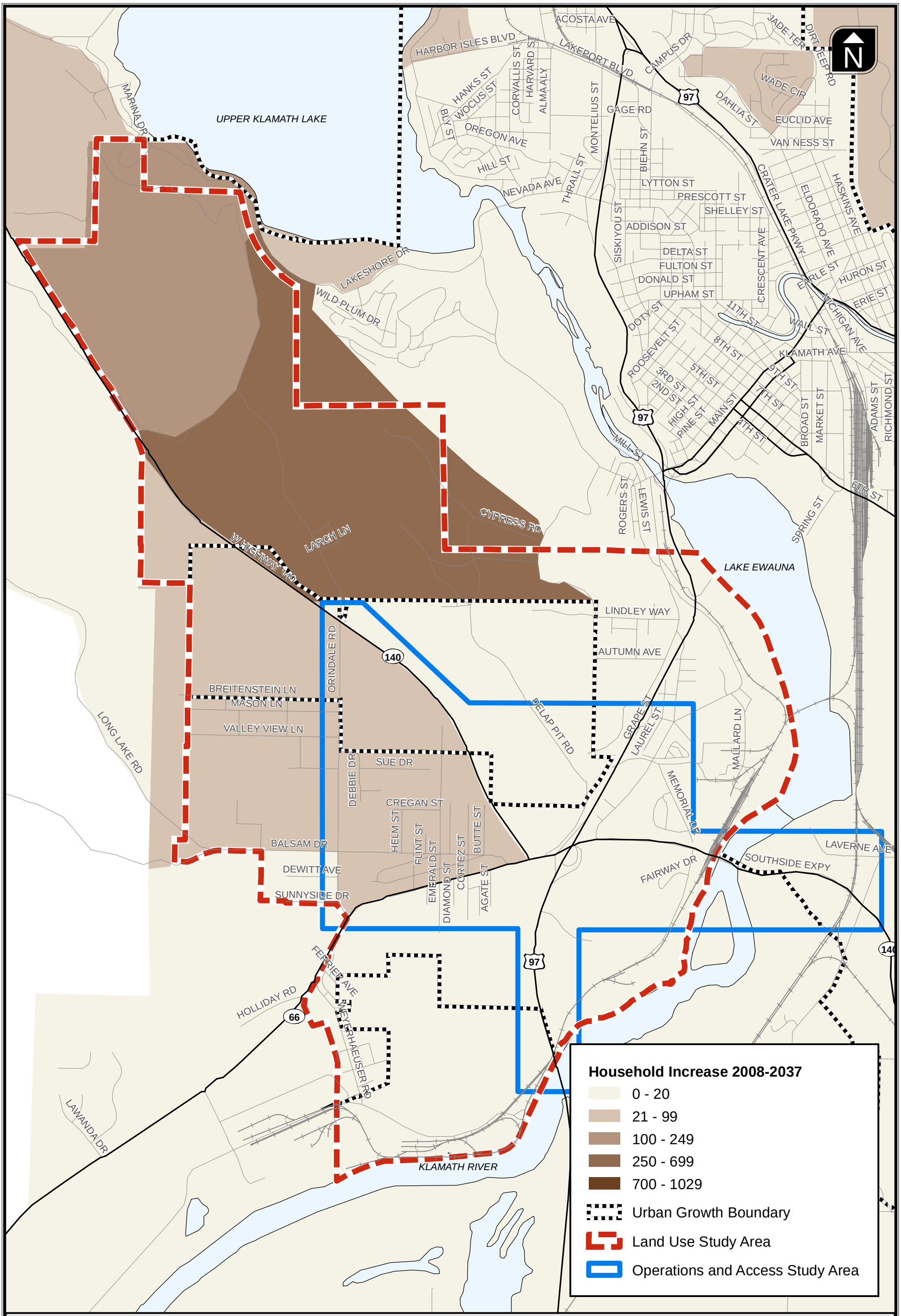

Oregon Department of Transportation

2008-2037 Household Change

Figure 3

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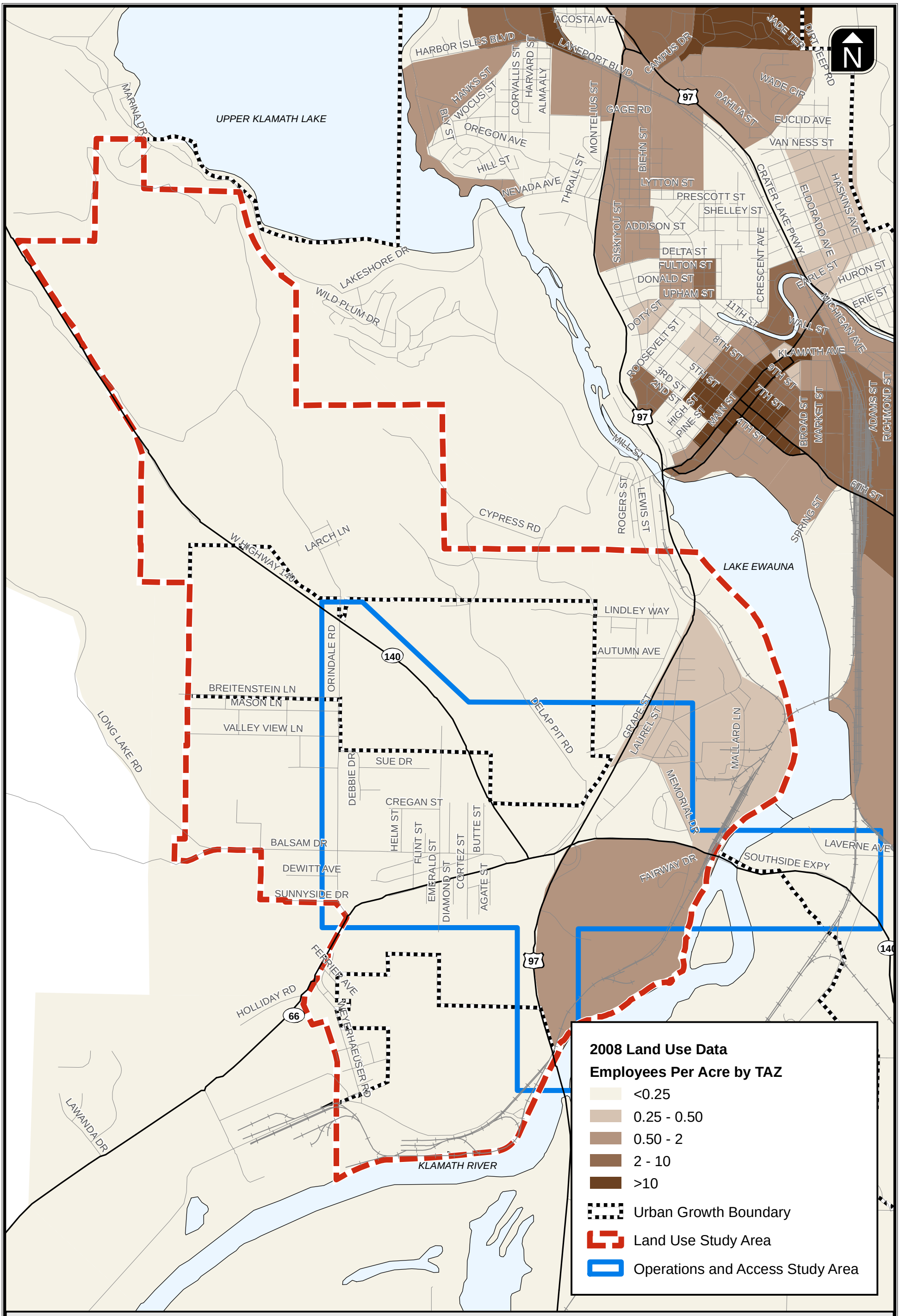

Oregon Department of Transportation

2008 Employment Density

Figure 4

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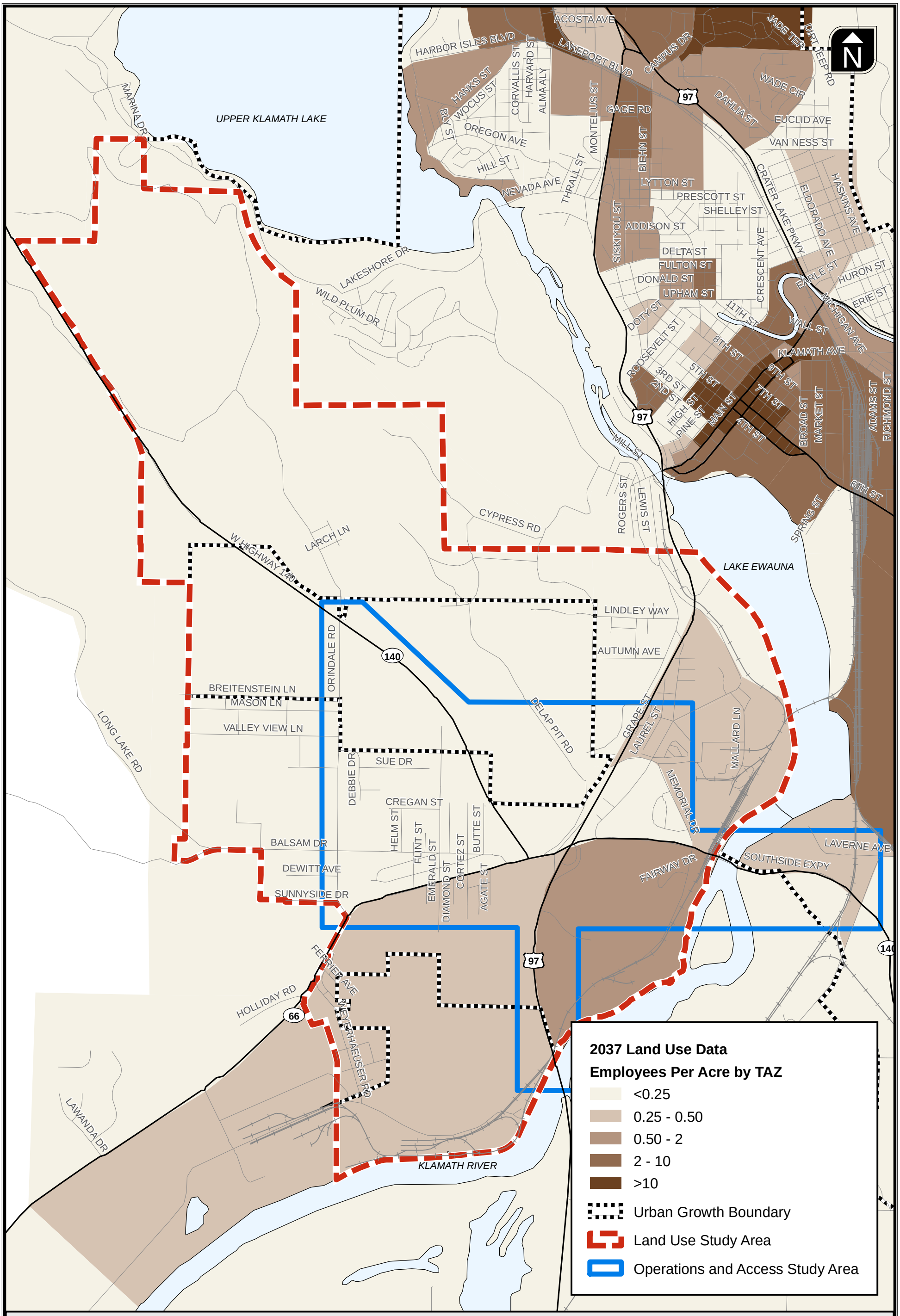

Oregon Department of Transportation

2037 Employment Density

Figure 5

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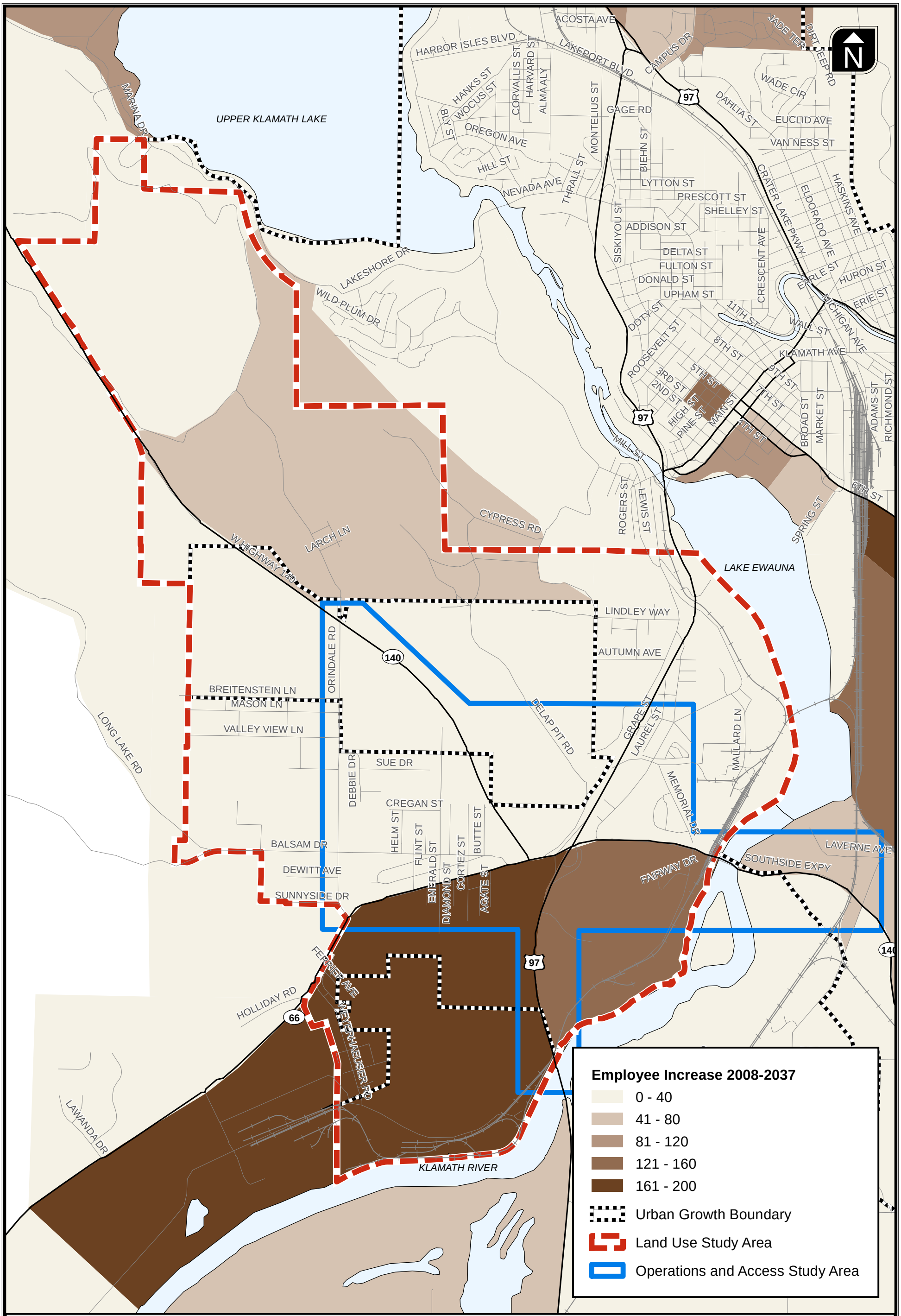

Oregon Department of Transportation

2008-2037 Employment Change

Figure 6

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FORECAST YEAR MODEL DEVELOPMENT

The Klamath Falls Urban Area Travel Demand Model was used to developed forecast year roadway volumes. ODOT staff generated base and future year travel demand model volumes for the study area that were used as a basis of comparison between existing and forecast conditions.

NCHRP 255 Methodology

Forecast intersection turning movement volumes was developed based on the procedures outlined in National Cooperative Highway Research Program (NCHRP) Report 255 (Reference 1). This procedure accounts for a combination of the 30th highest hour volumes measured at the intersections, and base and future year model forecasts from the EMME/2 model. The general methodology to develop the volumes is outlined below.

- The Year 2010 30th highest hour design volumes are used to represent the base volumes. These volumes will directly correlate to base year model volumes.
- The percentage change in the model's base and horizon year traffic volume for each movement is calculated and applied to the 2010 30th highest hour design volumes. Each table reports the existing model and future model volumes, in addition to the percentage change as applied.
- The numerical change (delta) in the model's traffic volumes is also calculated and applied to the 2010 30th highest hour design volumes.
- The results obtained from the percentage and numerical change calculations are averaged to obtain the design hour year 2035 analysis traffic volumes.

Post processing of the traffic volumes occurred on a link basis first. Once the volumes were adjusted, the link volumes were converted into turn movements at the intersections. This process was applied to all of the study intersections that exist in the base year model, as available. The reasonableness of the averaging method was reviewed at each location, especially in instances in which the numerical and percentage change yielded significantly different results (which can often occur on very low volume movements in the base model that increase significantly in 2035) or when the existing model differed significantly from the existing turning movement counts. On these occasions, the available data and travel forecasts was reviewed to determine the appropriate year 2035 analysis volumes. The resulting unbalanced year 2035 volumes were balanced, as appropriate, for use in the forecast conditions assessment.

The intersection performance of the 16 study area intersections was evaluated for year 2035 No Build conditions. These results are summarized in the following section.

FUTURE YEAR (2035) OPERATIONAL ANALYSIS

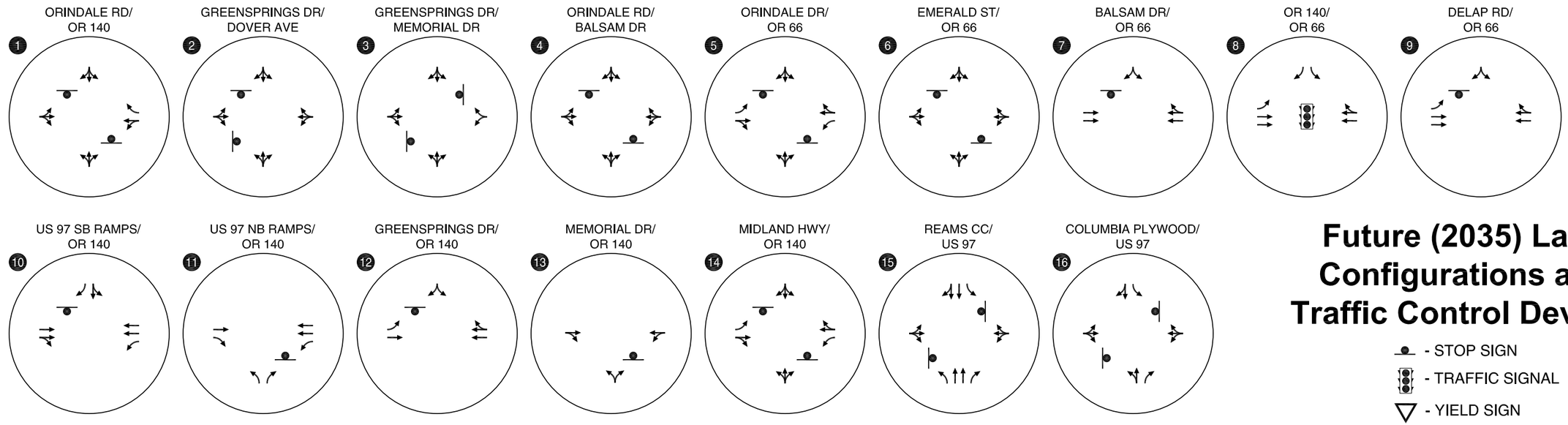
Based on the methodology described previously, future year (2035) traffic volumes were developed for the study intersections. The following subsections describe the results of that analysis and potential long-term deficiencies identified.

Future Year Analysis Assumptions

No major transportation improvements for the operational study area are currently included in the Statewide Transportation Improvement Program (STIP) or the City of Klamath Falls Capital Improvement Program (CIP). Further, no improvements funded by other means are currently planned for the vicinity. As such, the future year analysis described in this memorandum assumed the same lane configurations as exist today. However, peak hour factors (PHF) were adjusted as recommended in the ODOT Analysis Procedures Manual (APM) to account for increasing travel demand and peak demand spreading. Specifically, the PHFs were adjusted to 0.95 or 0.90 based on the roadway facility type as outlined in the APM. Where the existing PHF was higher than the suggested adjustment value, the existing PHF was retained.

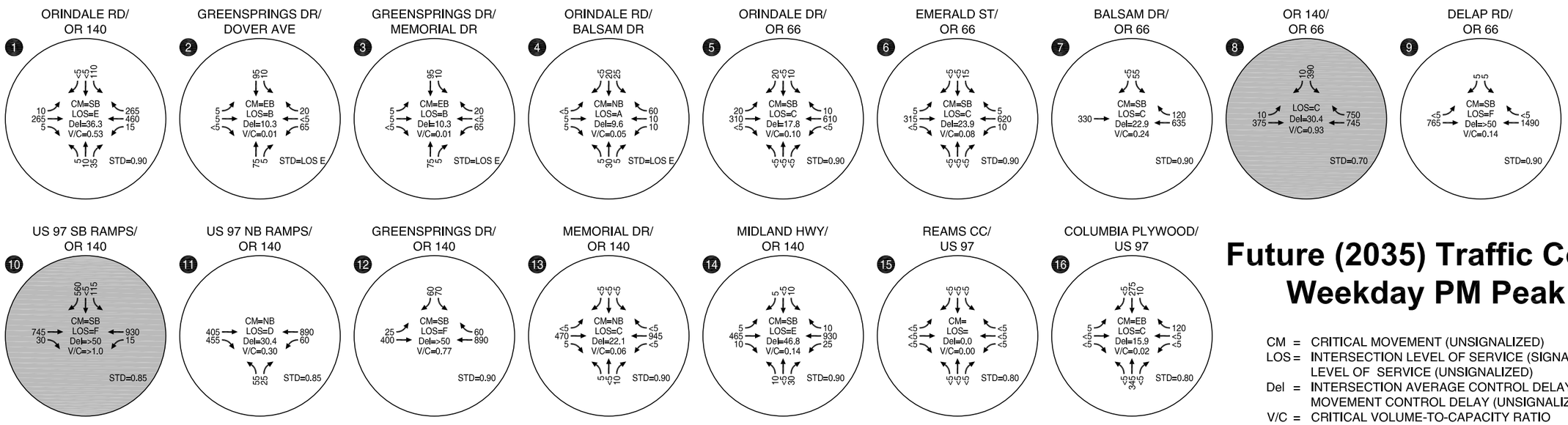
Operational Analysis Results

The study intersections were analyzed based on the 2035 traffic conditions developed based on the assumptions described previously. The results of that analysis are shown in Figure 7.



Future (2035) Lane Configurations and Traffic Control Devices

- STOP SIGN
- TRAFFIC SIGNAL
- YIELD SIGN



Future (2035) Traffic Conditions Weekday PM Peak Hour

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO
STD = OPERATIONAL STANDARD

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Future (2035) Lane Configurations and Traffic Control Devices / **Future (2035) Traffic Conditions Weekday PM Peak Hour**

Figure 7

As shown, two study intersections are expected to operate unacceptably based on the future year analysis. These include:

- OR 66/OR 140
- OR 140/US 97 Southbound Ramp Terminal

These intersections are expected to fail due to a large increase in travel demand from the US 97 southbound off-ramp to OR 140. This demand is largely associated with development assumed to occur along OR 140 to the northwest of the study area, including developments within the Running Y area as well as continued development in other residential areas such as Southview.

Within the p.m. peak hour demand analyzed for this study, the demand is observed to be largely directional in nature with heavy volumes heading from US 97 to OR 140. *An a.m. analysis was not conducted, but one could assume that the demand would likely be reversed in directionality due to the commuting nature of the trips.*

Future Year Analysis Summary

- Future evening demand is expected to be directional from the US 97 southbound off-ramp to OR 140 based on the travel demand model.
- Future morning demand is also anticipated to be directional with heavy demand going from OR 140 to US 97.
- Two study intersections are expected to operate in excess of current performance standards during the horizon year. These include the OR 66/OR 140 intersection and OR 140/US 97 Southbound Ramp terminal.
- The Delap Road/OR 140 intersection is between the two intersections that are expected to operate unacceptably during future conditions. As such, high traffic demands are expected on OR 140 at the intersection, potentially resulting in difficult turning movements from Delap Road to OR 140.
- The existing interchange form is well suited to serve the forecasted demand given the typical southbound off-ramp and loop northbound on-ramp configurations. Specifically, this configuration would result in the highest demand turns (southbound to westbound vehicles turning onto OR 140) during the p.m. peak hour to be served by a right-turn movement. Similarly, the highest demand turns (eastbound to northbound vehicles turning onto US 97) during the a.m. peak hour to be served by a right-turn movement.
- The OR 140/OR 66 intersection will also need to accommodate all other turning movements in the future as it does today.

INITIAL INTERCHANGE AREA DESIGN CONCEPTS

The project conducted a Public Visioning Workshop on December 19, 2011 where the PT and public provided initial feedback and ideas regarding potential improvements to address existing and future deficiencies. See Attachment "A" for original scanned comments.

The review of these comments and refinement process yielded several promising concepts for evaluation. To assist with this, the study area was divided into three areas that allow simplified development of future combinations of solution concepts. The following describes the sub-areas:

- West of the interchange
  - OR 140 and OR 66 are classified as Statewide and District Highways, respectively. These classifications differ from OR 140 east of the interchange.
- East of interchange
  - OR 140 is classified as a Statewide Expressway, which differs from OR 140 and OR 66 west of the interchange.
- Interchange form
  - The interchange form will guide the approach alignments along OR 140 and OR 66, as well as the location of the first full access intersection away from the ramp terminal intersection.

These concepts do not currently reflect or recommend any specific intersection traffic control. Rather, the future alternative analysis will explore the appropriate intersection traffic control for each study intersection. The intersection control options include:

- Unsignalized
- Signalized
- Roundabout.

The concepts presented herein are intended to document suggestions presented to the project team to date. These concepts have the potential to be modified from what is currently shown. As such, this is not an exhaustive list of potential alternatives. Further, the concepts shown could be "mixed" to concepts that incorporate individual aspects of one of more alternatives shown.

West of the Interchange

Three concepts have been identified for the road network to the west of the interchange that summarizes the comments to date. There are likely smaller alterations and combinations between these (such as an overcrossing of US 97 connecting the southwest and southeast quadrants of the interchange), but these should reflect a reasonable range of concepts for initial consideration.

West Side Concept W-1: Realign OR 140

- Realign OR 140 to the west of the existing OR 66 intersection to lengthen the spacing of the highway from the interchange. The south leg of this intersection would provide access to the southwest quadrant of the interchange.
- Realign Balsam and Delap Road to form a new intersection with the realigned OR 140.
    - A Balsam Drive connection is not necessarily needed due to alternate access to OR 66 via the Stewart-Lennox roadway system.
    - Previous plans indicated that Delap Road could be connected to Riverside Drive to the north.
- The objective for this concept is to increase intersection spacing and provide sufficient segment length for future anticipated queues and lane positioning.

Exhibit 1 Concept W-1: Realign OR 140

West Side Concept W-2: Align OR 140 with OR 140 East of Interchange

- Realign OR 140 to form a continuous alignment with OR 140 to the east of the interchange.
- Realign OR 66 to form a new intersection with the realigned OR 140.
- Realign Balsam Drive to intersect with the realigned OR 66 and provide access to the southwest quadrant of the interchange.
- Realign Delap Road to align with the realignment of OR 66. Previous plans indicated that Delap Road could be connected to Riverside Drive to the north.

Exhibit 2 Concept W-2: Align OR 140 with OR 140 East of Interchange

- The objective for this concept is to address the anticipated travel demand associated with future growth to the northwest of the interchange. In addition, it will connect OR 140, (the higher order road hierarchy) to OR 140 on the east side of the interchange.

West Side Concept W-3: Realign OR 140 and Disconnect Balsam Drive and Delap Road

- Realign OR 140 to the west of the existing OR 66 intersection to lengthen the spacing of the highway from the interchange. The south leg of this intersection would provide access to the southwest quadrant of the interchange; as well extend to provide access to the southeast quadrant of the interchange via an overpass.
- Disconnect Balsam Drive due to alternate access to OR 66 via the Steward-Lennox roadway system.
- Disconnect Delap Road because previous plans indicated that Delap Road could be connected to Riverside Drive to the north. However, emergency access could be maintained to OR 140.

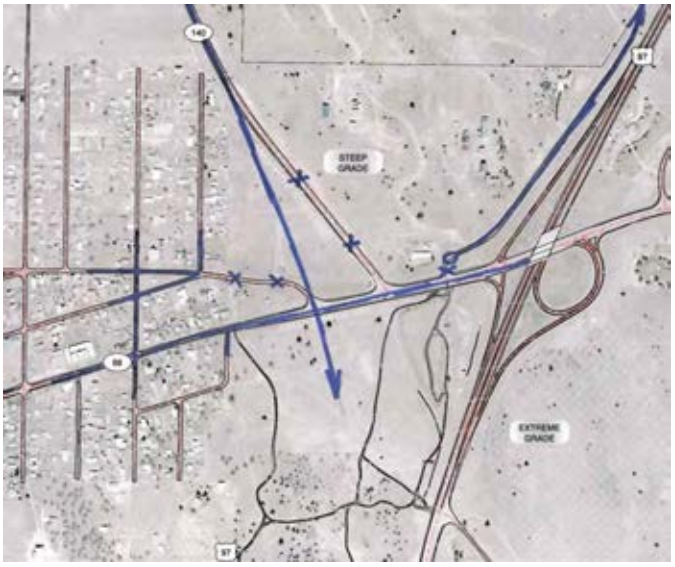


Exhibit 3 Concept W-3: Realign OR 140 and Disconnect Balsam and Delap

- The objective for this concept is similar to Concept W-1 that increases intersection spacing; however, it also disconnects Balsam Drive and Delap Road to reduce the number of intersections within the interchange influence area.

East of Interchange

Four concepts have been identified for the road network to the east of the interchange. Again, there are likely smaller alterations and combinations between these, but these should reflect a reasonable range of concepts for the west side of the interchange.

East Side Concept E-1: Greensprings Drive-Memorial Drive Frontage Road

- Realign Greensprings Drive and Memorial Drive to from a new frontage road north of OR 140 and introduce a new intersection farther to the east away from the interchange.
- Realign Memorial Drive on the south side of OR 140 to form the southern leg of the new intersection on OR 140.
- The longitudinal grade on OR 140 in the vicinity of the new intersection location could be a problem.
- Disconnect access to Country Club on US97 and provide access to Memorial Drive.

Exhibit 4 Concept E-1: Greensprings-Memorial Frontage Road

- The objective for this concept is to increase the intersection spacing between Greensprings Drive-Memorial Drive and the US 97 Northbound Ramp terminal and provide sufficient segment length for future anticipated queues and lane positioning.

East Side Concept E-2: Realign Greensprings Drive

- Realign Greensprings Drive along a property line and introduce a new intersection farther to the east away from the interchange.
    - Cul-de-sac Greensprings Drive in its current location.
- Realign Memorial Drive on the south side of OR 140 to form the southern leg of the new intersection on OR 140.
- The longitudinal grade on OR 140 in the vicinity of the new intersection location could be a problem.
- Disconnect access to Country Club on US97 and provide access to Memorial Drive.

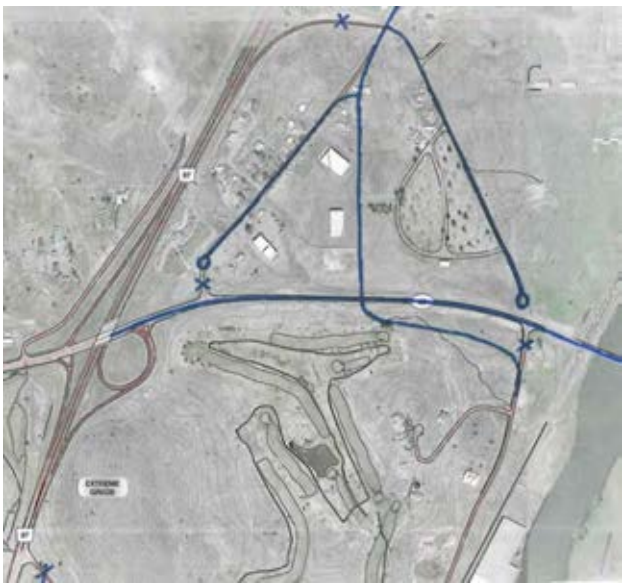


Exhibit 5 Concept E-2: Realign Greensprings

- The objective for this concept is similar to Concept E-1 that increases intersection spacing.

East Side Concept E-3: Realign Greensprings Drive & Memorial Drive

- Cul-de-sac Greensprings Drive in its current location, while opening Memorial Drive from the north on OR 140.
- This concept will require the widening of the existing bridge on OR 140 over the river to provide adequate turning lanes in the westbound direction.
- Disconnect access to Country Club on US97 and provide access to Memorial Drive.
- The objective for this concept is similar to Concept E-1 that increases intersection spacing. This location will meet the interspacing spacing standard for Statewide (Expressway) designated facilities.

Exhibit 6 Concept E-3: Memorial Full Access

East Side Concept E-4: Memorial Drive Jughandle

- Provide a grade-separated crossing of Memorial Drive on OR 140 immediately west of the river bridge with right-in/right-out connections on US 97.
- Cul-de-sac Greensprings Drive in its current location, while providing access to Memorial Drive.
- Disconnect access to Country Club on US 97 and provide access to Memorial Drive.
- The objective for this concept is similar to Concept E-3 by shifting the intersection as far as possible to the east. The grade separation will eliminate the existing at-grade full access intersection at Memorial Drive. This will then provide a typical expressway facility from the US 97 interchange through the Washburn Way interchange to the east.

Exhibit 7 Concept E-4: Memorial Drive Jughandle

Interchange Form

The interchange form will set the future footprint of the interchange and influence the surrounding road network. The respective concepts to the west and east of the interchange will have to be refined to fit the ultimate interchange form.

West Side Concept I-1: Improve Existing Interchange

- Maintain the existing interchange configuration.
- Close the existing second US97 Northbound Off-ramp onto Greensprings Drive
- Realign the US 97 Southbound off-ramp to address existing longitudinal approach grade.
- Improve the US 97 Southbound ramp terminal intersection angle to improve intersection sight distance.
- The objective of this interchange configuration is to continue accommodating the future directional demand during the morning and evening peak periods.

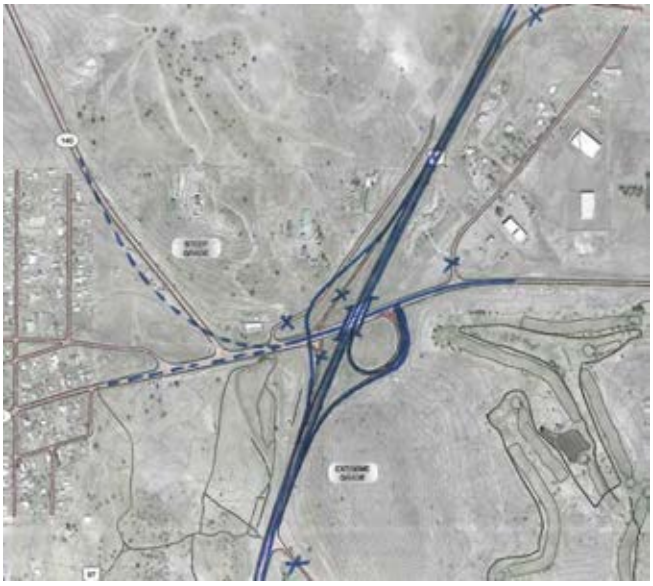


Exhibit 8 Concept I-1: Improve Existing Interchange

West Side Concept I-2: Diamond Interchange

- Convert the interchange to a diamond interchange form.
- Close the existing second US 97 Northbound Off-ramp onto Greensprings Drive
- Disconnect access to the Country Club on US 97 and provide access via Memorial Drive.
- Eliminating the US 97 northbound loop on-ramp will convert the eastbound free right-turn to a left-turn that will negatively impact traffic operations at the US 97 Northbound Ramp terminal.

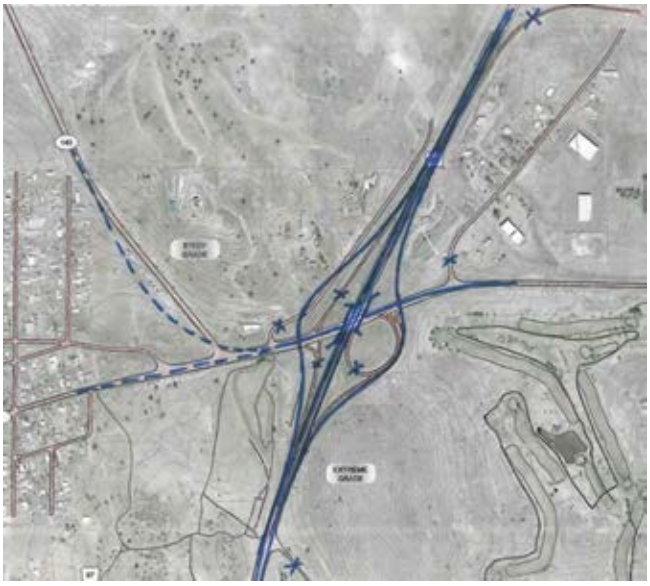


Exhibit 9 Concept I-2: Diamond Interchange

West Side Concept I-3: Partial Cloverleaf Interchange

- Convert the interchange to partial cloverleaf interchange form by adding a southbound loop off-ramp.
- Close the existing second US 97 Northbound Off-ramp onto Greensprings Drive
- Disconnect access to Country Club on US97 and provide access via Memorial Drive.
- This option would convert the southbound right-turn from the US 97 Southbound off-ramp to a left-turn that will negatively impact traffic operations at the US97 Southbound Ramp terminal.

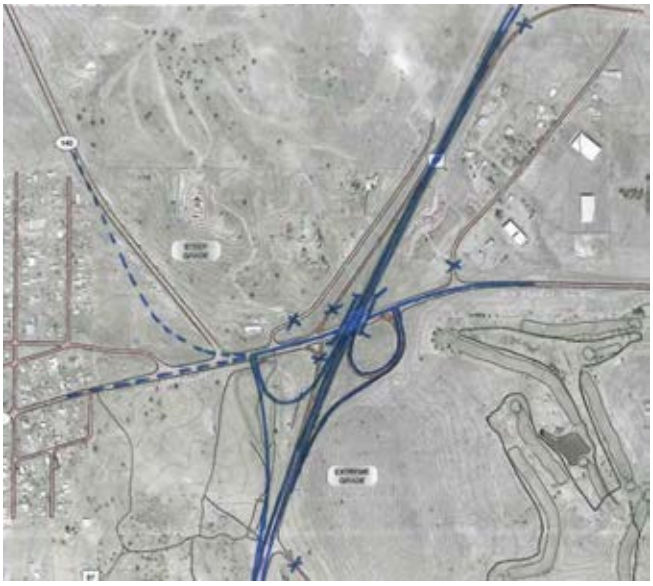


Exhibit 10 Concept I-3: Partial Cloverleaf Interchange

West Side Concept I-4: SPUI Configuration

- Convert the interchange to a single-point urban interchange (SPUI) form.
- Close the existing second US 97 Northbound Off-ramp onto Greensprings Drive
- Disconnect access to the Country Club on US 97 and provide access via Memorial Drive.
- The SPUI configuration typically provides significant operational benefit, especially with high turning movements. Due to the required large intersection, it is seen as pedestrian and bike unfriendly compared to typical diamond interchanges.

Exhibit 11 Concept I-4: SPUI Configuration

West Side Concept I-5: Diverging Diamond Interchange

- Convert the interchange to a diverging diamond interchange (DDI) form.
- Close the existing second US 97 Northbound Off-ramp onto Greensprings Drive
- Disconnect access to the Country Club on US97 and provide access via Memorial Drive.
- This is a relative new interchange form, but has shown operational benefit due to reducing the number of phases at the traffic signals. It also maintains a narrower cross-section between the ramp terminals because of the elimination of long left-turns storage areas.

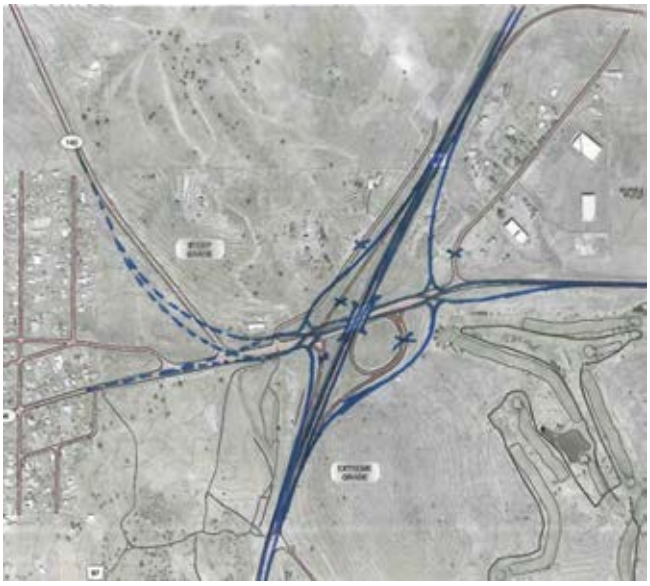


Exhibit 12 Concept I-5: Diverging Diamond Interchange

West Side Concept I-6: Full Cloverleaf Interchange

- Convert the interchange to a full cloverleaf interchange form.
- Close the existing second US 97 Northbound Off-ramp onto Greensprings Drive
- Disconnect access to the Country Club on US97 and provide access via Memorial Drive.
- All movements at the ramp terminal intersections are converted to right-in/right-out movements.
- This concept has a large footprint with topographical challenges in the northwest and southeast quadrants.

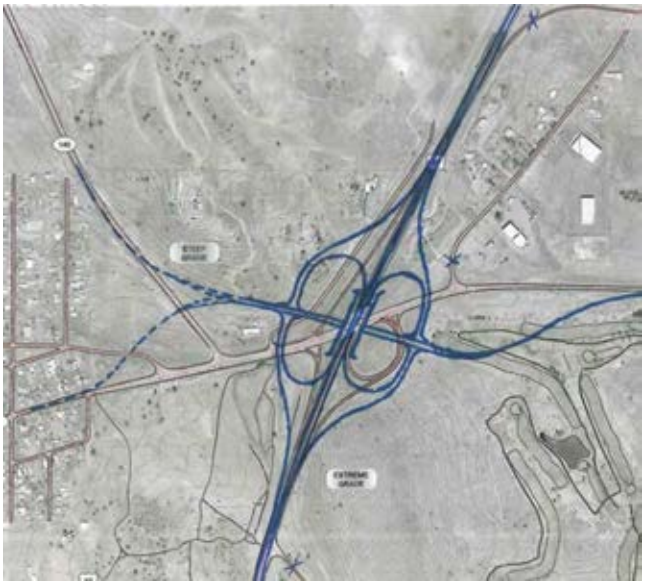


Exhibit 13 Concept I-6: Full Cloverleaf Interchange

NEXT STEPS

Based on the traffic forecasts developed and interchange area comments received to-date, the project team will develop a series of system alternatives to evaluate. These alternatives and analysis results will be presented at the upcoming project team meeting and public open house for comment.

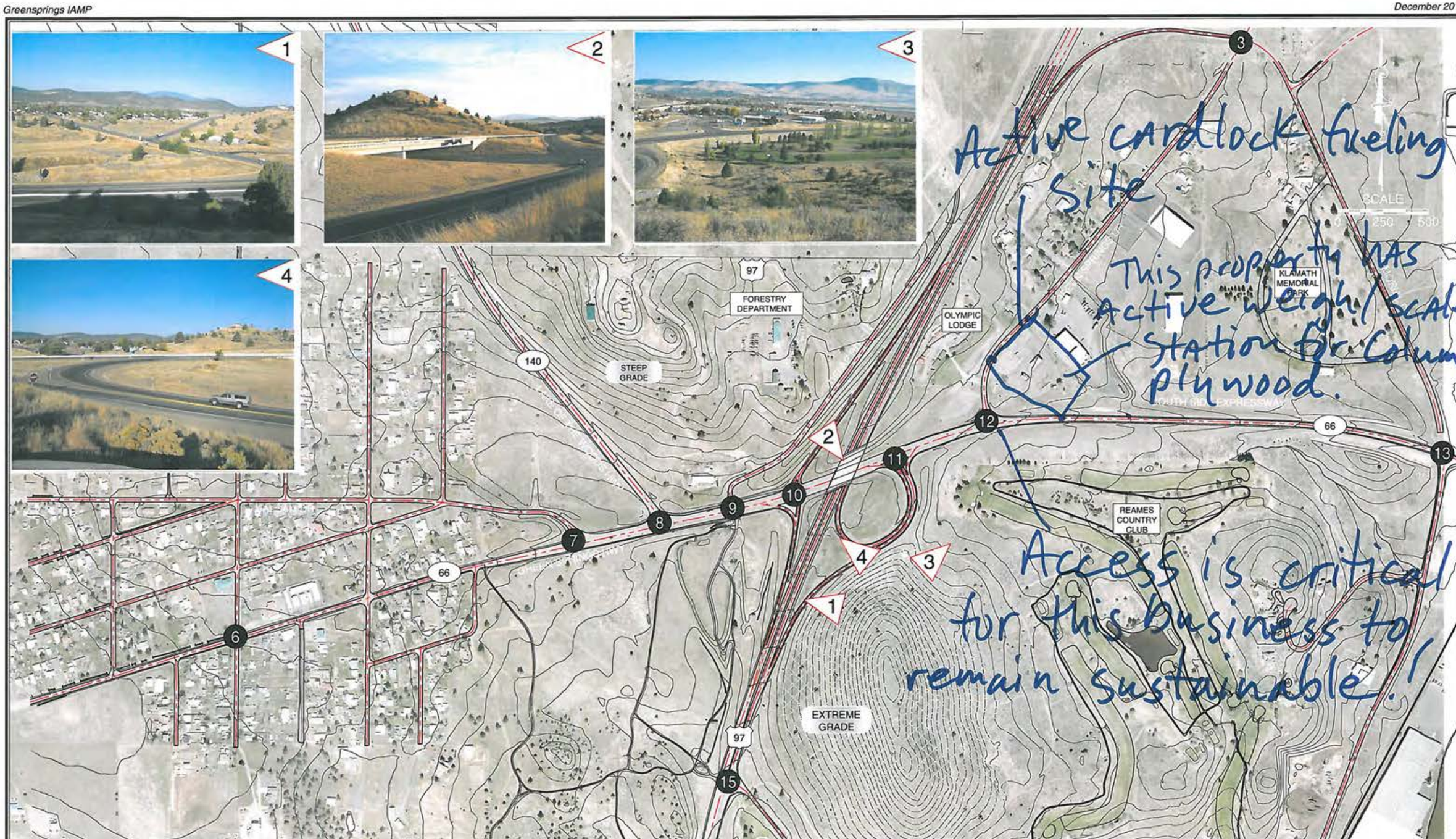
ATTACHMENTS

Attachment A: Original Submitted Comments

REFERENCES

1. National Cooperative Highway Research Program, Highway traffic Data for Urbanized Area Project Planning and Design (Report 255). 1982.
2. Oregon Department of Transportation. *Analysis Procedures Manual, 2006.*

Attachment A Original Submitted Comments



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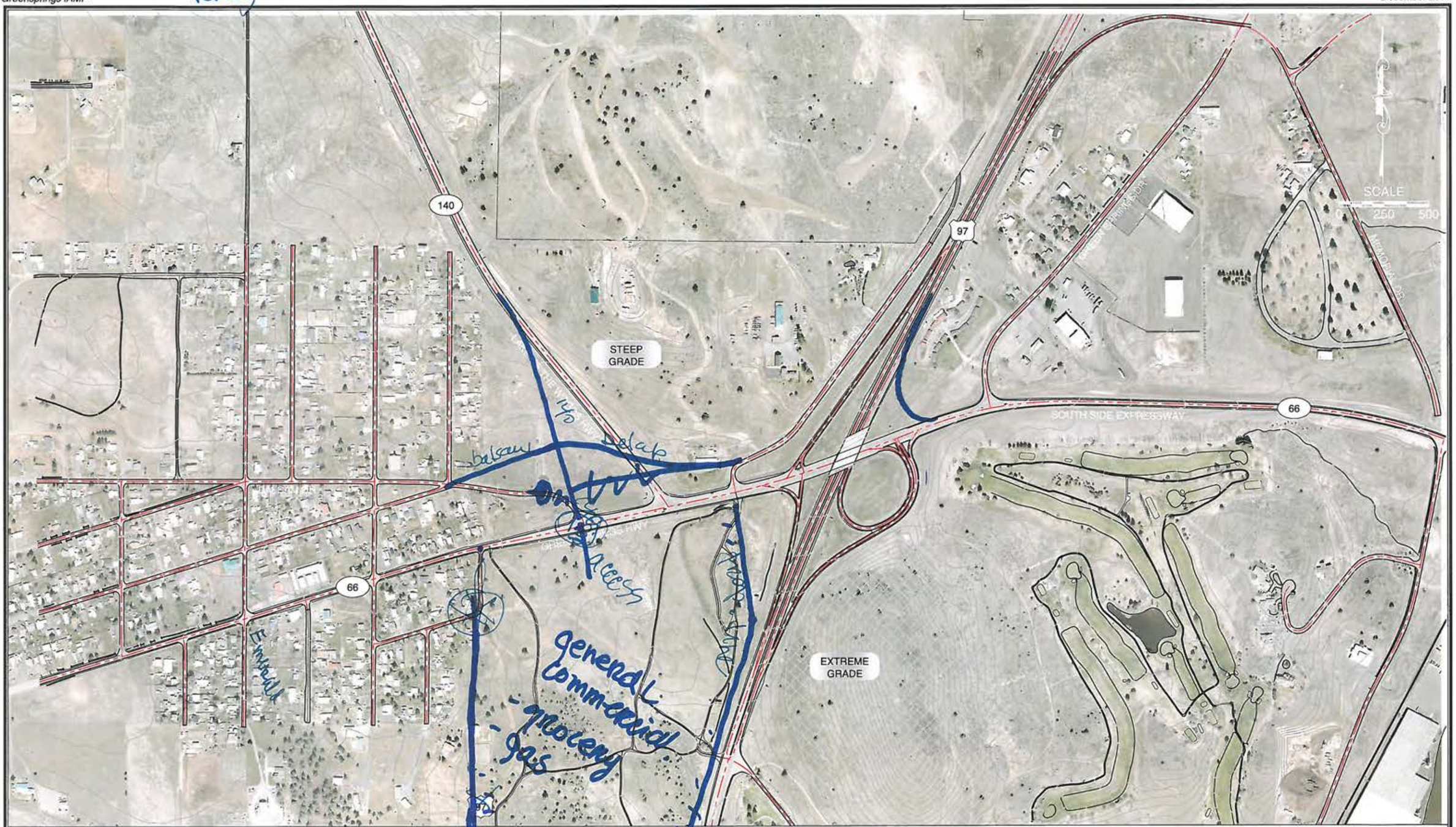
PROJECT AREA MAP
KLAMATH FALLS, OREGON



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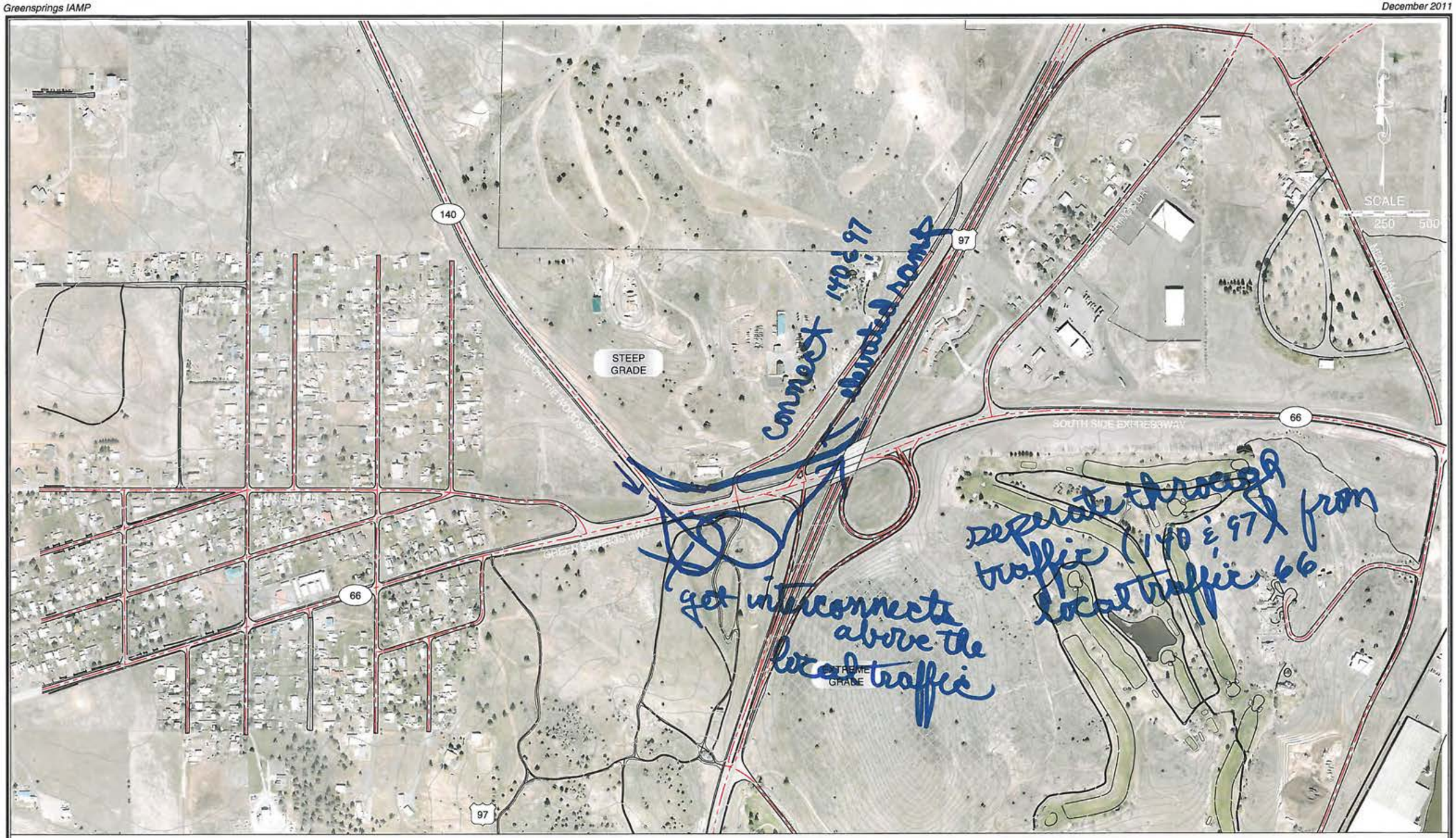
KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

Return comment form to: Ana Jovanovic
Ana.Jovanovic@odot.state.or.us
ODOT Region 4 Planning
63085 N Hwy. 97 Suite 107
Bend, OR 97701

COMMENTING MAP
KLAMATH FALLS, OREGON



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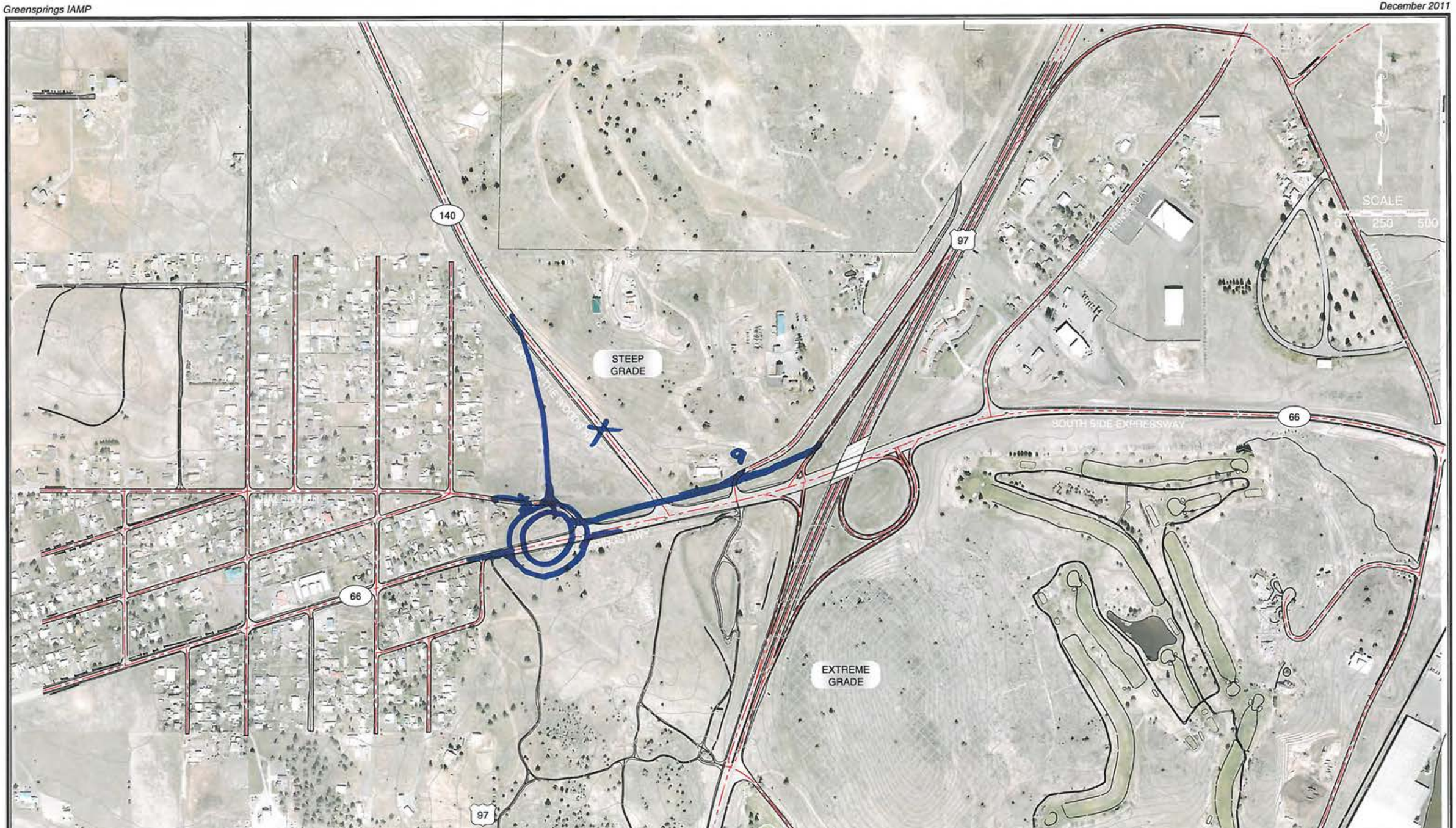
COMMENTING MAP
KLAMATH FALLS, OREGON



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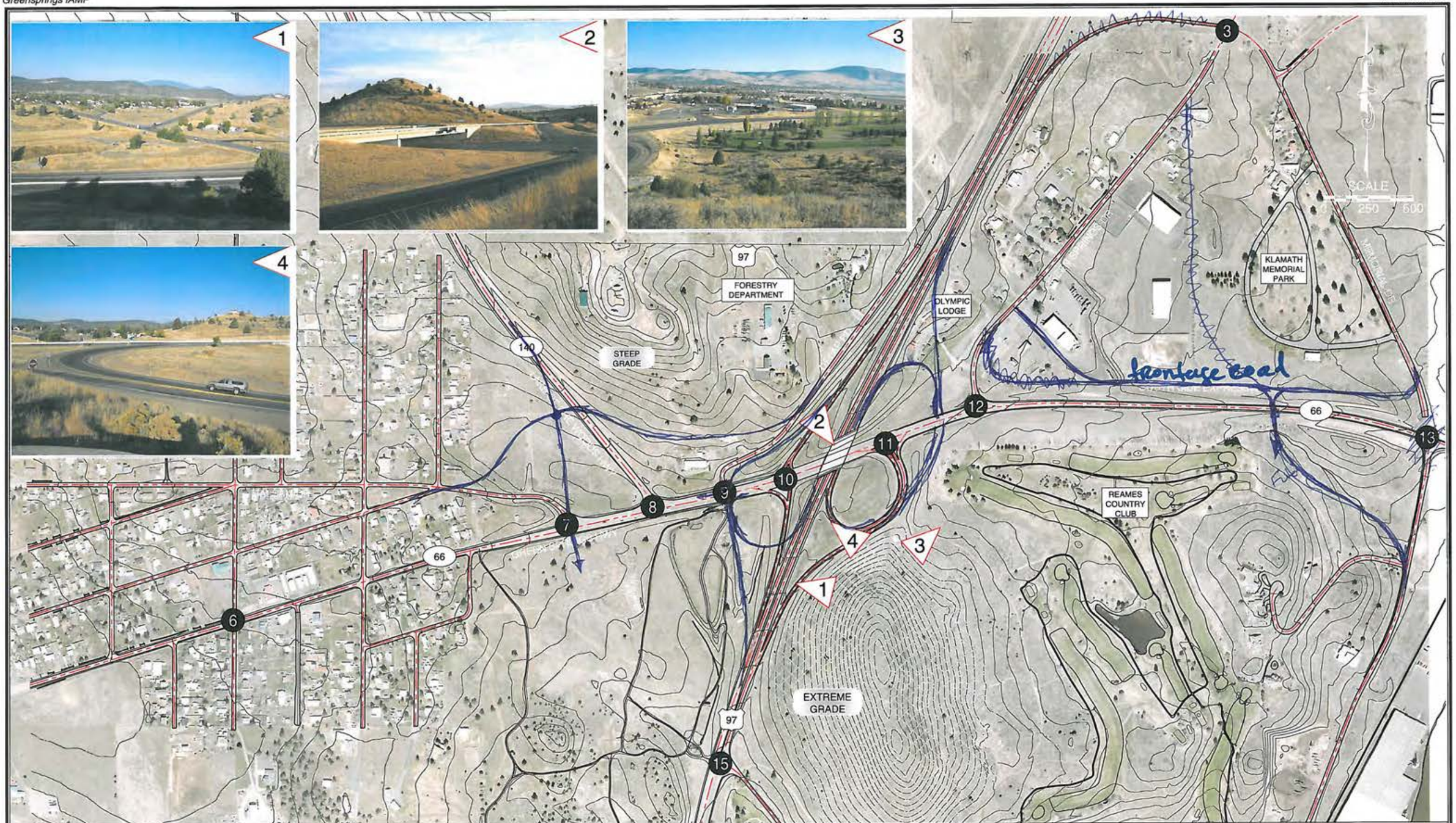
COMMENTING MAP
KLAMATH FALLS, OREGON

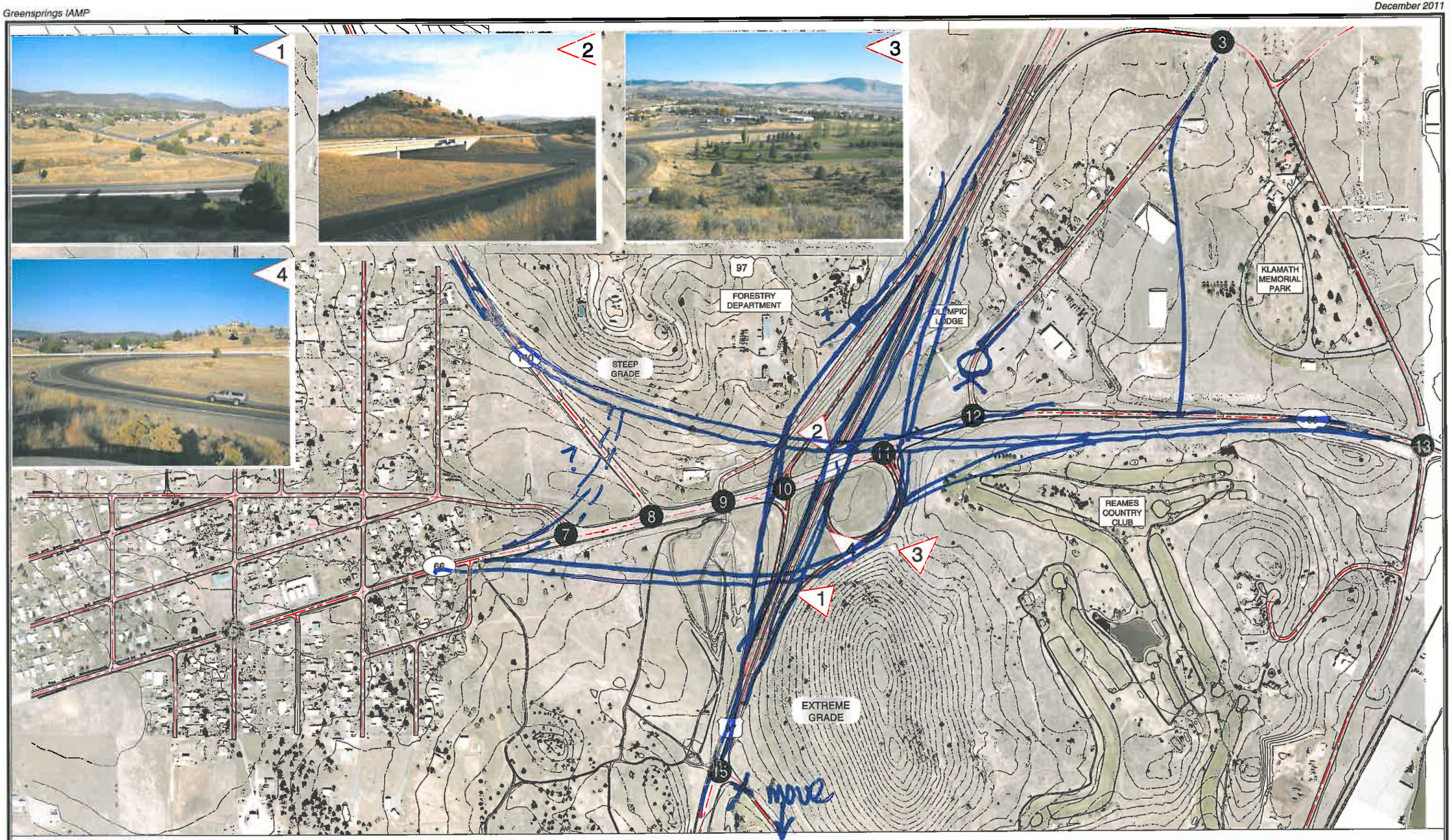


OREGON DEPARTMENT OF TRANSPORTATION

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

Terry McDonald
Marc Cross

PROJECT AREA MAP
KLAMATH FALLS, OREGON



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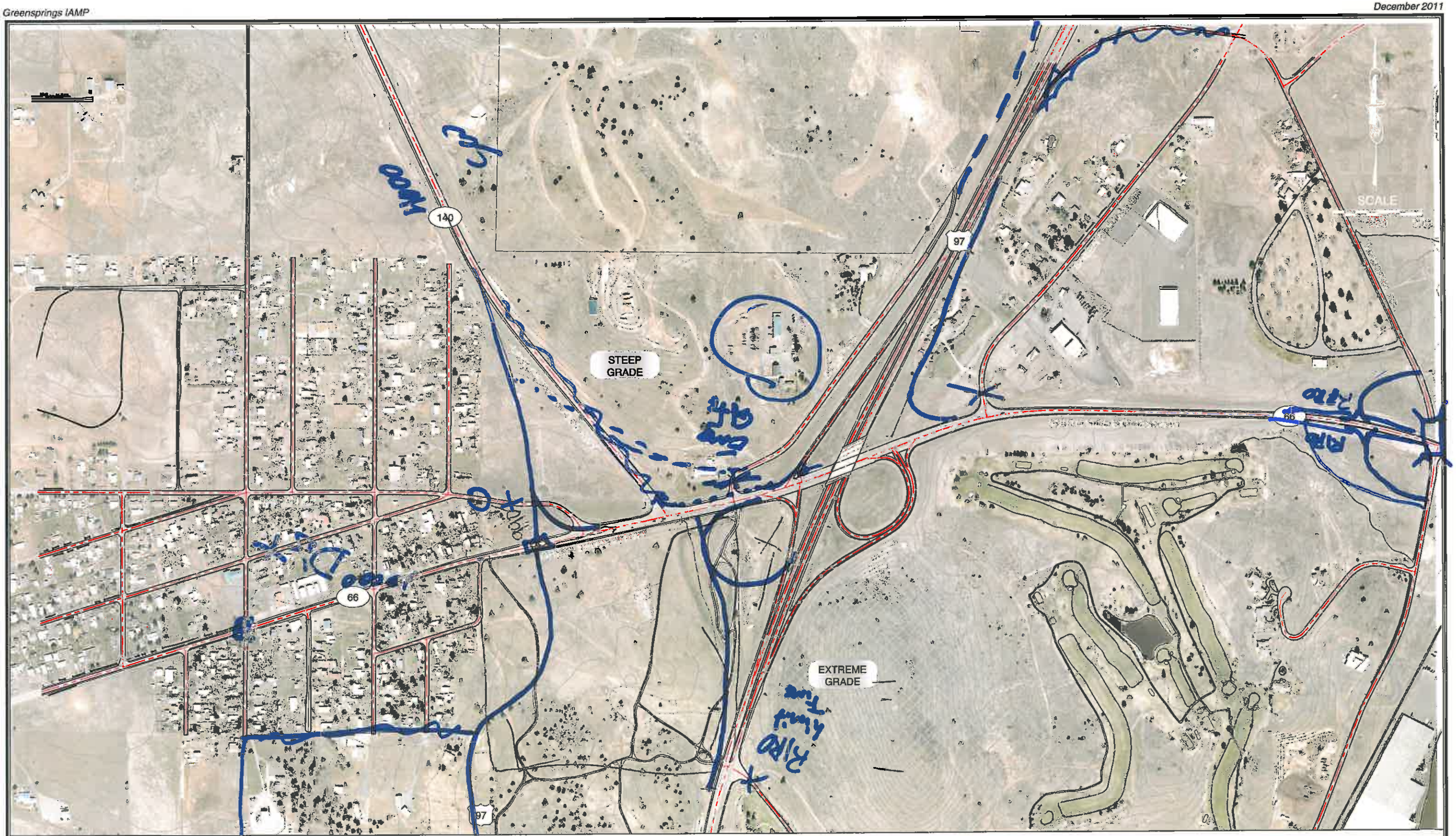
PROJECT AREA MAP
KLAMATH FALLS, OREGON



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COMMENTING MAP
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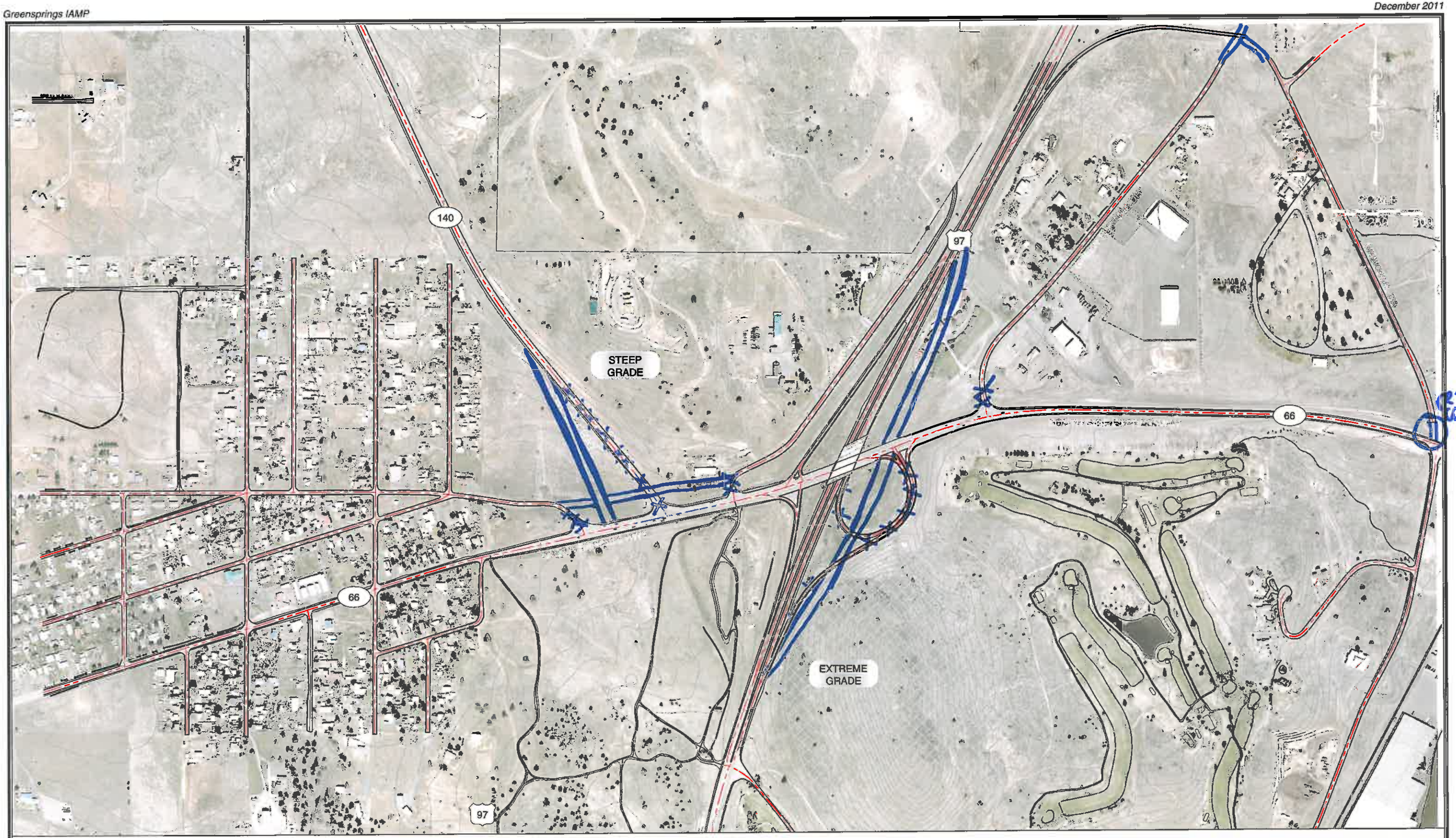

Shayna Rehberg

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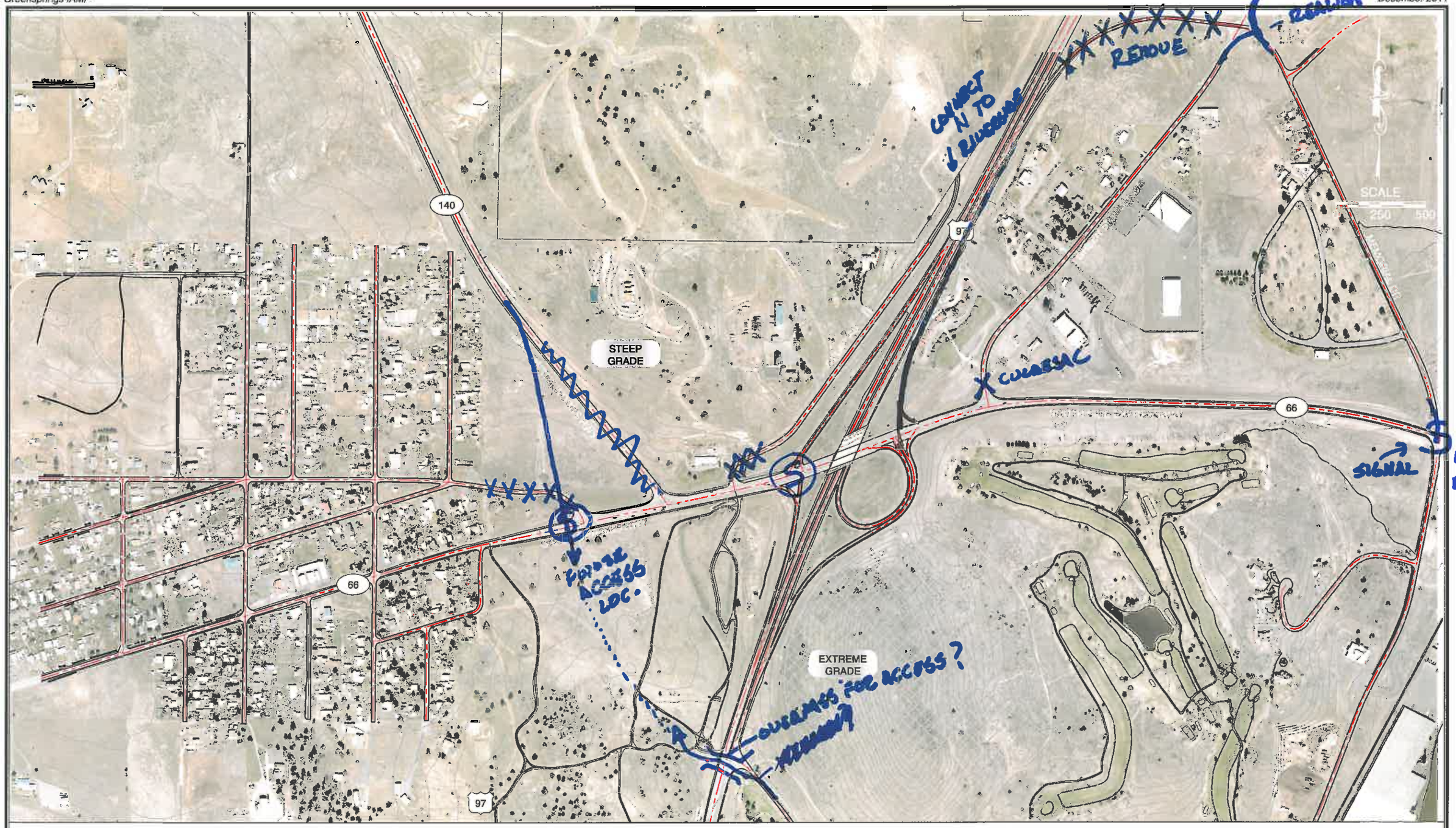

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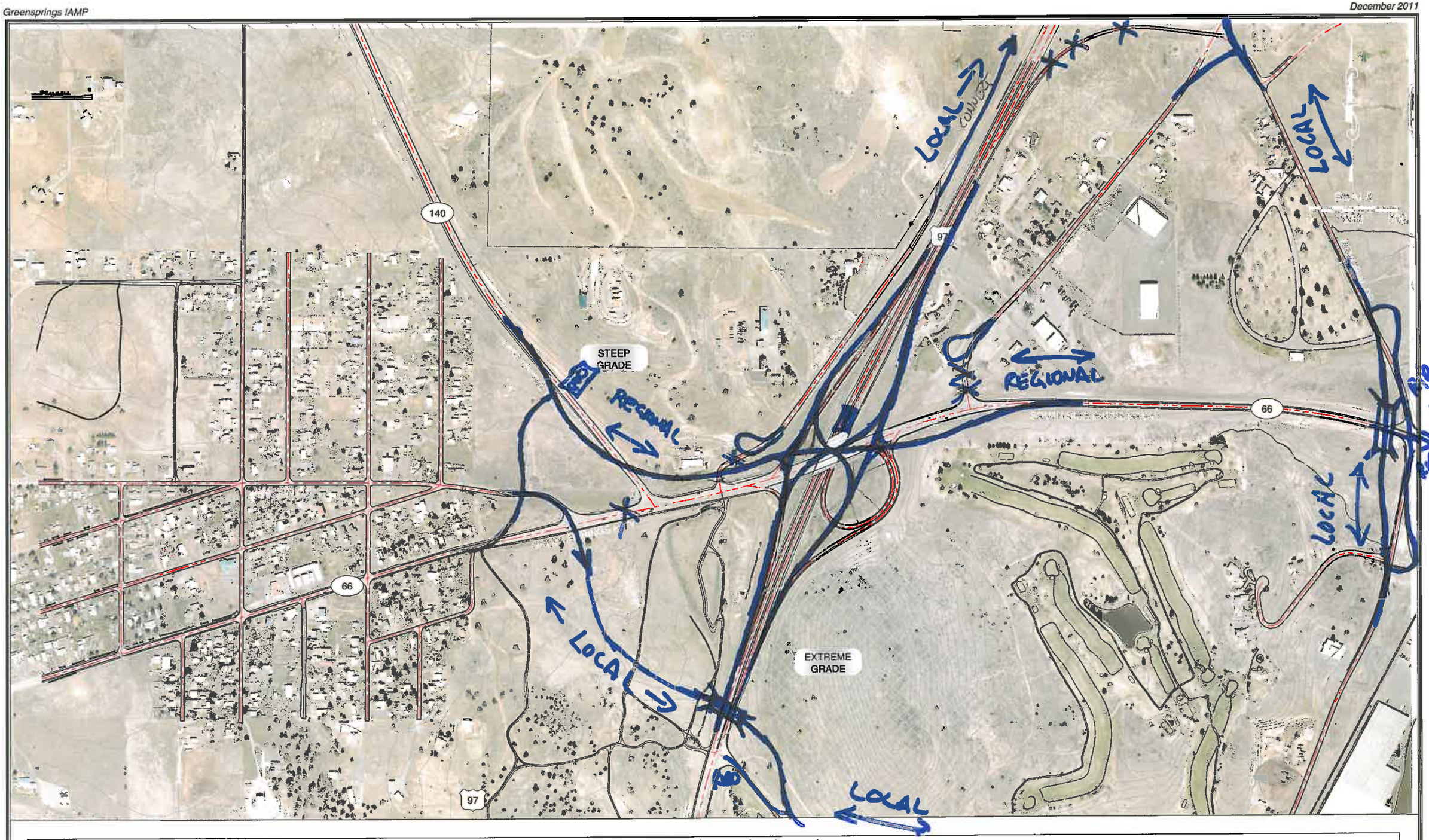

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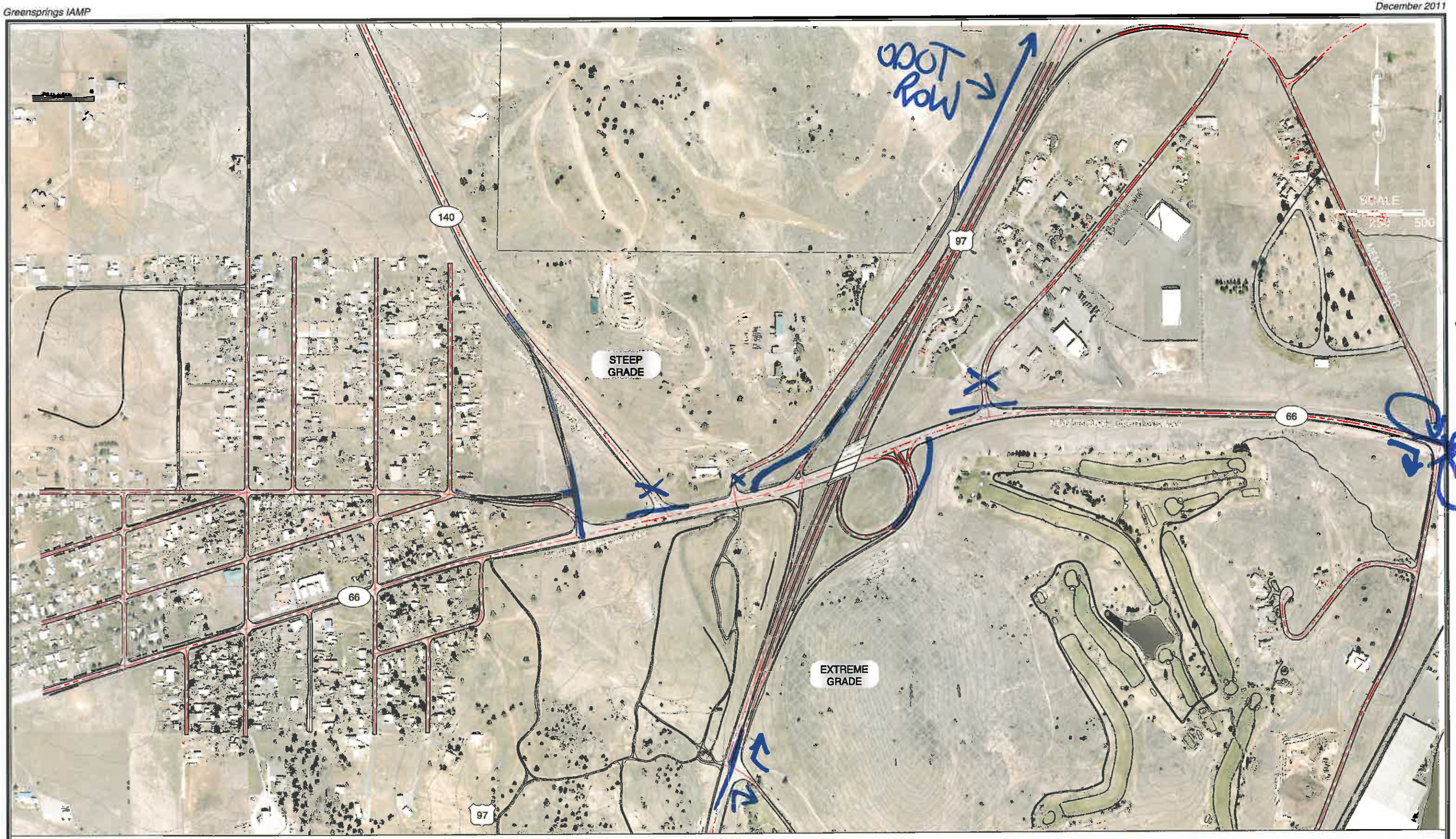

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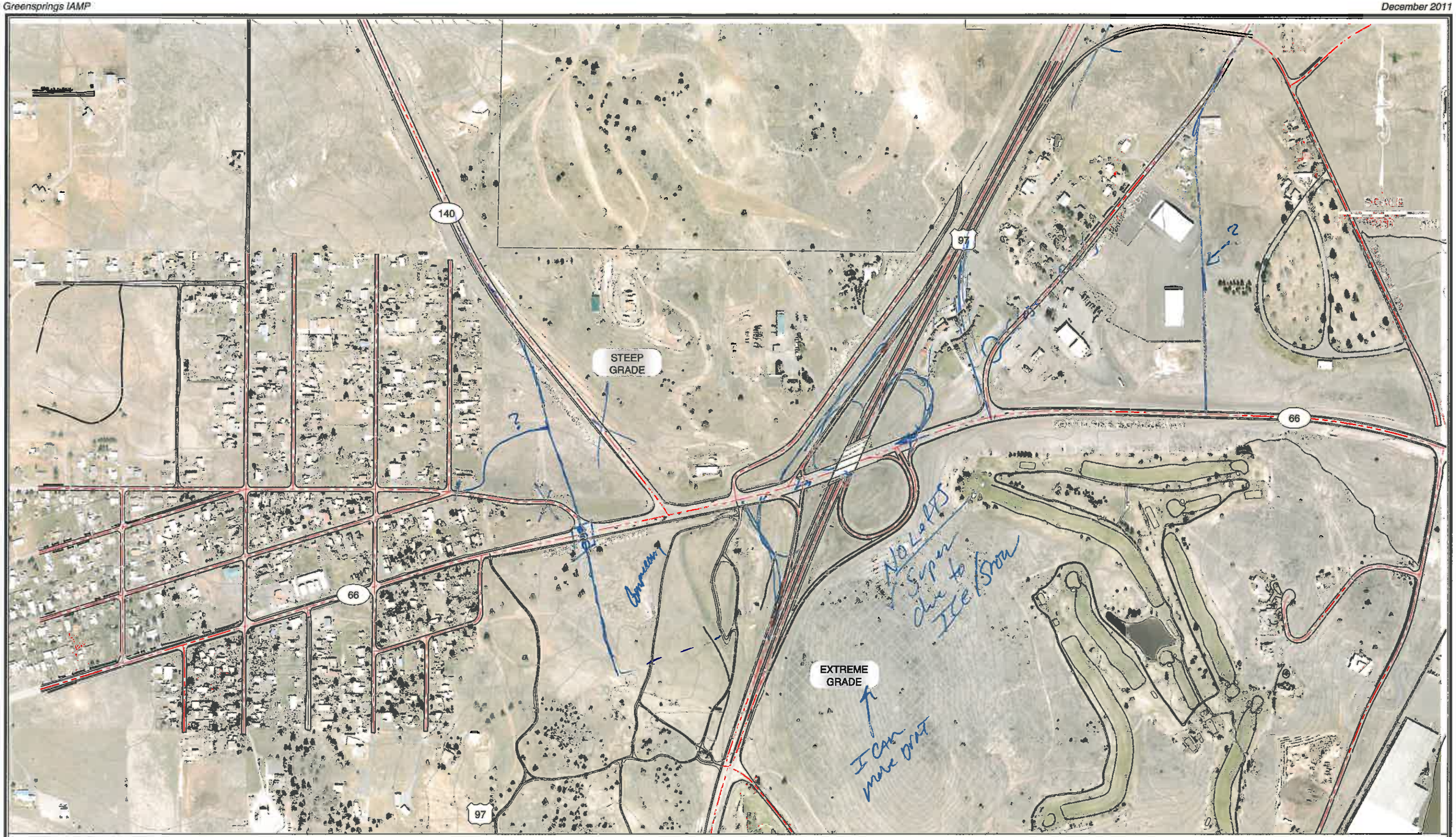

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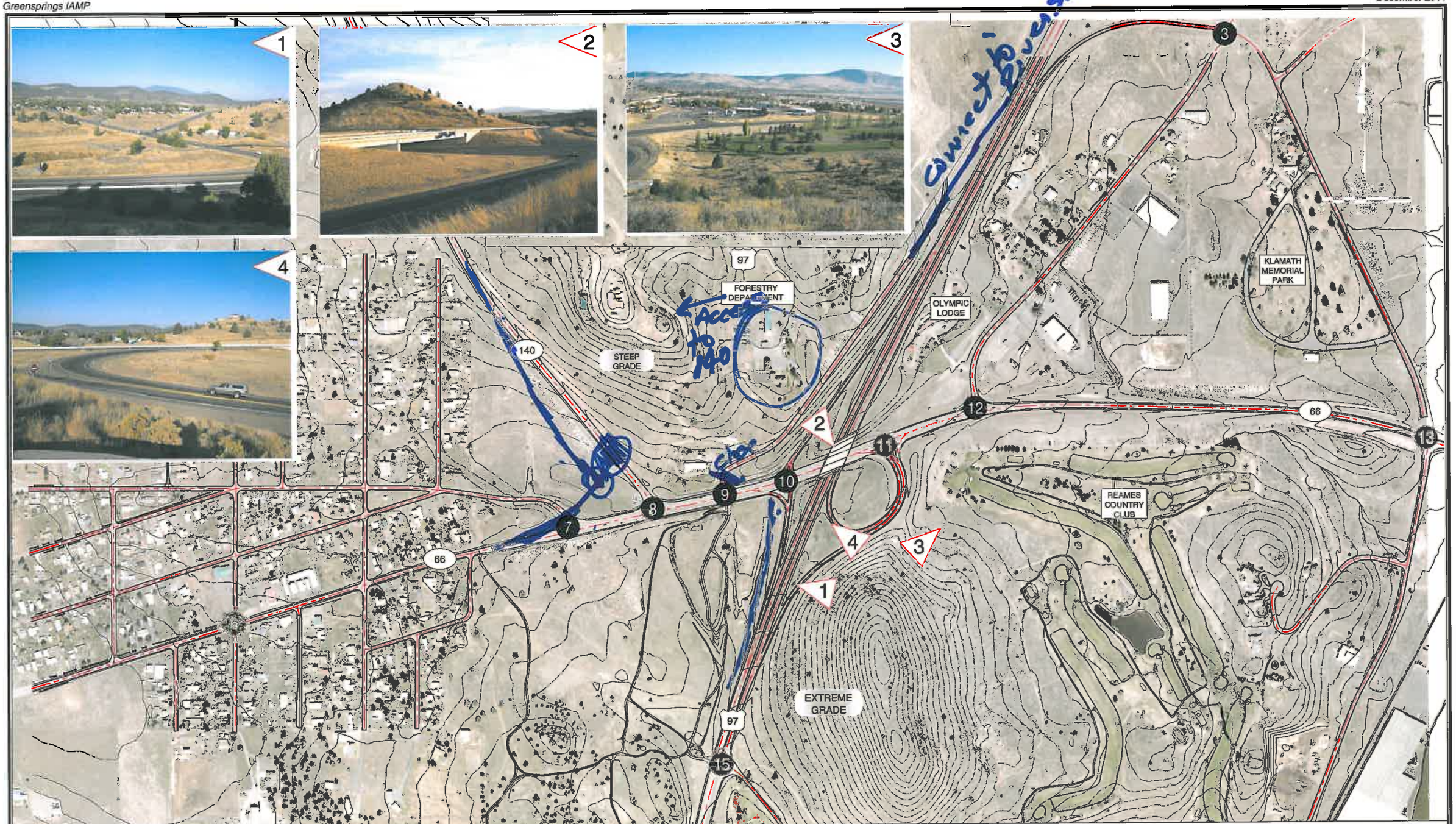

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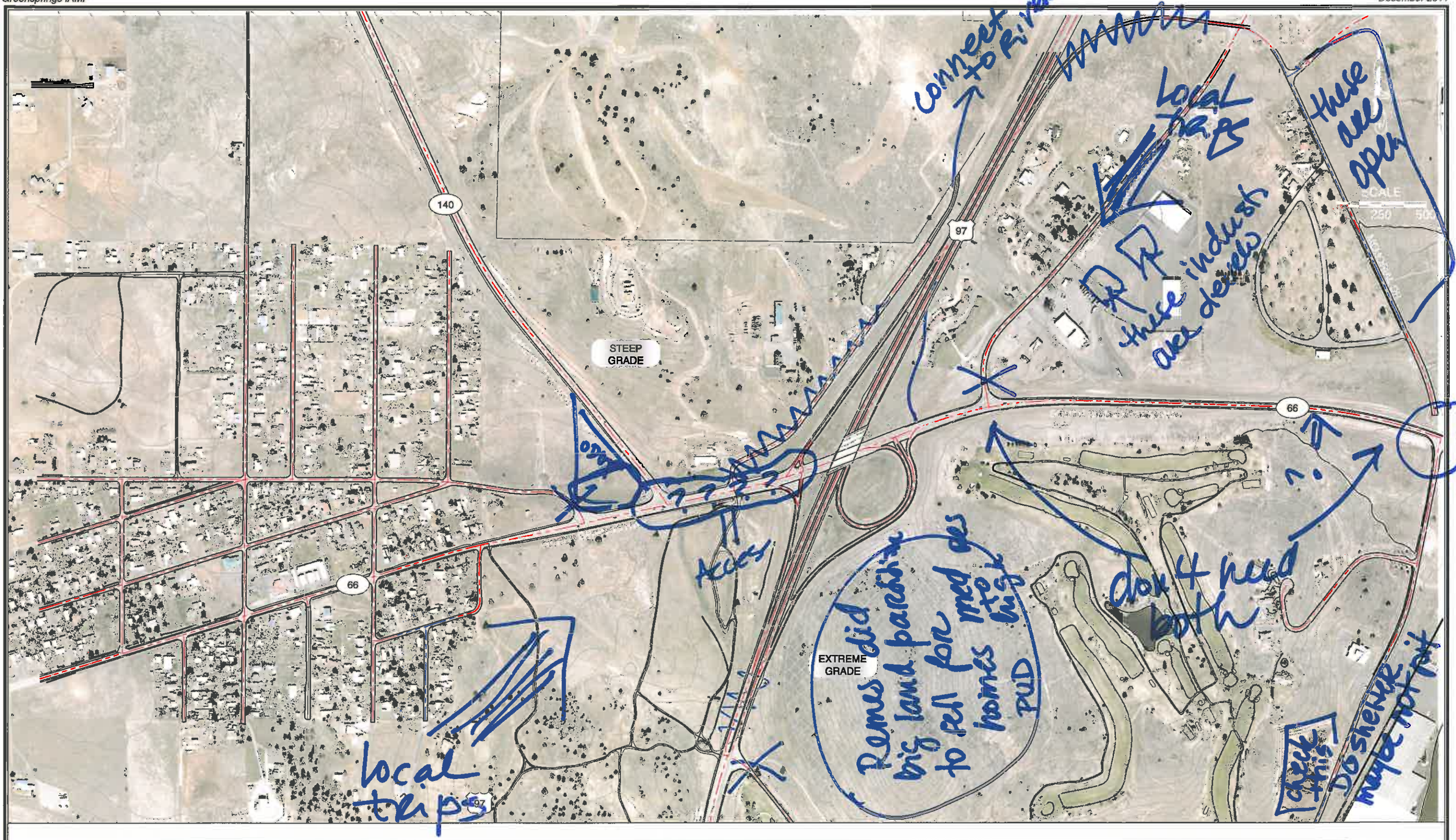

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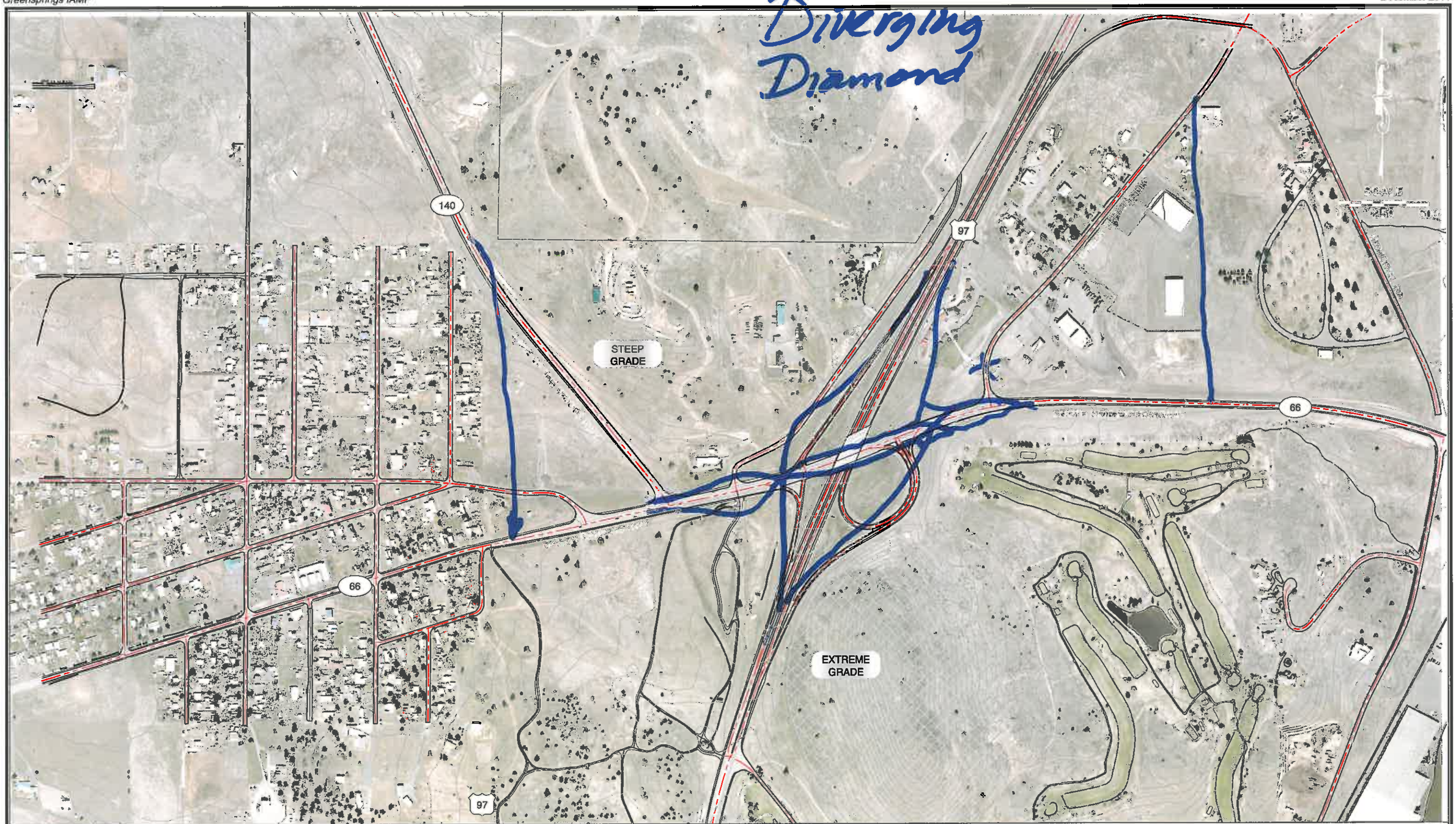

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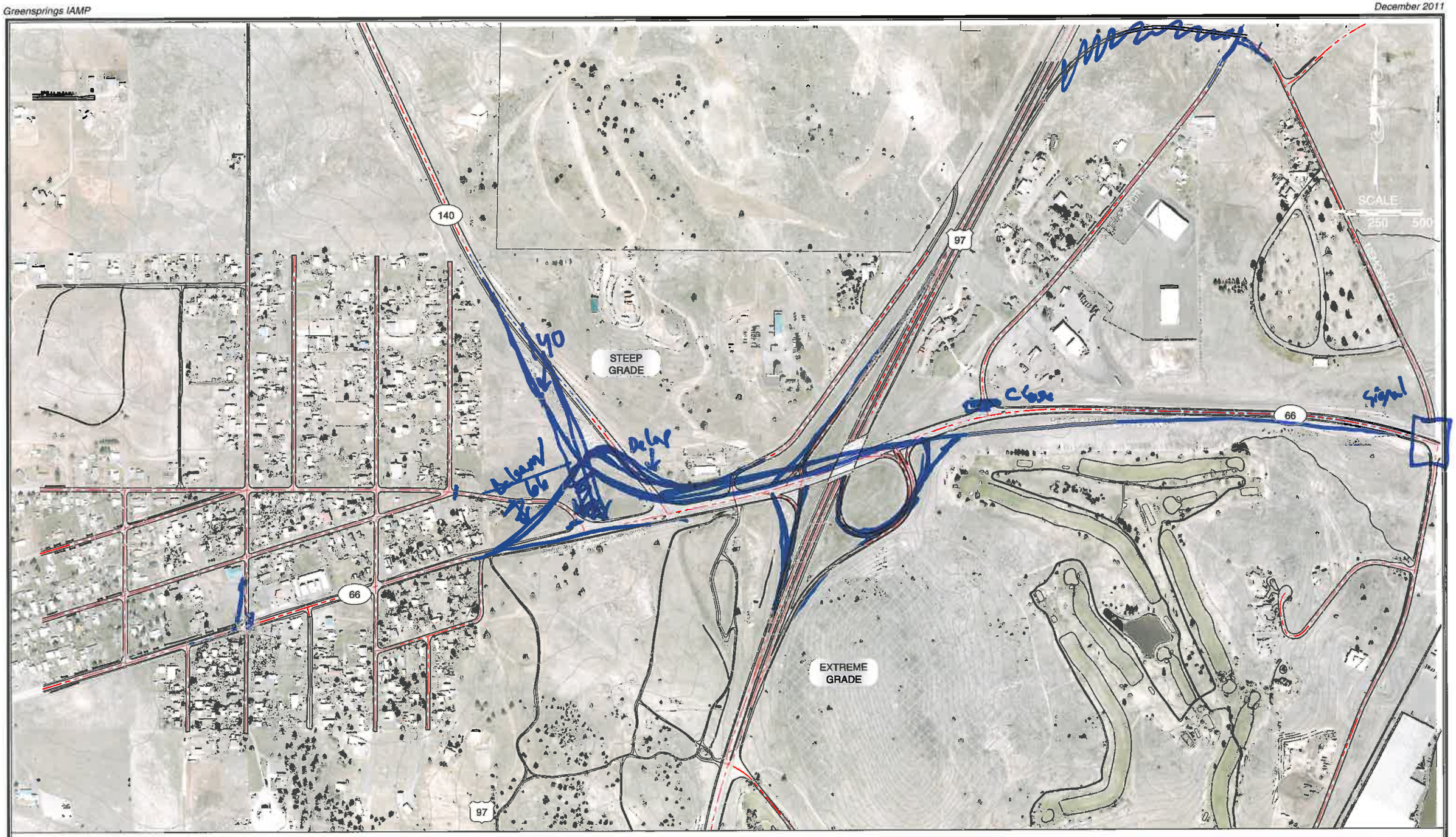

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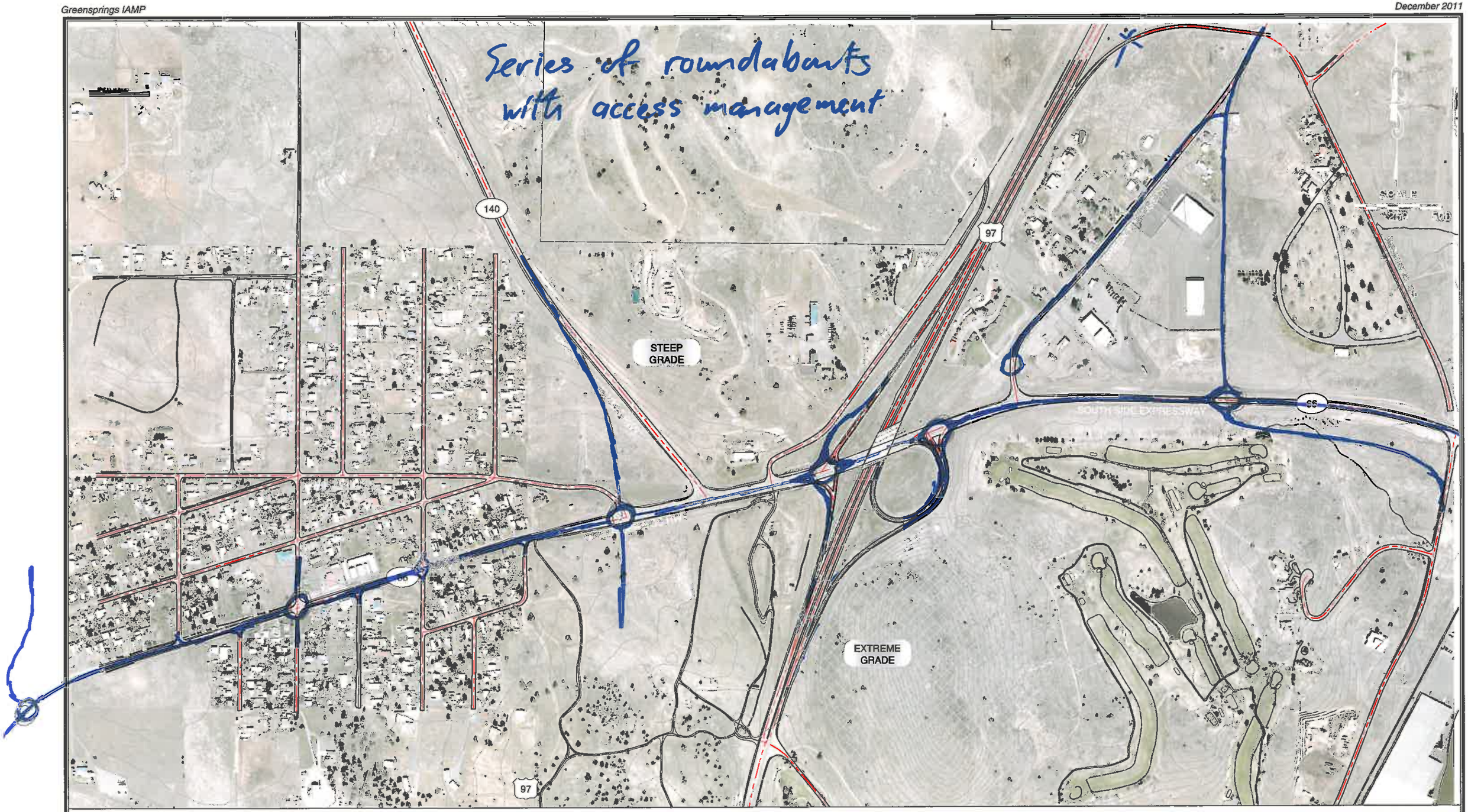

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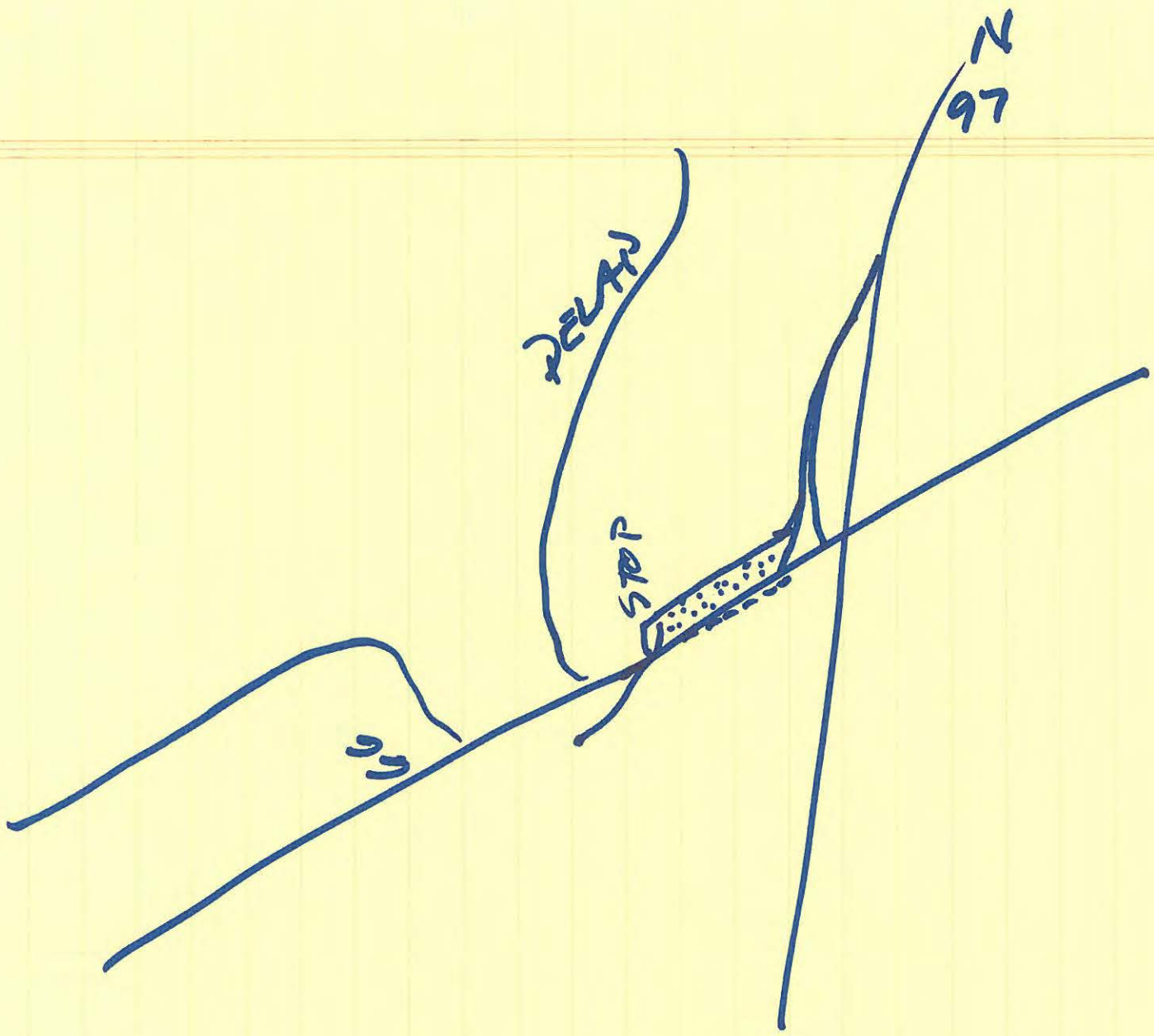

a pocket OR lane FOR right turn so that one can see traffic behind rather turning head

LEON WILLIAMSON
5207 DEWITT

OR 66 GREEN SPRINGS HIGHWAY
INTERCHANGE AREA MANAGEMENT PLAN

www.GreenSpringsIAMP.com

Public Workshop
December 19, 2011
Comment Sheet

Name Don Friedrich

Address 3938 Greensprings Dr 3995 Greensprings Dr

Email

Advance Signs need Before overpass To indicate Right lane closed Beyond 140 Balsam Dr lanes

Please return comments to:

Ana Jovanovic
ana.jovanovic@odot.state.or.us
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OR 66 GREEN SPRINGS HIGHWAY
INTERCHANGE AREA MANAGEMENT PLAN
www.GreenSpringsIAMP.com

Public Workshop
December 19, 2011
Comment Sheet

Name Hugh Nancy Thompson
Address 3280 Delap Rd
Email —

Do a Round About at Balsam DR App.
Run 140-66 Delap and 97 off Round
into it. Simple?

Please return comments to:
Ana Jovanovic
ana.jovanovic@odot.state.or.us
ODOT Region 4 Planning
63085 N Hwy. 97 Suite 107
Bend, OR 97701

OR 66 GREEN SPRINGS HIGHWAY
INTERCHANGE AREA MANAGEMENT PLAN
www.GreenSpringsIAMP.com

Public Workshop
December 19, 2011
Comment Sheet

Name Jim & Jill Clough
Address 2983 Anchor Way, K. Falls 97601
Email jagclough@gmail.com

Access at #12 is critical for the viability for our business.

Phone 541-885-2831 - Home
Cell 541-892-8312
Work 541-882-4444

Please return comments to:
Ana Jovanovic
ana.jovanovic@odot.state.or.us
ODOT Region 4 Planning
63085 N Hwy. 97 Suite 107
Bend, OR 97701

Appendix E
Technical Memorandum #5: IAMP Preliminary Alternatives Analysis

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING
354 SW Upper Terrace Drive, Suite 101, Bend, Oregon 97702 P 541.312.8300 F 541.312.4585

FINAL TECHNICAL MEMORANDUM #5

OR 66 Green Springs Highway IAMP

Interchange Area Alternatives Analysis

Date: August 31, 2012 Project #: 11881

To: Project Management Team

From: Hermanus Steyn, PE & Matt Kittelson, PE, & Jeff Whitman, PE

This memorandum documents the development and evaluation of local circulation and interchange form alternatives for the OR 66/US 97 interchange area in Klamath Falls, Oregon. This memorandum includes:

- Overview of the process used to develop initial concepts
- Qualitative assessment of initial concepts
- Refinement of alternatives
- Evaluation of alternatives

CONCEPT DEVELOPMENT PROCESS AND INITIAL CONCEPTS

The project team hosted a visioning workshop held in December 2011 that gathered information from local officials, property owners, and citizens related to specific transportation issues and possible roadway modification scenarios. Workshop attendees were given background information on traffic patterns, land use designations, and future growth assumptions.

The visioning workshop participants generated many concepts. These ideas served as a starting point for the alternatives presented and evaluated in this memorandum. Technical Memorandum #4 summarized the initial concepts submitted through the visioning workshop process.

The study area was divided into three areas to allow for simplified development of future combinations of solution concepts. The following summarizes the sub-areas and the respective concepts:

- West of the interchange
  - Concept W-1 - Realign OR 140
  - Concept W-2 – Align OR 140 with OR 140 east of interchange
  - Concept W-3 – Realign OR 140 and disconnect Balsam Drive and Delap Pit Road

Exhibit 1 Concept W-1 – Realign OR 140

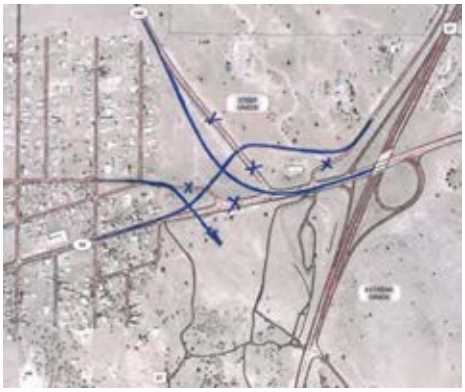


Exhibit 3 Concept W-2 – Align OR 140 with OR 140 East of Interchange

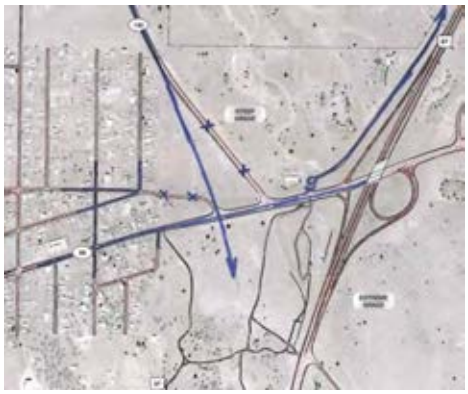


Exhibit 2 Concept W-3 – Realign OR 140 and Disconnect Balsam and Delap Pit Road

- East of the interchange
  - Concept E-1 – Greensprings Drive-Memorial Drive Frontage Road
  - Concept E-2 – Realign Greensprings Drive
  - Concept E-3 – Realign Greensprings Drive & Memorial Drive
  - Concept E-4 – Memorial Drive Jughandle

Exhibit 4 Concept E-1 –Greensprings-Memorial Frontage Road

Exhibit 5 Concept E-2 – Realign Greensprings

Exhibit 6 Concept E-3 –Memorial Full Access

Exhibit 7 Concept E-4 –Memorial Drive Jughandle

- Interchange form
  - Concept I-1 – Improve Existing Interchange
  - Concept I-2 – Diamond Interchange
  - Concept I-3 – Partial Cloverleaf Interchange
  - Concept I-4 – Single-Point Urban Interchange (SPUI)
  - Concept I-5 – Diverging Diamond Interchange (DDI)
  - Concept I-6 – Full Cloverleaf Interchange

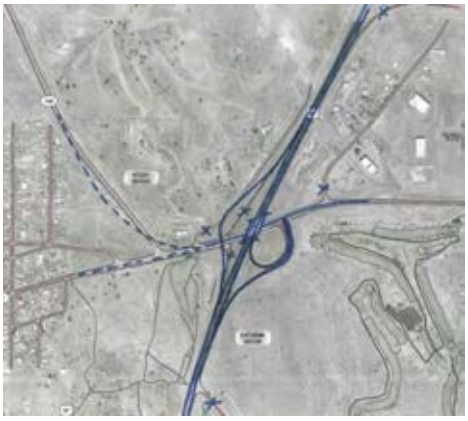


Exhibit 8 Concept I-1 – Improve Existing Interchange

Exhibit 9 Concept I-2 – Diamond Interchange

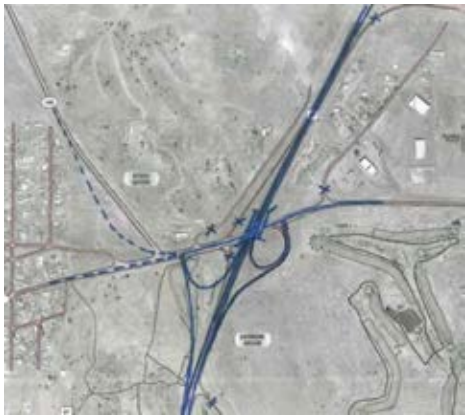


Exhibit 10 Concept I-3 – Partial Cloverleaf Interchange

Exhibit 11 Concept I-4 – SPUI Configuration

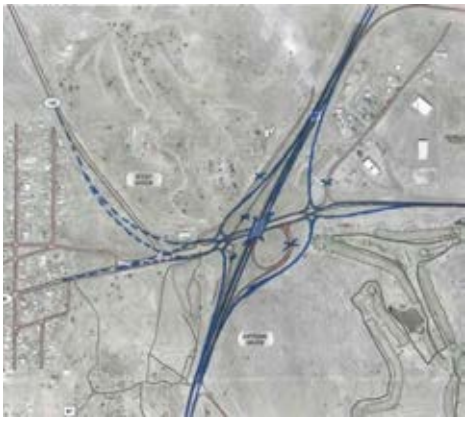


Exhibit 12 Concept I-5 – Diverging Diamond Interchange

Exhibit 13 Concept I-6 – Full Cloverleaf Interchange

PRELIMINARY QUALITATIVE EVALUATION OF INITIAL CONCEPTS

The consultant team conducted an evaluation and comparison of the initial concepts based on qualitative measures. The comparison is intended to identify those concepts that do not have any "'fatal flaws" and warrant detailed evaluation.

To help determine how to rank each of the concepts according to the evaluation criteria, a scoring system was developed. In essence, each evaluation criterion was assigned a range of numerical values (+2, +1, 0, -1, or -2). The concepts that achieve each metric better than others receive a "+2", those that do not impact the metric receive a "0", those that underperform compared to other concepts receive a "-2" score, and those that fall in between receive a "+1" or "-1" score. The following outlines the elements considered in the initial evaluation and aspects of each that characterized the variations between concepts.

These evaluation criteria were originally documented in Technical Memorandum #2.

Transportation Operations

- Safety
- Local connectivity and mobility
- Freight mobility

Multimodal Accessibility

- Pedestrian mobility
- Bicycle mobility
- Transit mobility

Land Use

- Right-of-way impacts
- Consistency with adopted land use and economic development plans
- Transportation capacity impacts of changes in land use intensity
- Impacts to utilities

Economic Development

- Near-term growth (1-5 years)
- Mid-term growth (5-15 years)
- Long-term growth (15-25 years)

Environmental, Social, and Equity factors

- Environmental impacts
- Socio-economic impacts

Accessibility and Connectivity

- Access spacing requirements
- Future access for undeveloped properties
- Local roadway connectivity

Cost

- Cost relative to other alternatives

Implementation

- Ability to construct in phases
- Local impacts during construction
- Impacts to existing and proposed developments

Table 1 provides a summary of the preliminary evaluation of initial concepts.

Each concept was compared to other concepts within each sub-area and the lowest scoring concepts (those that scored less than +0.500) were removed from further consideration. More detailed notes regarding the associated scores are provided in Appendix "A".

Table 1 Initial Qualitative Concept Evaluation

Concept	Operations	Multimodal	Land Use	Economic Develop.	Enviro., Social, and Equity Factors	Accessib. & Connectiv.	Cost	Implem.	Average Score	Recommended for Additional Evaluation?
West Interchange Concepts										
W-1	+1	0	+1	+1	0	+2	+1	+1	+0.875	Yes
W-2	-1	0	0	-1	0	-1	0	-2	-0.625	No
W-3	+2	0	+1	+1	0	+1	+2	+2	+1.125	Yes
East Interchange Concept										
E-1	+1	+1	+1	+1	-1	+1	+1	+2	+0.875	Yes
E-2	0	+1	-1	-2	-1	-1	+1	0	-0.375	No
E-3	+1	+1	+2	+1	-2	+1	-1	-1	+0.250	No
E-4	+2	+2	+1	+2	-1	+2	-2	+1	+0.875	Yes
Interchange Form Concepts										
I-1	+1	+1	+2	+2	+1	+2	+2	+2	+1.625	Yes[1]
I-2	-1	+1	+1	+1	-1	+2	+1	+1	+0.500	Yes[1]
I-3	-2	+1	+1	-1	-1	+2	+1	+1	+0.375	No
I-4	+2	-2	-2	-2	-2	+2	-2	-2	-1.000	No
I-5	+2	-1	+1	+1	+1	+2	-1	+1	+0.750	Yes
I-6	+2	-2	-2	-2	-2	+2	-2	-2	-1.000	No

Note: Concept I-1 and I-2 are similar and are considered to represent phased improvements in subsequent alternatives. Specifically, improvements to the existing interchange can be constructed in conjunction with adding a diagonal northbound on-ramp. A diamond interchange in isolation (i.e., closure of the existing loop on-ramp) will not be considered for operational reasons.

Table 2 provides information on the primary reason a concept was recommended for elimination and not considered for further evaluation. More detailed notes regarding the associated scores and supplemental to the information provided in Table 2 are provided in Appendix "A".

Table 2 Primary Reason for Concept Elimination

Concept	Primary Reason for Concept Elimination
Westside Concepts	
W-2	The realignment of OR 140 to be the through route instead of OR 66 does not result in an operational benefit long-term and causes difficulties for properties to develop in the southwest quadrant of the interchange.
Eastside Concept	
E-2	Realigning Greensprings Drive along the north-south property line results in the new Greensprings Drive/OR 140 intersection to be at an undesirable location in relation to the longitudinal grade along OR 140. Further, the realignment does not result in adequate access spacing distances between the new intersection location and existing northbound ramp terminal intersection.
E-3	The realignment of Greensprings Drive to share the northerly alignment of Memorial Drive would result in the need to expand the existing bridge along OR 140 to the east. Given the likely high cost of this improvement and negative local circulation benefits for the existing businesses on Greensprings Drive, this concept was not considered further.
Interchange Form Concepts	
I-3	Converting the US 97 southbound off-ramp from a typical exit ramp to a loop ramp in the southwest quadrant of the interchange does not support the forecasted high demand of southbound US 97 off-ramp to OR 140 westbound traffic during the p.m. peak hour.
I-4	The anticipated road realignments, the size of the new structure will result in high improvement costs with little benefits
I-6	The construction of a full cloverleaf interchange would have significant right-of-way impacts and high construction costs. Further, the large interchange would provide significantly more capacity than is needed based on the current forecasts.

At Project Team (PT) Meeting #4, the following modifications were identified to concepts that were identified for further evaluation:

- Combined Concepts W-1 and W-3 as a revised Concept W-1 that shows the realignment of OR 140 to the west, and keeps the Delap Pit Road connection with the realigned OR 140, while disconnecting Balsam Drive.
- Revised Concept E-1 that provides a frontage road from Greensprings Drive and disconnect Memorial Drive from the frontage road.
- Revised Concept E-4 that forms a jughandle configuration with Greensprings Drive (north)-Memorial Drive (south) and disconnects the Memorial Drive connection to the north.
- Revised Concept I-2 that keeps the existing eastbound to northbound loop on-ramp and adds the westbound to northbound on-ramp.

In summary, one west side concept, two east side concepts, and three interchange form concepts were recommended for additional evaluation based on this evaluation and PT Meeting #4.

REFINEMENT OF ALTERNATIVES

This section defines the major issues and considerations addressed by the remaining concepts in the three geographical project focus areas and further outlines why specific alternatives were modified to address those considerations.

West Side Alternatives

The major consideration on the west side of the interchange was the future alignment of OR 140 and OR 66. Specifically, consideration was given to both facilities to operate at the through east-west route. OR 66 currently operates in this function. The bullet points below discuss the results of this evaluation.

- Vehicular operations can be expected to operate acceptably in the future with either roadway alignment in place. Additional turn lanes would be required under both scenarios. These are summarized below:
    - OR 66 as the through route: A dedicated westbound right-turn lane operating with overlap phasing would result in OR 140/OR66 intersection operating with a volume-to-capacity (v/c) ratio of 0.71.
    - OR 140 as the through route: This configuration would require two westbound left-turn lanes from OR 140 onto OR 66 and would result in the OR 140/OR 66 intersection operating with a v/c ratio of 0.58.
- The OR 66 as the through route scenario results in the need to accommodate heavy westbound right turns onto OR 140. Under future conditions, accommodating right-turns is likely to be less problematic during the critical p.m. peak hour.
- The OR 140 as the through route scenario need to accommodate heavy westbound left-turns onto OR 66 that will result in unusual long left-turn pockets.
- The southwest quadrant of the interchange is planned for commercial development. As such, vehicular trips coming from the east (US 97 or OR 140) would likely be required to make two left-turns into the site under the OR 140 as the through route scenario.

Based on these observations and as discussed during PT Meeting #4, the team recommended to retain OR 66 as the through movement as the preferred alternative for the west side of the interchange. However, the OR 140/OR 66 intersection is currently closely spaced to the OR 140/US 97 Southbound Ramps intersection and should be relocated to the west based on access spacing standards to improve safety and operations.

Other considerations on the west side of the interchange include the connections of Balsam Drive and Delap Pit Road. Both intersect with the highway network in locations that do not adhere to applicable access spacing standards, resulting in potentially unsafe and/or inefficient traffic operations. As such, the recommended connections for each facility were considered and are discussed below.

- Delap Pit Road: This facility provides access to several residential lots, as well as the local Oregon Department of Forestry (ODF) office. The ODF office responds to fires on private lands from this location on both an emergency and routine basis. As such, the Delap Pit Road connection to OR 140 is an important factor in their response time. Considering this, the option to connect Delap Pit Road to the north, for which right-of-way (ROW) has previously been purchased, and closing the access at OR 140 becomes less desirable. Further, the required connection to Riverside Drive is likely a complicated and potentially expensive alternative from a geometric standpoint. For these reasons, maintaining a connection on the highway system for Delap Pit Road is preferable. To this end, a realignment of Delap Pit Road with OR 140 to the northwest is being evaluated. Potential modifications to this approach include:
    - Limiting Delap Pit Road to right-in/right-out in its current or proposed location (as an interim or long-term option).
    - Providing limited access to Delap Pit Road through the construction of an emergency gate at the access point.
- Balsam Drive: This facility provides access to the Stewart-Lennox neighborhood via OR 66. However, the Westside Refinement Plan has planned for this connection to be closed given the extensive grid system and alternative connections to the highway. As such, this connection is being evaluated as closed.

In summary, Alternative W-1 (Realign OR 140 and Disconnect Balsam) as illustrated in Figure 1 captures the only alternative identified for future considerations on the west side of the interchange.

Conceptual Cost Estimate

A conceptual cost estimate was developed for Alternative W-1. The estimated project cost including engineering fees, but excluding right-of-way costs for this improvement is approximately $5.8 million. Additional details are provided in Appendix "B". This estimate reflects the following major assumptions:

- Remove existing portions of OR 140 and Balsam Drive due to road realignments
- Widen OR 66 to add travel lanes required to improve mobility, as well as bike lanes and sidewalks along both sides.
- Provide retaining wall along the realignment of Delap Pit Road.

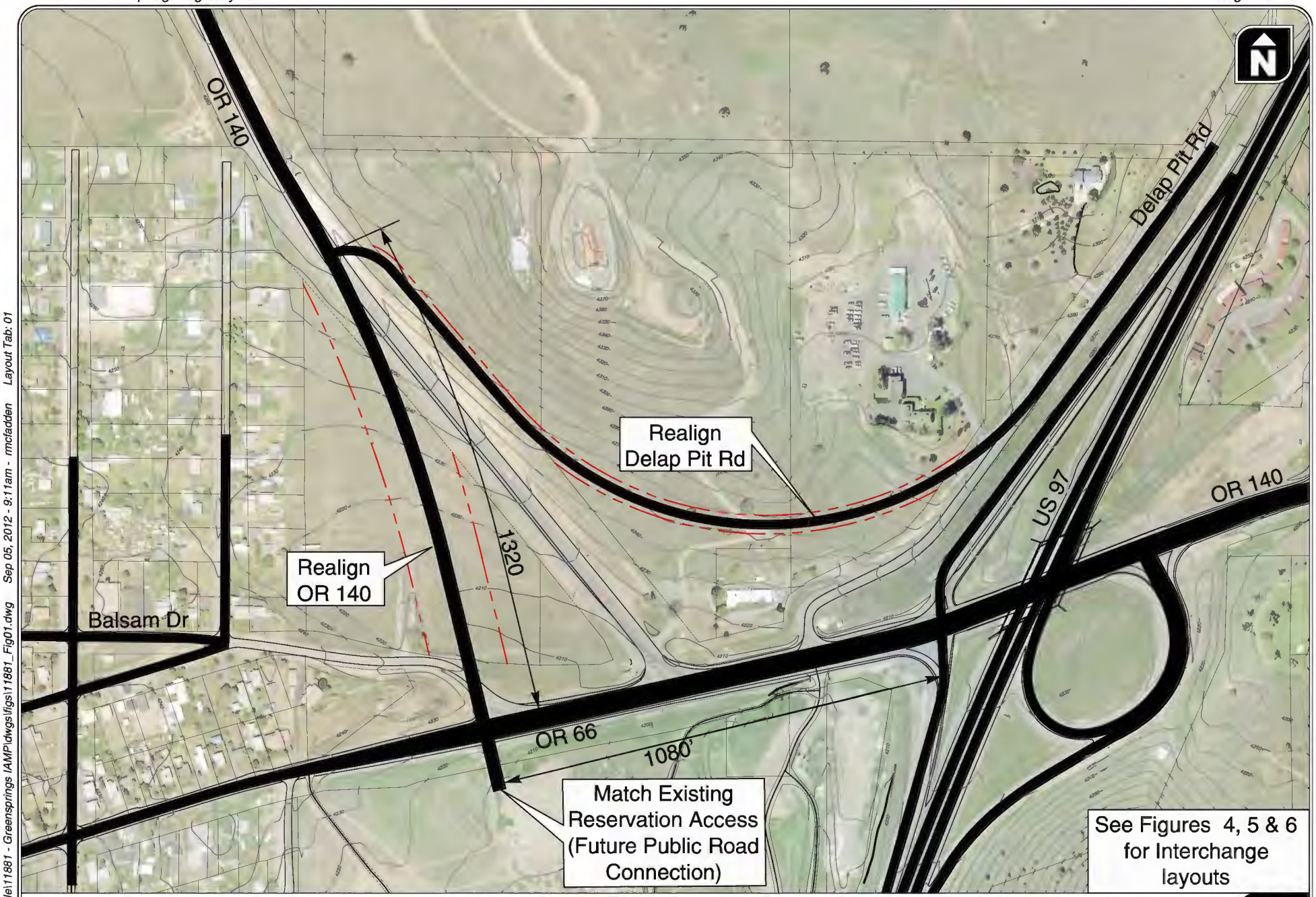
Accesses Along OR 140 & OR 66

The proposed improvements for the west side identify the realignment of Delap Pit Road to OR 140 based on access spacing guidelines. A limited number of private accesses exist along OR 140 between OR 66 and Orindale Road. However, future developments and/or redevelopments will need to

address access spacing standards and the required safety and operational analyses to provide access to their developments.

There are numerous accesses that will continue to exist along OR 66 to the west of the proposed realigned OR 140. There are limited opportunities to consolidate accesses and/or relocate to side streets. In addition, the existing right-of-way does not provide the latitude to consider frontage roads without significantly impacting properties along OR 66. Providing a raised median to limit access to right-in/right-out would encourage undesirable U-turns at the key intersections along OR 66; however intersection can be designed to accommodate U-turns. However, if a series of roundabouts are considered at the key intersections along OR 66, then those would provide flexibility in applying access management treatments along this section of OR 66.

Exhibit 14 Potential Roundabout Configuration



REVISED ALTERNATIVE W-1: REALIGN OR 140
DISCONNECT BALSAM DR
KLAMATH FALLS, OREGON

FIGURE 1

KITTELSON & ASSOCIATES, INC.
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H:\projfile\11881 - Greensprings IAMP\dwgs\figs\11881_Fig01.dwg Sep 05, 2012 - 9:11am - rmcfadden Layout Tab: 01

East Side Alternatives

The area east of the interchange faces several distinct issues related to access spacing associated with roadway functional classification, longitudinal grade, and the existing bridge of the southern portion of Lake Ewauna. These are summarized below:

- The functional classification of OR 140 changes to an expressway designation east of US 97, resulting in an access spacing requirement of ½ mile necessary to maintain safe and efficient operations for such facilities. This standard is violated by the existing Greensprings Drive intersection location.
- The expressway designation encourages grade separated crossing (i.e., interchange form or overcrossings/undercrossings) along OR 140. The Washburn Way connection with OR 140 to the east is currently an interchange. However, several other prominent connections along this stretch of OR 140 are currently at-grade intersections. The ultimate intersection configuration of intersections east of the interchange should consider the long-term vision for this stretch of highway in terms of access control and/or grade separation. Local businesses along Greensprings Drive rely on access to OR 140 and easy access to US 97 to retain viable operations. Any closure and/or relocation of access points along OR 140 should consider these impacts and strive to provide adequate alternative accommodations.
- An existing longitudinal grade of approximately 3% exists east of the interchange with the grade descending towards the river. This grade makes acceleration difficult for larger vehicles traveling to the west (up the grade) and requires consideration when siting new access points along this segment of OR 140.
- The existing bridge over the south portion of Lake Ewauna has no available area to add additional lanes on the existing structure. As such, new lanes across the bridge (through lanes or turning lanes) would result in a need to widen the bridge. Due to the high cost of such improvements, this constraint should be taken into account when considering improvements to the existing Memorial Drive/OR 140 intersection.

Two alternatives for the east side of the interchange address these issues and/or constraints in the most comprehensive manner. The following two alternatives for the eastside were identified. These include:

- Alternative E-1 (Greensprings Drive-Memorial Drive Frontage Road): This alternative will provide at-grade access further to the east to meet applicable access spacing standards necessary to provide safe and efficient operations and minimize the vertical longitudinal grade issue. Figure 2 shows the functional layout of this alternative.
- Alternative E-4 (Greensprings Drive-Memorial Drive Jughandle): This option would provide a jughandle style interchange with grade-separation in the vicinity of the existing Memorial Drive intersection. With the underpass in place, the access on OR 140 in the

location identified in Alternative E-1 would be changed to right-in/right-out movements only. Figure 3 illustrates the functional layout of this alternative.

These two alternatives also provide the potential for a phased implementation approach for the highway to the east of the interchange. Alternative E-1 would address near-term needs, while it can be upgraded to Alternative E-4 when future operational and/or safety demands require improvements at this access point.

Conceptual Cost Estimate

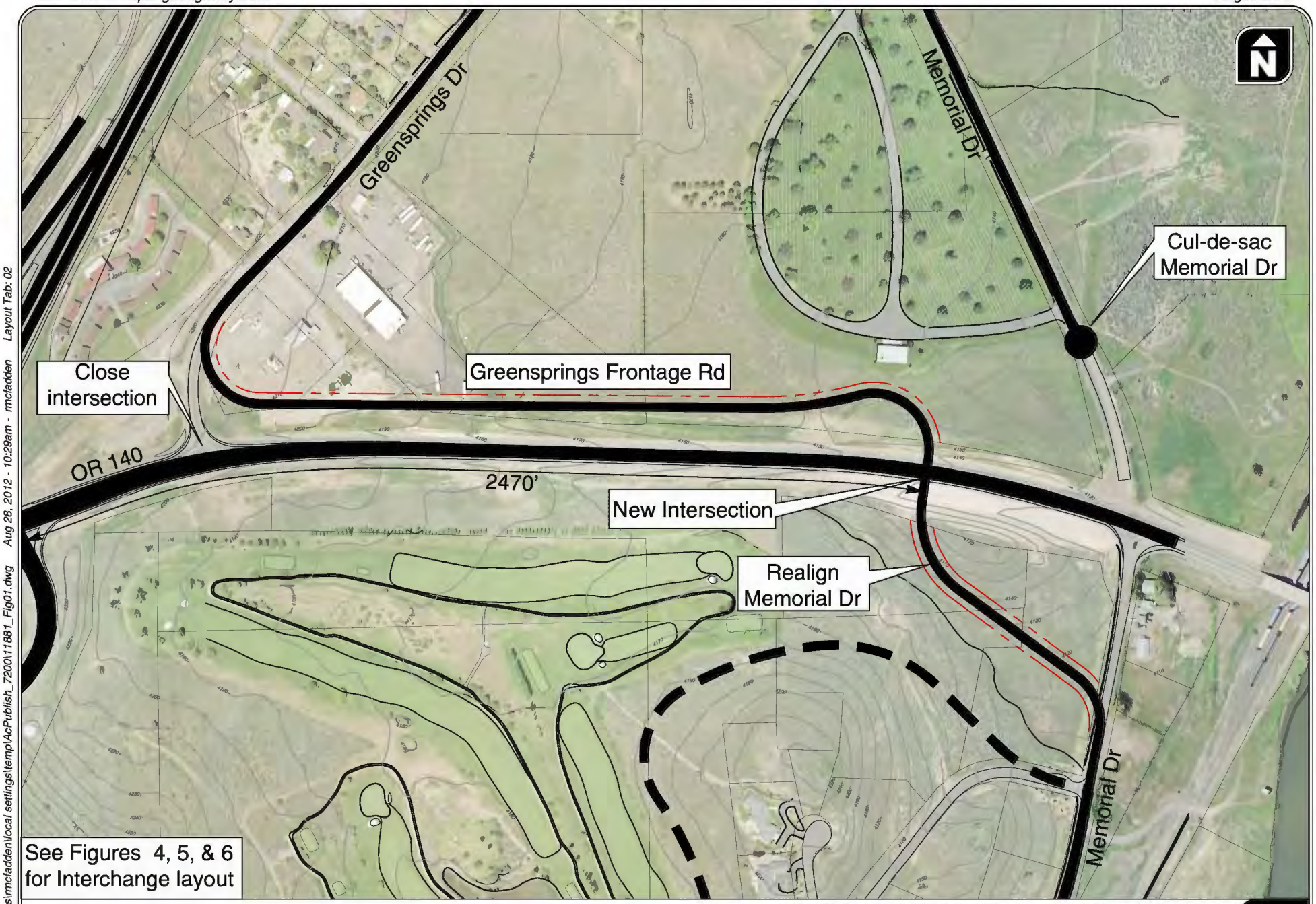
Conceptual cost estimates were developed for Alternatives E-1 and E-4. The estimated project costs including engineering fees, but excluding right-of-way costs for these improvements are approximately $5.3 million and $9.9 million respectively. Additional details are provided in Appendix "C".

This estimate for Alternative E-1 reflects the following major assumptions:

- Realign Greensprings Drive and Memorial Drive to for frontage roads along OR 140.
- Remove existing Greensprings Drive and Memorial Drive intersections on OR 140 due to their associated realignments.
- Widen OR140 for left turn lanes at proposed the Greensprings Drive/Memorial Drive intersection
- Widen OR 140 to provide bike lanes.
- Relocated existing cul-de-sac at end of Memorial Drive north of OR140.

This estimate for Alternative E-4 has the same major assumptions as Alternative E-1 plus the following additional items:

- Construct underpass structure under OR140 and the approaches along Greensprings Drive and Memorial Drive to complete the jughandle configuration.
- Rebuild the new intersection on OR 140 with Memorial Drive-Greenspring Drive to limit access to right-in/right-out movements only.



REVISED ALTERNATIVE E-1: GREENSPRINGS DR - MEMORIAL DR FRONTAGE RD KLAMATH FALLS, OREGON

FIGURE 2

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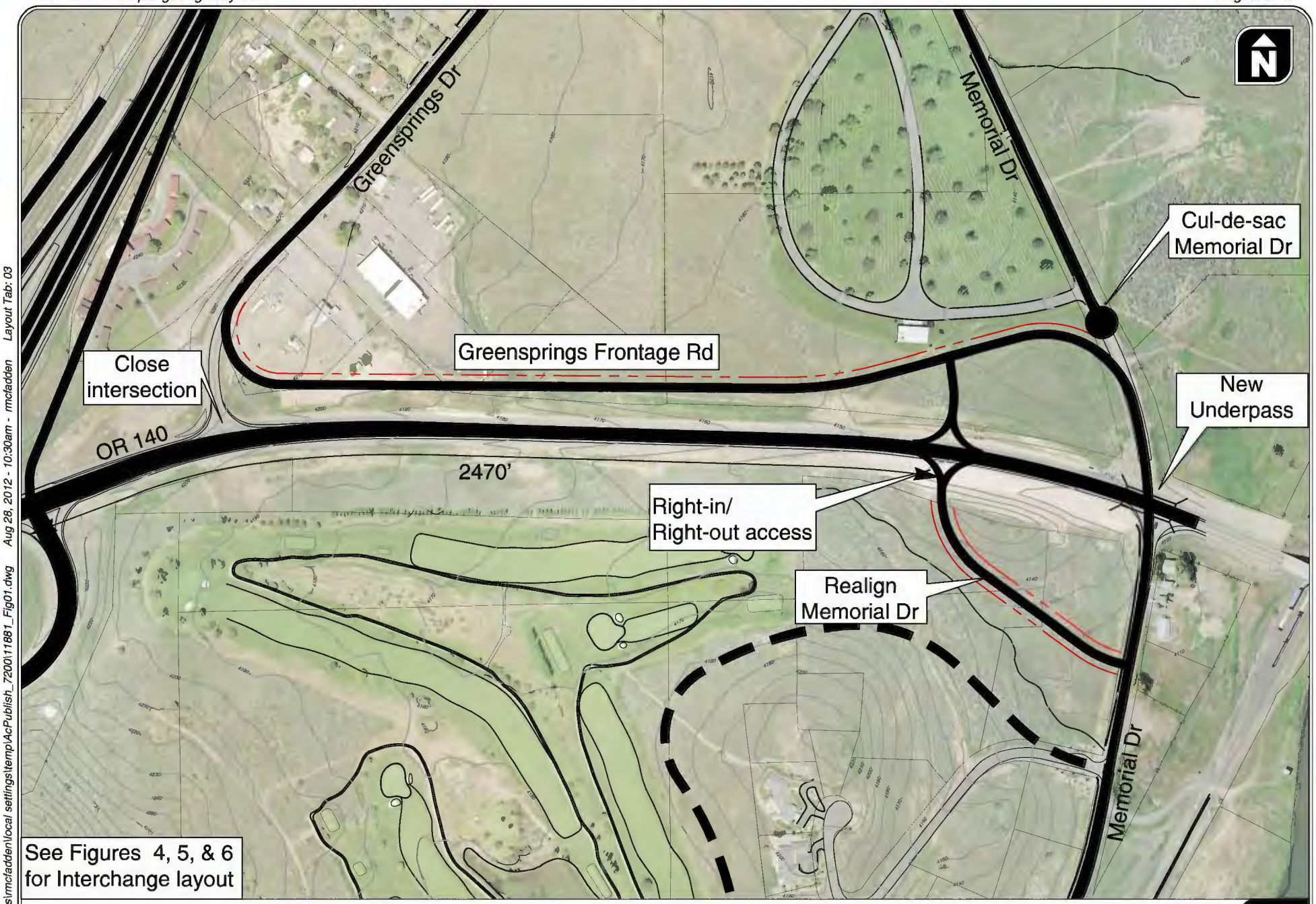

REVISED ALTERNATIVE E-4: GREENSPRINGS DR - MEMORIAL DR JUGHANDLE KLAMATH FALLS, OREGON

FIGURE 3

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Interchange Alternatives

Operational analysis of future conditions revealed that major operational deficiencies are not expected at the interchange during the horizon year. As such, major capacity improvements to the interchange are not considered priorities at this time. Rather, modifications should be focused on improvements to overall interchange safety and the accommodation of US 97 south to OR 140 west demand and vice versa, which is forecasted to be the major vehicle movements in the vicinity of the interchange during the weekday a.m. and p.m. peak hours, respectively.

Based on these priorities, the following improvements to the interchange are proposed without requiring modifications to the existing US 97 overpass structure:

- Alternative I-1 (Improve Existing Interchange): Improvements at the existing interchange entail the realignment of the southbound off-ramp improve the intersection section sight distances, as well as the longitudinal grade and landing area along the ramp. Figure 4 provides the functional layout of this alternative.
- Alternative I-2 (Improve Existing Interchange and Additional Northbound On-ramp): The alternative expands Alternative I-1 by adding a directional westbound to northbound on-ramp eliminating the existing westbound left-turn lane. This improvement would provide enhancements to the interchange that could be phased and implemented over time. With the addition of this ramp, the existing US 97 northbound off-ramp connecting Greensprings Drive across of Memorial Drive should be removed. Figure 5 illustrates the functional layout of this alternative.
- Alternative I-5 (Diverging Diamond Interchange [DDI]): The new interchange form provides additional capacity while maintaining the existing US 97 overpass structure, but will require the realignment of the OR 140 approaches to provide appropriate intersection geometries for the switch overs. Figure 6 shows the functional layout of this interchange.

Again, these three interchange alternatives provide the potential for a phased implementation plan:

- Phase 1: Alternative I-1 would address existing safety issues.
- Phase 2: Alternative I-2 provides additional capacity at the northbound ramp terminal.
- Phase 3: Alternative E-5 increases interchange capacity.

The conventional on- and off-ramps would be the same for all these alternatives, minimizing major construction costs for the improvements.

Conceptual Cost Estimate

Conceptual cost estimates were developed for Alternatives I-1, I-2, and I-5. The estimated project costs including engineering fees, but excluding right-of-way costs for these improvements are approximately $5.7 million, $7.5 million, and $12.8 million respectively. Additional details are provided in Appendix "D".

This estimate for Alternative I-1 reflects the following major assumptions:

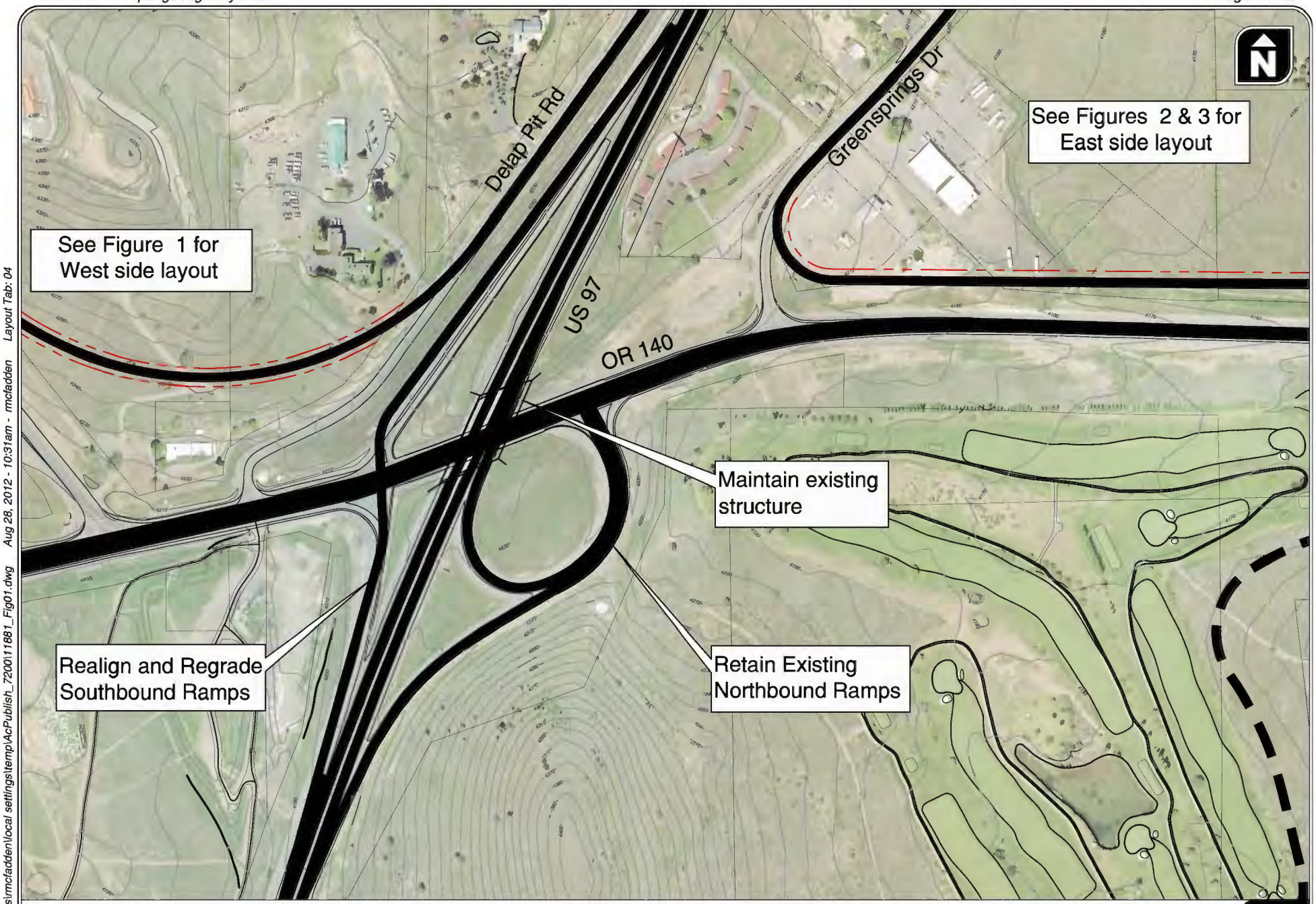
- Realign southbound off- and on-ramps to improve intersection angle and longitudinal grade.
- Widen OR 140 to provide bike lanes and sidewalks along both sides.
- Install a retaining wall along southbound off-ramp that is parallel with Delap Pit Road due to topography.

This estimate for Alternative I-2 has the same major assumptions as Alternative I-1 plus the following additional items:

- Build additional northbound on-ramp in northeast quadrant of the interchange.
- Install retaining wall along east side of new northbound on-ramp.
- Remove existing northbound off-ramp serving Greensprings Drive.

This estimate for Alternative I-5 reflects the following major assumptions:

- Realign southbound off- and on-ramps to improve intersection angle and longitudinal grade.
- Remove existing northbound loop on-ramp and rebuild US 97 northbound off-ramp.
- Construct northbound on-ramp and associated retaining wall in northeast quadrant of the interchange.
- Widen OR 140 to provide bike lanes and sidewalks along both sides.
- Rebuild OR 140 underneath the existing US 97 overpass into a diverging diamond interchange configuration with bike lanes and sidewalks.
- Install two new signals at the DDI ramp terminal intersections.



ALTERNATIVE I-1: IMPROVE EXISTING INTERCHANGE
KLAMATH FALLS, OREGON

FIGURE 4

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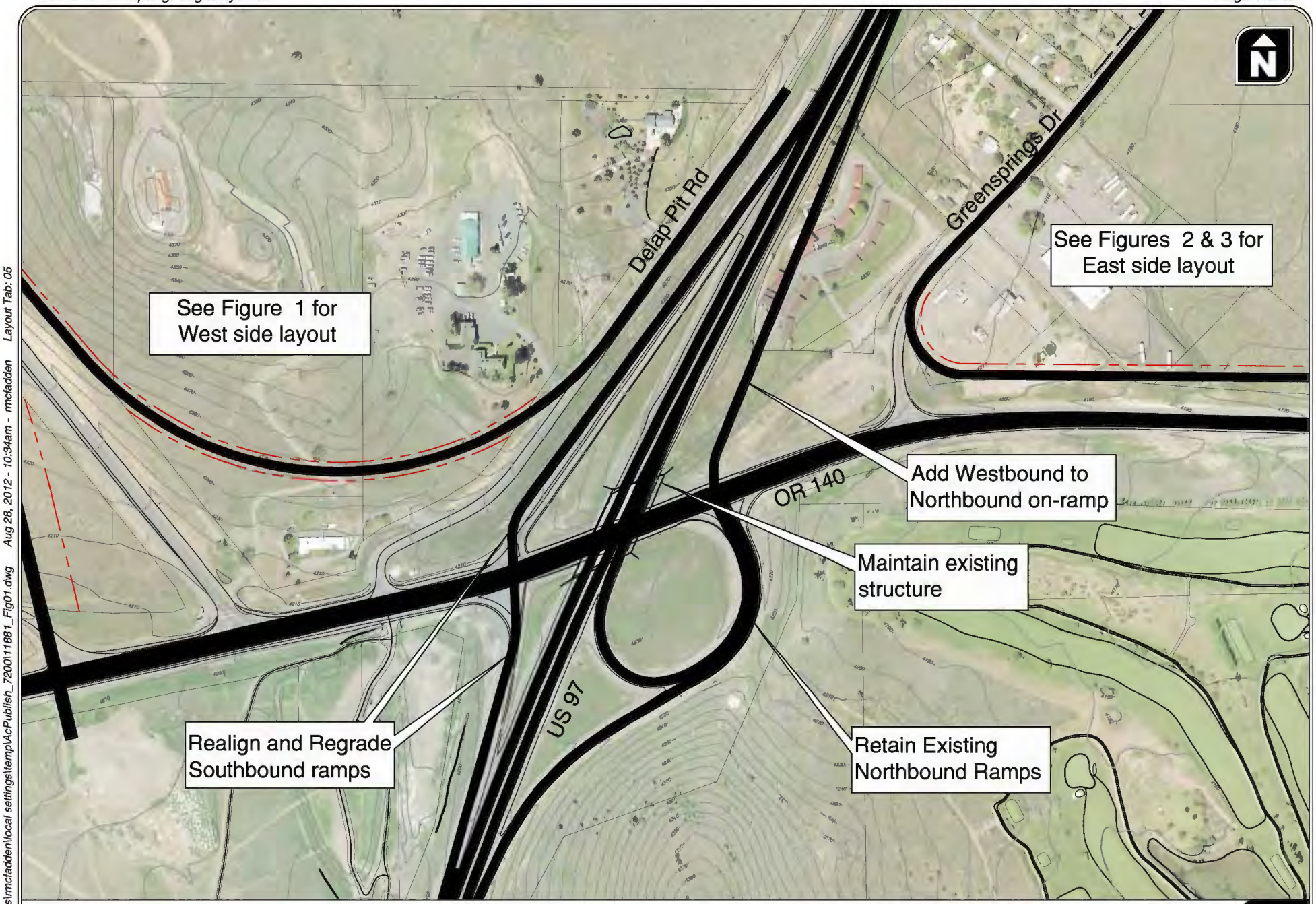

REVISED ALTERNATIVE I-2: ADD US 97 NB ON-RAMP IN NE QUADRANT & IMPROVE EXISTING INTERCHANGE KLAMATH FALLS, OREGON

FIGURE 5

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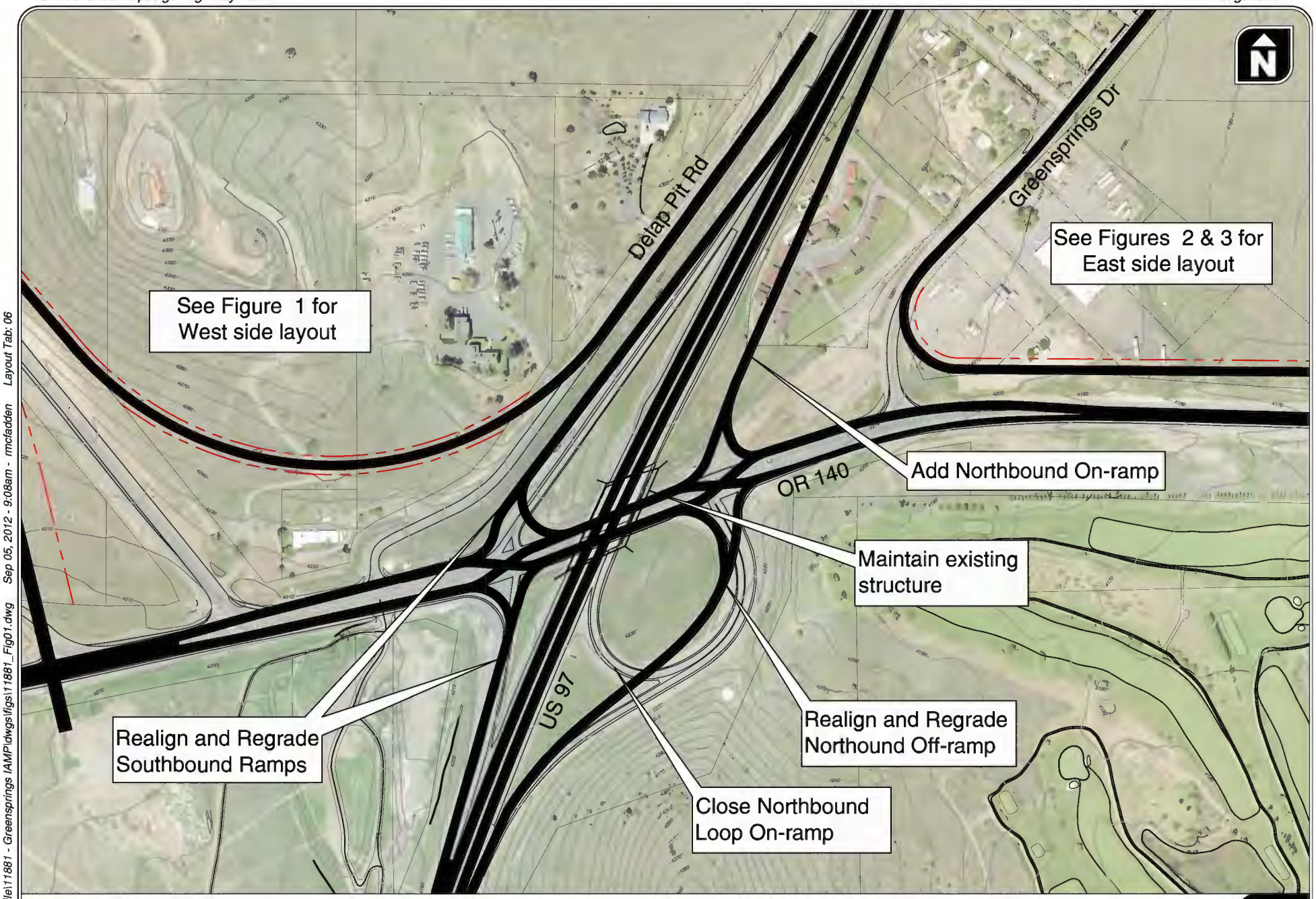

ALTERNATIVE I-5: DIVERGING DIAMOND INTERCHANGE
KLAMATH FALLS, OREGON

FIGURE 6

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Improvements Along US 97

During the evaluation of the transportation system the following two access points were identified as potential issues.

- Second northbound off-ramp to the north of the existing interchange
- Reames Country Club access point to the south of the existing interchange

Second Northbound Off-ramp

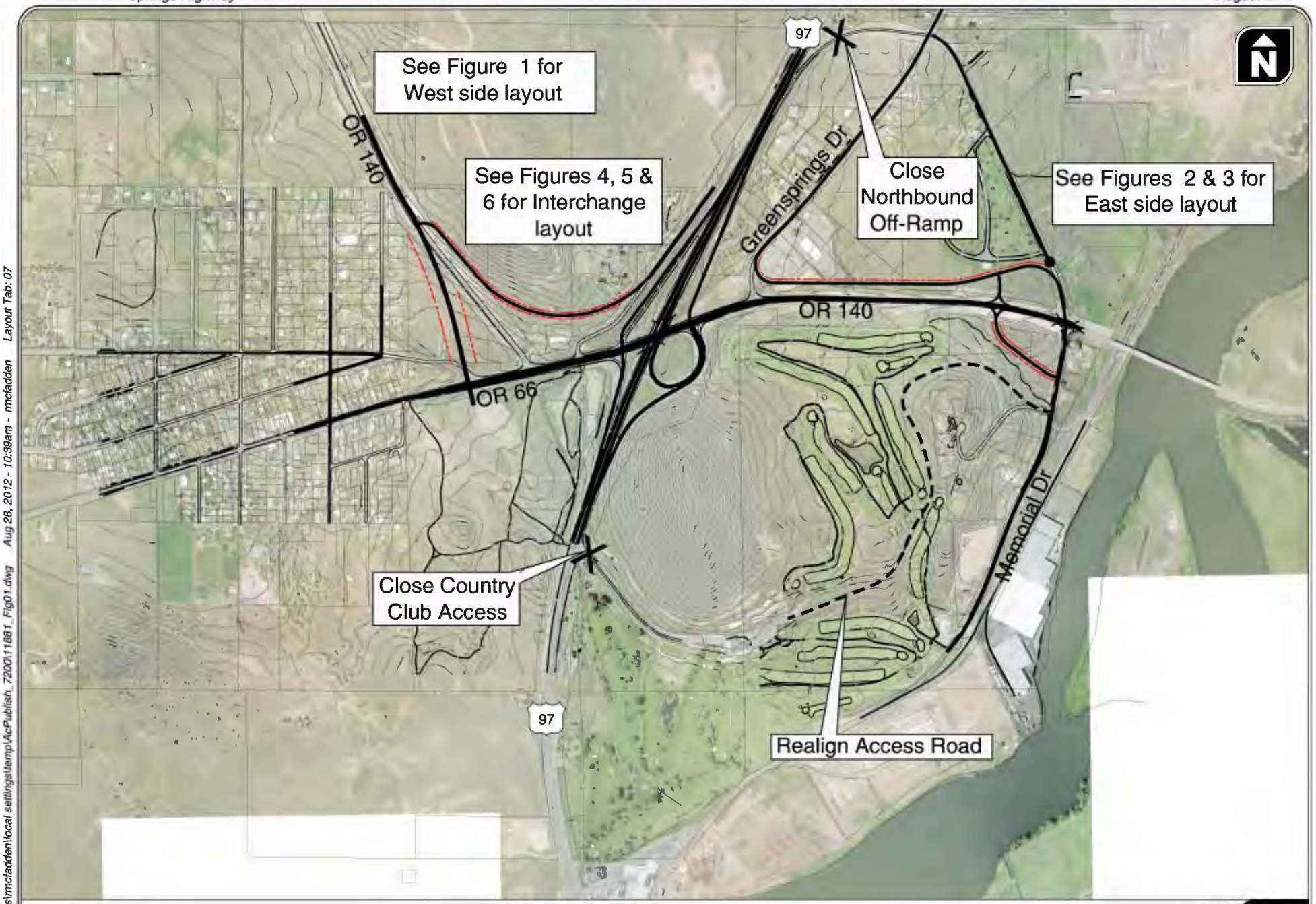
The need of this second low-volume northbound off-ramp is not required from an operational point of view and rerouted traffic can be accommodated at the interchange. Access to the northeast quadrant of the interchange is limited and the timing of the recommended closure should be considered from a transportation system point of view. Therefore, the implementation of the improvements proposed on the eastside of the interchange should be in place prior to the closure of this secondary on-ramp.

Reames Country Club Access

The proximity of this access in relation to the southbound on-ramp and northbound off-ramp has operational and safety issues. Three options are being considered to accommodate access to Reames Country Club due to the closure of the existing access.

- Option #1: A new approximately ¼-mile connection can be provided from the clubhouse parking lot through the golf course to Memorial Drive which will likely require modifications to a few holes on the golf course. With the implementation of the proposed improvements on the east side of the interchange, the existing US 97 access can be closed and/or converted to a right-in/right-out with full access to Memorial Drive. .
- Option #2: An approximately ½-mile frontage road can be provided from the existing access along the east of US 97 to the south up to the existing industrial access approximately 970 feet north of the Lake Ewauna/railroad Bridge.
- Option #3: An approximately one mile frontage road can be provided from the existing access along the east of US 97 to the north along the northbound off-ramp and then following the south side of OR 140 to connect with the proposed Memorial Drive frontage road access.

At the PT Meeting #5, a revised option (see Figure 7) was discussed with the Reames Country Club representative that connects the existing parking lot through the golf course to Memorial Drive. Figure 7 shows the transportation system with the closure of the second northbound off-ramp and the relocation of the Reames Country Club Access to Memorial Drive.



PROPOSED CLOSURES ALONG US 97
KLAMATH FALLS, OREGON

FIGURE 7

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EVALUATION OF ALTERNATIVES

There are one west side alternative, three interchange alternatives, and two east side alternatives from which six potential transportation system improvements (combinations of alternatives) can be developed in the vicinity of the existing US 97/OR 140 interchange. Therefore, three interchange system scenarios were identified for more detailed evaluation.

The purpose of these analyses is to show how the alternatives could be combined and implemented together. These alternatives could be modified as necessary to accommodate the needs of local property owners and agencies.

Table 3 shows the three scenarios evaluated based on the west area, east area, and interchange form alternatives considered.

Table 3 Detailed Evaluation Scenarios

<table>
<tr><th>Evaluation Scenario</th><th>Westside Alternative</th><th>Interchange Alternative</th><th>Eastside Alternative</th></tr>
<tr><td>Scenario #1</td><td rowspan="3">Alternative W-1:

Retain OR 66 as the through movement

Relocate OR 140/OR 66 intersection to the west

Disconnect Balsam Drive

Realign Delap Pit Road to connect to OR 140</td><td>Alternative I-1:

Construct improvements to the existing interchange, including:

• Realign southbound off-ramp
•</td><td>Alternative E-1:

Relocate existing Greenspring Drive and Memorial Drive access points and provide access via frontage roads.

Placement should meet applicable access spacing standards and adequately account for vertical curve impacts.</td></tr>
<tr><td>Scenario #2</td><td>Alternative I-2:

Construct improvements identified in Scenario 1.

Construct additional northbound on-ramp in the northeast quadrant.</td><td rowspan="2">Alternative E-4:

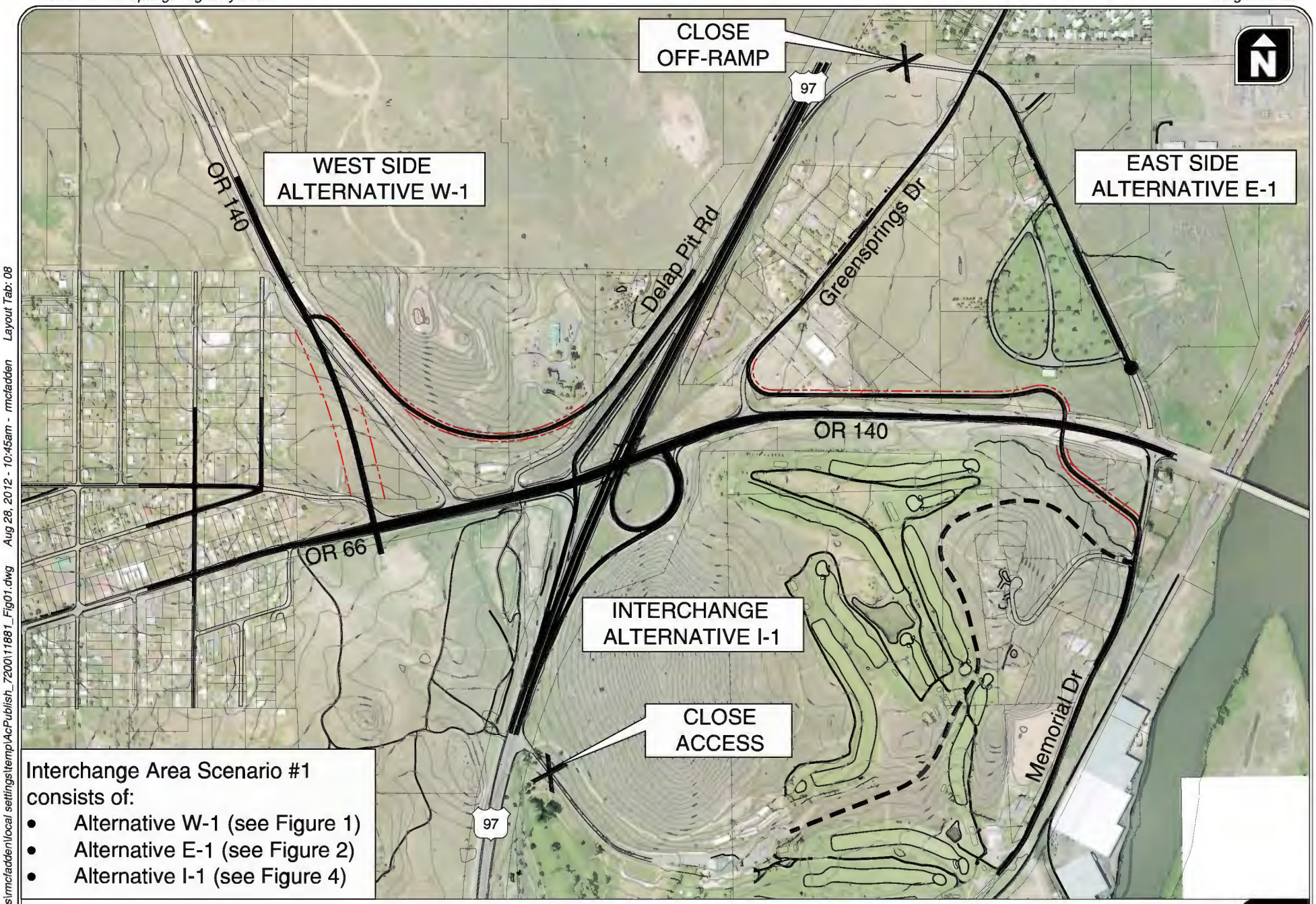
Construct a jughandle interchange at the location of the existing Memorial Drive/OR 140 intersection.

Disconnect Greensprings Drive/OR 140 and provide frontage road access to jughandle interchange.</td></tr>
<tr><td>Scenario #3</td><td>Alternative I-5:

Construct a diverging diamond interchange</td></tr>
</table>

These scenarios are displayed in Figure 8, Figure 9, and Figure 10, respectively.

As stated, the alternatives for the subareas were developed so they can be implemented in phases as the traffic demand increases, as well as with the development and/or redevelopment of properties.



Interchange Area Scenario #1 consists of:

- Alternative W-1 (see Figure 1)
- Alternative E-1 (see Figure 2)
- Alternative I-1 (see Figure 4)

INTERCHANGE AREA SCENARIO #1
KLAMATH FALLS, OREGON

FIGURE **8**

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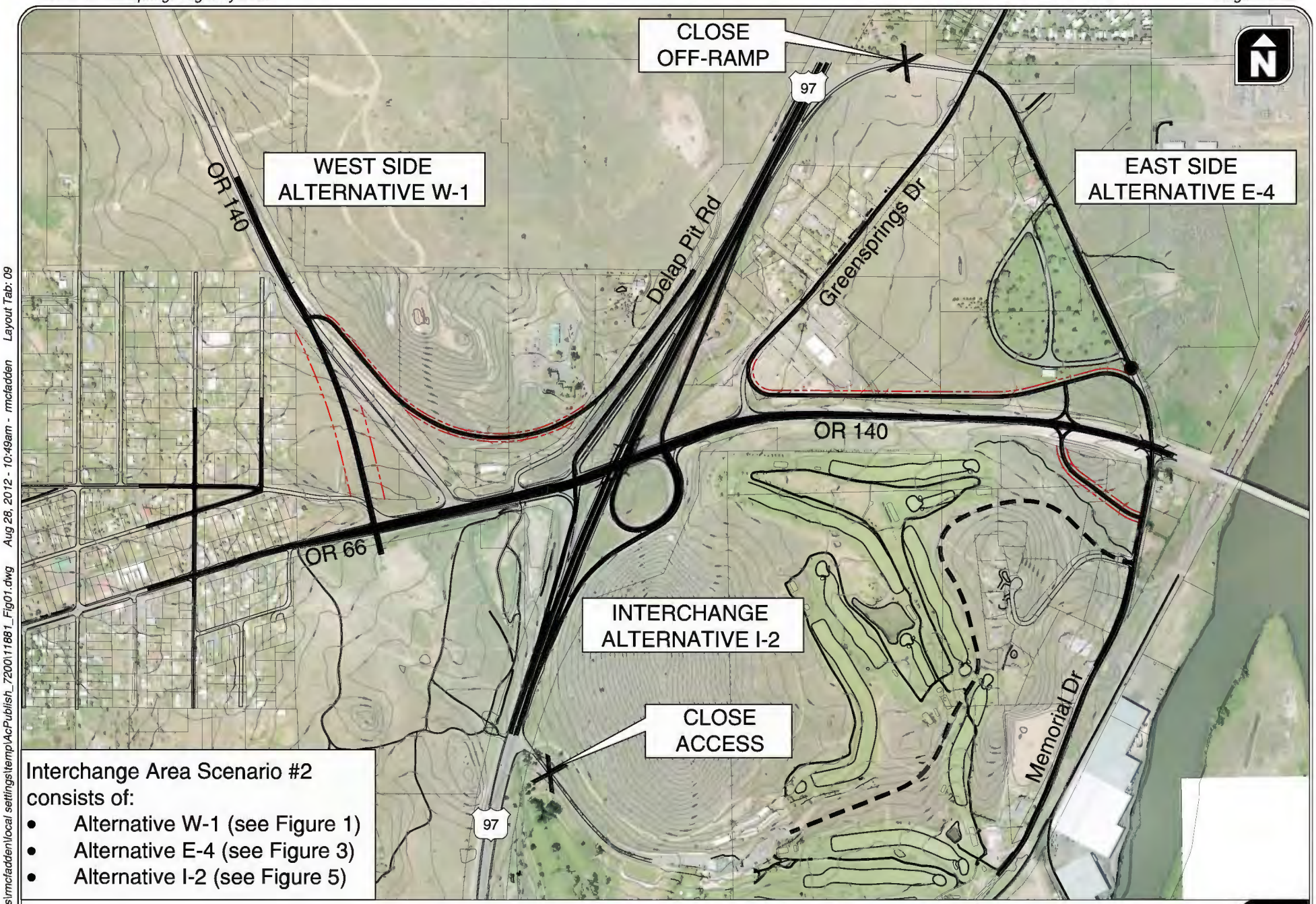

Interchange Area Scenario #2 consists of:

- Alternative W-1 (see Figure 1)
- Alternative E-4 (see Figure 3)
- Alternative I-2 (see Figure 5)

INTERCHANGE AREA SCENARIO #2
KLAMATH FALLS, OREGON

FIGURE
9

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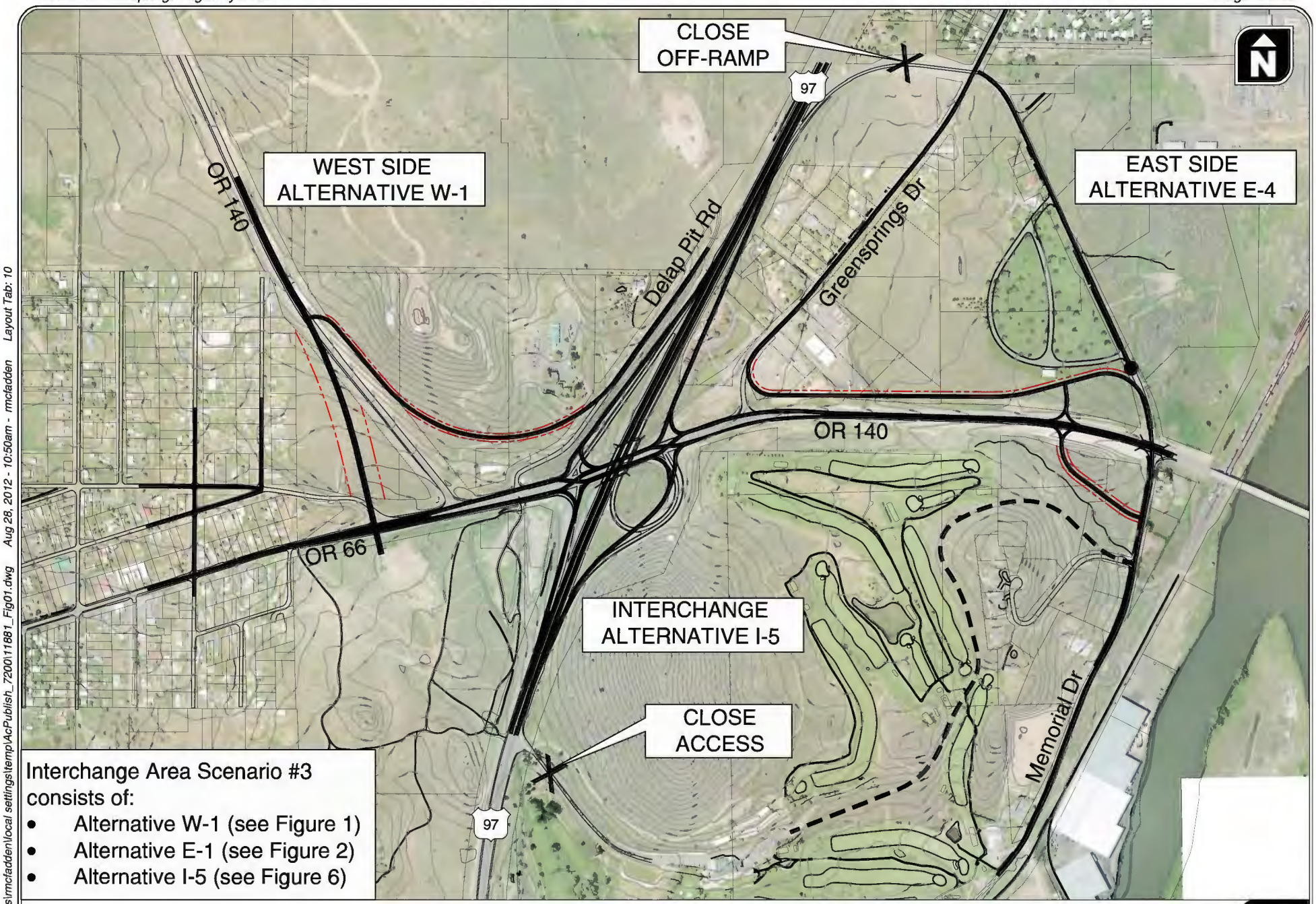

Interchange Area Scenario #3 consists of:

- Alternative W-1 (see Figure 1)
- Alternative E-1 (see Figure 2)
- Alternative I-5 (see Figure 6)

INTERCHANGE AREA SCENARIO #3
KLAMATH FALLS, OREGON

FIGURE **10**

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Intersection Control Alternatives

The interchange area scenarios are compatible with different types of intersection control. For the purposes of this analysis, the installation or construction of traffic signals or roundabouts was evaluated. In all cases, traffic control treatments should be constructed when warranted by safety issues, operational demand, and system needs.

Improvements/Notes for All Scenarios:

Several transportation system impacts would not change based on the traffic control identified for spot intersection improvements. These include the following:

- Emerald Street/OR 66 would likely become the main access point for vehicles previously utilizing Balsam Drive (which is proposed to be closed at OR 140). With additional traffic, the Emerald Street/OR 66 intersection would operate acceptably as side-street stop-controlled.
- Delap Pit Road would operate acceptably as a side-street stop controlled intersection at its new alignment on OR 140.

Signalized Intersection Control

The described scenarios were analyzed based on the assumption that signalized intersections would be installed where additional traffic control is needed. Below is a description of the resulting improvements to the transportation system by scenario.

All Scenarios:

- OR 140/OR 66 would require the addition of a dedicated right-turn lane with overlap phasing in the westbound direction to accommodate future demand. This intersection is controlled by a traffic signal today.
- US 97/OR 140 Southbound Ramp Terminal would require a traffic signal to be installed and dual right-turn lanes in the southbound direction. Given the heavy traffic demand, the dedicated right turn lane proposed at the OR 140/OR 66 intersection should start immediately to the west of the ramp terminal. This would result in a weaving section, but since the two intersections are approximately ¼ mile apart, and the majority of the traffic is making this movement, the weave should not present major safety issues.

Exhibit 15 OR 140 between SB Ramp and OR140 Intersection

Scenario #1:

- US 97/OR 140 Northbound Ramp Terminal would continue to operate acceptably as a side-street stop controlled intersection.
- The new Greenspring Drive-Memorial Drive/OR 140 intersection (created from the realignment of Greensprings Drive and Memorial Drive [frontage roads]) may require the installation of a traffic signal. Additional turning lanes may be necessary to promote efficient signal operations.

Scenario #2:

- US 97/OR 140 Northbound Ramp Terminal would experience minor delay with the addition of the northbound directional on-ramp. This intersection would remain functional as side-street stop-controlled.
- The jughandle interchange would operate with excess capacity under future conditions. The right-in/right-out connections with OR 140 would operate acceptably as side-street stop-controlled intersections. The benefits of this improvement would be most profound related to maintaining the existing expressway designation along OR 140 and providing acceleration areas for heavy vehicles traveling up the grade to the west.

Scenario #3:

- The diverging diamond interchange configuration would provide ample opportunity for travel demand growth beyond the forecast year.
- The rest of the intersections would operate similarly to those in Scenarios #1 and #2.

Roundabout Control

The described scenarios were analyzed based on the assumption that roundabout intersections would be installed where additional traffic control is needed. Below is a description of the resulting improvements to the transportation system by scenario.

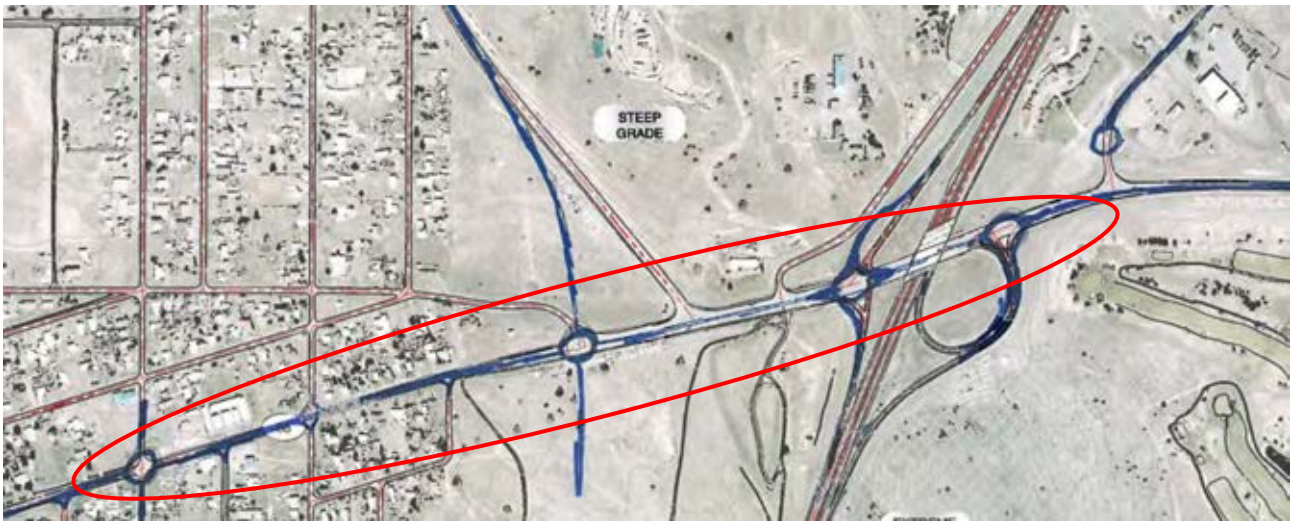


Exhibit 16 A series of roundabouts along OR 140

All Scenarios:

- OR 140/OR 66 would be designed with two through lanes in the westbound and eastbound directions, consistent with the cross section of OR 140/OR 66 today. The southbound approach would be single lane. With this configuration, the intersection would operate acceptably.
- US 97/OR 140 Southbound Ramp Terminal would require a dedicated right-turn lane southbound. All other approaches could be single lane from an operational standpoint, but would be designed with two through lanes westbound and eastbound to match the existing cross section of OR 140.

Scenario #1:

- US 97/OR 140 Northbound Ramp Terminal would continue to operate acceptably as a side-street stop controlled intersection.
- The new Greenspring Drive/Memorial Drive/OR 140 intersection (created from a realignment of Greensprings Drive and Memorial Drive) would require the installation of a roundabout. This location would operate acceptably with two through lanes in the westbound direction, which is consistent with the existing OR 140 cross section in the vicinity of the interchange, and single lane approach on all other legs.

Scenario #2:

- US 97/OR 140 Northbound Ramp Terminal would experience minor delay with the addition of the northbound directional on-ramp. This intersection would remain functional as side-street stop-controlled.
- The jughandle interchange would operate with excess capacity under future conditions. The right-in/right-out connections on OR 140 would operate acceptably as side-street stop-controlled intersections. The benefits of this improvement would be most profound related to maintaining the existing expressway designation along OR 140 and providing acceleration areas for heavy vehicles traveling up the grade to the west.

Scenario #3:

- The diverging diamond interchange configuration would provide ample opportunity for travel demand growth beyond the forecast year. However, the ramp terminals will not be able to function as roundabouts due to the switching of traffic for a DDI.
- The rest of the intersections would operate similarly to those in Scenarios #1 and #2.

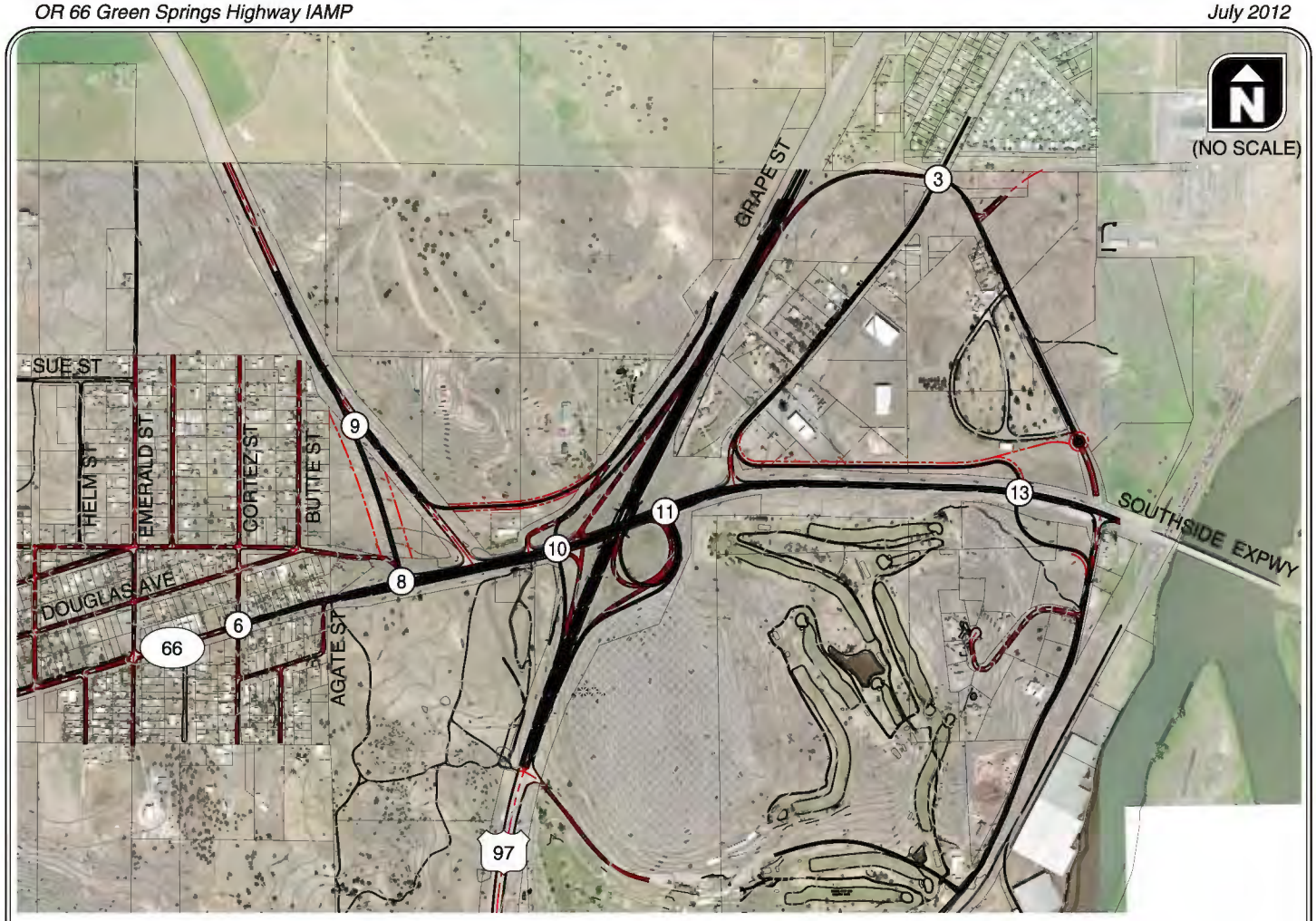
Intersection Control Summary

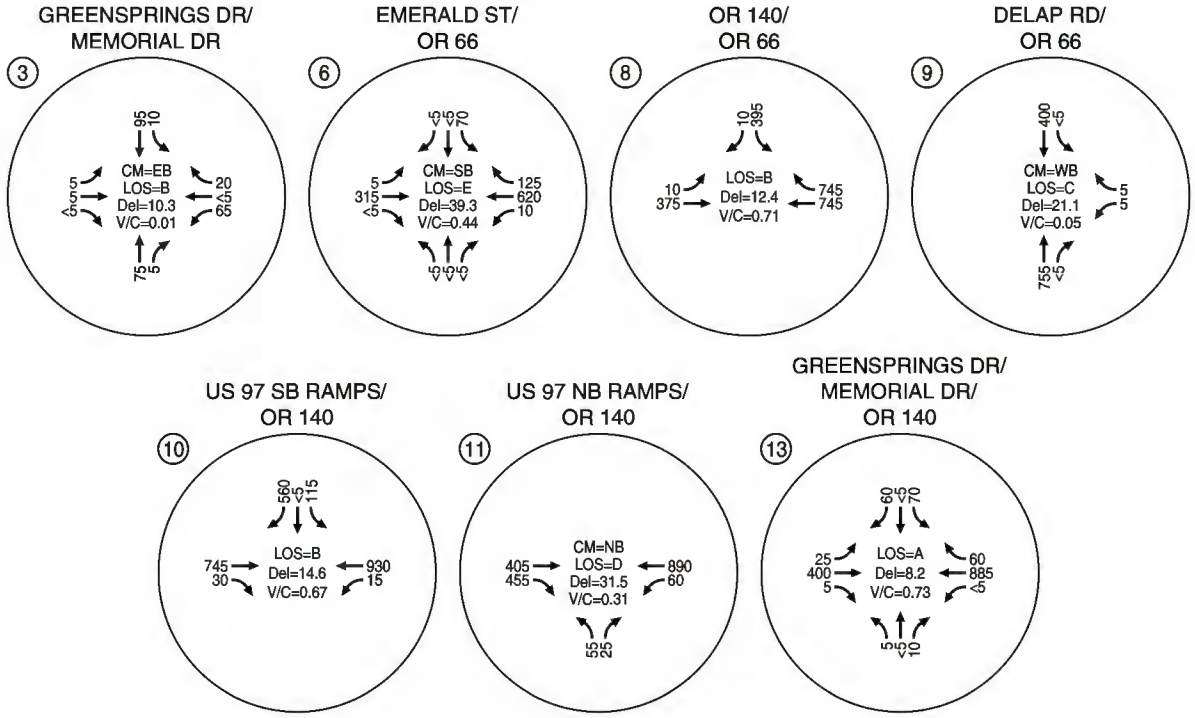
For comparison purposes, the traffic operations results for roundabout and signalized options under Scenario #1, shown in Figure 8 and described previously, are shown in Table 4. Comments are provided related to the configuration of each intersection under each control option.

Table 4 Scenario #1 Intersection Control Comparison

Intersection	Signalized Control		Roundabout Control		Comments
	Delay/LOS	v/c	Delay/LOS	v/c	
8. OR 140/OR 66	12.4/B (Overall)	0.71 (Overall)	16.2/C (East leg)	0.75 (East leg)	Signal: Dedicated WB right-turn lane Roundabout: Two through lanes east/west
10. US 97 SB Ramps/OR 140	14.6/B (Overall)	0.67 (Overall)	10.2/B (West leg)	0.48 (West leg)	Signal: Carry additional westbound lane to OR 140/OR 66 Roundabout: Two through lanes east/west Would require channelized SB right-turn lane.
11. US 97 NB Ramps/OR 140	31.5/D (south leg)	0.31 (south leg)	10.5/B (East leg)	0.54 (East leg)	Signal: Would not require signalization Roundabout: Two through lanes westbound
13 Greensprings Drive/Memorial Drive/OR 140	8.2/A (Overall)	0.73 (Overall)	9.4/A (East leg)	0.50 (East leg)	Signal: Combined intersection. Would likely require dedicated left-turn lanes on mainline, at a minimum. Roundabout: Two through lanes westbound

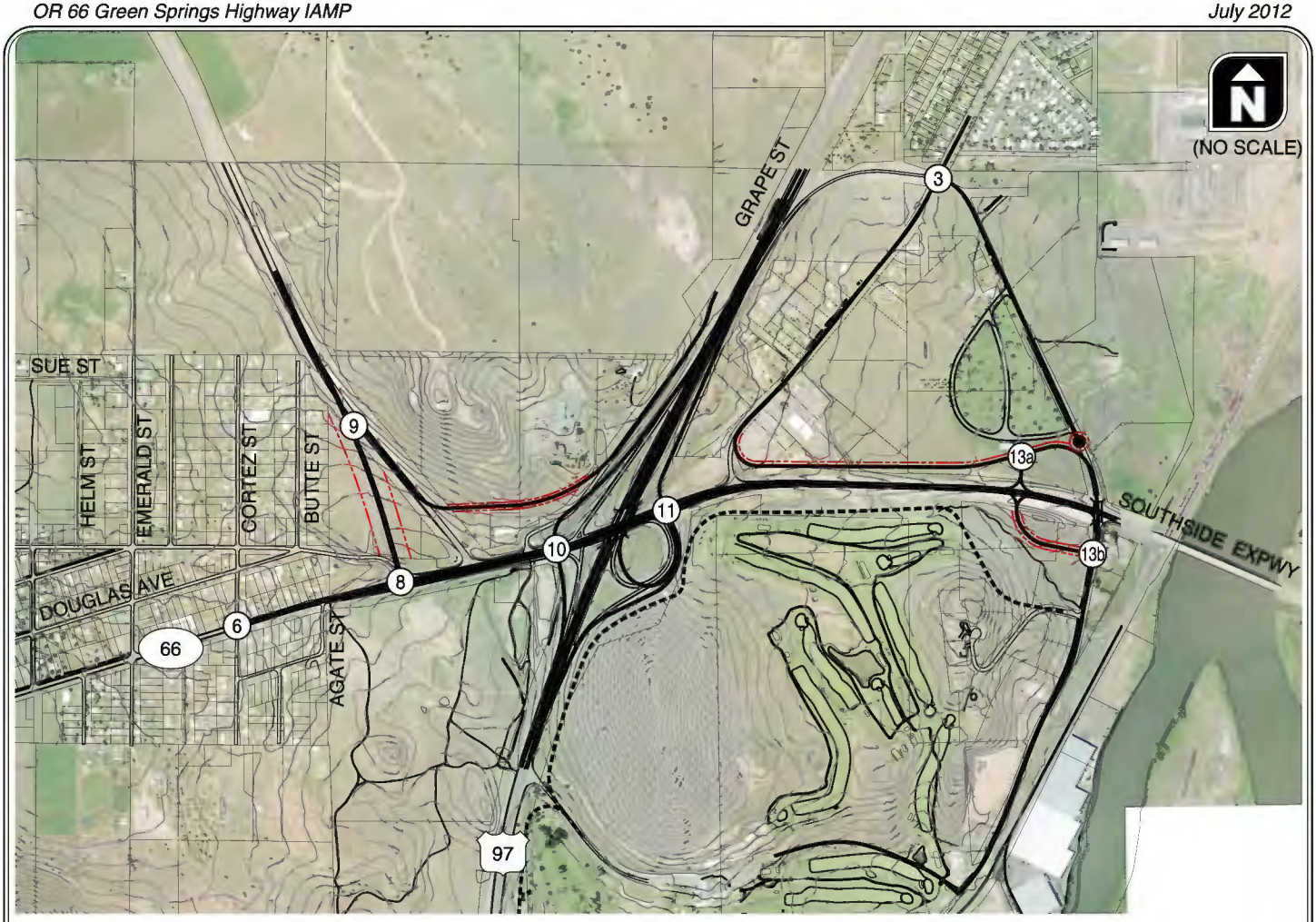
A complete summary of the traffic operations for the three scenarios and the respective traffic operations results are summarized in Figure 11, Figure 12, and Figure 13, respectively. These operational results assumed signalized intersection control, where necessary.

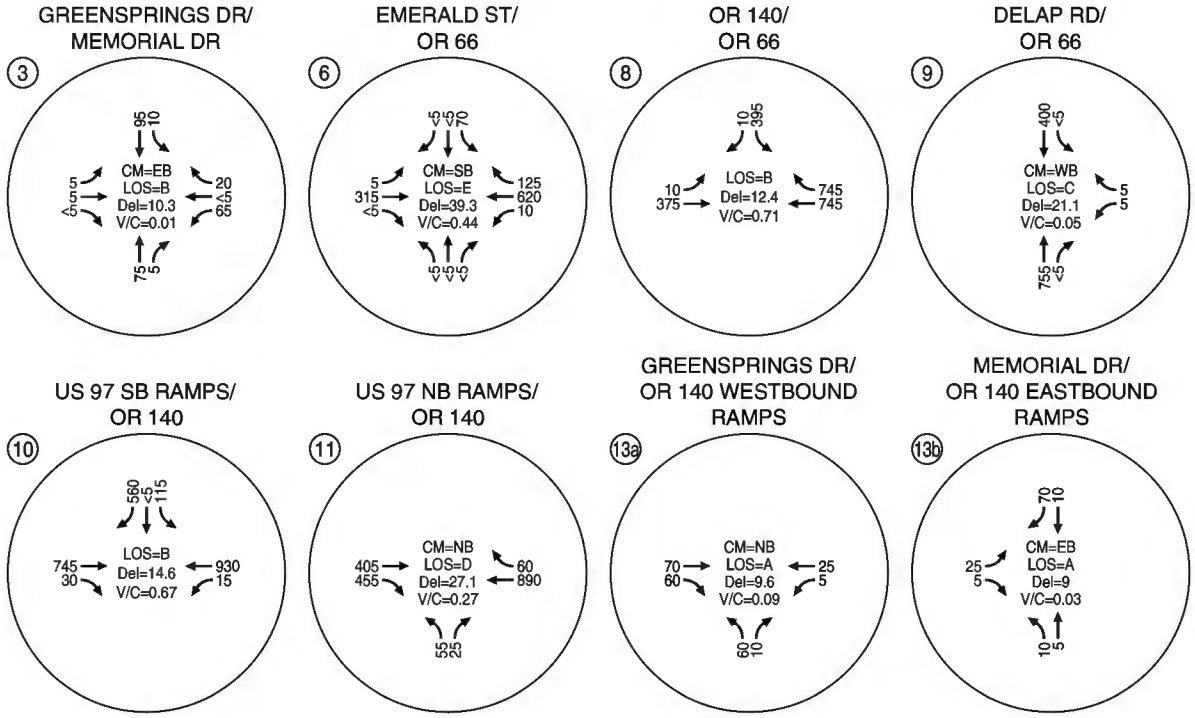




INTERCHANGE AREA SCENARIO #1
KLAMATH FALLS, OREGON

FIGURE **11**





INTERCHANGE AREA SCENARIO #2
KLAMATH FALLS, OREGON

FIGURE **12**

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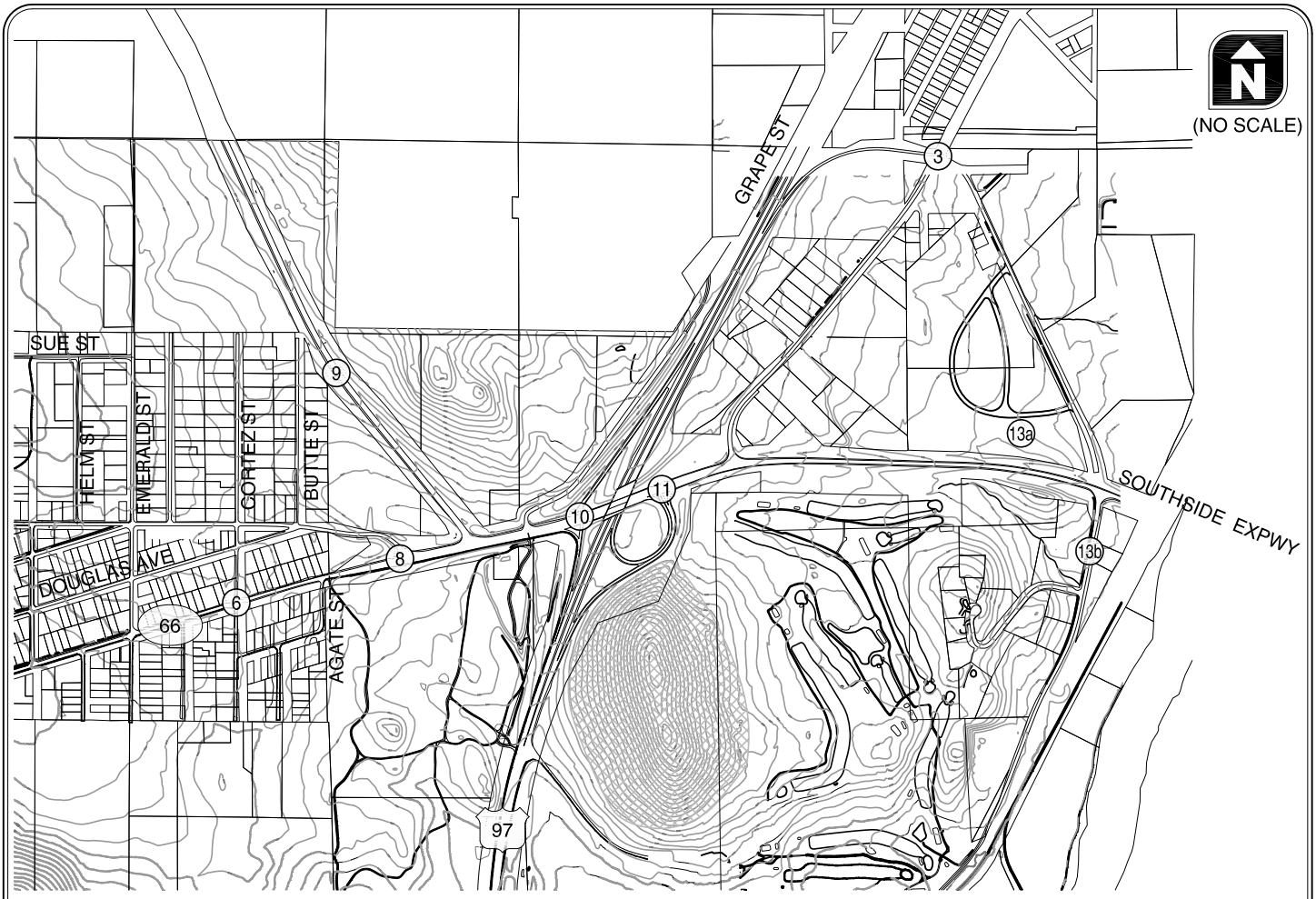

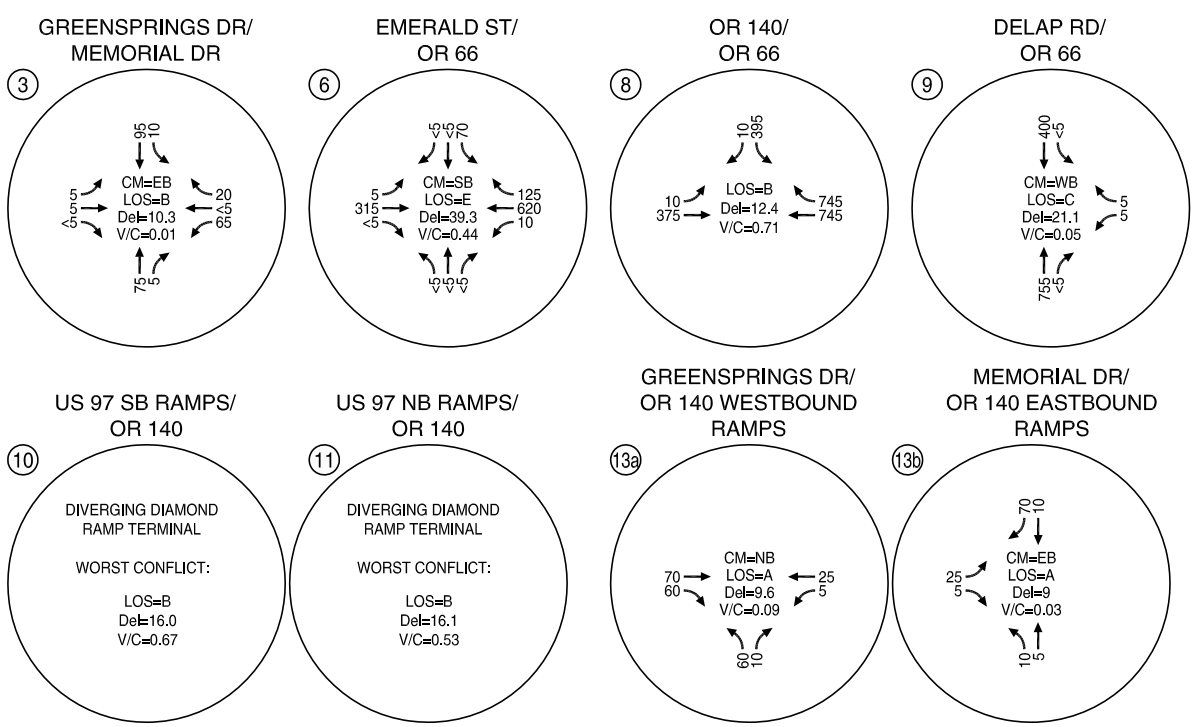

INTERCHANGE AREA SCENARIO #3
KLAMATH FALLS, OREGON

FIGURE 13

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Appendix A
Detailed Concept Review

This section details the quantitative analysis conducted to evaluate the concepts presented within this memorandum.

WEST SIDE CONCEPTS

Concept W-1: Realign OR 140

Transportation Operations (+1)

Concept would result in a roadway alignment that is well suited to serve future travel demand, but would retain connections to OR 140 (Balsam Drive and Delap Pit Road) that may cause slightly deteriorated transportation operations in the future.

Multimodal Accessibility (0)

Retaining the existing alignment of the highway does not enhance or degrade the ability for pedestrians, bicycles, or transit to navigate the transportation network in the area.

Land Use (+1)

This alignment would have limited right-of-way impacts and impacts to nearby land uses.

Economic Development (+1)

This configuration would improve roadway operations by providing more access spacing and retain the ability for adjacent properties to easily develop in the future.

Environmental, Social, and Equity factors (0)

This concept would have minimal impacts to environmental, social, or equity factors.

Accessibility and Connectivity (+2)

Access spacing along OR 140 would be improved and access to developed and undeveloped properties would not be compromised.

Cost (+1)

This configuration would require the realignment of Delap Pit Road and Balsam Drive, but not the reorientation of OR 140.

Implementation (+1)

The project could be constructed in phases and would have minimal impacts to local users during construction.

Concept W-2: Align OR 140 with OR 140 East of Interchange

Transportation Operations (-1)

The concept would result in a roadway alignment that is not well suited to serve future travel demand along the highways or into proposed development lands.

Multimodal Accessibility (0)

The realignment of the highway does not enhance or degrade the ability for pedestrians, bicycles, or transit to navigate the transportation network in the area.

Land Use (0)

The realignment of OR 140 would cause some impacts to adjacent land uses, but would also make additional lands available be vacating the existing alignment.

Economic Development (-1)

Access to adjacent properties could be complicated by this configuration.

Environmental, Social, and Equity factors (0)

This concept would have minimal impacts to environmental, social, or equity factors.

Accessibility and Connectivity (0)

This concept would likely be the most expensive west side alternative due to significant realignment

Cost (+1)

This concept would likely be the most expensive west side alternative due to the large realignment effort that would be required.

Implementation (-2)

Construction of this alignment would redefine the existing transportation system making near term improvements likely “throw away” when this alternative was ultimately constructed.

Concept W-3: Realign OR 140 and Disconnect Balsam and Delap Pit Road

Transportation Operations (+2)

Concept would result in a roadway alignment that is well suited to serve future travel demand, but eliminate the Balsam Drive connection retain in Concept W-1, improving future transportation operations.

Multimodal Accessibility (0)

Retaining the existing alignment of the highway does not enhance or degrade the ability for pedestrians, bicycles, or transit to navigate the transportation network in the area.

Land Use (+1)

This alignment would have limited right-of-way impacts and/or impacts to nearby land uses.

Economic Development (+1)

This configuration would improve roadway operations by providing more access spacing and retain the ability for adjacent properties to develop in the future.

Environmental, Social, and Equity factors (0)

This concept would have minimal impacts to environmental, social, or equity factors.

Accessibility and Connectivity (+1)

Access spacing along OR 140 would be improved and access to developed and undeveloped properties would not be compromised. The removal of Balsam Drive would result in less local street connectivity, but would likely be an overall benefit to the area wide transportation system.

Cost (+2)

This configuration would require the realignment of Delap Pit Road, but not the reorientation of OR 140.

Implementation (+2)

The project could be constructed in phases and would have minimal impacts to local users during construction.

EAST SIDE CONCEPTS

Concept E-1: Greensprings Drive-Memorial Drive Frontage Road

Transportation Operations (+1)

This concept would consolidate access locations along OR 140, improving operations and access spacing, but would retain an at-grade intersection which is inconsistent with the expressway designation of the section of highway.

Multimodal Accessibility (+1)

This concept would provide an improved access point along the highway for pedestrians and bicyclists, but would still require an at-grade crossing movement for these users.

Land Use (+1)

Relatively direct access would be provided to existing businesses, particularly those along Greensprings Drive.

Economic Development (+1)

This concept would retain accessibility to a number of existing businesses as well as future developable lands.

Environmental, Social, and Equity factors (-1)

The realignment of Greensprings Drive and Memorial Drive would result in longer roadway connections and, thus, increased environmental impacts.

Accessibility and Connectivity (+1)

This concept would increase access to the northern extent of Memorial Drive (currently closed at OR 140) and provide a direct north-south connection from Memorial Drive and Greensprings Drive.

Cost (+1)

The construction of frontage roads and a new at-grade intersection would be relatively inexpensive compared to other alternatives considered.

Implementation (+2)

This concept could be phased in its implementation by constructing the north and south leg separately.

Concept E-2: Realign Greensprings Drive

Transportation Operations (0)

This concept would consolidate access locations along OR 140, but it would place the new intersection on the existing longitudinal grade, potentially resulting in safety and/or operational issues.

Multimodal Accessibility (+1)

This concept would provide an improved access point along the highway for pedestrians and bicyclists, but would still require an at-grade crossing movement for these users.

Land Use (-1)

Access to the existing businesses along Memorial Drive and Greensprings Drive would be indirect compared to existing configurations and other concepts presented.

Economic Development (-2)

Access to existing business and developable lands would be indirect, potentially reducing the desirability to development lands in the area.

Environmental, Social, and Equity factors (-1)

The realignment of Greensprings Drive and Memorial Drive would result in longer roadway connections and, thus, increased environmental impacts.

Accessibility and Connectivity (-1)

This concept provides a direct north-south connection from Memorial Drive and Greensprings Drive, but would make the existing Greensprings Drive and Memorial Drive alignments less accessible.

Cost (+1)

The construction of frontage roads and new at-grade intersection would be relatively inexpensive compared to other alternatives considered.

Implementation (0)

This concept would result in impacts near existing developed properties based on the proposed alignment of the combined Greensprings Drive and Memorial Drive facility.

Concept E-3: Realign Greensprings Drive & Memorial Drive

Transportation Operations (+1)

This concept would consolidate access locations along OR 140, improving operations and access spacing, but would retain an at-grade intersection which is inconsistent with the expressway designation of the section of highway.

Multimodal Accessibility (+1)

This concept would provide an improved access point along the highway for pedestrians and bicyclists, but would still require an at-grade crossing movement for these users.

Land Use (+2)

Relatively direct access would be provided to existing businesses and no ROW would be required from adjacent property owners.

Economic Development (+1)

This concept would retain accessibility to a number of existing businesses as well as future developable lands.

Environmental, Social, and Equity factors (-2)

This alignment would result in the need to expand the existing bridge on OR 140 just to the east, potentially resulting in environmental impacts.

Accessibility and Connectivity (+1)

This concept would increase access to the northern extent of Memorial Drive (currently close at OR 140), thus providing a direct north-south connection along Memorial Drive.

Cost (-1)

The likely need to expand the existing bridge on OR 140 just to the east makes this concept a more expensive construction project.

Implementation (-1)

Required bridge improvements would result in the need for a large amount of funds prior to the construction of the new intersection.

Concept E-4: Memorial Drive Jughandle

Transportation Operations (+2)

An interchange design would have high levels of capacity available to accommodate future growth.

Multimodal Accessibility (+2)

This concept would provide a grade separated undercrossing of the highway.

Land Use (+1)

Relatively direct access would be provided to existing businesses, but some ROW would be required to construct the highway access roads.

Economic Development (+2)

An interchange would likely make land nearby more desirable due to the increased highway access.

Environmental, Social, and Equity factors (-1)

The construction of the interchange would require a large footprint and potentially have environmental impacts associated with the construction.

Accessibility and Connectivity (+2)

Access to and over the highway would be greatly increased for Memorial Drive and Greensprings Drive users with this concept.

Cost (-2)

The construction of a jughandle interchange would be expensive compared to the other alternatives.

Implementation (-1)

The construction of the interchange could be phased as a secondary improvement after the construction of an at-grade intersection that realigned Greensprings Drive and Memorial Drive.

INTERCHANGE FORM CONCEPTS

Concept I-1 – Improve Existing Interchange

Transportation Operations (+1)

The existing interchange is well suited to serve west to north demand (a.m. peak hour) and south to west demand (p.m. peak hour).

Multimodal Accessibility (+1)

The existing interchange configuration, with some pedestrian and bicycle improvements, could adequately serve bicycle and pedestrian users.

Land Use (+2)

Right-of-way impacts and other impacts to adjacent properties would be minimized with this concept.

Economic Development (+2)

The economic viability of the area would be improved by providing a safer, more efficient interchange in its current form.

Environmental, Social, and Equity factors (+1)

Environmental impacts would be minimized by not expanding the footprint of the interchange.

Accessibility and Connectivity (+2)

This concept would not inhibit local street connectivity or prohibit access to nearby properties.

Cost (+2)

Improvements to the existing interchange would likely be the least expensive improvement alternative.

Implementation (+2)

Construction of this improvement could be done in phases and would have minimal impacts to adjacent land uses during construction.

Concept I-2 – Diamond Interchange

Transportation Operations (-1)

The removal of the northbound loop ramp would have a negative impact related to serving west to north demand, which is expected to be heavy during the a.m. peak hour.

Multimodal Accessibility (+1)

The removal of the northbound loop ramp could improve multimodal access to the area by eliminating the free right-turn that exists today.

Land Use (+1)

This concept would likely require the removal of the currently vacant development to the northeast of the interchange.

Economic Development (+1)

The economic viability of the area would be improved by providing an improved interchange, but the removal of the northbound loop ramp would reduce west to north capacity.

Environmental, Social, and Equity factors (-1)

The footprint of the interchange would be expanded to the northeast quadrant of the interchange, causing potential environmental impacts in the area.

Accessibility and Connectivity (+2)

This concept would not inhibit local street connectivity or prohibit access to nearby properties.

Cost (+1)

The removal of the existing loop ramp and construction of the new diagonal ramp would minimal costs compared to other concepts considered.

Implementation (+1)

Construction of this improvement could be done in phases and would have minimal impacts to adjacent land uses during construction, though an adjacent property (northeast quadrant) would likely be removed by this concept.

Concept I-3 – Partial Cloverleaf Interchange

Transportation Operations (-2)

This interchange configuration is not well suited to serve future demand patterns and would likely result in deteriorated operations from the existing configuration.

Multimodal Accessibility (+1)

The north side of the highway would have continuous, unimpeded access for pedestrians through the interchange ramp terminal area.

Land Use (+1)

This concept would have impacts to the vacant land to the southwest, but would not have impacts in the northeast quadrant.

Economic Development (-1)

The economic viability of the area would be impacted negatively by the likely poor operations of this interchange configuration.

Environmental, Social, and Equity factors (-1)

The footprint of the interchange would be expanded to the southwest quadrant of the interchange, causing potential environmental impacts in the area.

Accessibility and Connectivity (+2)

This concept would not inhibit local street connectivity or prohibit access to nearby properties.

Cost (+1)

The removal of the existing southbound off-ramp and construction of the new ramps in the southwest quadrant would be minimal costs compared to other concepts considered.

Implementation (+1)

Construction of this improvement could be done in phases, those some impacts could result for users using the southbound on-ramp during construction.

Concept I-4 – Single-Point Urban Interchange (SPUI)

Transportation Operations (+2)

This interchange configuration would have high capacity and be able to handle large amounts of increased demand.

Multimodal Accessibility (-2)

SPUI configurations are known to have challenges related to serving bicycle and pedestrian users.

Land Use (-2)

The interchange configuration would have a large footprint with impacts to all quadrants of the interchange.

Economic Development (-2)

The large footprint of the interchange and configuration would make development nearby the interchange difficult.

Environmental, Social, and Equity factors (-2)

This concept would have large environmental impacts due to the massive reconstruction that would be required for construction.

Accessibility and Connectivity (+2)

This concept would not inhibit local street connectivity or prohibit access to nearby properties.

Cost (-2)

The construction of a SPUI would have high costs due to the reconstruction of the overpass that would be necessary and the approach realignments.

Implementation (-2)

This concept would have significant impacts to the area during construction.

Concept I-5 – Diverging Diamond Interchange (DDI)

Transportation Operations (+2)

A DDI would provide a significant amount of reserved capacity for the interchange.

Multimodal Accessibility (-1)

Pedestrian and bicycle users unfamiliar with the DDI form may be initially confused by the interchange.

Land Use (+1)

The interchange would not have a large footprint, limiting impacts to adjacent properties.

Economic Development (+1)

Improved traffic operations and reserve capacity made available by this configuration would be attractive to entice economic development.

Environmental, Social, and Equity factors (+1)

By remaining within the existing interchange footprint, this configuration would have minimal environmental impacts.

Accessibility and Connectivity (+2)

This concept would not inhibit local street connectivity or prohibit access to nearby properties.

Cost (-1)

Construction of a DDI would require the installation of two traffic signals and significant reconstruction within the ramps terminals and external approaches.

Implementation (+1)

This concept could be phased with other improvements to the interchange.

Concept I-6 – Full Cloverleaf Interchange

Transportation Operations (+2)

A full cloverleaf interchange would have large amounts of reserve capacity to serve future development.

Multimodal Accessibility (-2)

All movements on and off the highway would be potentially high speed, causing significant conflicts for bicycle and pedestrian users.

Land Use (-2)

The footprint of this concept would be quite large with severe impacts to all quadrants of the interchange.

Economic Development (-2)

The large footprint would inhibit development near the interchange, potentially causing decreased economic viability.

Environmental, Social, and Equity factors (-2)

The large footprint would have significant environmental impacts, including the need to excavate hills nearby to accommodate the new on- and off-ramps.

Accessibility and Connectivity (+2)

This concept would not inhibit local street connectivity or prohibit access to nearby properties.

Cost (-2)

The cost to construct this interchange would be significant.

Implementation (-2)

The construction of this interchange would be a major project with many logistical difficulties.

Appendix B
West Side Concept Cost Estimates

OR 66 GREEN SPRINGS IAMP

Revised Concept W-1: Realign OR-140

Project Sheet: W-1

Note: The Construction Cost Index for 2010 was estimated to be 219

Proposed Road Improvements				
Item	**Unit**	**Quantity**	**Unit Cost**	**Total**
Excavation (Cut)	cu. yd.	16,114	$15.00	$241,716
Embankment (Fill)	cu. yd.	5,371	$20.00	$107,430
Pavement Rehabilitation	sq. ft.	0	$4.00	$0
New Pavement	sq. ft.	145,175	$8.00	$1,161,400
New Curb	lin. ft.	3,320	$15.00	$49,800
New Sidewalk & Concrete Median	sq. ft.	19,920	$5.00	$99,600
Pavement markings	lin. ft.	13,210	$1.00	$13,210
Signage	each	20	$500.00	$10,000
Pavement Removal	sq. ft.	116,578	$2.00	$233,156
			Subtotal A (Roadworks)	*$1,916,312*
Storm Drainage System		% of Subtotal A	20%	$383,262.38
Landscape Improvement		% of Subtotal A	5%	$95,815.59
Street Lighting	each	8	$7,000.00	$56,000.00
Private Utility Coordination	Lump/Sum	1	$50,000.00	$50,000
New Traffic Signal	each	1	$250,000.00	$250,000
Traffic Signal Modification	each	0	$100,000.00	$0
Retaining Walls	sq. ft.	5,060	$50.00	$253,000
Structures	sq. ft.	0	$150.00	$0
Railroad Crossing & Signalization	each	0	$750,000.00	$0
			Subtotal B (Other)	*$1,088,078*
Subtotal 1 (Subtotals A + B)				$3,004,390
Mobilization		% of Subtotal 1	10%	$300,438.98
Erosion Control		% of Subtotal 1	5%	$150,219.49
Traffic Control		% of Subtotal 1	5%	$150,219.49
Subtotal 2 (Mobilization & Traffic Control)				$600,878
Total (Subtotals 1 + 2)				$3,605,268
Plus Contingencies		% of Total	30%	$1,081,580.34
Estimated Construction Cost				**$4,686,848**
Architectural/Engineering		% of Est. Cost	15%	$703,027.22
Construction Management		% of Est. Cost	10%	$468,684.82
Estimated Professional Fees				**$1,171,712**
Right-of-Way	sq. ft.	0	$10.00	$0
Estimated Property Acquisition Cost				**$0**
Estimated Project Cost				**$5,858,560**

Appendix C
East Side Concept Cost Estimate

OR 66 GREEN SPRINGS IAMP

Revised Concept E-1: Greensprings Dr / Frontage Rd

Project Sheet: E-1

Note: The Construction Cost Index for 2010 was estimated to be 219

Proposed Road Improvements				
Item	**Unit**	**Quantity**	**Unit Cost**	**Total**
Excavation (Cut)	cu. yd.	18,515	$15.00	$277,722
Embankment (Fill)	cu. yd.	5,772	$20.00	$115,440
Pavement Rehabilitation	sq. ft.	0	$4.00	$0
New Pavement	sq. ft.	166,800	$8.00	$1,334,400
New Curb	lin. ft.	4,828	$15.00	$72,420
New Sidewalk & Concrete Median	sq. ft.	28,968	$5.00	$144,840
Pavement markings	lin. ft.	3,250	$1.00	$3,250
Signage	each	16	$500.00	$8,000
Pavement Removal	sq. ft.	32,507	$2.00	$65,014
			Subtotal A (Roadworks)	*$2,021,086*
Storm Drainage System		% of Subtotal A	20%	$404,217.20
Landscape Improvement		% of Subtotal A	5%	$101,054.30
Street Lighting	each	16	$7,000.00	$113,750
Private Utility Coordination	Lump/Sum	1	$50,000.00	$50,000
New Traffic Signal	each	0	$250,000.00	$0
Traffic Signal Modification	each	0	$100,000.00	$0
Retaining Walls	sq. ft.	0	$50.00	$0
Structures	sq. ft.	0	$150.00	$0
Railroad Crossing & Signalization	each	0	$750,000.00	$0
			Subtotal B (Other)	*$669,022*
Subtotal 1 (Subtotals A + B)				$2,690,108
Mobilization		% of Subtotal 1	10%	$269,010.75
Erosion Control		% of Subtotal 1	5%	$134,505.38
Traffic Control		% of Subtotal 1	5%	$134,505.38
Subtotal 2 (Mobilization & Traffic Control)				$538,022
Total (Subtotals 1 + 2)				$3,228,129
Plus Contingencies		% of Total	30%	$968,438.70
Estimated Construction Cost				**$4,196,568**
Architectural/Engineering		% of Est. Cost	15%	$629,485.16
Construction Management		% of Est. Cost	10%	$419,656.77
Estimated Professional Fees				**$1,049,142**
Right-of-Way	sq. ft.	0	$10.00	$0
Estimated Property Acquisition Cost				**$0**
Estimated Project Cost				**$5,245,710**

OR 66 GREEN SPRINGS IAMP

Revised Concept E-4: Greensprings Dr / Memorial

Project Sheet: E-4

Note: The Construction Cost Index for 2010 was estimated to be 219

Proposed Road Improvements				
Item	**Unit**	**Quantity**	**Unit Cost**	**Total**
Excavation (Cut)	cu. yd.	37,296	$15.00	$559,440
Embankment (Fill)	cu. yd.	9,324	$20.00	$186,480
Pavement Rehabilitation	sq. ft.	0	$4.00	$0
New Pavement	sq. ft.	252,000	$8.00	$2,016,000
New Curb	lin. ft.	0	$15.00	$0
New Sidewalk & Concrete Median	sq. ft.	0	$5.00	$0
Pavement markings	lin. ft.	5,250	$1.00	$5,250
Signage	each	26	$500.00	$13,000
Pavement Removal	sq. ft.	39,007	$2.00	$78,014
Median	ft.	270	$30.00	$8,100
			Subtotal A (Roadworks)	*$2,866,284*
Storm Drainage System		% of Subtotal A	20%	$573,257
Landscape Improvement		% of Subtotal A	5%	$143,314
Street Lighting	each	53	$7,000.00	$367,500
Private Utility Coordination	Lump/Sum	1	$10,000.00	$10,000
New Traffic Signal	each	0	$250,000.00	$0
Traffic Signal Modification	each	0	$100,000.00	$0
Retaining Walls	sq. ft.	0	$50.00	$0
Structures	sq. ft.	7,314	$150.00	$1,097,100
Railroad Crossing & Signalization	each	0	$750,000.00	$0
			Subtotal B (Other)	*$2,191,171*
Subtotal 1 (Subtotals A + B)				$5,057,455
Mobilization		% of Subtotal 1	10%	$505,745.50
Erosion Control		% of Subtotal 1	5%	$252,872.75
Traffic Control		% of Subtotal 1	5%	$252,872.75
Subtotal 2 (Mobilization & Traffic Control)				$1,011,491
Total (Subtotals 1 + 2)				$6,068,946
Plus Contingencies		% of Total	30%	$1,820,684
Estimated Construction Cost				**$7,889,630**
Architectural/Engineering		% of Est. Cost	15%	$1,183,444.47
Construction Management		% of Est. Cost	10%	$788,962.98
Estimated Professional Fees				**$1,972,407**
Right-of-Way	sq. ft.	0	$10.00	$0
Estimated Property Acquisition Cost				**$0**
Estimated Project Cost				**$9,862,037**

Appendix D
Interchange Concept Cost Estimate

OR 66 GREEN SPRINGS IAMP

Concept I-1: Improve Existing Interchange

Project Sheet: I-1

Note: The Construction Cost Index for 2010 was estimated to be 219

Proposed Road Improvements				
Item	**Unit**	**Quantity**	**Unit Cost**	**Total**
Excavation (Cut)	cu. yd.	5,717	$15.00	$85,761
Embankment (Fill)	cu. yd.	2,576	$20.00	$51,523
Pavement Rehabilitation	sq. ft.	174,800	$4.00	$699,200
New Pavement	sq. ft.	69,625	$8.00	$557,000
New Curb	lin. ft.	4,600	$15.00	$69,000
New Sidewalk & Concrete Median	sq. ft.	27,600	$5.00	$138,000
Pavement markings	lin. ft.	5,570	$1.00	$5,570
Signage	each	14	$500.00	$7,000
Pavement Removal	sq. ft.	58,514	$2.00	$117,028
			Subtotal A (Roadworks)	*$1,730,082*
Storm Drainage System		% of Subtotal A	20%	$346,016.38
Landscape Improvement		% of Subtotal A	5%	$86,504.09
Street Lighting	each	28	$7,000.00	$194,950
Private Utility Coordination	Lump/Sum	1	$10,000.00	$10,000
New Traffic Signal	each	0	$250,000.00	$0
Traffic Signal Modification	each	0	$100,000.00	$0
Retaining Walls	sq. ft.	10,640	$50.00	$532,000
Structures	sq. ft.	0	$150.00	$0
Railroad Crossing & Signalization	each	0	$750,000.00	$0
			Subtotal B (Other)	*$1,169,470*
Subtotal 1 (Subtotals A + B)				$2,899,552
Mobilization		% of Subtotal 1	10%	$289,955.23
Erosion Control		% of Subtotal 1	5%	$144,977.62
Traffic Control		% of Subtotal 1	5%	$144,978
Subtotal 2 (Mobilization & Traffic Control)				$579,910
Total (Subtotals 1 + 2)				$3,479,463
Plus Contingencies		% of Total	30%	$1,043,838.84
Estimated Construction Cost				**$4,523,302**
Architectural/Engineering		% of Est. Cost	15%	$678,495.25
Construction Management		% of Est. Cost	10%	$452,330.17
Estimated Professional Fees				**$1,130,825**
Right-of-Way	sq. ft.	0	$10.00	$0
Estimated Property Acquisition Cost				**$0**
Estimated Project Cost				**$5,654,127**

OR 66 GREEN SPRINGS IAMP

Revised Concept I-2: Add US 97 NB On-Ramp

Project Sheet: I-2

Note: The Construction Cost Index for 2010 was estimated to be 219

Proposed Road Improvements				
Item	**Unit**	**Quantity**	**Unit Cost**	**Total**
Excavation (Cut)	cu. yd.	9,575	$15.00	$143,620
Embankment (Fill)	cu. yd.	3,415	$20.00	$68,302
Pavement Rehabilitation	sq. ft.	174,800	$4.00	$699,200
New Pavement	sq. ft.	92,300	$8.00	$738,400
New Curb	lin. ft.	4,600	$15.00	$69,000
New Sidewalk & Concrete Median	sq. ft.	27,600	$5.00	$138,000
Pavement markings	lin. ft.	3,692	$1.00	$3,692
Signage	each	18	$500.00	$9,000
Pavement Removal	sq. ft.	58,514	$2.00	$117,028
			Subtotal A (Roadworks)	*$1,986,242*
Storm Drainage System		% of Subtotal A	20%	$397,248.43
Landscape Improvement		% of Subtotal A	5%	$99,312.11
Street Lighting	each	37	$7,000.00	$258,440
Private Utility Coordination	Lump/Sum	1	$50,000.00	$50,000
New Traffic Signal	each	0	$250,000.00	$0
Traffic Signal Modification	each	0	$100,000.00	$0
Retaining Walls	sq. ft.	20,240	$50.00	$1,012,000
Structures	sq. ft.	0	$150.00	$0
Railroad Crossing & Signalization	each	0	$750,000.00	$0
			Subtotal B (Other)	*$1,817,001*
Subtotal 1 (Subtotals A + B)				$3,803,243
Mobilization		% of Subtotal 1	10%	$380,324.27
Erosion Control		% of Subtotal 1	5%	$190,162.13
Traffic Control		% of Subtotal 1	5%	$190,162.13
Subtotal 2 (Mobilization & Traffic Control)				$760,649
Total (Subtotals 1 + 2)				$4,563,891
Plus Contingencies		% of Total	30%	$1,369,167.36
Estimated Construction Cost				**$5,933,059**
Architectural/Engineering		% of Est. Cost	15%	$889,958.78
Construction Management		% of Est. Cost	10%	$593,305.85
Estimated Professional Fees				**$1,483,265**
Right-of-Way	sq. ft.	0	$10.00	$0
Estimated Property Acquisition Cost				**$0**
Estimated Project Cost				**$7,416,323**

OR 66 GREEN SPRINGS IAMP

Concept I-5: Diverging Diamond Interchange

Project Sheet: I-5

Note: The Construction Cost Index for 2010 was estimated to be 219

Proposed Road Improvements				
Item	**Unit**	**Quantity**	**Unit Cost**	**Total**
Excavation (Cut)	cu. yd.	27,940	$15.00	$419,094
Embankment (Fill)	cu. yd.	9,238	$20.00	$184,760
Pavement Rehabilitation	sq. ft.	0	$4.00	$0
New Pavement	sq. ft.	284,425	$8.00	$2,275,400
New Curb	lin. ft.	4,600	$15.00	$69,000
New Sidewalk & Concrete Median	sq. ft.	27,600	$5.00	$138,000
Pavement markings	lin. ft.	29,961	$1.00	$29,961
Signage	each	27	$500.00	$13,500
Pavement Removal	sq. ft.	283,531	$2.00	$567,062
Median	ft.	680	$30.00	$20,400
			Subtotal A (Roadworks)	*$3,717,177*
Storm Drainage System		% of Subtotal A	20%	$743,435.38
Landscape Improvement		% of Subtotal A	5%	$185,858.84
Street Lighting	each	53	$7,000.00	$371,980
Private Utility Coordination	Lump/Sum	1	$10,000.00	$10,000
New Traffic Signal	each	2	$250,000.00	$500,000
Traffic Signal Modification	each	0	$100,000.00	$0
Retaining Walls (less than 5 feet)	sq. ft.	20,400	$50.00	$1,020,000
Structures	sq. ft.	0	$150.00	$0
Railroad Crossing & Signalization	each	0	$750,000.00	$0
			Subtotal B (Other)	*$2,831,274*
Subtotal 1 (Subtotals A + B)				$6,548,451
Mobilization		% of Subtotal 1	10%	$654,845.11
Erosion Control		% of Subtotal 1	5%	$327,422.55
Traffic Control		% of Subtotal 1	5%	$327,422.55
Subtotal 2 (Mobilization & Traffic Control)				$1,309,690
Total (Subtotals 1 + 2)				$7,858,141
Plus Contingencies		% of Total	30%	$2,357,442.39
Estimated Construction Cost				**$10,215,584**
Architectural/Engineering		% of Est. Cost	15%	$1,532,337.56
Construction Management		% of Est. Cost	10%	$1,021,558.37
Estimated Professional Fees				**$2,553,896**
Right-of-Way	sq. ft.	0	$10.00	$0
Estimated Property Acquisition Cost				**$0**
Estimated Project Cost				**$12,769,480**

Appendix F
Technical Memorandum #6: Proposed Local Amendments for Implementation

Angelo planning group

LAND USE PLANNING • TRANSPORTATION PLANNING • PROJECT MANAGEMENT

Memorandum

Date:	September 28, 2012
To:	Joe Slaughter, City of Klamath Falls; Bill Adams, Klamath County
From:	Darci Rudzinski, AICP Shayna Rehberg, AICP
cc:	Ana Jovanovic, ODOT Mark Willret, City of Klamath Falls Matt Kittelson, Kittelson & Associates Hermanus Steyn, PE, Kittelson & Associates
Re:	OR 66 Green Springs Interchange Area Management Plan (IAMP) – Proposed Local Amendments for Implementation (Technical Memorandum #6)

Background

As established in the September 6, 2012 *Implementation Recommendations – Proposed Local Actions* memorandum (see Attachment A), the implementation phase of the IAMP planning process anticipates actions by the City of Klamath Falls and Klamath County to ensure that future development in the vicinity of the interchange is consistent with the assumptions and recommended improvements in the IAMP. The September 6 memorandum recommended amending the jurisdictions' respective comprehensive plan and development requirements, proposed a couple of different approaches for making modifications, and specified types of policy and ordinance language that would characterize the modifications. The result of consultations with City and County staff, this memorandum includes proposed policy language for inclusion in the IAMP document (and ultimately adopted as local transportation policy), as well as draft code language that can be incorporated into the Community Development Ordinance (Klamath Falls) and Land Development Code (County). This proposed language will need to be discussed with the Project Team and refined further by the jurisdictions.

Proposed Comprehensive Plan Amendments

City of Klamath Falls shall:

1. Amend the Zoning Map to include a OR 66 Green Springs Interchange Area Management Plan (IAMP) Overlay Zone to identify where compliance with the IAMP will be a condition of future development approval.
2. Adopt the OR 66 Green Springs Interchange Area Management Plan by reference as an element of the Urban Area Transportation System Plan (TSP). The IAMP, including the access management and phasing plans therein, will serve as the transportation policy document for the identified IAMP Overlay Zone area and will guide future improvements that are specifically addressed in the Plan.
3. Amend the TSP to incorporate the following interchange policy statement:

The function of the OR 66 Green Springs Interchange, located near the southwestern edge of the Klamath Falls area urban growth boundary (UGB), is to: serve local and long distance freight movements by providing a connection between US 97 and the shared alignment of OR 66 and OR 140; provide access to existing local businesses as well as a large amount of developable lands near the interchange, and; provide a connection to greater Klamath Falls for residents living near the interchange.

4. Include the IAMP Interchange Area Improvements Project Phasing Plan as listed in Table 2 of the IAMP, in the recommended transportation improvements project list of the TSP.

Klamath County shall:

1. Amend the Zoning Map to include a OR 66 Green Springs Interchange Area Management Plan (IAMP) Overlay Zone to identify where compliance with the IAMP will be a condition of future development approval.
2. Adopt the OR 66 Green Springs Interchange Area Management Plan by reference as an element of the Urban Area Transportation System Plan. The IAMP, including the access management and phasing plans therein, will serve as the transportation policy document for the identified IAMP Overlay Zone area and will guide future improvements that are specifically addressed in the Plan.
3. Amend the Urban Area TSP to incorporate the following interchange policy statement:

   The function of the OR 66 Green Springs Interchange, located near the southwestern edge of the Klamath Falls area urban growth boundary (UGB), is to: serve local and long distance freight movements by providing a connection between US 97 and the shared alignment of OR 66 and OR 140; provide access to existing local businesses as well as a large amount of developable lands near the interchange, and; provide a connection to greater Klamath Falls for residents living near the interchange.

4. Amend and update the recommended transportation improvements project list(s) of the TSP with the projects listed in Table 2 (Interchange Area Improvements Project Phasing) of the IAMP.

Proposed Code Amendments

Modifications to the Klamath Falls Community Development Ordinance (CDO) and Klamath County Land Development Code (LDC) are recommended to ensure that future development in the vicinity of the interchange is consistent with the assumptions and recommended improvements in the IAMP. The proposed approach contains proposed requirements related to developing within the IAMP Overlay Zone in a new overlay chapter. A draft chapter for the City's CDO is Attachment B; matching language suitable for inclusion in the County LDC is Attachment C. The proposed language clarifies transportation impact study, access management, and agency coordination requirements, as well as codifies triggers for review and update of the IAMP.

ATTACHMENT A

Implementation Recommendations – Proposed Local Actions Memo

Angelo planning group LAND USE PLANNING • TRANSPORTATION PLANNING • PROJECT MANAGEMENT

Memorandum

Date:	September 6, 2012
To:	Project Team
From:	Darci Rudzinski, AICP Shayna Rehberg, AICP
cc:	Ana Jovanovic, ODOT Matt Kittelson, Kittelson & Associates Hermanus Steyn, PE, Kittelson & Associates
Re:	OR 66 Green Springs Interchange Area Management Plan (IAMP) Implementation Recommendations – Proposed Local Actions (Tasks 6. 2)

Overview

Development and implementation of Interchange Area Management Plans (IAMPs) are guided by Oregon Administrative Rule (OAR) 734-051 (Division 51) and OAR 660-012. Division 51 requires that an IAMP be developed no later than the time that an interchange is designed or redesigned (734-051-0155(7)). The IAMP must be completed before project construction. The OAR also states that "prior to adoption by the Oregon Transportation Commission, the Department will work with local governments on any amendments to local comprehensive plans and transportation system plans and local land use and subdivision codes to ensure the proposed… Interchange Area Management Plan is consistent with the local plan and codes (734-051-0155(2))."

OAR 660-012-0045(2), a provision of the Transportation Planning Rule (TPR), requires that local governments adopt land use regulations consistent with state and federal requirements "to protect transportation facilities, corridors, and sites for their identified functions."

This memorandum outlines the necessary local actions to comply with OAR 734-051 and OAR 660-012. To ensure that local land use actions are consistent with the transportation facility planning within the IAMP management area, IAMP implementation measures typically consist of policy language (in the IAMP and, if desired, mirrored in the adopted TSP/Comprehensive Plan) and development code requirements. Implementation measures appropriate for the Green Springs IAMP, and the ways they are developed and adopted, are discussed in more detail in this memorandum.

Implementation Process

IAMPs are one type of facility plan established by the Oregon Department of Transportation (ODOT). IAMPs must include policies **and** objectives that guide ODOT and local governments in subsequent decisions and actions that are consistent with and that implement these facility plans. Since an IAMP involves both ODOT and local government authority, some policies will guide ODOT actions and others will guide local government decisions. It is expected that the IAMP will be made part of the City of Klamath Falls and Klamath County Comprehensive Plans through amendments to the Klamath Falls Urban Area Transportation System Plan and Klamath County Rural Transportation System Plan.

The recommendations in the memorandum outline local comprehensive plan (TSP) amendments and code sections that may need revision to ensure that future development is consistent with the assumptions and recommended improvements in the IAMP.

Guided in part by the recommendations below, in the next few weeks the consultant team will be drafting the implementation plan section of the IAMP, including specific policy language and recommended code amendments. Once drafted, City and County staff will have an opportunity to review draft IAMP materials in preparation of the September 17 TAC meeting.

Implementation Approach

Klamath Falls and Klamath County will need to confirm what regulatory changes are necessary for local implementation of the IAMP. Two basic approaches for discussion: regulate development through a mapped overlay district or make targeted changes to existing development codes to address interchange-related requirements.

Overlay District

A mapped zoning overlay district defines an area in which special regulations apply. The use and development standards of the underlying zoning district typically continue to apply, with the provision that if there is a conflict between the two districts, the overlay district shall prevail. In the case of interchange-related overlay districts, the special regulations tend to address additional access management and impact study requirements for the interchange area.[1] Many IAMPs all over the state are implemented locally through a mapped overlay zone and corresponding development ordinance requirements. If it is determine that this approach provides a useful tool for development review in the vicinity of the Green Springs interchange, the City of Klamath Falls and Klamath County will need to and jointly adopt the overlay and associated regulatory requirements.[2] The boundary of the overlay, or the "Interchange Management Area," will need to be determined and mapped.[3]

Future transportation system development charges (SDC) may also apply in a defined area in the vicinity of the interchange, but SDC requirements are established in a separate ordinance and not in code language pertaining to an interchange overlay district. The applicable area for an area specific transportation SDC may also have different boundaries than the established overlay district.

Code Modifications

Generally speaking, due in large part to recent code updates associated with the adoption of the Urban Area TSP,[4] few modifications are required to local ordinances to implement the IAMP. The City and County have in place development-related requirements that will help ensure mobility and operational standards are monitored in the vicinity of the interchange and that transportation impacts are mitigated. These include transportation impact analysis (or study) requirements consistent with

[1] In accordance with the TPR requirements that transportation facilities be protected for their identified function.

[2] The alternative to adopting a management overlay is to rely on code requirements that call for consistency with the adopted TSP (of which relevant parts of the IAMP are a part) as a condition of development approval.

[3] It is typical to use the IAMP study area defined for analysis purposes as the IAMP Overlay (or "Management Area").

[4] Confirmation of Urban Area TSP adoption ordinance number(s) from the City and County and confirmation of code language related to the adoption is needed. County code amendments will need to be applicable to areas outside of the urban growth boundary.

the transportation planning rule (660-012-0060) and notification requirements that will ensure that ODOT can participate in the local decision process.[5]

Implementation of the IAMP can be further supported by targeted modifications to the Klamath Falls Community Development Ordinance (CDO) and County Land Development Code (LDC). The following is a list of recommendations related to implementing the IAMP through existing local development requirements.

- Review/revise transportation impact study (TIS) requirements to ensure that development within the Interchange Management Area (or that meet prescribed thresholds for traffic generation or impacts on the state system if an overlay is not adopted) are subject to these requirements.[6] (CDO Section 14.051 Traffic Impact Study Requirements; LDC 71.200 Traffic Impact Study.)

- Require that development and redevelopment proposals within the Interchange Management Area (or, more generally, development that put trips on the interchange) show consistency with the IAMP access management plan as a condition of approval. (CDO Section 14.050 Access and Driveways; LDC Section 71.020 Access Standards.)

If a Management Area/Overlay approach is chosen, the City and County may want to consider having all requirements associated with the Interchange Management Area codified in a new overlay chapter; an outline of a typical development review chapter is provided as an attachment to this memorandum. This code chapter could be in addition to, or could take the place of, the modifications listed above.

Implementation Recommendations

The following actions are recommended for both the City of Klamath Falls and Klamath County in support of the implementation of the Green Springs IAMP.

1. Amend the Urban Area Transportation System Plan (TSP) and Klamath County Rural Transportation System Plan to incorporate the interchange policy statement(s) and recommended transportation improvements. *New policy language would include the "Purpose and Intent" statement from TM #2 and general policies that address ODOT/City/County coordination.*

2. Adopt the IAMP as part of the Comprehensive Plan(s) and TSPs. The IAMP, including the access management and phasing plans therein, will serve as the transportation policy document for the area and will guide future improvements that are specifically addressed in the Plan. *The City and County can adopt the locally-relevant portions of the IAMP, such as the project lists and access management plan, by reference into the Urban Area TSP; IAMP*

[5] Notice of decisions requiring a public hearing for proposals located adjacent to a state roadway or where proposals are expected to have an impact on a state transportation facility must be sent to ODOT (CDO Section 10.605 Public Hearings; LDC Section 32.030). Pursuant to City requirements in CDO Chapter 11 Land Development Review, subdivision approval is a Planning Commission decision and requires public hearing.

[6] Note that, through the TIS requirements, the City, County and ODOT may condition approval to meet operation and safety needs at the interchange, including requiring crossover easement agreements and conditional access permits (CDO Section 14.051(4); LDC Section 20.040).

recommendations pertaining to land outside the urban growth boundary will require an amendment to the Klamath County Rural Transportation System Plan.

3. Amend the Comprehensive Plan and Zoning Map(s) to include an IAMP Management Area (or IAMP Overlay) to identify where compliance with the IAMP will be a condition of future development approval. *Note: Discussion needed re: the utility of legislatively amending the City/County land use maps.*
4. Amend development ordinances to ensure mobility and operational standards are monitored and that transportation impacts are mitigated within the Interchange Management Area. *(This may be accomplished through targeted text amendments or, if an IAMP overlay is mapped, through an overlay zone chapter. See previous Implementation Approach section.)*

ATTACHMENT

Section X.XXX Green Springs Interchange Area Management Plan Overlay Zone

X.XXX.00 Purpose

Purpose statement reflects the draft "Purpose and Intent" developed to guide the IAMP planning process.

X.XXX.05 Boundary of the CIO

The boundary of the Overlay Zone is shown on the adopted Comprehensive Land Use Plan Map(s) and Zoning Map(s).

X.XXX.10 Applicability

Subsection identifies the applicability of the requirements for specific land use applications, for parcels wholly or partially within the Overlay Zone. Conflicts within the development code are resolved in favor of the Overlay Zone.

X.XXX.15 Permitted Land Uses

Uses allowed in the underlying zoning district are allowed subject to other applicable provisions in the development code.

X.XXX.20 Access Management

Subsection includes cross-references to existing access management, street, and parking and loading standards, with the addition of any Overlay Zone-specific access management requirements. Requirements could include consistency with IAMP access management plan, specifying that where the access management plan conflicts with other code provisions the IAMP governs, and joint review by the City, County, and ODOT of local street access within the overlay.

X.XXX.25 Administration

Subsection delineates the responsibilities of the City, County and ODOT to monitor and evaluate vehicle trip generation on the interchange from development approval. Cross-references to the existing transportation impact analysis requirements belong in this section, as do any additional requirements for interchange area-specific analysis and additional coordination responsibilities that are not sufficiently captured elsewhere in code.

(1.) Transportation Analysis

(2.) Agency Coordination

X.XXX.30 Interchange Area Management Plan Review and Update

Subsection identifies the circumstances under which the IAMP will be reviewed and potentially updated. A typical IAMP update "trigger" is proposed comprehensive land use plan map or zoning map amendment within the Overlay Zone that has a "significant affect" on the interchange, pursuant to Section -0060 of the Transportation Planning Rule. Examples of other triggers include percentage of capacity exhausted on a facility, safety-related thresholds, and time passed since adoption.

ATTACHMENT B

Proposed City of Klamath Falls CDO Overlay Chapter

OR 66 GREEN SPRINGS INTERCHANGE AREA MANAGEMENT PLAN (IAMP) OVERLAY ZONE

12.655 Purpose

The purpose of the OR 66 Green Springs Interchange Area Management (IAMP) Overlay Zone is to protect the function of the US 97/OR 66 Green Springs interchange and provide safe and efficient connections between all roadways within the vicinity of the interchange. The function of the interchange, located near the southwestern edge of the Klamath Falls area urban growth boundary (UGB), is to: serve local and long distance freight movements by providing a connection between US 97 and the shared alignment of OR 66 and OR 140; provide access to existing local businesses as well as a large amount of developable lands near the interchange, and; provide a connection to greater Klamath Falls for residents living near the interchange.

12.660 Zone Boundary

The boundary of the IAMP Overlay Zone is shown on the adopted City of Klamath Falls Zoning Map.

12.665 Applicability

The provisions of this section shall apply to all annexation, zone change, subdivision, land partition, conditional use permit, and design review applications pursuant to CDO Chapter 11, Land Development Review, for parcels wholly or partially within the IAMP Overlay zone, as defined by Section 12.660. The standards of the IAMP Overlay Zone shall supersede where conflicts arise between the standards of the Overlay Zone and those contained within other sections of the Community Development Ordinance.

12.670 Uses Permitted

Uses allowed in the underlying zoning district are allowed subject to other applicable provisions in the Community Development Ordinance and Chapter 12, Land Use.

12.675 Access Management

In addition to the standards and requirements of Section 11.805 (Design Standards) and Chapter 14 (Off Street Parking and Loading) parcels wholly or partially within the IAMP Overlay Zone are governed by the Access Management Plan in the OR 66 Green Springs Interchange Area Management Plan. The following access approval criteria apply to land use and

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development applications for parcels within the Overlay District that are subject to Section 14.050 (Access and Driveways).

(1) Access to local streets within the IAMP Overlay Zone shall be subject to joint review by the City and the Oregon Department of Transportation (ODOT) and, where applicable, by Klamath County. Coordination of this review will occur pursuant to Section 12.680.

(2) Approval of a driveway access to a site is based on the standards contained in this section, the provisions of 11.805 (Design Standards), Chapter 14 (Off Street Parking and Loading) in the CDO, Sections 8.550 – 8.575 (Curb Cuts and Driveways) of the City Code, Chapters 8 (Streets and Related Work) and 12 (Guidelines for Transportation Impact Analysis) of the Public Works Engineering Standards, and the Access Management Plan in the OR 66 Green Springs IAMP. Where the recommendations of the Access Management Plan conflict with other access and spacing requirements in Section 14.050 the Access Management Plan shall govern.

12.680 Administration

This section delineates the responsibilities of the City and ODOT to monitor and evaluate vehicle trip generation on the Green Springs Interchange from development approval under this section.

(1) Transportation Analysis

a. The applicant shall prepare and submit to the City a traffic impact study pursuant to the requirements in Section 14.051.

b. A TIS will be required for all applications for zone change and/or comprehensive plan amendments located within the IAMP Overlay Zone that result in an increase in trips as compared to the existing land use designation.

c. Land use applications that require a State Highway Private Approach application may also be are required to provide ODOT a TIS, pursuant to OAR 734-051-3030(4).

(2) Agency Coordination

a. For land use applications within the IAMP Overlay Zone, the City shall invite ODOT and Klamath County to participate in the City's pre-application meeting with the applicant.

b. The City shall provide written notification to ODOT when the application is deemed complete. The City shall also provide written notification to Klamath County, the transit agency and other public or quasi-public agencies that serve the IAMP Overlay Zone when the application is deemed complete.

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c. ODOT shall have at least 20 days, measured from the date completion notice was mailed, to provide written comments to the City. If ODOT does not provide written comments during this 20-day period, the City staff report will be issued without consideration of ODOT comments.

12.685 Interchange Area Management Plan Review and Update

(1) IAMP Review Triggers. In order to ensure that the interchange function and capacity is preserved, the City, in coordination with ODOT and Klamath County, shall undertake a formal IAMP review when the following occurs:

a. Five (5) years has elapsed since the date of IAMP adoption or since the last update occurred.

b. Comprehensive Land Use Plan Map or Zoning Map amendments that have a "significant effect" pursuant to the Transportation Planning Rule and are proposed for land within the IAMP Overlay Zone or for land outside the overlay zone that significantly affect the Green Springs Interchange.

(2) IAMP Updates.

a. If the findings and conclusions from an IAMP review demonstrate the need for an update to the plan, review participants will initiate an IAMP update process pursuant to the provisions of the IAMP.

b. An updated IAMP shall be legislatively adopted, requiring a City Council public hearing, as an amendment to the Klamath Falls Urban Area Transportation System Plan and will be adopted by the OTC as an update to the Oregon Highway Plan.

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ATTACHMENT C

Proposed Klamath County LDC Overlay Chapter

50.030 - LIST OF SPECIAL PURPOSE ZONES
The following special purpose zones are established:
SRO Significant Resource Overlay
ASK Airport Safety Overlay - Kingsley Field
ANK Airport Noise Overlay - Kingsley Field
AS Airport Safety Overlay - Beaver Marsh, Chiloquin, Crescent Lake & Malin
FHZ Flood Hazard Overlay
GEO Geothermal Overlay
LU Limited Use Overlay
ART Air/Rail Transportation
IAMP OR 66 Green Springs Interchange Area Management Plan Overlay Zone

ARTICLE 59.9

OR 66 GREEN SPRINGS INTERCHANGE AREA MANAGEMENT PLAN (IAMP) OVERLAY ZONE

59.910 - PURPOSE

The purpose of the OR 66 Green Springs Interchange Area Management (IAMP) Overlay Zone is to protect the function of the US 97/OR 66 Green Springs interchange and provide safe and efficient connections between all roadways within the vicinity of the interchange. The function of the interchange, located near the southwestern edge of the Klamath Falls area urban growth boundary (UGB), is to: serve local and long distance freight movements by providing a connection between US 97 and the shared alignment of OR 66 and OR 140; provide access to existing local businesses as well as a large amount of developable lands near the interchange, and; provide a connection to greater Klamath Falls for residents living near the interchange.

59.920 - ZONE BOUNDARY

The boundary of the IAMP Overlay Zone is shown on the Klamath County official Zoning Map.

59.930 - APPLICABILITY

The provisions of this Article shall apply to all land use and development applications pursuant to the LDC, for parcels wholly or partially within the IAMP Overlay Zone, as defined by Section 59.920. The standards of the IAMP Overlay Zone shall supersede where conflicts arise between the standards of the Overlay Zone and those contained within other sections of the Land Development Code.

59.940 - USES PERMITTED

Uses allowed in the underlying zoning district are allowed subject to other applicable provisions in the Land Development Code and Chapter 50, Land Use Zones.

59.950 - ACCESS MANAGEMENT

In addition to the standards and requirements of Article 68 (Off Street Parking and Loading) and Article 71 (Vehicular Access and Circulation), parcels wholly or partially within the IAMP Overlay Zone are governed by the Access Management Plan in the OR 66 Green Springs Interchange Area Management Plan. The following access approval criteria apply to land use and development applications for parcels within the Overlay District that are subject to Section 71.160 (Access Permits).

(1) Access to streets and property within the IAMP Overlay Zone shall be subject to joint review by the County and the Oregon Department of Transportation (ODOT) and, where applicable, by the City of Klamath Falls. Coordination of this review will occur pursuant to Section 59.960.

(2) Approval of an access permit is based on the standards contained in this section, the provisions of Article 68 (Off Street Parking and Loading) and Article 71 (Vehicular Access and Circulation) in the LDC, and the Access Management Plan in the OR 66 Green Springs IAMP. Where the recommendations of the Access Management Plan conflict with other access and spacing requirements in 71.020, Access Standards, the Access Management Plan shall govern.

59.960 - ADMINISTRATION

This section delineates the responsibilities of the County and ODOT to monitor and evaluate vehicle trip generation on the Green Springs Interchange from development approval under this section.

(1) Transportation Analysis

a. The applicant shall prepare and submit to the County a traffic impact study pursuant to the requirements in Section 71.200 Traffic Impact Study.

b. A TIS will be required for all applications for zone change and/or comprehensive plan amendments located within the IAMP Overlay Zone that result in an increase in trips as compared to the existing land use designation.

c. Land use applications that require a State Highway Private Approach application may also be are required to provide ODOT a TIS, pursuant to OAR 734-051-3030(4).

(2) Agency Coordination

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a. For land use applications within the IAMP Overlay Zone, the County shall invite ODOT and the City of Klamath Falls to participate in the County's pre-application meeting with the applicant.

b. The County shall provide written notification to ODOT when the application is deemed complete. The County shall also provide written notification to the City of Klamath Falls, the transit agency and other public or quasi-public agencies that serve the IAMP Overlay Zone when the application is deemed complete.

c. ODOT shall have at least 20 days, measured from the date completion notice was mailed, to provide written comments to the County. If ODOT does not provide written comments during this 20-day period, the County staff report will be issued without consideration of ODOT comments.

59.970 – INTERCHANGE AREA MANAGEMENT PLAN REVIEW AND UPDATE

(1) IAMP Review Triggers. In order to ensure that the interchange function and capacity is preserved the County, in coordination with ODOT and the City of Klamath Falls, shall undertake a formal IAMP review when the following occurs:

a. Five (5) years has elapsed since the date of IAMP adoption or since the last update occurred.

b. Comprehensive Land Use Plan Map or Zoning Map amendments that have a "significant effect" pursuant to the Transportation Planning Rule and are proposed for land within the IAMP Overlay Zone or for land outside the overlay zone that significantly affect the Green Springs Interchange.

(2) IAMP Updates.

a. If the findings and conclusions from an IAMP review demonstrate the need for an update to the plan, review participants will initiate an IAMP update process pursuant to the provisions of the IAMP.

b. An updated IAMP shall be legislatively adopted, requiring a Board of Commissioners public hearing, as an amendment to the Klamath Falls Urban Area Transportation System Plan and will be adopted by the OTC as an update to the Oregon Highway Plan.

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Appendix G
Public Involvement Plan Memorandum

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING
610 SW Alder Street, Suite 700, Portland, OR 97205 P 503.228.5230 F 503.273.8169

MEMORANDUM

Date: January 9, 2011 Project #: 11881

To: Project Team (PT)

From: Matt Kittelson and Hermanus Steyn

Project: OR 66 Green Springs Interchange Access Management Plan (IAMP)

Subject: Public Involvement Plan

This project will develop an Interchange Access Management Plan (IAMP) that identifies the location and design of a future interchange to improve the operations of The Dalles-California Highway (U.S. 97), Green Springs Highway (OR 66), and Lake of the Woods-South Klamath Falls Highway (OR 140) at the southwest edge of Klamath Falls. This memorandum provides an overview of the Public Involvement Plan (PIP) for the IAMP (refer to as *OR 66 Green Springs IAMP*) development. The OR 66 Green Springs IAMP project will be approximately 18 months in length.

The interchange must improve highway-to-highway connectivity, safety, mobility, and provide bicyclists and pedestrians a better way to navigate through a rural, high-speed area. The plan must also:

- Identify current accesses to the highways that will need to be relocated, consolidated, or closed
- Provide a design level of sufficient detail for the future interchange and associated street and intersection improvements to allow efficient local street connectivity
- Prepare for right of way purchases and easements during land use approval for any affected properties in the area
- Link appropriate land uses in the surrounding area to the capacity of the improved transportation system
- Identify a funding strategy and cost sharing for needed improvements

As such, public input and involvement will be critical to the success of the project. To accomplish this outcome, the PIP for the OR 66 Green Springs IAMP includes:

- Six Project Team (PT) meetings open to public
- One visioning workshop
- Two public workshops,
- Regular updates by city and county staff to City Planning Commission, County Planning Commission, City Council, and County Board of County Commissioner meetings and hearings
- A project website providing information about on-going project activities
- Four separate adoption hearings with the City Planning Commission, County Planning Commission, City Council, and County Board of County Commissioner

The following sections discuss key questions and goals that frame the PIP strategy; the fundamental purpose of the strategy presented is to secure input, understanding, and acceptance from project stakeholders (e.g., citizens, governing agencies).

Key Questions

The following are key questions that help frame the strategy for obtaining and integrating public and agency input into OR 66 Green Springs IAMP development.

- City and County values – What is the desired character of the Klamath Falls urban area in the vicinity of the study area?
- Government Agency Coordination – What is the most productive and valuable way to engage the City, County, and ODOT to understand and find ways to meet their collective needs? What is the best way to promote ownership of the project by Local Government Agencies? What is the best way to assure adoption by Local Government Agencies?
- Public Information/Involvement – How do we gain public input in OR 66 Green Springs IAMP development and acceptance of the preferred alternative?
- Local Property Owner Outreach – How do we gain input from local property owners and facilitate the future economic growth within the study area?
- Future Funding Considerations – What strategy should be implemented to fund the preferred alternative of the interchange area?
- IAMP Implementation – How will the plan be adopted and implemented once planning phase is complete (responsible parties, knowledge transfer, training)?

These key questions led to formulating a set of goals to guide the PIP.

PIP Goals

The City, County, and Oregon Department of Transportation (ODOT) are committed to a PIP approach that:

- Provides open and transparent decision-making process
- Is open to all members of the public
- Includes equitable and constructive two-way communication between the public and the project team
- Provides early and on-going opportunities for stakeholder (i.e., public, agencies, service providers) input
- Proactively informs and encourages stakeholder participation
- Builds community understanding of opportunities, constraints, findings, and decisions
- Documents for possible environmental issues and NEPA requirements

A key element of the approach is a structured decision process with clear decision points and well-defined roles and responsibilities. Thorough and thoughtful consideration of issues at each decision point by the project stakeholders helps to ensure quality decisions that will not have to be revisited later in the project because something of significance has been omitted or improperly addressed. Clearly identifying decision points creates an expectation in stakeholders for meeting the deadlines and staying on schedule as a way to avoid more and more meetings, time and costs.

Defining the decision structure—groups that will be involved and how they will participate—can help answer frequently asked questions, such as:

- Who will make the decisions?
- How can I influence the decisions?
- When will I have an opportunity to participate?
- Who will consider my input?

PIP Strategy Elements

The PIP strategy elements are:

- Designate public information contacts
- Create project website
- Conduct public workshops
- Include key project stakeholders on the Project Team (PT)
- Updates to Commission and Council
- Conduct adoption hearings with the four adoption bodies

- Tracking of outreach and involvement by minority groups (to be done by WPM (Ana) at public meetings
- Tracking for NEPA requirements, environmental issues and decisions around alternative selection

Each element is discussed below.

DESIGNATE PUBLIC INFORMATION CONTACTS

Ana Jovanovic is the point of contact for ODOT. Mark Willrett is the point contact for the City of Klamath Falls. Stan Strickland is the point contact for Klamath County. Hermanus Steyn is the point contact for the consultant team.

CREATE PROJECT WEBSITE

The project website for the OR 66 Green Springs IAMP is www.GreenSpringsIAMP.com. The website will be used throughout the project to provide information including:

- Latest news updates;
- A calendar with project related events and meetings open to the public;
- A project schedule;
- Information on opportunities for the public to be involved;
- Project documents for public review;
- Photo gallery;
- Project resources;
- Information on the project participants (e.g., Project Team and Consultant Team);
- Access to Virtual Open House information; and
- A place for the public to directly provide input, comments or questions to the project team.

The primary purpose of the website is to provide a consistent and constant source for the latest information on the project as well as a location for the public to provide comments and input through the project duration.

CONDUCT PUBLIC WORKSHOPS

Two public workshops are planned during the OR 66 Green Springs IAMP project. These public workshops will provide citizens the opportunity to review and provide input on existing conditions analysis, future conditions analysis, and future alternatives developed and evaluated within the IAMP process. The consultant team will work with ODOT, City, and County to ensure the public workshops are appropriately and effectively advertised to citizens. The preliminary project schedule illustrates the timeline and sequence of these events in relation to the rest of the project.

INCLUDE KEY PROJECT STAKEHOLDERS ON THE PROJECT TEAM

A Project Team (PT) has been created to help guide the development of the OR 66 Green Springs IAMP, provide input throughout the project, review draft documents and provide input at key decisions points. The PT members represent relevant/affected jurisdictions, service providers, community interests, business interests, and geographic diversity.

Project Team Members

ODOT Region 4 Planning	Ana Jovanovic
ODOT Region 4 Roadway Design	Dave Warrick
ODOT Region 4 Access Management Engineer	David Boyd
ODOT Region 4 Traffic Operations	Joel McCarroll
ODOT District 11	Mike Stinson/Butch Hansen
ODOT TPAU	Peter Schuytema
City of Klamath Falls Community Development	Sandra Fox/Joe Slaughter
City of Klamath Falls Public Works	Mark Willrett
City of Klamath Falls City Manager	Rick Whitlock
City of Klamath Falls Police Chief	Chief James Hunter
Klamath County Planning Department	Bill Adams
Klamath County Road Department	Stan Strickland
Klamath County Planning Commission	Tim Thompson
Kittelson & Associates, Inc.	Hermanus Steyn/Matt Kittelson
Angelo Planning Group	Darci Rudzinski

During the project, six joint meetings with the PT will be held. These meetings will be advertised on the project website and are open to the public. The preliminary project schedule illustrates the timeline and sequence of these meetings.

UPDATES TO COMMISSION AND COUNCIL

A key aspect of the OR 66 Green Springs Highway IAMP project will be to provide updates to the City Council and County Commission on an ongoing basis. City and County representatives will be utilized

to determine when such updates are prudent and what means should be used to provide those updates.

CONDUCT ADOPTION HEARINGS WITH THE FOUR ADOPTION BODIES

In developing the OR 66 Green Springs IAMP, the public, PT, City Planning Commission (PC), County PC, City Council, and Board of County Commissioners will provide input to help guide and reach a preferred alternative for the interchange. Once this preferred alternative has been reached a draft IAMP will be prepared, reviewed by the various project stakeholders, revised and then put forth to the City PC, County PC, City Council and Board of County Commissioners for adoption. Each body will have a separate hearing, open to the public, for the purpose of adopting the document as an update to the Klamath Falls Urban Area TSP. This adoption process allows for multiple opportunities for a wide variety of public stakeholders to provide final input and thoughts.

Consultant Manager

ODOT Region 4 Planner, Ana Jovanovic, is responsible for contract management. Hermanus Steyn is the consultant team leader.

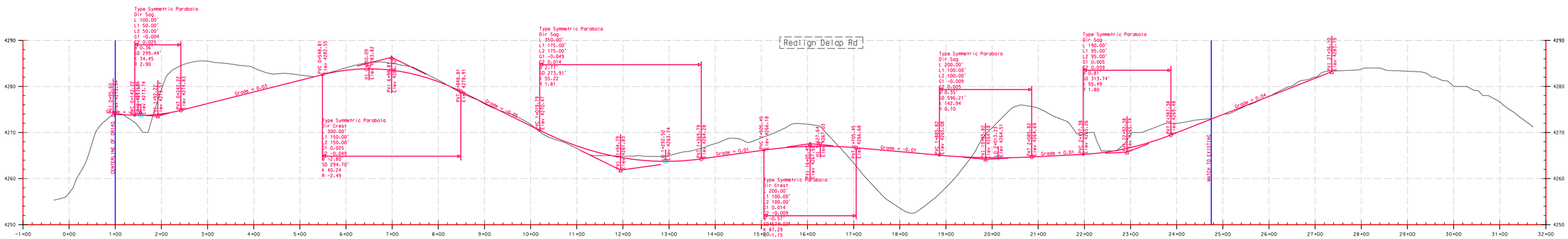
Summary

The key elements of the PIP for the OR 66 Green Springs IAMP are:

- Designate public information contacts
- Create project website
- Conduct two public workshops
- Conduct one visioning workshop
- Regular updates by city and county staff to City Planning Commission, County Planning Commission, City Council, and County Board of County Commissioner meetings and hearings
- A project website providing information about on-going project activities
- Four separate adoption hearings with the City Planning Commission, County Planning Commission, City Council, and County Board of County Commissioner

These elements provide opportunities for two-way communication between citizens, business owners, governing agencies, and the project team throughout the duration of the project. The attached project schedule and road map illustrate opportunities for public involvement as it relates to other project activities.

Appendix H
Conceptual Profiles for New/Realigned Road Connections



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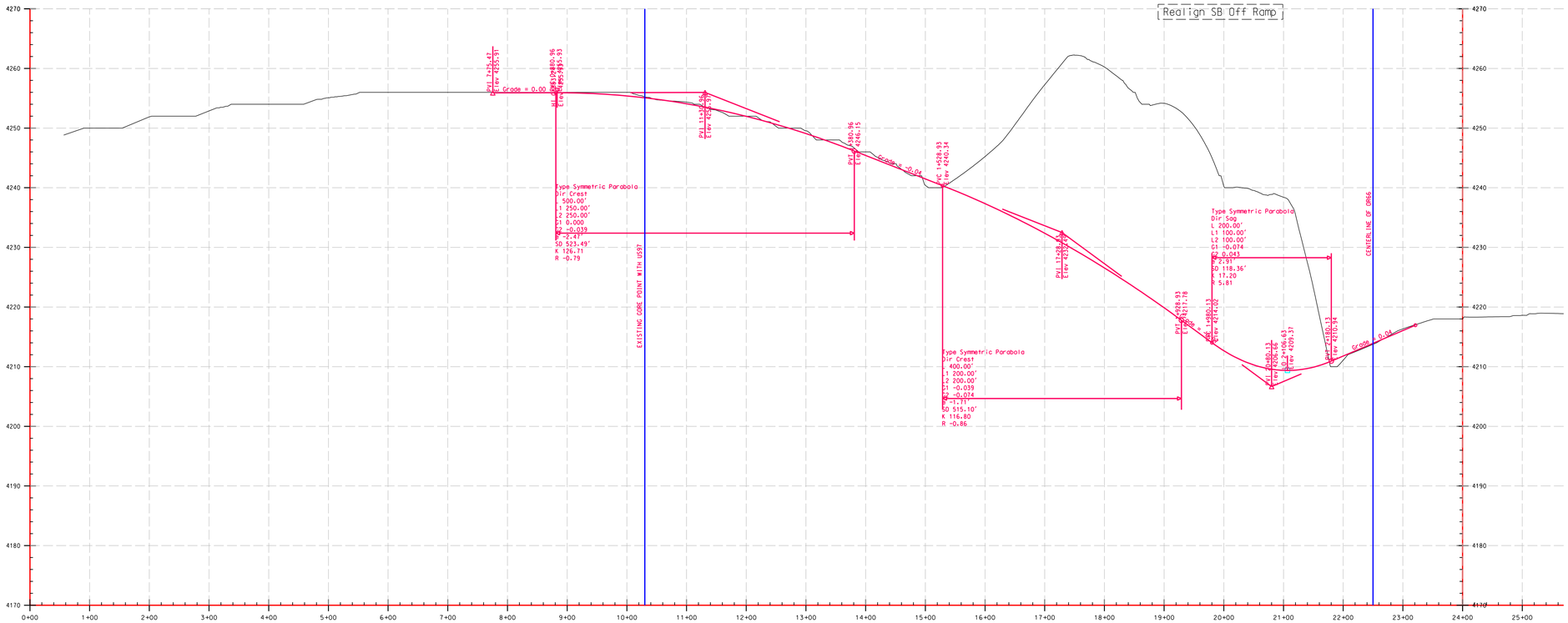

Realign SB Off Ramp
Type Symmetric Parabola
Dir Crest
L 500.00'
L1 250.00'
L2 250.00'
G1 0.000
G2 -0.039
P -2.47'
SD 523.49'
K 126.71
R -0.79
Type Symmetric Parabola
Dir Crest
L 400.00'
L1 200.00'
L2 200.00'
G1 -0.039
G2 -0.074
P -1.71'
SD 515.10'
K 116.80
R -0.86
Type Symmetric Parabola
Dir Sag
L 200.00'
L1 100.00'
L2 100.00'
G1 -0.074
G2 0.043
P 2.91'
SD 118.36'
K 17.20
R 5.81
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CENTERLINE OF OR66
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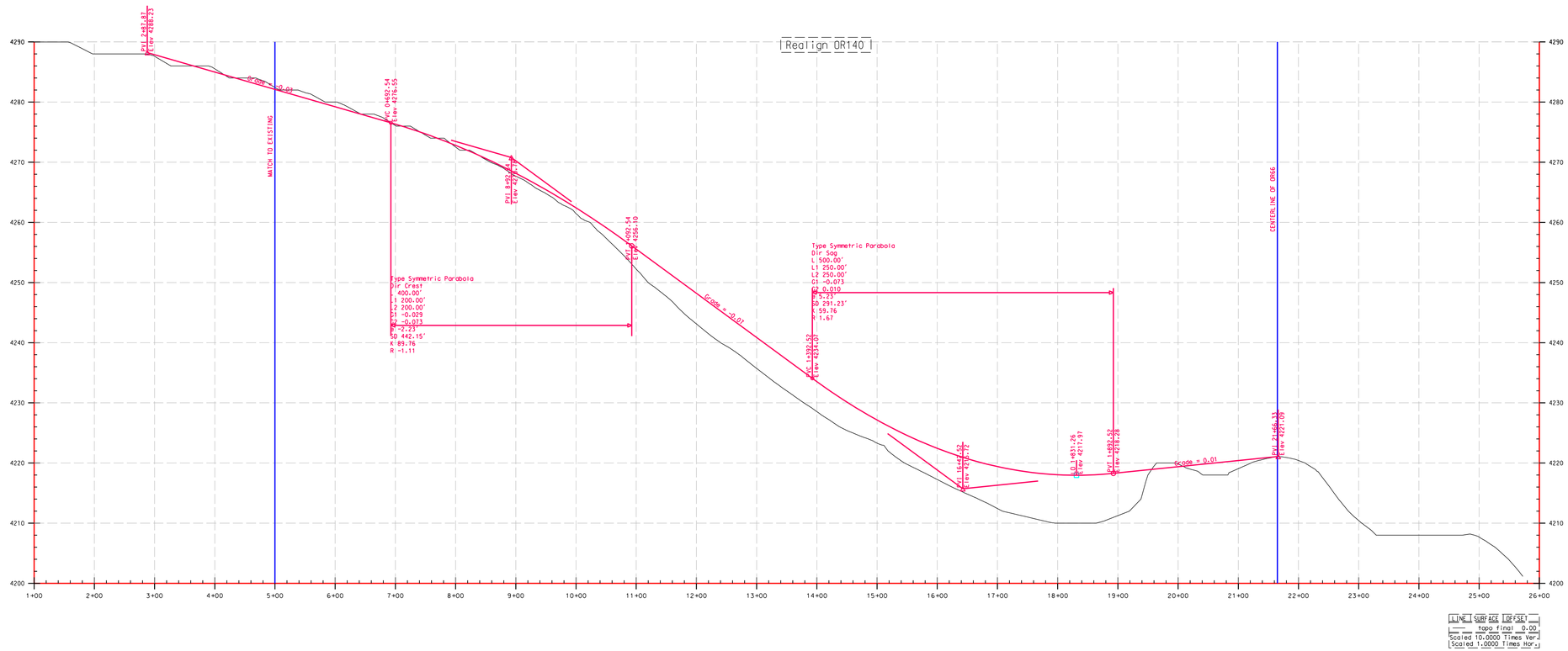
Grade = -0.04
Grade = 0.04



Realign OR140
PVI 2+87.87
Elev 4288.23
Grade = -0.03
MATCH TO EXISTING
PVC 0+692.54
Elev 4276.55
PVI 8+92.54
Elev 4276.78
PVT 1+092.54
Elev 4256.10
Type Symmetric Parabola
Dir Crest
L 400.00'
L1 200.00'
L2 200.00'
G1 -0.029
G2 -0.073
PI -2.23'
SD 442.15'
K 89.76
R -1.11
Grade = -0.07
PVC 1+392.52
Elev 4234.07
Type Symmetric Parabola
Dir Sag
L 500.00'
L1 250.00'
L2 250.00'
G1 -0.073
G2 0.010
PI 5.23'
SD 291.23'
K 59.76
R 1.67
PVI 16+42.52
Elev 4216.72
LO 1+831.26
Elev 4211.97
PVT 1+892.52
Elev 4218.28
Grade = 0.01
PVI 21+66.33
Elev 4221.09
CENTERLINE OF OR66
4290
4280
4270
4260
4250
4240
4230
4220
4210
4200
1+00
2+00
3+00
4+00
5+00
6+00
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26+00
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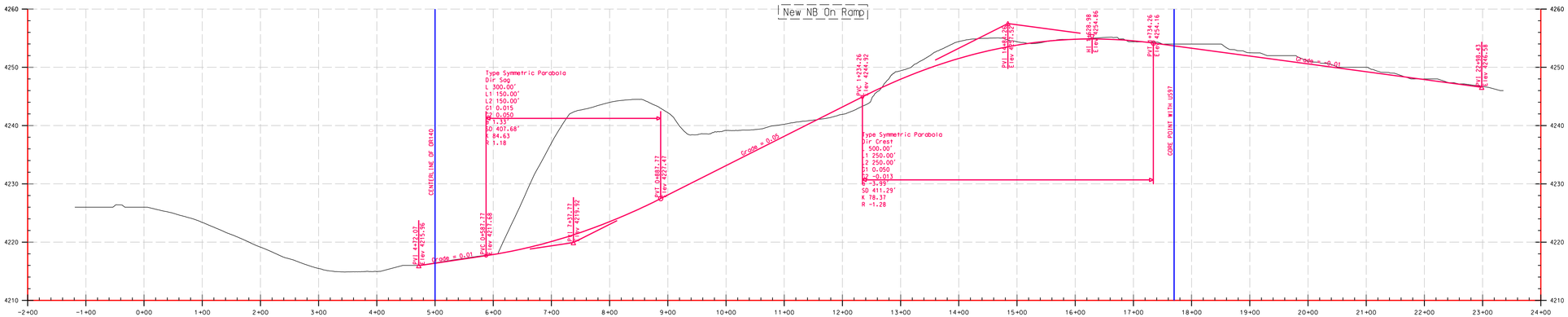
Scaled 1.0000 Times Hor.



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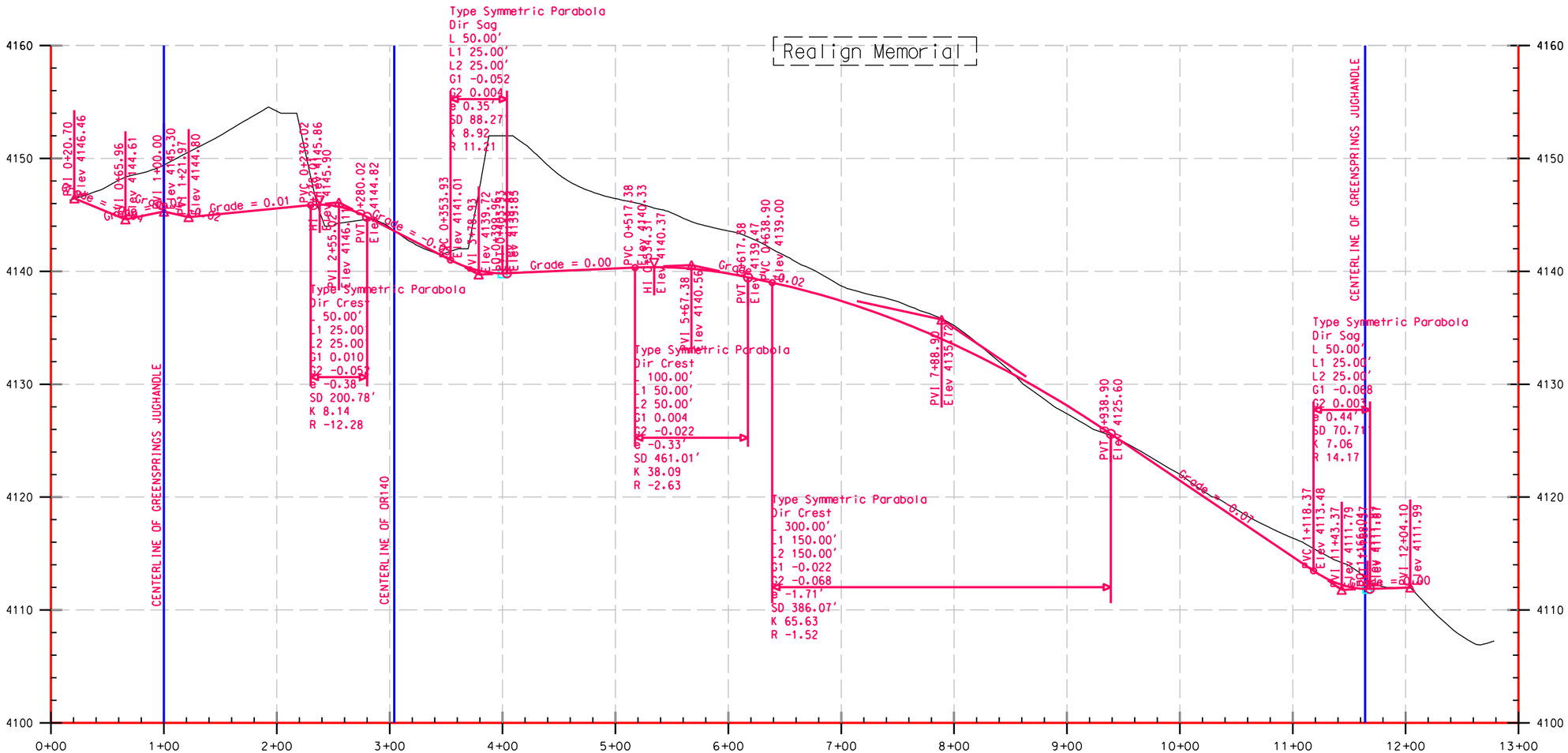

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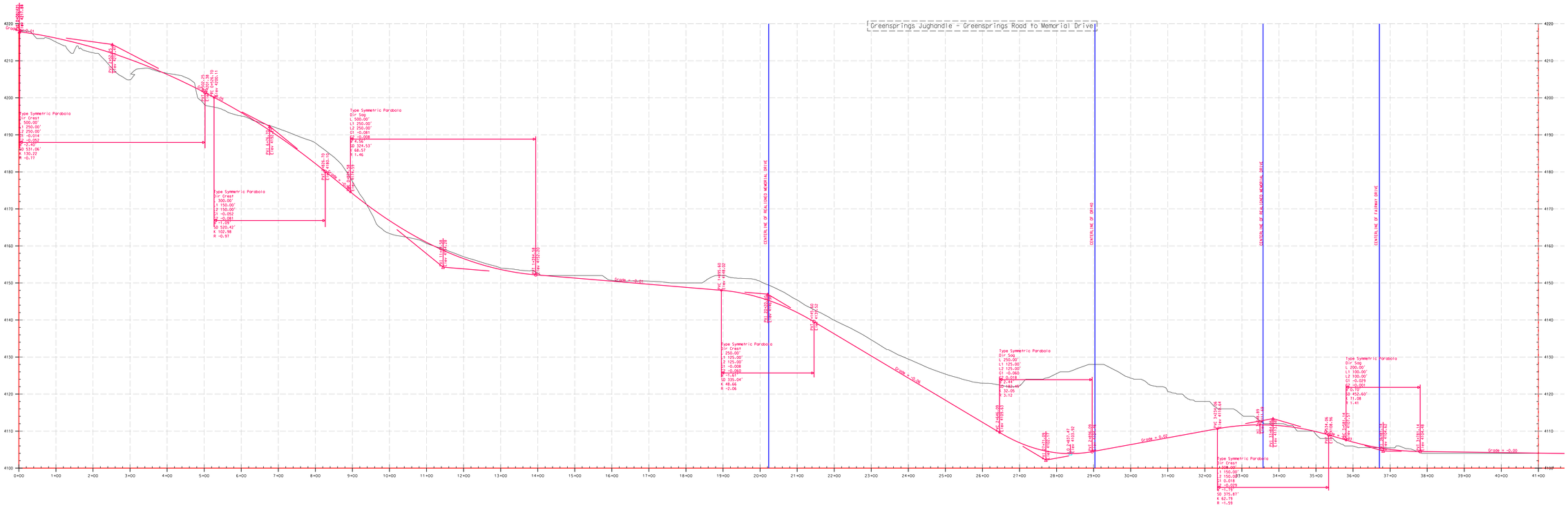
Scaled 1.0000 Times Hor.


Greensprings Jughandle - Greensprings Road to Memorial Drive
CENTERLINE OF HOLLINGS MEMORIAL DRIVE
CENTERLINE OF GRAND
CENTERLINE OF FAIRWAY DRIVE
Grade = 0.02
Grade = -0.06
Grade = 0.02
Grade = -0.00
Type Symmetric Parabola
Sta Crest
L 500.00'
L1 250.00'
L2 250.00'
G1 -0.014
G2 -0.052
PVI Sta 1+54.06'
Elev 4191.27
K -30.27
R -0.77
Type Symmetric Parabola
Sta Crest
L 300.00'
L1 150.00'
L2 150.00'
G1 -0.052
G2 -0.081
PVI Sta 5+20.42'
Elev 4180.12
K 102.98
R -0.97
Type Symmetric Parabola
Sta Sag
L 500.00'
L1 250.00'
L2 250.00'
G1 -0.081
G2 -0.008
PVI Sta 8+48.57'
Elev 4166.13
K 324.53'
R 1.46
Type Symmetric Parabola
Sta Crest
L 250.00'
L1 125.00'
L2 125.00'
G1 -0.008
G2 -1.81
PVI Sta 19+48.66'
Elev 4119.62
K 48.66
R -2.06
Type Symmetric Parabola
Sta Sag
L 250.00'
L1 125.00'
L2 125.00'
G1 -0.060
G2 0.019
PVI Sta 26+48.66'
Elev 4105.64
K 32.05
R 3.12
Type Symmetric Parabola
Sta Crest
L 150.00'
L1 150.00'
G1 0.018
G2 -0.029
PVI Sta 32+75.46'
Elev 4109.64
K -12.79
SD 315.87'
R -1.59
Type Symmetric Parabola
Sta Sag
L 200.00'
L1 100.00'
L2 100.00'
G1 -0.029
G2 -0.001
PVI Sta 36+16.06'
Elev 4106.36
K 71.08
R 1.41
4220
4210
4200
4190
4180
4170
4160
4150
4140
4130
4120
4110
4100
0+00
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Appendix I
Conceptual Cost Estimates

OR 66 GREEN SPRINGS IAMP

Project W1: Realign OR-140 and Widen OR-66

Project Sheet: W1

Note: The Construction Cost Index for 2010 was estimated to be 219

Proposed Road Improvements				
Item	**Unit**	**Quantity**	**Unit Cost**	**Total**
Excavation (Cut)	cu. yd.	4,683	$15.00	$70,241
Embankment (Fill)	cu. yd.	18,197	$20.00	$363,936
Pavement Rehabilitation	sq. ft.	109,982	$4.00	$439,928
New Pavement	sq. ft.	135,100	$8.00	$1,080,800
New Curb	lin. ft.	4,640	$15.00	$69,600
New Sidewalk	sq. ft.	25,400	$5.00	$127,000
Pavement markings	lin. ft.	20,150	$1.00	$20,150
Signage	each	19	$500.00	$9,500
Pavement Removal	sq. ft.	136,500	$2.00	$273,000
			Subtotal A (Roadworks)	*$2,454,155*
Storm Drainage System		% of Subtotal A	20%	$490,831.01
Landscape Improvement		% of Subtotal A	5%	$122,707.75
Street Lighting	each	12	$7,000.00	$80,500.00
Private Utility Coordination	Lump/Sum	1	$25,000.00	$25,000
New Traffic Signal	each	1	$250,000.00	$250,000
Traffic Signal Modification	each	0	$100,000.00	$0
Retaining Walls	sq. ft.	0	$50.00	$0
Structures	sq. ft.	0	$150.00	$0
Railroad Crossing & Signalization	each	0	$750,000.00	$0
			Subtotal B (Other)	*$969,039*
Subtotal 1 (Subtotals A + B)				$3,423,194
Mobilization		% of Subtotal 1	10%	$342,319.38
Erosion Control		% of Subtotal 1	5%	$171,159.69
Traffic Control		% of Subtotal 1	5%	$171,159.69
Subtotal 2 (Mobilization & Traffic Control)				$684,639
Total (Subtotals 1 + 2)				$4,107,833
Plus Contingencies		% of Total	30%	$1,232,349.77
Estimated Construction Cost				**$5,340,182**
Architectural/Engineering		% of Est. Cost	15%	$801,027.35
Construction Management		% of Est. Cost	10%	$534,018.24
Estimated Professional Fees				**$1,335,046**
Right-of-Way	sq. ft.	138,300	$4.00	$553,200
Estimated Property Acquisition Cost				**$553,200**
Estimated Project Cost				**$7,228,428**

OR 66 GREEN SPRINGS IAMP

Project W2: Realign Delap Pit Road

Project Sheet: W2

Note: The Construction Cost Index for 2010 was estimated to be 219

Proposed Road Improvements				
Item	**Unit**	**Quantity**	**Unit Cost**	**Total**
Excavation (Cut)	cu. yd.	6,682	$15.00	$100,233
Embankment (Fill)	cu. yd.	2,227	$20.00	$44,548
Pavement Rehabilitation	sq. ft.	0	$4.00	$0
New Pavement	sq. ft.	60,200	$8.00	$481,600
New Curb	lin. ft.	0	$15.00	$0
New Sidewalk	sq. ft.	0	$5.00	$0
Pavement markings	lin. ft.	2,350	$1.00	$2,350
Signage	each	7	$500.00	$3,500
Pavement Removal	sq. ft.	34,700	$2.00	$69,400
			Subtotal A (Roadworks)	*$701,631*
Storm Drainage System		% of Subtotal A	20%	$140,326.20
Landscape Improvement		% of Subtotal A	5%	$35,081.55
Street Lighting	each	0	$7,000.00	$0.00
Private Utility Coordination	Lump/Sum	1	$10,000.00	$10,000
New Traffic Signal	each	0	$250,000.00	$0
Traffic Signal Modification	each	0	$100,000.00	$0
Retaining Walls	sq. ft.	4,350	$50.00	$217,500
Structures	sq. ft.	0	$150.00	$0
Railroad Crossing & Signalization	each	0	$750,000.00	$0
			Subtotal B (Other)	*$402,908*
Subtotal 1 (Subtotals A + B)				$1,104,539
Mobilization		% of Subtotal 1	10%	$110,453.88
Erosion Control		% of Subtotal 1	5%	$55,226.94
Traffic Control		% of Subtotal 1	2%	$22,090.78
Subtotal 2 (Mobilization & Traffic Control)				$187,772
Total (Subtotals 1 + 2)				$1,292,310
Plus Contingencies		% of Total	30%	$387,693.10
Estimated Construction Cost				**$1,680,003**
Architectural/Engineering		% of Est. Cost	15%	$252,000.52
Construction Management		% of Est. Cost	10%	$168,000.34
Estimated Professional Fees				**$420,001**
Right-of-Way	sq. ft.	97,000	$4.00	$388,000
Estimated Property Acquisition Cost				**$388,000**
Estimated Project Cost				**$2,488,004**

OR 66 GREEN SPRINGS IAMP

Project I1: Realign SB Offramp and Widen OR-66

Project Sheet: I1

Note: The Construction Cost Index for 2010 was estimated to be 219

Proposed Road Improvements				
Item	**Unit**	**Quantity**	**Unit Cost**	**Total**
Excavation (Cut)	cu. yd.	13,505	$15.00	$202,575
Embankment (Fill)	cu. yd.	1,917	$20.00	$38,332
Pavement Rehabilitation	sq. ft.	62,000	$4.00	$248,000
New Pavement	sq. ft.	51,800	$8.00	$414,400
New Curb	lin. ft.	1,800	$15.00	$27,000
New Sidewalk	sq. ft.	8,534	$5.00	$42,670
Pavement markings	lin. ft.	8,500	$1.00	$8,500
Signage	each	9	$500.00	$4,500
Pavement Removal	sq. ft.	37,800	$2.00	$75,600
			Subtotal A (Roadworks)	*$1,061,577*
Storm Drainage System		% of Subtotal A	20%	$212,315.40
Landscape Improvement		% of Subtotal A	5%	$53,078.85
Street Lighting	each	5	$7,000.00	$31,500.00
Private Utility Coordination	Lump/Sum	1	$25,000.00	$25,000
New Traffic Signal	each	1	$250,000.00	$250,000
Traffic Signal Modification	each	0	$100,000.00	$0
Retaining Walls	sq. ft.	3,250	$50.00	$162,500
Structures	sq. ft.	0	$150.00	$0
Railroad Crossing & Signalization	each	0	$750,000.00	$0
			Subtotal B (Other)	*$734,394*
Subtotal 1 (Subtotals A + B)				$1,795,971
Mobilization		% of Subtotal 1	10%	$179,597.13
Erosion Control		% of Subtotal 1	5%	$89,798.56
Traffic Control		% of Subtotal 1	5%	$89,798.56
Subtotal 2 (Mobilization & Traffic Control)				$359,194
Total (Subtotals 1 + 2)				$2,155,166
Plus Contingencies		% of Total	30%	$646,549.65
Estimated Construction Cost				**$2,801,715**
Architectural/Engineering		% of Est. Cost	15%	$420,257.27
Construction Management		% of Est. Cost	10%	$280,171.52
Estimated Professional Fees				**$700,429**
Right-of-Way	sq. ft.	20,900	$4.00	$83,600
Estimated Property Acquisition Cost				**$83,600**
Estimated Project Cost				**$3,585,744**

OR 66 GREEN SPRINGS IAMP

Project I2: New NB Onramp

Project Sheet: I2

Note: The Construction Cost Index for 2010 was estimated to be 219

Proposed Road Improvements				
Item	**Unit**	**Quantity**	**Unit Cost**	**Total**
Excavation (Cut)	cu. yd.	7,215	$15.00	$108,225
Embankment (Fill)	cu. yd.	1,443	$20.00	$28,860
Pavement Rehabilitation	sq. ft.	0	$4.00	$0
New Pavement	sq. ft.	39,000	$8.00	$312,000
New Curb	lin. ft.	0	$15.00	$0
New Sidewalk	sq. ft.	0	$5.00	$0
Pavement markings	lin. ft.	3,000	$1.00	$3,000
Signage	each	8	$500.00	$4,000
Pavement Removal	sq. ft.	0	$2.00	$0
			Subtotal A (Roadworks)	*$456,085*
Storm Drainage System		% of Subtotal A	20%	$91,217.00
Landscape Improvement		% of Subtotal A	5%	$22,804.25
Street Lighting	each	0	$7,000.00	$0.00
Private Utility Coordination	Lump/Sum	1	$25,000.00	$25,000
New Traffic Signal	each	0	$250,000.00	$0
Traffic Signal Modification	each	0	$100,000.00	$0
Retaining Walls	sq. ft.	5,215	$50.00	$260,750
Structures	sq. ft.	0	$150.00	$0
Railroad Crossing & Signalization	each	0	$750,000.00	$0
			Subtotal B (Other)	*$399,771*
Subtotal 1 (Subtotals A + B)				$855,856
Mobilization		% of Subtotal 1	10%	$85,585.63
Erosion Control		% of Subtotal 1	5%	$42,792.81
Traffic Control		% of Subtotal 1	5%	$42,792.81
Subtotal 2 (Mobilization & Traffic Control)				$171,171
Total (Subtotals 1 + 2)				$1,027,028
Plus Contingencies		% of Total	30%	$308,108.25
Estimated Construction Cost				**$1,335,136**
Architectural/Engineering		% of Est. Cost	15%	$200,270.36
Construction Management		% of Est. Cost	10%	$133,513.58
Estimated Professional Fees				**$333,784**
Right-of-Way	sq. ft.	33,000	$4.00	$132,000
Estimated Property Acquisition Cost				**$132,000**
Estimated Project Cost				**$1,800,920**

OR 66 GREEN SPRINGS IAMP

Project E1: Realign Greensprings Drive and Widen OR-140

Project Sheet: E1

Note: The Construction Cost Index for 2010 was estimated to be 219

Proposed Road Improvements				
Item	**Unit**	**Quantity**	**Unit Cost**	**Total**
Excavation (Cut)	cu. yd.	7,792	$15.00	$116,883
Embankment (Fill)	cu. yd.	7,792	$20.00	$155,844
Pavement Rehabilitation	sq. ft.	49,000	$4.00	$196,000
New Pavement	sq. ft.	105,300	$8.00	$842,400
New Curb	lin. ft.	0	$15.00	$0
New Sidewalk	sq. ft.	0	$5.00	$0
Pavement markings	lin. ft.	10,520	$1.00	$10,520
Signage	each	9	$500.00	$4,500
Pavement Removal	sq. ft.	30,520	$2.00	$61,040
			Subtotal A (Roadworks)	*$1,387,187*
Storm Drainage System		% of Subtotal A	20%	$277,437.40
Landscape Improvement		% of Subtotal A	5%	$69,359.35
Street Lighting	each	9	$7,000.00	$59,500.00
Private Utility Coordination	Lump/Sum	1	$25,000.00	$25,000
New Traffic Signal	each	0	$250,000.00	$0
Traffic Signal Modification	each	0	$100,000.00	$0
Retaining Walls	sq. ft.	0	$50.00	$0
Structures	sq. ft.	0	$150.00	$0
Railroad Crossing & Signalization	each	0	$750,000.00	$0
			Subtotal B (Other)	*$431,297*
Subtotal 1 (Subtotals A + B)				$1,818,484
Mobilization		% of Subtotal 1	10%	$181,848.38
Erosion Control		% of Subtotal 1	5%	$90,924.19
Traffic Control		% of Subtotal 1	5%	$90,924.19
Subtotal 2 (Mobilization & Traffic Control)				$363,697
Total (Subtotals 1 + 2)				$2,182,181
Plus Contingencies		% of Total	30%	$654,654.15
Estimated Construction Cost				**$2,836,835**
Architectural/Engineering		% of Est. Cost	15%	$425,525.20
Construction Management		% of Est. Cost	10%	$283,683.47
Estimated Professional Fees				**$709,209**
Right-of-Way	sq. ft.	65,400	$4.00	$261,600
Estimated Property Acquisition Cost				**$261,600**
Estimated Project Cost				**$3,807,643**

OR 66 GREEN SPRINGS IAMP

Project E2: Realign Memorial Drive

Project Sheet: E2

Note: The Construction Cost Index for 2010 was estimated to be 219

Proposed Road Improvements				
Item	**Unit**	**Quantity**	**Unit Cost**	**Total**
Excavation (Cut)	cu. yd.	1,628	$15.00	$24,420
Embankment (Fill)	cu. yd.	1,628	$20.00	$32,560
Pavement Rehabilitation	sq. ft.	0	$4.00	$0
New Pavement	sq. ft.	22,000	$8.00	$176,000
New Curb	lin. ft.	0	$15.00	$0
New Sidewalk	sq. ft.	0	$5.00	$0
Pavement markings	lin. ft.	905	$1.00	$905
Signage	each	7	$500.00	$3,500
Pavement Removal	sq. ft.	14,500	$2.00	$29,000
			Subtotal A (Roadworks)	*$266,385*
Storm Drainage System		% of Subtotal A	20%	$53,277.00
Landscape Improvement		% of Subtotal A	5%	$13,319.25
Street Lighting	each	0	$7,000.00	$0.00
Private Utility Coordination	Lump/Sum	1	$5,000.00	$5,000
New Traffic Signal	each	0	$250,000.00	$0
Traffic Signal Modification	each	0	$100,000.00	$0
Retaining Walls	sq. ft.	0	$50.00	$0
Structures	sq. ft.	0	$150.00	$0
Railroad Crossing & Signalization	each	0	$750,000.00	$0
			Subtotal B (Other)	*$71,596*
Subtotal 1 (Subtotals A + B)				$337,981
Mobilization		% of Subtotal 1	10%	$33,798.13
Erosion Control		% of Subtotal 1	5%	$16,899.06
Traffic Control		% of Subtotal 1	5%	$16,899.06
Subtotal 2 (Mobilization & Traffic Control)				$67,596
Total (Subtotals 1 + 2)				$405,578
Plus Contingencies		% of Total	30%	$121,673.25
Estimated Construction Cost				**$527,251**
Architectural/Engineering		% of Est. Cost	15%	$79,087.61
Construction Management		% of Est. Cost	10%	$52,725.08
Estimated Professional Fees				**$131,813**
Right-of-Way	sq. ft.	49,500	$4.00	$198,000
Estimated Property Acquisition Cost				**$198,000**
Estimated Project Cost				**$857,063**

OR 66 GREEN SPRINGS IAMP

Project E3: Construct Jughandle Interchange

Project Sheet: E3

Note: The Construction Cost Index for 2010 was estimated to be 219

Proposed Road Improvements				
Item	**Unit**	**Quantity**	**Unit Cost**	**Total**
Excavation (Cut)	cu. yd.	3,182	$15.00	$47,730
Embankment (Fill)	cu. yd.	3,182	$20.00	$63,640
Pavement Rehabilitation	sq. ft.	0	$4.00	$0
New Pavement	sq. ft.	43,000	$8.00	$344,000
New Curb	lin. ft.	0	$15.00	$0
New Sidewalk	sq. ft.	0	$5.00	$0
Pavement markings	lin. ft.	1,450	$1.00	$1,450
Signage	each	7	$500.00	$3,500
Pavement Removal	sq. ft.	6,000	$2.00	$12,000
Barricade Median	lin. ft.	850	$30.00	$25,500
			Subtotal A (Roadworks)	*$497,820*
Storm Drainage System		% of Subtotal A	20%	$99,564.00
Landscape Improvement		% of Subtotal A	5%	$24,891.00
Street Lighting	each	0	$7,000.00	$0.00
Private Utility Coordination	Lump/Sum	1	$10,000.00	$10,000
New Traffic Signal	each	0	$250,000.00	$0
Traffic Signal Modification	each	0	$100,000.00	$0
Retaining Walls	sq. ft.	1,050	$50.00	$52,500
Structures	sq. ft.	3,200	$150.00	$480,000
Railroad Crossing & Signalization	each	0	$750,000.00	$0
			Subtotal B (Other)	*$666,955*
Subtotal 1 (Subtotals A + B)				$1,164,775
Mobilization		% of Subtotal 1	10%	$116,477.50
Erosion Control		% of Subtotal 1	5%	$58,238.75
Traffic Control		% of Subtotal 1	5%	$58,238.75
Subtotal 2 (Mobilization & Traffic Control)				$232,955
Total (Subtotals 1 + 2)				$1,397,730
Plus Contingencies		% of Total	30%	$419,319.00
Estimated Construction Cost				**$1,817,049**
Architectural/Engineering		% of Est. Cost	15%	$272,557.35
Construction Management		% of Est. Cost	10%	$181,704.90
Estimated Professional Fees				**$454,262**
Right-of-Way	sq. ft.	34,400	$4.00	$137,600
Estimated Property Acquisition Cost				**$137,600**
Estimated Project Cost				**$2,408,911**

Appendix J
Access Spacing Deviation Documentation

This section documents the need for deviations to Division 51 access spacing standards based on the proposed alignments included in the IAMP.

REALIGNED OR 140

OR 140 is planned to be realigned to the west and connect with OR 66 near the current Balsam Drive intersection with OR 66. This alignment would result in an access spacing of 1,230 feet to the US 97 Southbound Ramp Terminal intersection, which would not meet the required distance of 1,320 feet. The reason for this deviation is document below:

- The realignment results in 1,230 feet of access spacing, which is significantly better than the approximately 375 feet separating OR 140 and Delap Pit Road and the approximately 350 feet separating Delap Pit Road and the US 97 Southbound Ramp Terminal intersection today.
- Safety and/or operational issues are not expected based on the proposed alignment scenario.
- Realignment further to the west to meet 1,320 feet of spacing distance would impact properties on the north side of OR 66.
- The Crossroads development to the south has been developing sites plans based on the existing access reservation located opposite of the existing Balsam Drive access location.
- The ultimate location of the realigned US 97 Southbound Ramp Terminal intersection could vary based on final design considerations, which may require further modifications to the OR 140/OR 66 realigned intersection. As such, the exact deviation needs are not known at this time.
- Deviations to standards are not proposed for intersections to the west because Agate Street is proposed to be right-in/right-out in the future and other accesses farther to the west are undocumented.

REALIGNED GREENSPRINGS DRIVE/MEMORIAL DRIVE

Greensprings Drive and Memorial Drive are proposed to be realigned to a distance 2,420 feet east of the existing US 97 Northbound Ramp Terminal intersection. The distance is short of the 2,640 feet required for access spacing on OR 140 that is designed as an expressway. The need for this deviation is documented below.

- Movement of the realigned intersection farther to the east would require the expansion of the existing bridge over Lake Ewauna to accommodate turn lanes and appropriate taper lengths, which would be cost prohibitive.

- The realigned intersection provides significantly more spacing than the approximately 525 feet that exist between Greensprings Drive and the US 97 Northbound Ramp Terminal intersection today.
- Project E3 (jughandle interchange) introduces an underpass immediately west of the Lake Ewauna Bridge. The closer the right-in/right-out connections with OR 140 are to the underpass, the steeper the longitudinal grades along the roadways of the jughandle configuration will be.

REALIGNED DELAP PIT ROAD

Delap Pit Road will be realigned to intersect with the realigned OR 140. This intersection is planned to be 1,390 feet north of the OR 140/OR 66 intersection, which would meet the 1,320 feet required under Division 51. However, private access locations currently exist to the north and south on OR 140 that do not meet the 1,320 feet access spacing requirement. As such, deviations to these locations would be needed. The need for this is documented below.

- The existing private access locations serve private residences. As such, travel demand for these locations will be minimal. Further, existing Delap Pit Road traffic volumes are very low and expected to remain so. As such, minimal conflicts are expected based on the proximity of the access locations.
- The location of the realigned Delap Pit Road is dictated by meeting spacing standards from OR 140 and the existing grade in the area. As such, locating the roadway in a different location would likely be cost prohibitive and/or infeasible.

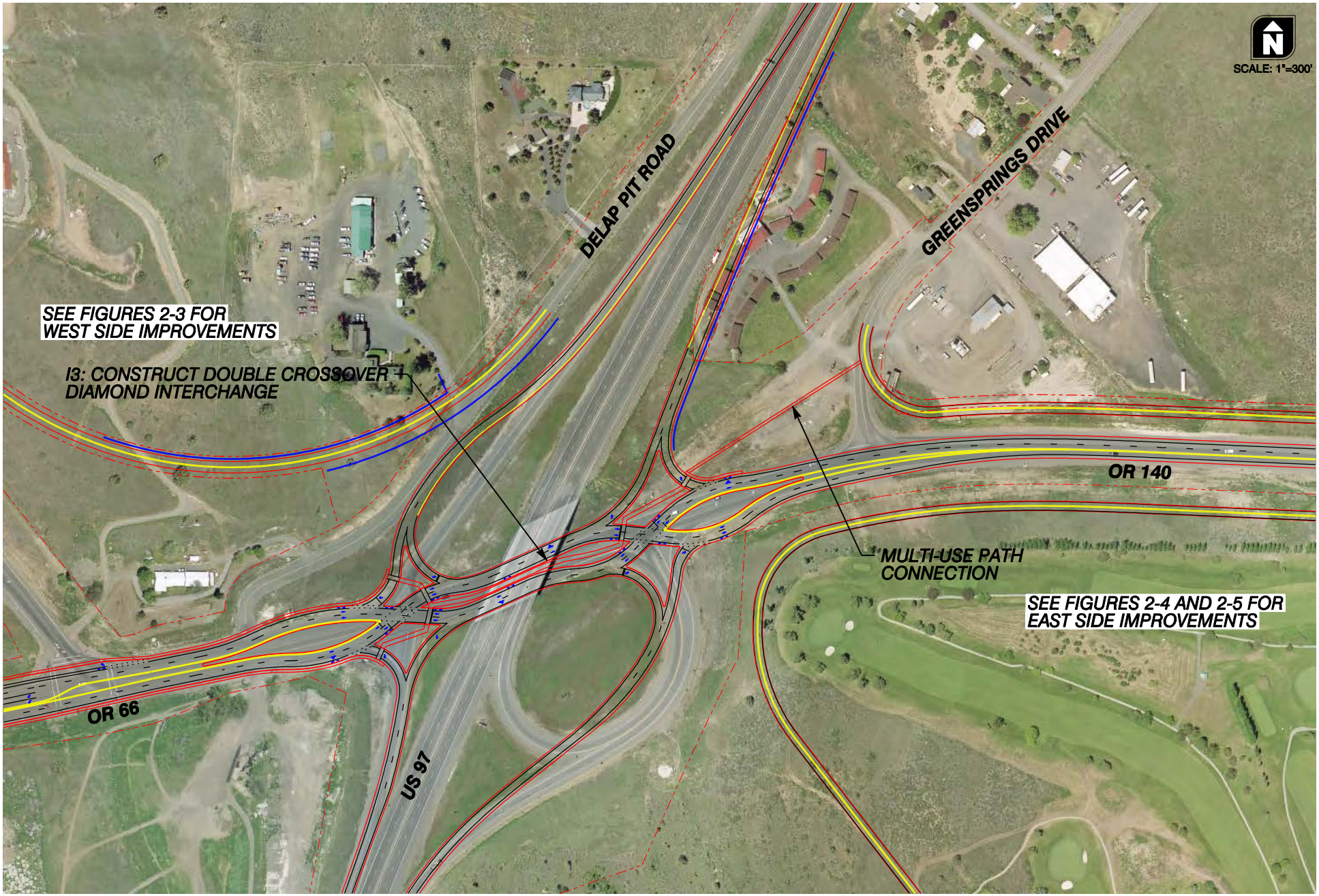
Appendix K
Double Crossover Diamond Interchange

The interchange form projects included in the IAMP are expected to have enough capacity to serve the expected demand at the interchange beyond the 20-year horizon of the planning period. However, all the projects included build toward an ultimate, long-term alternative at this interchange that would construct a Double Crossover Diamond (DCD) interchange. The specifics of this project is described below and shown in Figure K-1.

Project I3 – Construct Double Crossover Diamond Interchange

- Convert interchange to a DCD interchange
- Realign northbound off-ramp in the southeast quadrant of the interchange
- Construct switch-overs at the two ramp terminals with the associated realignment of the approaches
- Install new signals to accommodate the new intersection geometries
- The conceptual cost estimate for Project I3 is approximately $12.8 million excluding right-of-way costs (included at the end of Appendix K)

It is unlikely that Project I3 will be needed within the planning horizon studied as part of this IAMP. Therefore, the DCD interchange improvement was identified to be considered as a potential Vision Project for inclusion into the transportation system plan (TSP).



INTERCHANGE FORM IMPROVEMENT PROJECT: I3
KLAMATH FALLS, OREGON

FIGURE
K-1

KAL_FILE_MODEL_DATE_TIME

Kittelson & Associates, Inc.
Transportation Engineering / Planning

OR 66 GREEN SPRINGS IAMP

Project I3: Diverging Diamond Interchange

Project Sheet: I3

Note: The Construction Cost Index for 2010 was estimated to be 219

Proposed Road Improvements				
Item	**Unit**	**Quantity**	**Unit Cost**	**Total**
Excavation (Cut)	cu. yd.	27,940	$15.00	$419,094
Embankment (Fill)	cu. yd.	9,238	$20.00	$184,760
Pavement Rehabilitation	sq. ft.	0	$4.00	$0
New Pavement	sq. ft.	284,425	$8.00	$2,275,400
New Curb	lin. ft.	4,600	$15.00	$69,000
New Sidewalk & Concrete Median	sq. ft.	27,600	$5.00	$138,000
Pavement markings	lin. ft.	29,961	$1.00	$29,961
Signage	each	27	$500.00	$13,500
Pavement Removal	sq. ft.	283,531	$2.00	$567,062
Median	ft.	680	$30.00	$20,400
			Subtotal A (Roadworks)	*$3,717,177*
Storm Drainage System		% of Subtotal A	20%	$743,435.38
Landscape Improvement		% of Subtotal A	5%	$185,858.84
Street Lighting	each	53	$7,000.00	$371,980
Private Utility Coordination	Lump/Sum	1	$10,000.00	$10,000
New Traffic Signal	each	2	$250,000.00	$500,000
Traffic Signal Modification	each	0	$100,000.00	$0
Retaining Walls (less than 5 feet)	sq. ft.	20,400	$50.00	$1,020,000
Structures	sq. ft.	0	$150.00	$0
Railroad Crossing & Signalization	each	0	$750,000.00	$0
			Subtotal B (Other)	*$2,831,274*
Subtotal 1 (Subtotals A + B)				$6,548,451
Mobilization		% of Subtotal 1	10%	$654,845.11
Erosion Control		% of Subtotal 1	5%	$327,422.55
Traffic Control		% of Subtotal 1	5%	$327,422.55
Subtotal 2 (Mobilization & Traffic Control)				$1,309,690
Total (Subtotals 1 + 2)				$7,858,141
Plus Contingencies		% of Total	30%	$2,357,442.39
Estimated Construction Cost				**$10,215,584**
Architectural/Engineering		% of Est. Cost	15%	$1,532,337.56
Construction Management		% of Est. Cost	10%	$1,021,558.37
Estimated Professional Fees				**$2,553,896**
Right-of-Way	sq. ft.	0	$10.00	$0
Estimated Property Acquisition Cost				**$0**
Estimated Project Cost				**$12,769,480**