April 2012

KLAMATH FALLS URBAN AREA TRANSPORTATION SYSTEM PLAN UPDATE

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING/PLANNING

Transportation System Plan

Klamath Falls Urban Area Transportation System Plan

Klamath Falls, Oregon

Adopted by Klamath County: January 24, 2012

Adopted by the City of Klamath Falls: August 6, 2012

Transportation System Plan

Klamath Falls Urban Area Transportation System Plan

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April 2012

This project was funded by the Oregon Department of Transportation.

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ABBREVIATIONS

ADT	Average Daily Traffic
AMM	Access Management Manual
APM	Analysis Procedures Manual
BTS	Basin Transit Services
BNSF	Burlington Northern Santa Fe
CAC	Citizen Advisory Committee
CDO	Community Development Ordinance
DLCD	Department of Land Conservation and Development
HCM	Highway Capacity Manual
HDM	Highway Design Manual
HSM	Highway Safety Manual
IAMP	Interchange Area Management Plan
ITE	Institute of Transportation Engineers
KCC	Klamath Community College
LDC	Land Development Code
LOS	Level of Service
MUTCD	Manual on Uniform Traffic Control Devices
MMLOS	Multimodal Level of Service
MPH	Miles per Hour
NCHRP	National Cooperative Highway Research Program
NTM	Neighborhood Traffic Management
OC&E	Oregon, California and Eastern
ODOT	Oregon Department of Transportation
OHP	Oregon Highway Plan
OIT	Oregon Institute of Technology
ORS	Oregon Revised Statues
PMT	Project Management Team

SDC	System Development Charge
SOV	Single Occupancy Vehicle
SRTS	Safe Routes to School
STP	Surface Transportation Program
SPIS	Statewide Priority Index System
TAC	Technical Advisory Committee
TDM	Transportation Demand Management
TPR	Transportation Planning Rule
TSP	Transportation System Plan
TPAU	Transportation Planning and Analysis Unit
UGB	Urban Growth Boundary
UP	Union Pacific
V/C	Volume-to-Capacity
VMT	Vehicle Miles Traveled
VHT	Vehicle Hours Traveled

PREFACE

The development of this TSP update was guided by the Project Management Team (PMT), the Technical Advisory Committee (TAC), and the Citizen Advisory Committee (CAC). Members of the PMT, TAC, and CAC are identified below, along with members of the consultant team. The members listed devoted substantial amounts of time towards the development of the Klamath Falls Urban Area Transportation System Plan (TSP) Update. In particular, members of the TAC and CAC should be applauded for the volunteer efforts that each contributed to this plan update. The PMT and consultant team appreciate their dedication to achieving the TSP contained herein.

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Section 1 Introduction

1 INTRODUCTION

The City of Klamath Falls and Klamath County, in conjunction with the Oregon Department of Transportation (ODOT), initiated an update of the urban area's Transportation System Plan (TSP) in 2010. This plan is intended to guide the management and implementation of the transportation facilities, policies, and programs, within the urban area over the next 25 years. This plan blends the vision of the City and County as it relates to the future of the transportation system while remaining consistent with state and other local plans and policies. The plan also provides the necessary elements for adoption by the governing bodies into both the City and County's respective Comprehensive Plans.

State of Oregon planning rules require that the TSP be based on the current comprehensive plan land use map and must provide a transportation system that accommodates the expected 20-year growth in population and employment that will result from implementation of the land use plan. The contents of this TSP update are guided by Oregon Revised Statute (ORS) 197.712 and the Department of Land Conservation and Development (DLCD) administrative rule known as the Transportation Planning Rule (TPR). These laws and rules require that jurisdictions develop the following:

- a road plan for a network of arterial and collector streets;
- a bicycle and pedestrian plan;
- an air, rail, water, and pipeline plan;
- a transportation financing plan; and
- policies and ordinances for implementing the TSP.

The TPR requires that the transportation system plan incorporates the needs of all users and abilities. In addition, the TPR requires that local jurisdictions adopt land use and subdivision ordinance amendments to protect transportation facilities and to provide bicycle and pedestrian facilities between residential, commercial, and employment/institutional areas. It is further required that local communities coordinate their respective plans with the applicable county, regional, and state transportation plans.

TSP Process

The Klamath Falls Urban Area TSP was updated through a process that identified transportation needs, analyzed potential options for addressing those needs over the next 25 years, and provided a financial and implementation plan. The following steps were involved in this process:

- Review of state, regional, and local transportation plans and policies that the Klamath Falls Urban Area TSP must either comply with or be consistent with.
- Gathering community input through public workshops at key points in the project.
- Working with technical and citizen advisory committees to establish goals and objectives, identify and assess alternatives, and prioritize future needs.
- Using a detailed inventory of existing transportation facilities to serve as a foundation to establish needs near- and long-term.
- Identifying and evaluating future transportation needs to support the land use vision and economic vitality of the urban area
- Prioritizing improvements and strategies that are reflective of the community's vision and fiscal realities.
- Preparing for review and adoption by local agencies, including the Klamath Falls City Council, Klamath County Commissioners, and the City and County Planning Commissions.

Public Involvement

The TSP update process provided City and County residents the opportunity to share their respective visions for the future of the transportation system. Comments were gathered at two public open house events held during the TSP development process as well as during two Virtual Open House events where residents who could not attend the in-person meetings could still hear the latest information and provide feedback. Lastly, a project website was maintained throughout the project that provided interested parties with the most recent documents available, information on upcoming meetings, and the ability to provide general comments to the project team. All of this input informed the development of the TSP goals and policies as well as the planned improvements.

The planning process was guided by a Technical Advisory Committee (TAC) and a Citizen Advisory Committee (CAC). The TAC was comprised of local and state officials from key agencies including the City of Klamath Falls Planning and Public Works Departments, Klamath County Planning and Public

Works Departments, Oregon Department of Transportation Planning and Rail Divisions, Kingsley Field, and Basin Area Transit. The CAC was comprised of community leaders including members of the City Council, County Commissioners, City and County Planning Commissions, and other local groups and committees.

Members of the TAC and CAC reviewed the technical aspects of the TSP. They held five joint meetings that focused on all aspects of the TSP development, including the evaluation of existing deficiencies and forecast needs, the selection of transportation options, the presentation of the draft TSP, and the review of ordinance amendments.

In addition to the established advisory committees, the draft plans were discussed with the City and County Planning Commissions, County Commissioners, and City Council at work sessions and at public hearings. A summary of the meetings and dates related to the public involvement process is provided below.

TABLE 1-1: PLAN DEVELOPMENT & ADOPTION PUBLIC INVOLVEMENT SUMMARY

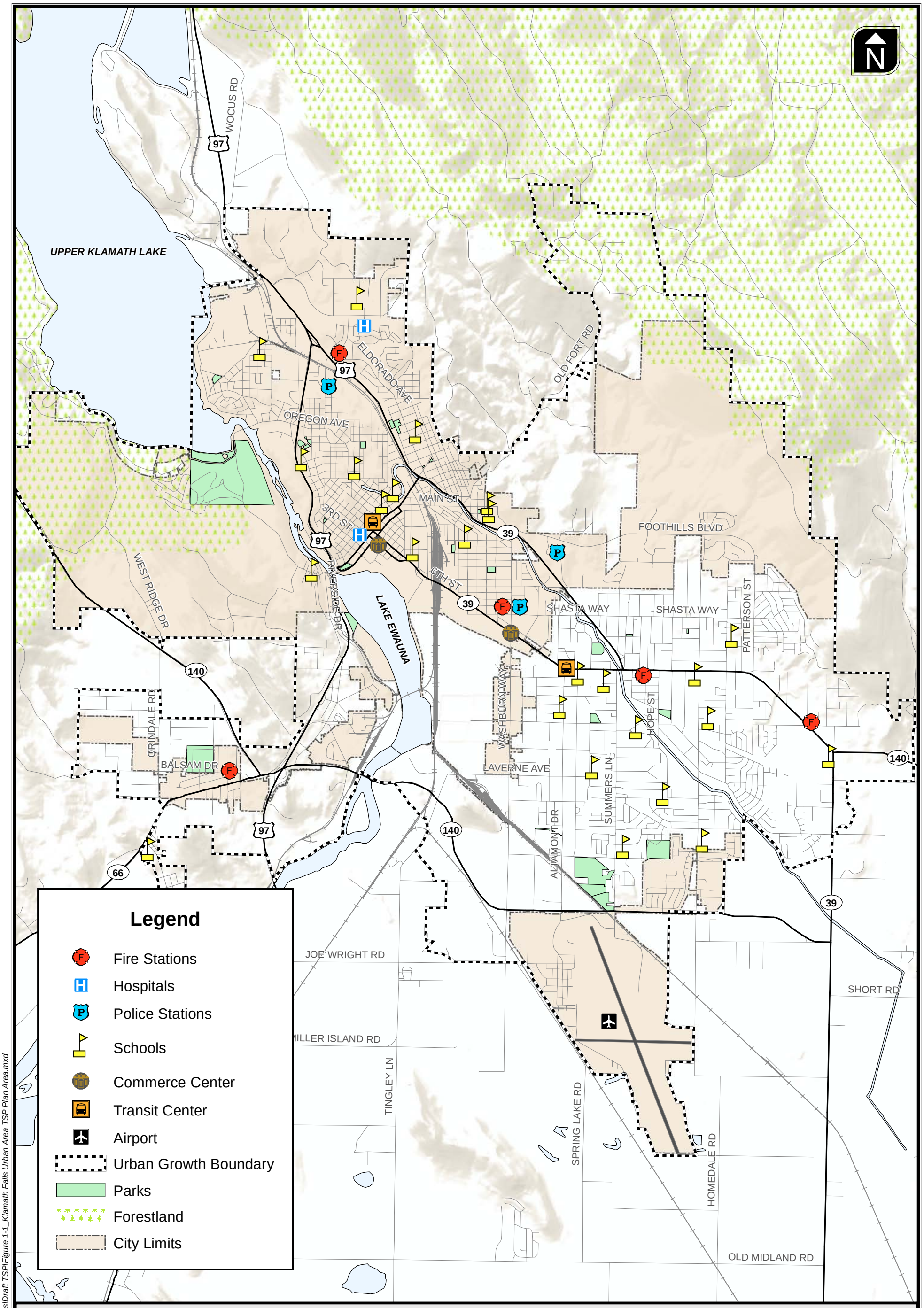
Meeting Event	Date/Location	Meeting Purpose/Objectives
TAC/CAC Meeting #1	Monday, November 15, 2010 City of Klamath Falls	Provided an opportunity for project stakeholders to become familiar with the project scope, schedule and key deliverables. Discussed draft Technical Memorandum #1 and #2, which present the policy and plan review and the goals and evaluation criteria, respectively.
TAC/CAC Meeting #2	Wednesday, January 19, 2011 City of Klamath Falls	Discussed Technical Memorandum #3 and #4, which evaluated existing and future conditions and presented the results.
Public Workshop #1	Wednesday, January 19, 2011 Community Meeting Room 133 North 4th Street Klamath Falls, OR	Provided an opportunity for community members to share their ideas, thoughts, concerns and desires related to Klamath Falls in its present state and the future of Klamath Falls. Also presented the results of the existing and future conditions analyses. A Virtual Open House was also available for those unable to attend to have information discussed available online and to submit their comments electronically.
TAC/CAC Meeting #3	Tuesday, March 29, 2011 City of Klamath Falls	Discussed Technical Memorandum #5, which summarized the alternatives analysis conducted.
Adopting Bodies Joint Work Session #1	Tuesday, March 29, 2011 Klamath County Commissioners Chambers	Discussed project findings to date and outlined project tasks yet to be completed.
Access Spacing Discussion	Monday, June 6, 2011 City of Klamath Falls	Discussed existing and potential access spacing standards with City, County, and ODOT staff.

Meeting Event	Date/Location	Meeting Purpose/Objectives
TAC/CAC Meeting #4	Monday, June 6th, 2011 City of Klamath Falls	Discussed Technical Memorandum #6, which summarizes the preferred plan and the cost constrained plan.
Public Workshop #2	Wednesday, June 29, 2011 Klamath Falls City Council Chambers 500 Klamath Avenue Klamath Falls, Oregon	Provided an opportunity for community members to hear review the projects included in the draft preferred plan and provide input. A general project update was also provided. A Virtual Open House was also available for those unable to attend to have information discussed available online and to submit their comments electronically.
TAC/CAC Meeting #5	Tuesday, September 6th, 2011 City of Klamath Falls	Discussed the Draft TSP.
Adopting Bodies Joint Work Session #2	Monday, September 19, 2011 Klamath County Commissioners Chambers	Provided an overview of the Draft TSP.
Board of County Commissioners Public Hearing	Tuesday, January 24th, 2012 Klamath County Commissioners Chambers	Adopted Klamath Falls Urban Area TSP. This was a joint hearing with the Klamath County Planning Commission.
County Planning Commission Public Hearing	Tuesday, January 24th, 2012 Klamath County Commissioners Chambers	Adopted Klamath Falls Urban Area TSP. This was a joint hearing with the Klamath County Board of Commissioners.
City Planning Commission Public Hearing	Monday, April 9th, 2012 City of Klamath Falls Council Chambers	Adopted Klamath Falls Urban Area TSP. This was a joint hearing with the Klamath Falls City Council.
City Council Public Hearing #1	Monday, April 9th, 2012 City of Klamath Falls Council Chambers	This was the first reading of the Klamath Falls Urban Area TSP. This was a joint hearing with the Klamath Falls City Planning Commission.
City Council Public Hearing #2	Monday, August 6th, 2012 City of Klamath Falls Council Chambers	Adopted Klamath Falls Urban Area TSP.

Note: Appendix 1A provides the detailed public involvement plan

Plan Area

This TSP covers publicly owned transportation facilities within the existing Klamath Falls urban growth boundary (UGB) as reflected in Figure 1-1. Per TPR, the plan focuses on arterial and collector streets and their intersections, pedestrian and bicycle facilities along the arterial and collector streets and at other off-street locations, public transportation, and other transport facilities and services, including rail service, air service, pipelines and water service.



Klamath Falls Urban Area TSP Plan Area

Figure 1-1

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TSP Organization and Methodology

Development of the TSP began with the development of transportation goals and objectives to guide development of the TSP and the long-term vision for the transportation system. These goals and objectives are presented in Section 2 of this plan. Section 3 summarizes a review of relative policies, codes, and plans and how each applies to the Klamath Falls Urban Area TSP update.

Section 4, Section 5, Section 6, Section 7, and Section 8 present the Roadway, Pedestrian Facilities, Bicycle Facilities, Transit System, and Rail, Air, Pipeline, & Surface Water Plans, respectively. These sections discuss the existing conditions analysis that was conducted for each travel mode, the future conditions (year 2035) analysis (where applicable), and any relative plan elements that have been included in the TSP.

Section 9 documents "Vision Projects" that are included in the Klamath Falls Urban Area TSP. These are projects that have been identified as needed based on sub-area analysis that have been conducted throughout the urban area, but were not identified as needs through the horizon year of the TSP. However, varying development patterns or intensities could result in these projects being needed earlier than anticipated.

Section 10, Transportation Funding Plan, provides an analysis and summary of funding sources to finance the identified transportation system improvements as well as the constrained and unconstrained plan elements.

Finally, Section 11, Implementation Ordinances, presents the adoption ordinances required for the adopting agencies to formally adopt the TSP, including specific changes in local zoning policies to implement the TSP and to achieve compliance with the Oregon TPR (OAR 660 Division 12).

Sections 1 through 11, in combination with Appendices 1A through 1E, comprise Volume 1 of the TSP and provide the main substance of the plan. These are supplemented by Technical Appendices in Volume 2 that contain the technical memoranda documenting the existing conditions analysis, forecast needs, alternatives analysis, and the sub-area plans that informed the TSP update.

Section 2 Goals and Policies

2 GOALS AND POLICIES

The goals and objectives presented in the section were developed based on input from the TSP Technical Advisory Committee (TAC) and Citizen Advisory Committee (CAC). These guidelines are intended to define the short- and long-term priorities for the urban area transportation system. Ultimately, the goals and objective presented here represent the collective vision for the transportation system and emphasize what areas future transportation system improvements or modifications should focus on. These goals are discussed in more detail in *Technical Memorandum #2: Goals, Objectives, and Evaluation Criteria* which is provided in the *Technical Appendix 2B.*

Transportation Goals

Seven goals were developed by the PMT, TAC, and CAC to guide the future vision of the Klamath Falls urban area transportation system and are presented below.

1. Ensure a safe and efficient transportation system for all users.
2. Provide access to the transportation system for all users.
3. Integrate adequate bicycle and pedestrian pathways, sidewalks, and bicycle lanes through the community, particularly to connect residential areas with schools and activity centers.
4. Improve the local circulation system to reduce the community's reliance on State Highways to travel to local destinations.
5. Build and maintain the transportation system to facilitate economic development in the region.
6. Improve system performance by balancing mobility and access, particularly along main travel routes.
7. Minimize the impacts of transportation system development on the natural and built environment.

Transportation Goals, Objectives, and Evaluation Criteria

A detailed description of the objectives of each goal and the criteria by which progress towards meeting each goal can be evaluated throughout implementation of the plan is provided below.

Goal #1: Ensure a safe and efficient transportation system for all users

Objectives

1A. Coordinate with existing safe routes to school (SRTS) plans and identify potential engineering components for future SRTS plans for local schools.

1B. Strategically plan for safety and operational improvements for bicyclists and pedestrians.

1C. Incorporate the Highway Safety Manual (HSM) into development review and capital project evaluation processes.

1D. Reduce the number of fatal and serious crashes in the plan area by 50% in the next 20 years.

1E. Reduce the frequency of bicycle and pedestrian related crashes in the plan area by 50% in the next 20 years.

1F. Meet applicable City, County, or State operational performance measures.

Criteria

1C1. Project includes pedestrian and bicycle improvements located within existing or potential SRTS plan areas.

1C2. Influence of proposed project on developing new SRTS plans and/or enhancing existing SRTS plans.

1C3. Number of conflict points between all modes of travel including crossing points for pedestrians and bicyclists along major arterials.

1C4. Miles of designated facilities (on-street and off-street) for bicyclists and pedestrians provided.

1C5. Intersection visibility and sight distances available to motorists, pedestrians, and bicyclists at intersections and key decision points.

1C6. Estimated number of fatal and serious injury crashes.

1C7. Estimated number of bicycle and pedestrian related crashes.

1C8. Percent of facilities meeting applicable operational performance measure.

Goal #2: Provide access to the transportation system for all users

Objectives

2A. Provide transportation mode choices to all users of the transportation system.

Criteria

2C1. Impact of transportation projects on low income and minority populations

2C2. ADA Compliance.

2C3. Viability of non-auto travel.

2C4. Incorporation of safe, convenient, and comfortable multimodal facilities.

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

Objectives

3A. Provide safe and convenient connections between travel modes.

3B. Identify ways to improve street connectivity to provide additional travel routes for bicyclists, pedestrians, and autos.

3C. Prioritize projects that improve pedestrian and bicycle system connectivity in areas near schools.

3D. Provide signing and pavement markings to identify bicycle and pedestrian networks through the City and to help bicycle and pedestrians reach their destinations via the network.

Criteria

3C1. Potential impact on bicycle and pedestrian volumes.

3C2. Impact on connectivity of bicycle and pedestrian systems.

3C3. Average trip length for bicyclists from residential areas to activity centers via the bicycle/pedestrian networks.

3C4. Average trip length for pedestrians from residential areas to activity centers via the bicycle/pedestrian networks

3C5. Incorporation of wayfinding signs and pavement markings for pedestrians and bicyclists.

3C6. Number of uncontrolled crossing conflict points between vehicles and pedestrians/bicyclists on the bicyclist/pedestrian network.

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

Objectives

4A. Provide alternative routes to the state highways.

4B. Provide adequate capacity on alternative routes to state highways.

4C. Develop local circulation plan identifying valuable new local circulation routes and connections.

4D. Sign local routes for local destinations.

Criteria

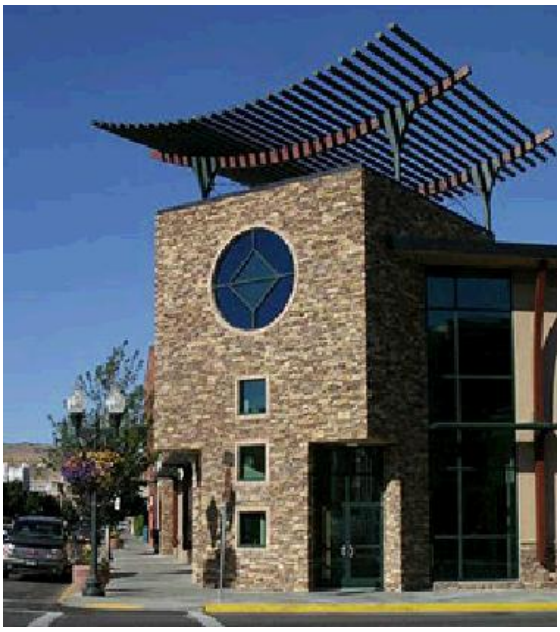
4C1. Average trip length.

4C2. Percent of capacity on regional facilities used for reaching local destinations.

4C3. Volume-to-capacity (V/C) ratios on parallel routes to highways.

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

Objectives



5A. Improve the movement of goods and delivery of services throughout the region using a variety of travel modes.

5B. Ensure adequate capacity for future travel demand and multiple modes on collector and arterial streets and on the local highways to enable economic development in the community.

5C. Identify lower cost alternatives or provide funding mechanisms for transportation improvements necessary for development to occur.

5D. Program transportation improvements to facilitate the development of desired land uses.

5E. Provide adequate capacity at rail crossings to meet demand.

5F. Review transportation and land-use code and regulations and identify changes to attract and facilitate desired development.

Criteria

5C1. Roadway geometry accommodates freight movement where it is needed.

5C2. Traffic operations performance on designated freight routes.

5C3. Potential increased attraction to desired businesses and developers.

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

Objectives

6A. Develop an access management plan that reflects desired character and operations of roadways and is feasible in terms of adoption and enforcement.

6B. Incorporate the HSM analysis into corridor planning, operations and design activities to help improve safety.

6C. Incorporate multimodal level-of-service (MMLOS) analysis from the Highway Capacity Manual (HCM) 2010 to improve mobility for multiple modes.

Criteria

6C1. Number of access points for motorists based on street classification and desired street character.

6C2. Estimated number of future crashes along the corridor.

6C3. Estimated MMLOS performance along the corridor.

6C4. Access provided for freight, bicyclists, and pedestrians.

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

Objectives

7A. Reduce vehicle miles traveled (VMT) to reduce emissions.

7B. Increase the non-auto mode split to reduce emissions.

7C. Update City design standards to reduce water run-off and street maintenance costs.

7D. Use technology to improve efficiency and safety of the transportation system.

7E. Assess the ability of the

transportation system to handle proposed changes to, or development of, adjacent land uses.

7F. Promote transportation demand management strategies (carpooling, flexible work hours, telecommuting, etc.) to reduce VMT on the transportation system.

7G. Base planned future improvements on available funding.

Criteria

7C1. City-wide VMT and vehicle hours traveled (VHT).

7C2. Prevailing (i.e., 85th percentile) corridor travel speed on major thoroughfares compared to the desired operating speeds given roadway function, class, and desired character.

7C3. Travel mode split.

7C4. Effectiveness of City design standards to limit the environmental impact of the transportation system.

7C5. Vehicle occupancy along commuting corridors during the peak periods.

7C6. Installation of ITS devices.

7C7. Compatibility of transportation system and adjacent land use.

7C8. Compatibility of planned future improvements and available funding.

Section 3 Policy and Code Review

3 POLICY AND CODE REVIEW

One of the project objectives of the Klamath Falls Urban Area TSP Update is to ensure that this transportation policy document is consistent with local and state transportation policies and standards, and that it is implemented through the City of Klamath Falls and Klamath County land development ordinances. To meet these objectives, a review and evaluation of existing plans, policies, standards, and laws that are relevant to local transportation planning was conducted. Detailed information from this review, including a complete list of the documents reviewed, can be found in *Technical Appendix 2A*.

The summary of state, regional, and local documents, as they relate to transportation planning in the Klamath Falls Urban Area, provides the policy framework for the TSP planning process. An overview of State policy and regulations, including those pertaining to the highway system, freight movement, public transportation, aviation, and bicycle and pedestrian facilities, guided the development of the local system and ensured consistency with State transportation objectives. Notably, the regulatory review included an examination of the City of Klamath Falls Community Development Ordinance and the Klamath County Land Development Code for compliance with the requirements of the TPR (OAR 660, Division 12). The review summarizes the requirements of TPR Section -0045, Implementation of the Transportation System Plan, lists the applicable implementation elements of the TPR, and demonstrates where the adopted City and County regulations comply, or where amendments to code language need to comply, with the TPR. These recommendations guided the development of draft ordinance language (see *Appendix 1B, Recommended Ordinance Amendments*).

A number of local documents were also reviewed for adopted policies or requirements that could have possible impacts on the transportation system and implications for the Urban Area TSP Update. Reviewed documents include the Klamath Falls Urban Area Economic Opportunities Analysis, Klamath Falls Airport Master Plan, and Oregon Parks Master Plan. Several other Klamath Falls area plans were reviewed for development assumptions and requirements and transportation improvements that impact the transportation system. The Klamath Falls West Side Refinement Plan, Orindale/Balsam Sub-Area Transportation Master Plan, Campus Area Sub-Area Master Plan, and Basin View PUD Standards were all reviewed to ensure that the Urban Area TSP reflects the assumptions and recommendations of these documents.

Section 4 Roadway Facility Plan

4 ROADWAY FACILITY PLAN

The Klamath Falls urban area has a variety of transportation facilities that serve all types of travel including pedestrians, bicyclists, transit riders, and vehicular traffic. However, the majority of travel within the urban area is served via the roadway system which accommodates vehicular traffic as well as many of the other modes mentioned previously.

The following subsections describe in detail the existing characteristics of the roadway system within the urban area and how each roadway is utilized. The forecast 2035 traffic conditions are described and deficiencies are identified. Based on these analysis, future roadway projects, intersection projects, safety projects, and studies are outlined to address deficiencies. Policies and strategies to manage traffic demands in the future are also identified.

Existing Roadway System

This subsection describes the existing roadway system within the Klamath Falls urban area. Specifically, roadway jurisdiction, functional classification, and designated truck routes are addressed.

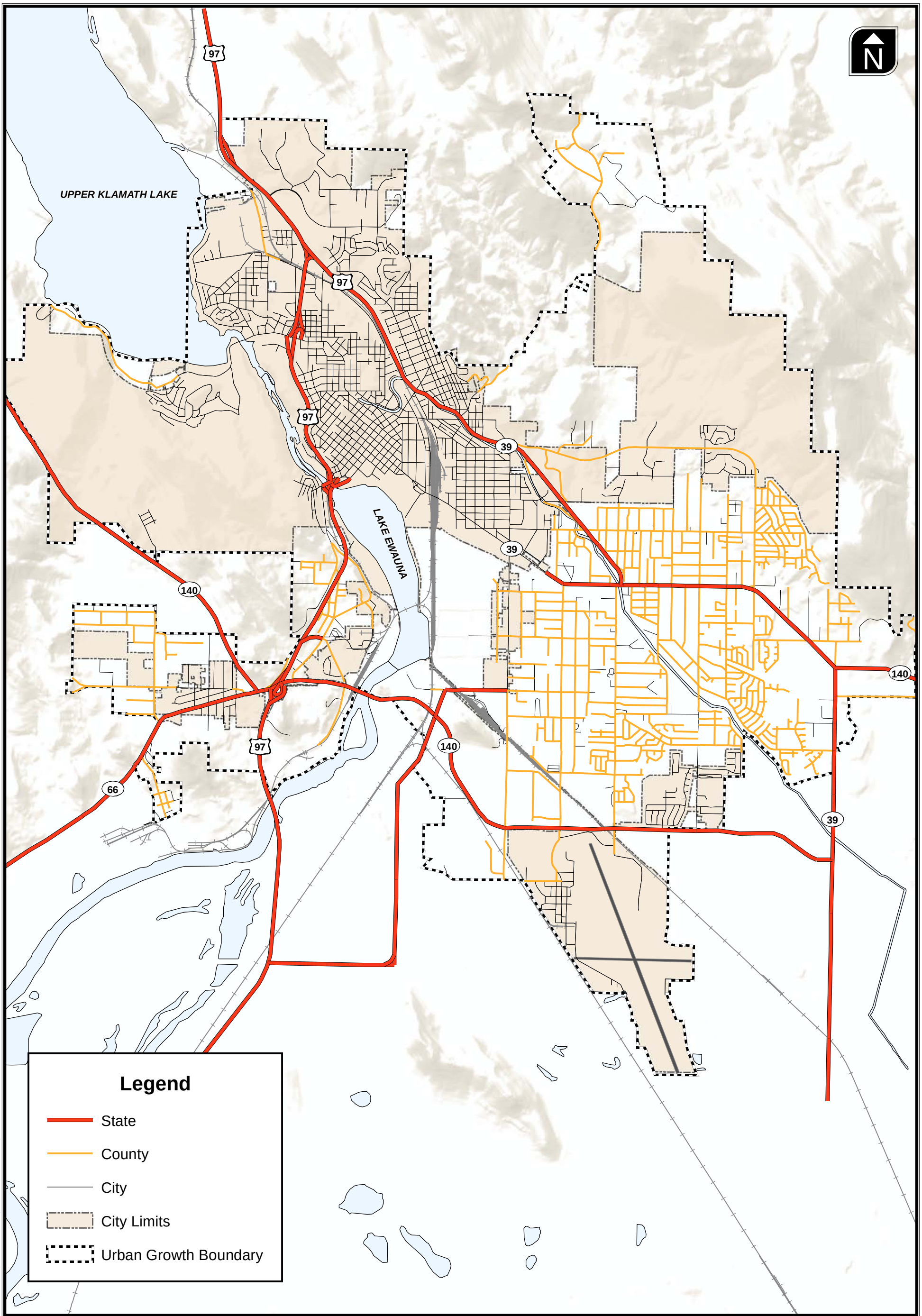
JURISDICTION

Public roads within the UGB are operated and maintained by three separate jurisdictions: the City of Klamath Falls, Klamath County, and the Oregon Department of Transportation (ODOT). Each jurisdiction is responsible for the following:

- Determining the road's functional classification;
- Defining the roadway's major design and multimodal features;
- Maintenance and operations; and,
- Approving construction and access permits.

Coordination is required among the three jurisdictions to ensure that the transportation system is planned, operated, maintained, and improved to safely meet public needs. Figure 4-1 illustrates the existing street system and which agency is responsible for each street within the UGB.

Many of the major routes throughout the urban area are maintained by ODOT. As such, local trips made within the urban area have a tendency to rely heavily upon the state highway system. Figure 4-1 shows roadway jurisdictional control within the urban area.



Transportation Facilities by Jurisdiction

Figure 4-1

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FUNCTIONAL CLASSIFICATION

A street's functional classification reflects its role in the transportation system and defines desired operational and design characteristics such as pavement width, right-of-way requirements, driveway (access) spacing requirements, and the appropriate type of pedestrian and bicycle facilities. The Klamath Falls Urban Area TSP includes the following classifications:

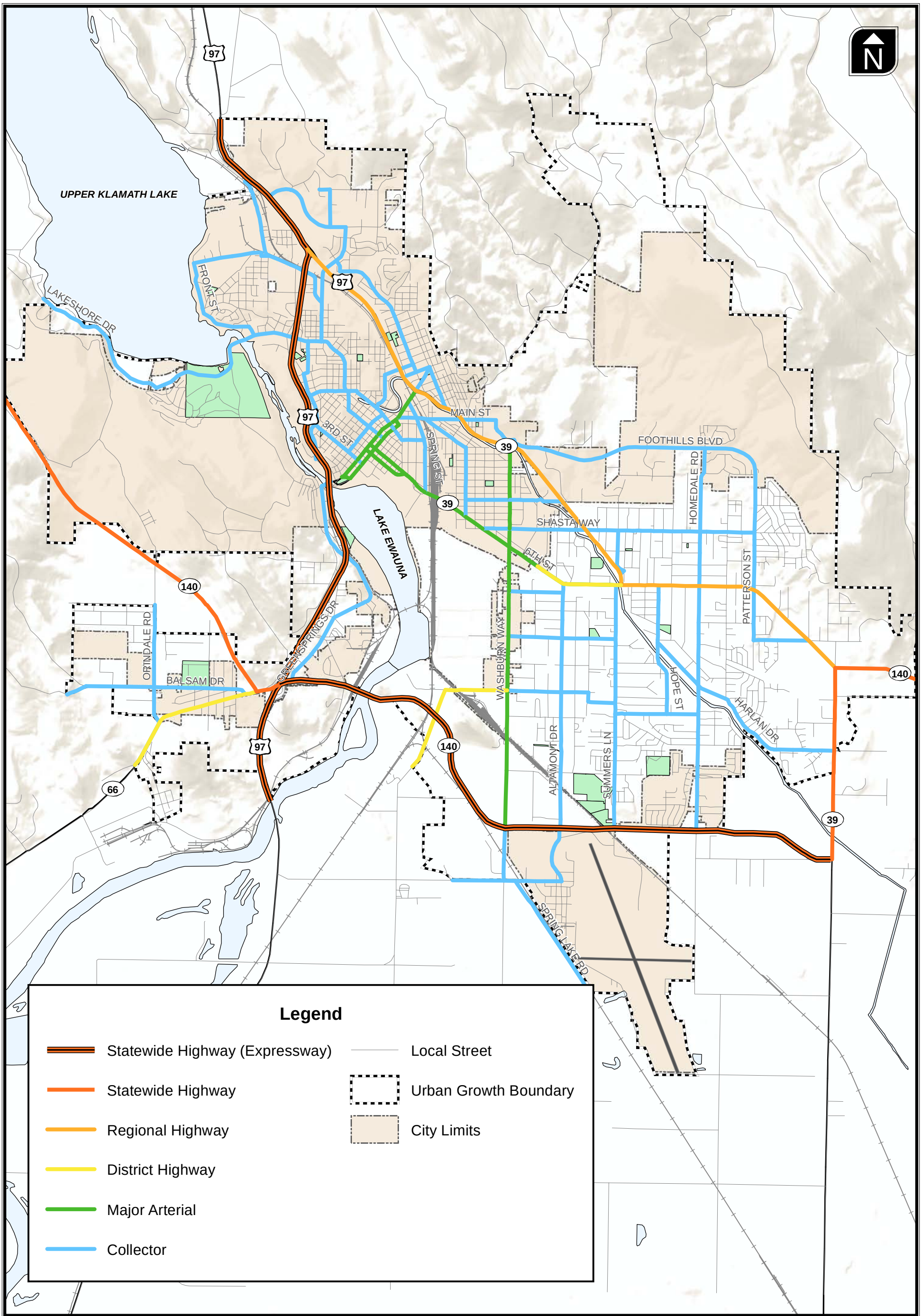
State Highways serve as the primary gateways in the Klamath Falls urban area, and carry the majority of all the vehicle trips entering, leaving, or passing through the Klamath Falls urban area. These highways are critical to the urban area because they generally serve the highest traffic volumes and longest trips. Access control is critical on these facilities to ensure that they operate safely and efficiently.

Major Arterials connect the state highways and link major, high concentration commercial, residential, industrial, and institutional areas. Major arterial streets are typically spaced to assure accessibility and reduce the incidence of longer distance trips using collectors and local streets in lieu of well-placed major arterials.

Collector streets generally facilitate the movement of traffic within the urban area. Collectors provide for circulation and mobility for all users of the system. Collectors carry lower volumes than arterials and typically have facilities to accommodate a variety of travel modes. They serve as the primary routes into residential neighborhoods. Although they carry higher volumes than local streets, they are intended to provide direct access to adjacent land rather than serving through traffic.

Local Streets are primarily intended to provide access to abutting land uses. Local street facilities offer the lowest level of mobility and consequently tend to be short, low-speed facilities. As such, local streets should primarily serve passenger cars, pedestrians, and bicyclists; heavy truck traffic is discouraged. On-street parking is common. Sidewalks are typically present, though the relatively low travel speeds and traffic volumes allow bicycles to share the vehicle travel lanes.

Figure 4-2 illustrates the functional classification designations of the streets within the UGB as amended through the TSP update process.

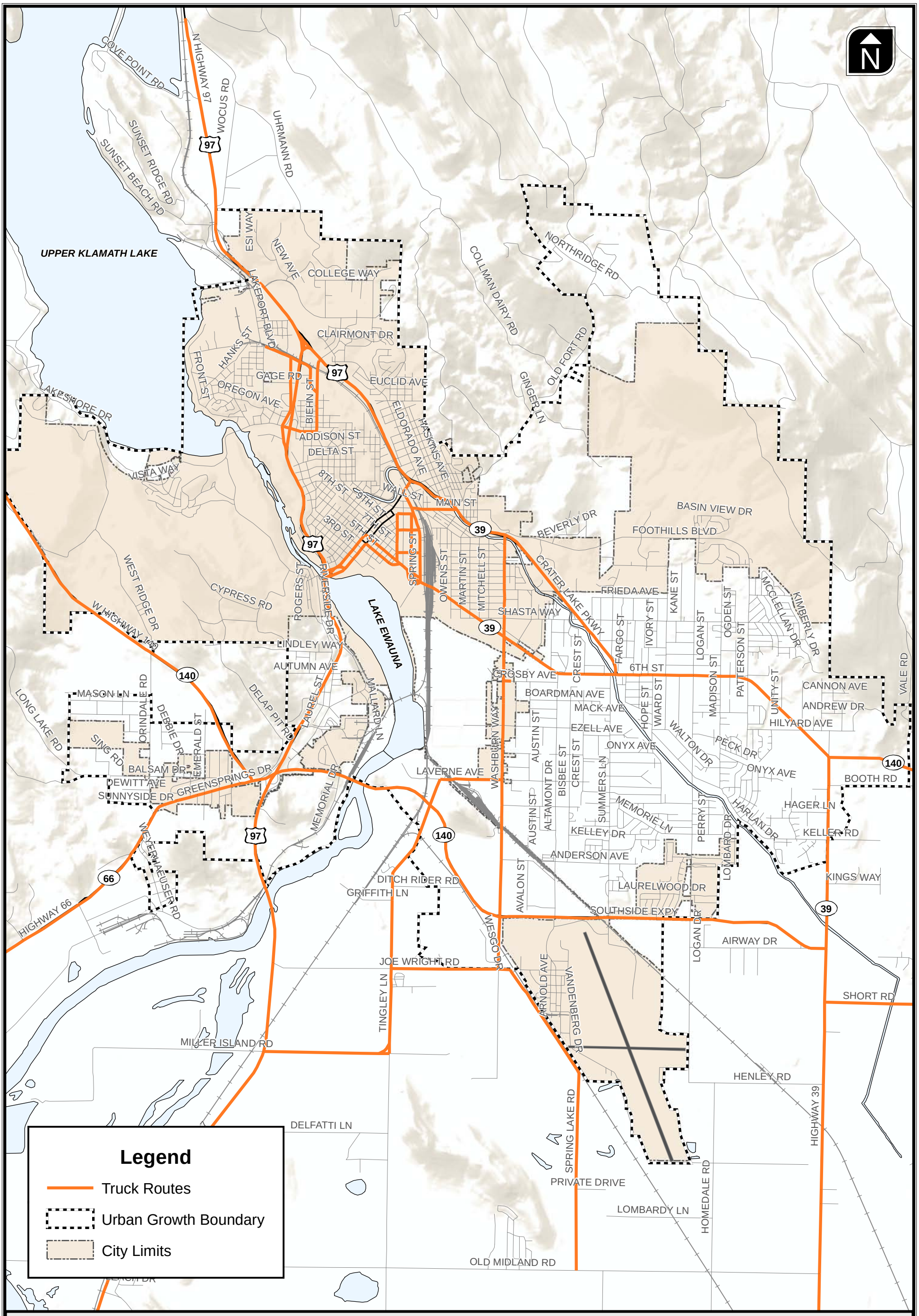


Functional Classification Map

Figure 4-2

TRUCK FREIGHT ROUTES

All four state highway facilities within the Klamath Falls urban area (US 97, OR 140, OR 39, and OR 66) are designated as State Highway Freight Routes. Figure 4-3 illustrates the truck freight routes within the Klamath Falls urban area. National and regional truck freight movements are intended to occur via US 97, which is part of the National Highway System. Local and other regional truck freight movements are intended to occur on OR 140, OR 39, and OR 66.



Truck Freight Routes

Figure 4-3

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Year 2010 Intersection Operations

The operational and safety analyses conducted as part of the TSP is intended to provide an understanding of regional needs and strategies to guide the management of the urban area's street system. These analyses are not intended to provide a comprehensive listing of improvement needs, but rather to identify some of the key roadway and intersection needs. To understand system needs, the operational and safety performance of the existing transportation system was reviewed at 75 intersections throughout the urban area. Additional information related to current intersection operations, including details of the operations analyses performed at the study intersections is included in *Technical Memorandum 3: Existing Conditions*, which is provided in *Technical Appendix 2C.*

PERFORMANCE STANDARDS

All operational analyses were performed in accordance with the procedures stated in the *2000 Highway Capacity Manual* (Reference 1). In addition, all intersection operational evaluations were conducted based on the peak 15-minute flow rate observed during the weekday p.m. peak hour. The operational analysis results were compared with mobility standards used by the applicable agency to assess performance and potential areas for improvement.

City and County Intersections

Traffic operations at City and County intersections are generally described using a measure known as "level of service" (LOS). Level of service represents ranges in the average amount of delay that motorists experience when passing through the intersection. LOS is measured on an "A" (best) to "F" (worst) scale. At signalized and all-way stop-controlled intersections, LOS is based on the average delay experienced by all vehicles entering the intersection. At two-way stop-controlled intersections, LOS is based on the average delay experienced by the critical movement at the intersection, typically a left-turn from a stop-controlled street.

The City of Klamath Falls and Klamath County have established LOS "E" for the poorest operating approach as the performance standard for unsignalized intersections and LOS "D" as the performance standard for signalized intersections. The performance of the study intersections under control of either of these jurisdictions is compared to these performance standards.

ODOT Intersections

ODOT presently uses volume-to-capacity ratio standards to assess intersections operations. Table 6 of the Oregon Highway Plan (OHP - Reference 2) provides maximum volume-to-capacity ratios for all

signalized and unsignalized intersections. The ODOT controlled intersections within the UGB are located along state operated facilities, including US 97, OR 39, OR 140, and OR 66.

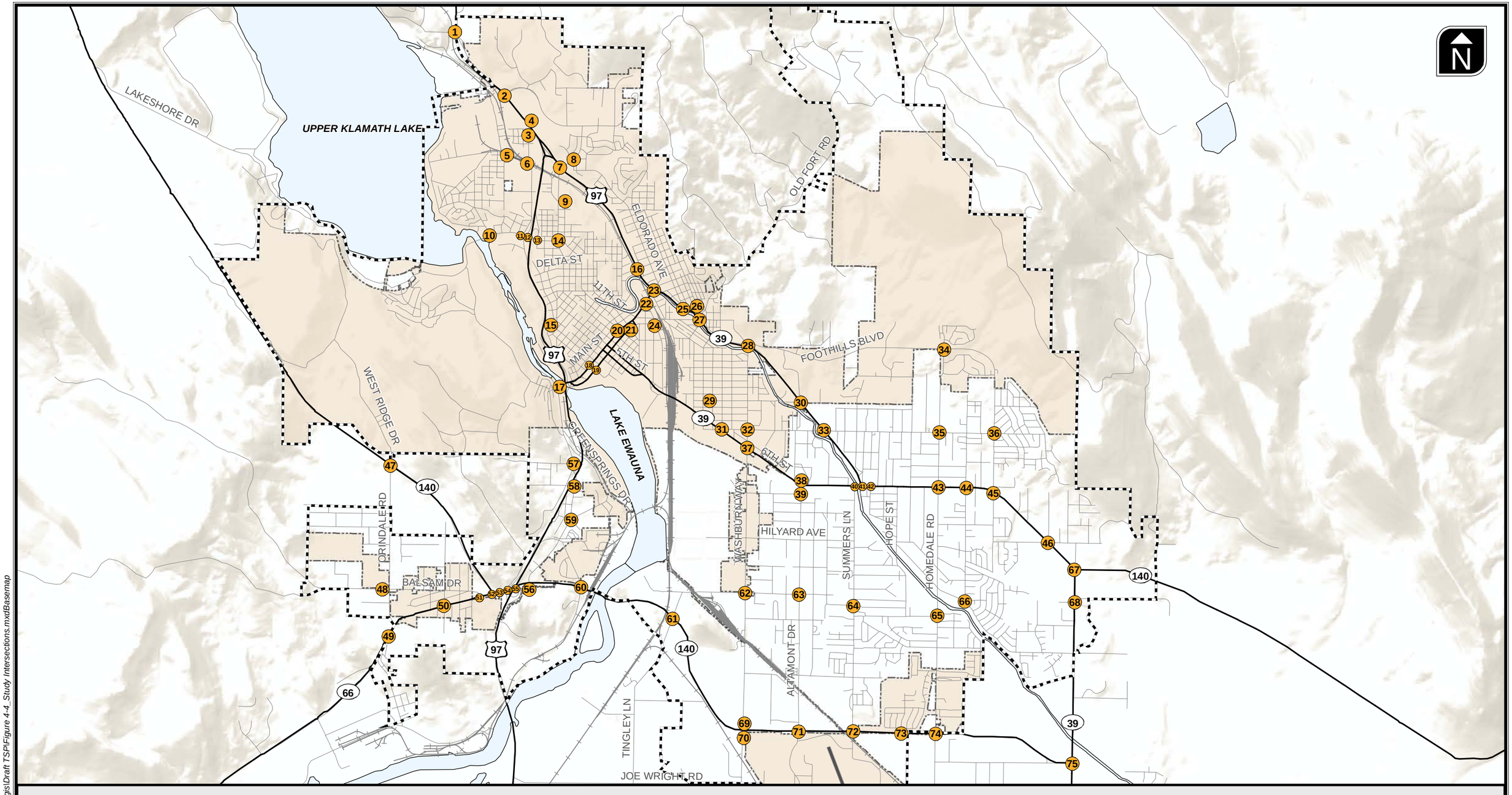
Study Intersection Performance Standards

Technical Memorandum 3: Existing Conditions, which is provided in *Technical Appendix 2C* presents the applicable performance measures for the study intersections.

TRAFFIC VOLUMES AT TSP STUDY INTERSECTIONS

TSP study intersections were selected based on input from ODOT, City, and County staff. Figure 4-4 shows the location of each of these study intersections and Figures 4-5A and 4-5B illustrate the existing lane configurations and traffic control devices at each location.

Manual turning-movement counts were collected by ODOT at the study intersection between February and September in 2010. The peak hour of intersections was found to occur between 4:30 and 5:30 p.m. Figures 4-6A and 4-6B provides a summary of the seasonally adjusted year 2010 turning movement counts, which are rounded to the nearest five vehicles per hour for the weekday p.m. peak hour. Figures 4-6A and 4-6B also reflect the existing operations at the intersections. As shown, three study intersections, Homedale Road & OR 39/140, OR 39 & OR 140, and Washburn Way & OR 140 EB Ramps, do not meet the applicable performance standards during the weekday p.m. peak hour.



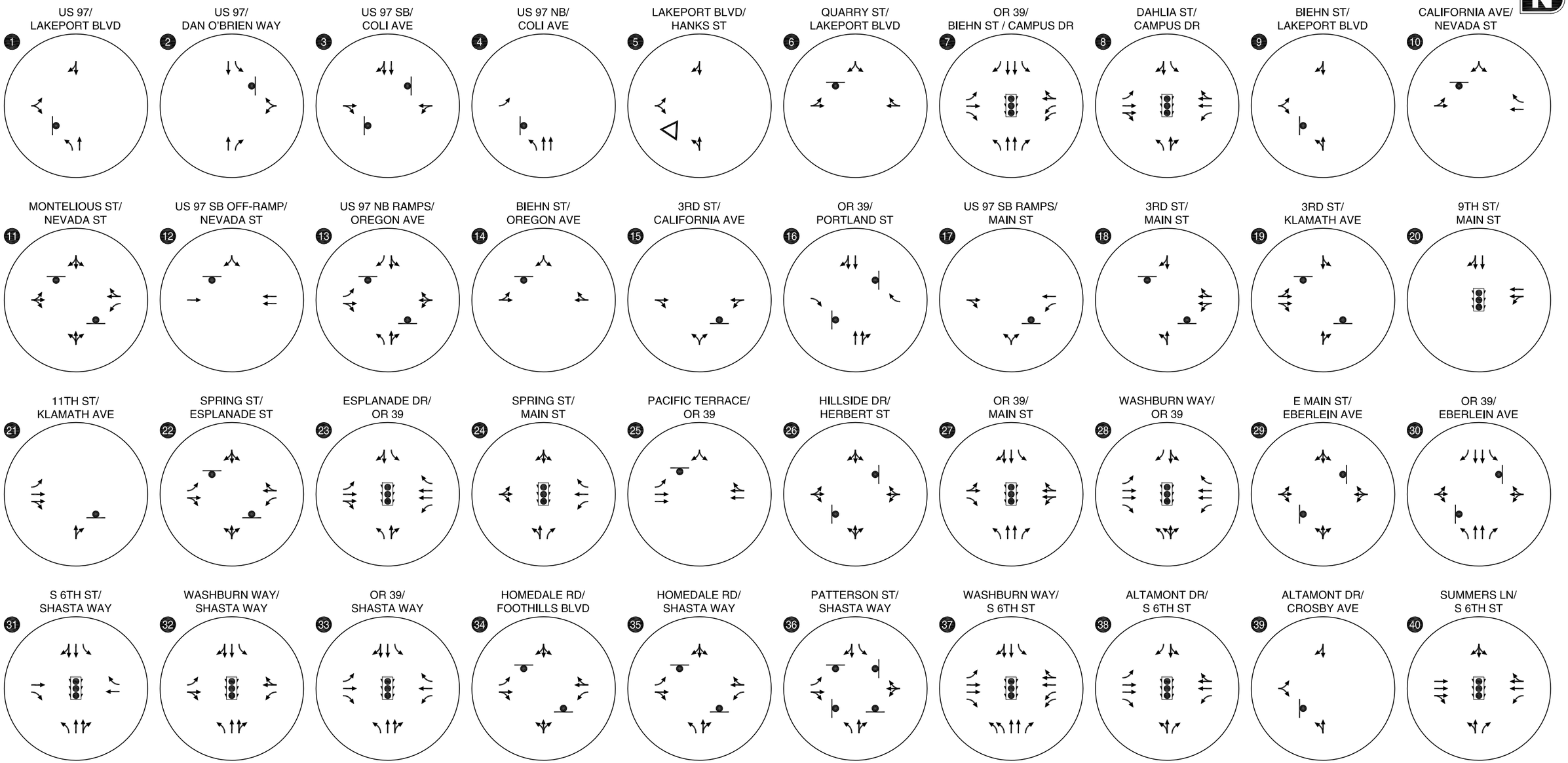
Legend

- Urban Growth Boundary
- City Limits
- ## Study Intersection

Study Intersections

Figure

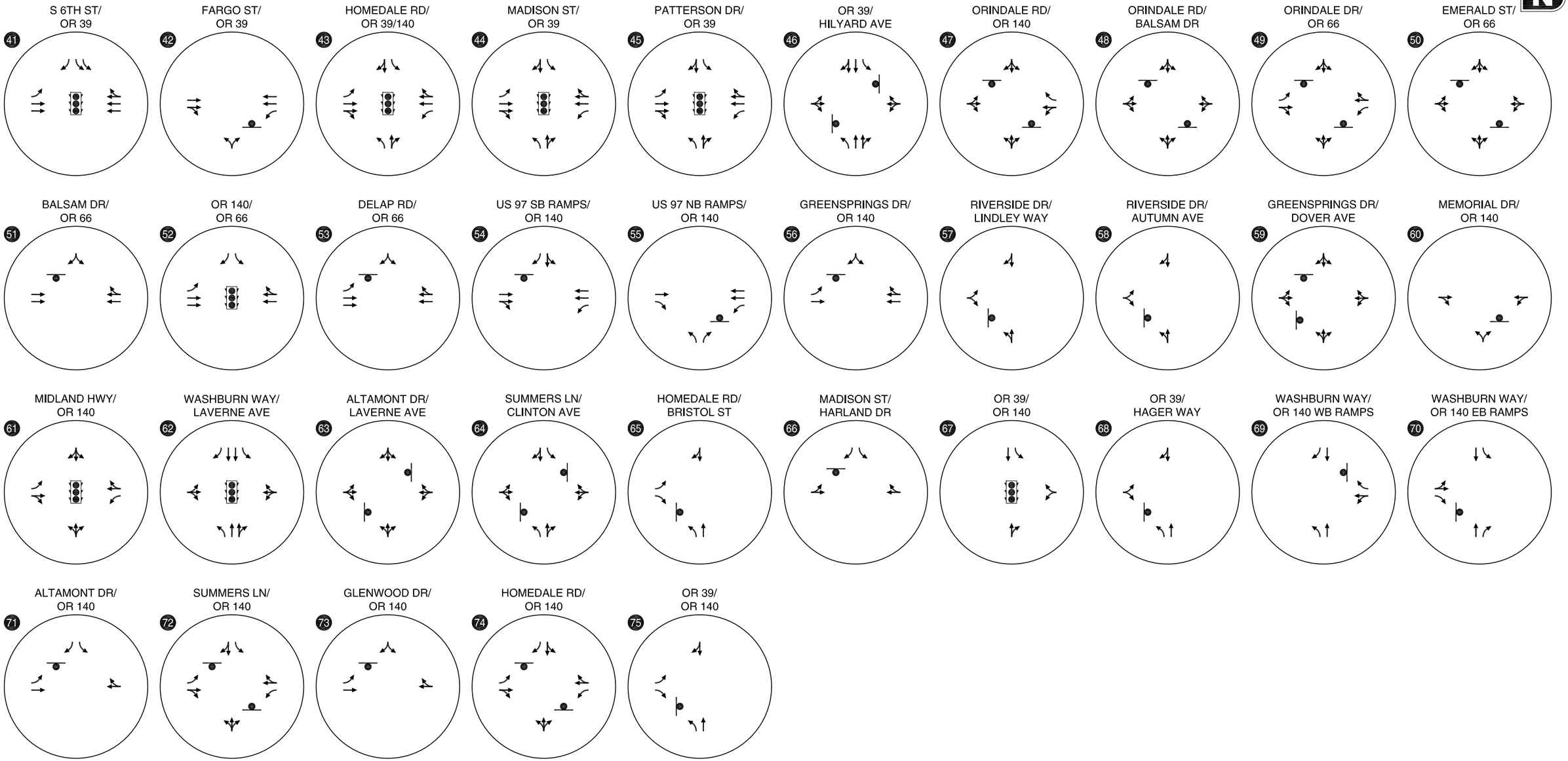
4-4



- STOP SIGN
- TRAFFIC SIGNAL
- YIELD SIGN

Existing Lane Configurations and Traffic Control Devices

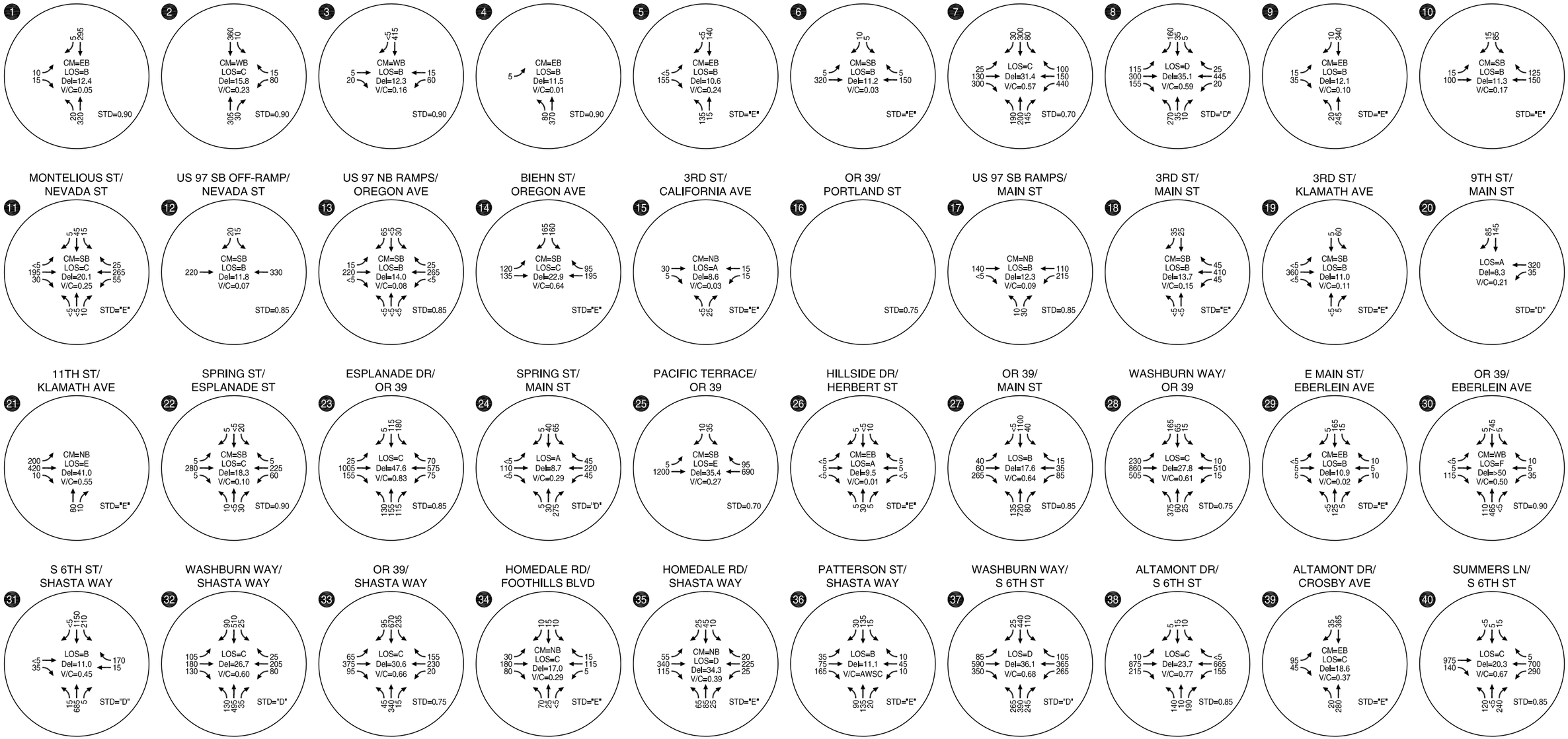
Figure 4-5A



- STOP SIGN
- TRAFFIC SIGNAL
- YIELD SIGN

Existing Lane Configurations and Traffic Control Devices

Figure 4-5B



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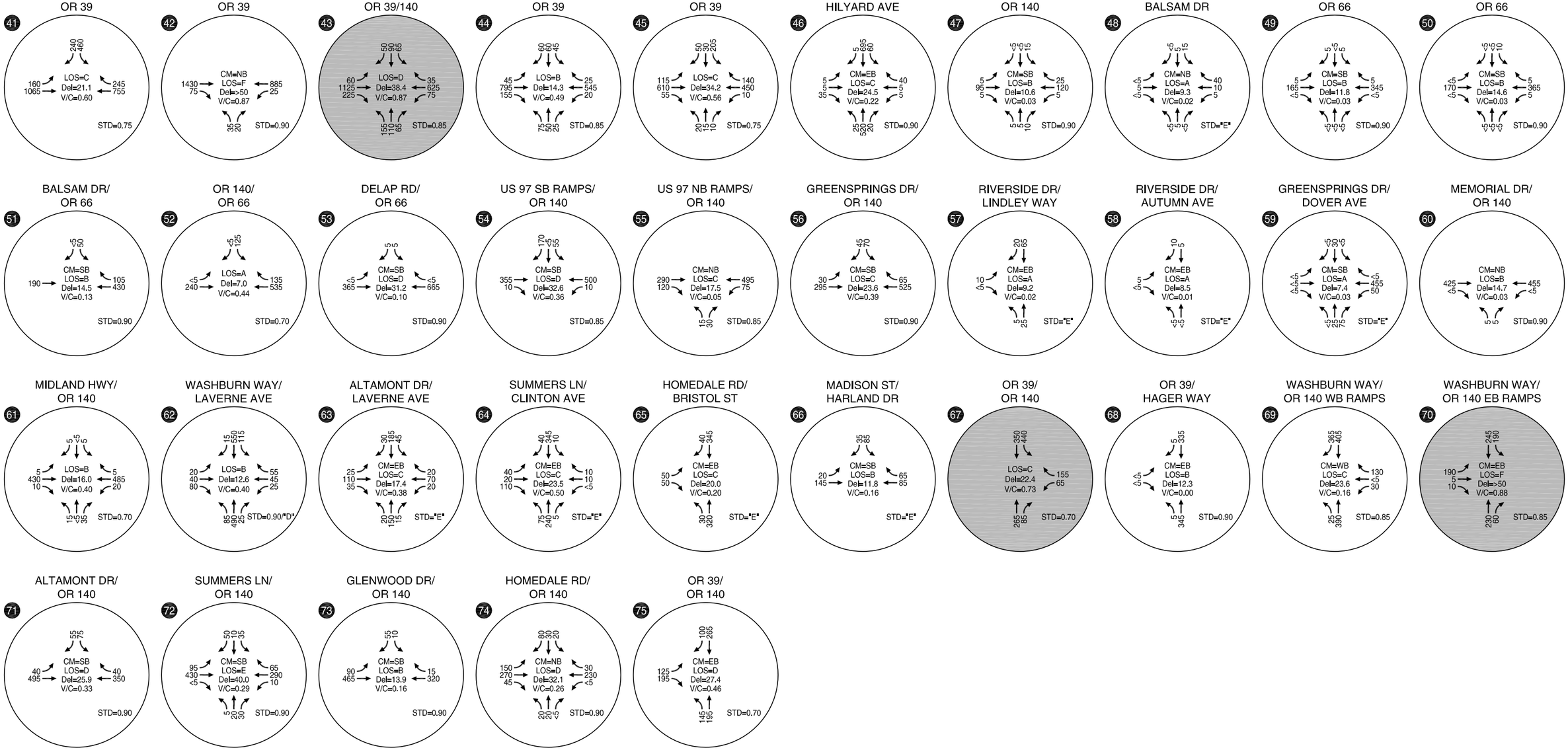
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO
STD = OPERATIONAL STANDARD

Existing Traffic Conditions Weekday PM Peak Hour

Figure 4-6A



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Existing Traffic Conditions Weekday PM Peak Hour

Figure 4-6B

Safety Analysis

Crash data for the year 2005-2009 was collected from ODOT for the study intersections and key roadway segments within the Klamath Falls urban area. Crash analysis was conducted using the data obtained from ODOT. As part of the analysis, the Statewide Priority Index System (SPIS) was also reviewed to determine if ODOT has identified any hazardous locations along US 97, OR 39 and/or OR 140 within the study area. ODOT's SPIS analysis uses the most recent three years of crash data (i.e., 2007 through 2009 for this analysis); the intersection and segment crash analysis conducted as part of this TSP update uses the five most recent years of crash data (i.e., 2005 through 2009).

Findings from the existing safety analysis indicated the following.

- Segments of US 97, OR 39 and OR 140 are rated as a SPIS Category 3 (of five categories with Category 5 the most severe rating) or below within the Klamath Falls urban area.
- There are two intersections within the Klamath Falls urban area that are categorized as top 5% SPIS sites: 1) OR 140 (Southside Expressway)/Summers Lane; and 2) OR 39 (Klamath Falls-Malin Highway)/South 6th Street.
- There are six study intersections with crash rates higher than expected compared to crash rates at intersections in Klamath Falls urban area with the same type of traffic control; including:
    - OR 39 & Eberlein Avenue;
    - Washburn Way & Shasta Way;
    - Altamont Drive & Laverne Avenue;
    - OR 140 & Summers Lane;
    - OR 140 & Homedale Drive; and
    - OR 140 & OR 39 (south of the Big Y).
- From 2005 through 2009, 55% of crashes along key roadways in Klamath Falls were property damage only, 43% were injury crashes, and 2% were fatal crashes.

The existing conditions analysis is described in more detail in *Technical Memorandum #3: Existing Conditions* which is provided in the *Technical Appendix 2C*.

Year 2035 Forecast Transportation Conditions

This section presents the year 2035 forecast transportation conditions for the Klamath Falls urban area. Included in this section is a summary of the future "no-build" traffic conditions analysis conducted for the Klamath Falls urban area to identify transportation system deficiencies that may exist by the year 2035 if no additional improvements to the system are made in the next twenty to twenty-five years. This analysis was used to inform the identification and evaluation of transportation system options summarized in *Section 6*. Additional information related to year 2035 forecast transportation conditions, including details on the operations analyses performed at the study intersections, is included in *Technical Memorandum #4: Future Conditions*, which is provided in the *Technical Appendix 2D*.

2035 TRAFFIC VOLUME FORECAST

The turning movement counts provided by the Oregon Department of Transportation (ODOT) for the existing conditions analysis were used in conjunction with the link volumes provided by ODOT Transportation Planning and Analysis Unit (TPAU) to derive future turning movements at the study intersections. The link volumes shown in the base year 2008 and future year 2037 TPAU traffic models were distributed at study intersections based on the existing distribution shown in the ODOT counts to derive base and future year turning movements at the study intersections. A summary of the growth assumed for the Klamath Falls urban area in the model is shown in Table 4-1.

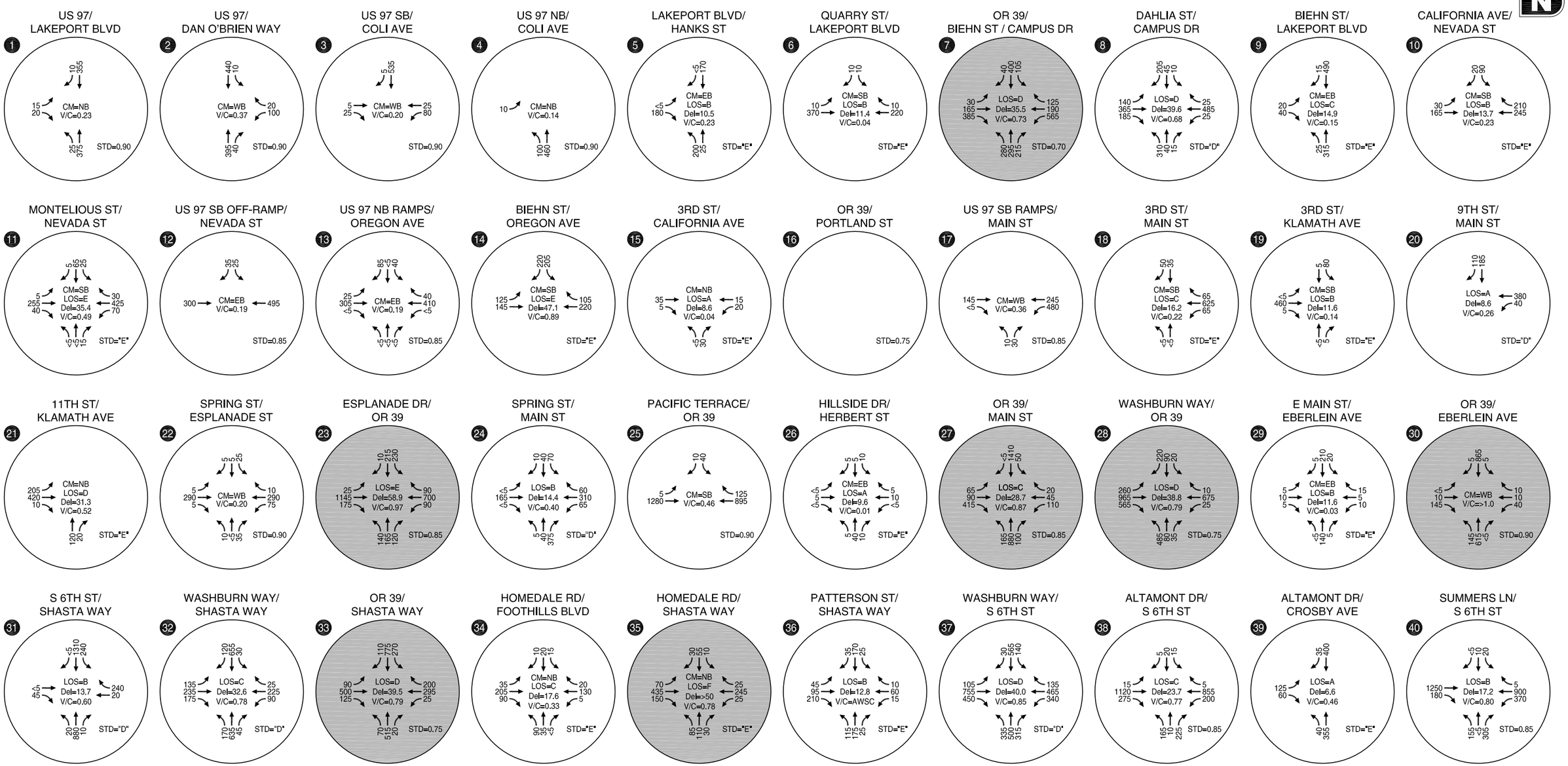
TABLE 4-1: PERCENT CHANGE IN POPULATION AND EMPLOYMENT FOR KLAMATH FALLS URBAN AREA

Land Use Type	2008	2037	Increase	Total Percent Increase	Average Yearly Percent Increase
Households	**18,818**	**22,911**	**4,093**	**21.75%**	**0.68%**
All Jobs	**19,951**	**24,024**	**4,073**	**20.42%**	**0.64%**
Agricultural/Industrial Jobs	2,371	2,388	17	0.72%	0.02%
Commercial/Service Jobs	11,940	14,708	2,768	23.18%	0.72%
Education/Government Jobs	3,286	4,258	972	29.58%	0.90%
Other Jobs	2,354	2,670	316	13.42%	0.44%

From Table 4-1, it is evident the jobs to housing balance will remain close to a 1:1 ratio in the future. . The largest growth in employment in terms of number of jobs is estimated to occur in service related employment, while the larges percent increases are forecasted for education and government related employment.

2035 TRAFFIC CONDITIONS

The 2035 forecast no-build traffic volumes are shown in Figures 4-7A and 4B, which also shows the results of an operations analysis performed at each of the study intersections.



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STD = OPERATIONAL STANDARD

Future Year 2035 Alternative Analysis Traffic Conditions Weekday PM Peak Hour

Figure
4-7A

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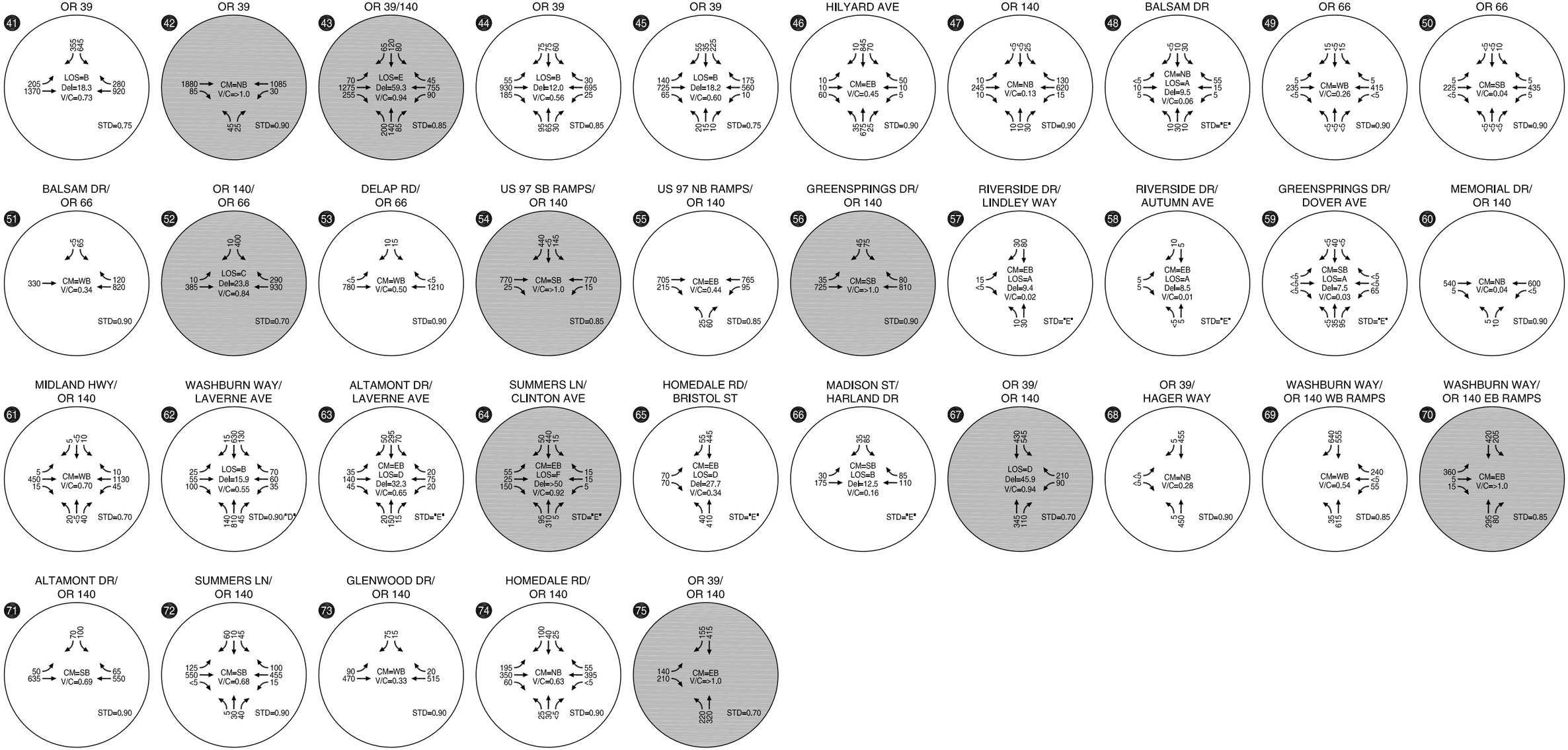

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STD = OPERATIONAL STANDARD

Future Year 2035 Alternative Analysis Traffic Conditions Weekday PM Peak Hour

Figure
4-7B

As can be seen in Figures 4-7A and 4-7B, 16 study intersections are forecasted to operate in excess of the applicable performance standard under 2035 conditions.

A summary of the future 2035 no-build traffic conditions findings is shown below.

- 16 of the 75 study intersections were found to operate in excess of applicable performance standards under future conditions.
- 12 of the 16 intersections that do not meet performance standards under future conditions are located on state facilities.
- Of the 16 study intersections that did not meet performance standards, 9 are unsignalized locations and 5 of the 9 met the eight-hour signal warrants based on Manual on Uniform Traffic Control Devices (MUTCD) standards.

The results of the future "no-build" traffic conditions analysis indicate that Klamath Falls is expected to have moderate levels of traffic growth over the next 25 years. However, several detailed subarea plans have been conducted within the Klamath Falls urban area that indicated future growth patterns (some beyond the 2035 forecast year) may result in higher traffic demand in the vicinity of potential developments. *The potential for this type of growth is discussed in Section 9.*

Street Section Standards

Currently, the City and County maintain and implement roadway cross-section standards within the urban area. Although there are some differences for the same classifications, the City and County have determined that the roadway standards being applied by each jurisdiction are similar enough that a uniform set of cross-section standards is not needed. As such, both intend on maintaining their respective roadway cross-section standards. Below is the location where the respective roadway cross-sectional standards are referenced by the City and County.

- **City of Klamath Falls Cross-Sectional Standards:** City of Klamath Falls Engineering Standards
- **Klamath County Cross-Sectional Standards:** Klamath County Land Development Code

Access Spacing Standards

Access management is the systematic implementation and control of the locations, spacing, design, and operations of driveways, median openings, interchanges, roundabouts, and street connections to a roadway, according to the Access Management Manual (AMM - Reference 3). It involves roadway design applications, such as median treatments and auxiliary lanes, and the appropriate spacing and design of signalized intersections. Access management strives for a balanced transportation network with appropriate proportions and distributions of arterials, collectors, and local streets that are integrated with local land use activities.

Access management techniques and strategies help to preserve the transportation system investment, and guard against deteriorations in safety and increased congestion. Land use activities and property parcels are served with appropriate access by access management solutions, while safe and efficient movement of traffic is preserved.

Access management generally becomes more stringent as the functional classification level of roadways increases and the corresponding importance of mobility increases. Exhibit 4-1 illustrates the general relationship between access and mobility.

EXHIBIT 4-1: RELATIONSHIP BETWEEN ACCESS, MOBILITY, AND FUNCTIONAL CLASSIFICATION

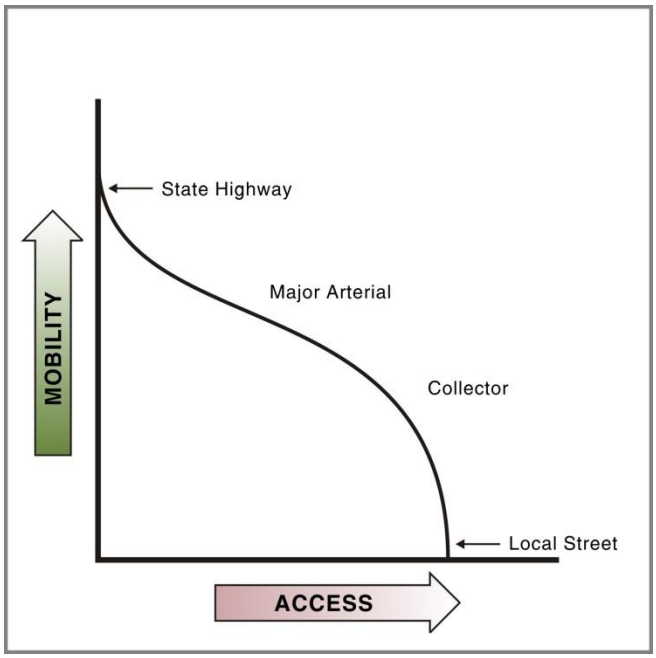


Table 4-2 identifies the appropriate spacing standards within both City and County owned roadways. It should be noted that the driveway access spacing is measured from center-to-center of each driveway to the upstream or downstream driveway or intersection on one side of the roadway. It should be noted these are ideal standards that may take many years to achieve on existing roadways.

TABLE 4-2: CITY AND COUNTY ACCESS SPACING STANDARDS

Street Functional Classification	Intersection Spacing	Minimum Driveway Access Spacing	Residential Uses	Commercial Uses	Industrial Uses
Major Arterial	¼ mile	300 feet	No Direct Access	Shared Access Encouraged Left-Turn Lanes Determined through Review	
Collector	¼ mile	100 feet	Shared Access Encouraged New Development to Access Local Streets	Shared Access Encouraged Left-Turn Lanes Determined through Review	
Local Street	Min. 400 feet Max. 600 feet	None	Curb Cut Minimum 50 feet to Curb Return	Curb Cut Minimum 50 feet to Curb Return	

ODOT has jurisdiction over several roadways within the urban area. With the exception of sections of Washburn Way and South Sixth Street, the ODOT facilities are highways with clearly defined access spacing standards. ODOT's access spacing standards are organized by intersection traffic control and a specific state highway's level of importance. A spacing of a ½-mile between traffic signals is desired for statewide and regional urban highways (i.e., US 97, OR 140, and OR 39). Table 4-3 summarizes ODOT's

spacing standards for unsignalized intersections on urban highways of various levels of importance. Washburn Way and South Sixth Street are District Highways.

TABLE 4-3: ODOT ACCESS SPACING STANDARDS FOR UNSIGNALIZED PRIVATE AND PUBLIC APPROACHES

Posted Speed Limit	Minimum Space Required (feet)			
	Statewide (Expressway)	Statewide	Regional	District
≤ 25 mph	-	520	350	350
30 mph and 35 mph	-	720	425	350
40 mph and 45 mph	2,640	990	750	500
50 mph	2,640	1,100	830	550
≥ 55 mph	2,640	1,320	990	700
Klamath Falls Facilities	US 97	OR 140	Crater Lake Parkway South 6th Street (portion)	OR 66 South 6th Street (portion) Laverne Avenue (portion)

Access Management Policies

Adopting a common set of standards will ensure that new access locations meet uniform standards throughout the urban area. However, many existing access locations do not meet the adopted standards. As such, an effort should be made to consolidate access locations by governing jurisdictions where spacing is too dense, over time, as redevelopment occurs.

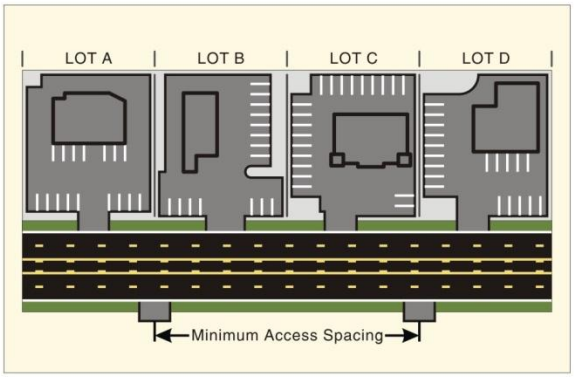
The following policies will be implemented by the City of Klamath Falls and Klamath County, as part of every land use action, in order to maintain and/or improve traffic operations and safety along the arterial and collector roadways. Access decisions should be based upon the review of an approved traffic study prepared according to the *Traffic Impact Analysis guidelines (see Appendix 1C)* and the *Recommended Ordinance Amendments (Appendix 1B).*

- Developments with frontage on two roadways should locate their driveways on the lower functional classified roadway.
- Access driveways should be located to align with opposing driveways.
- Multiple driveways may be permitted so long as they meet the driveway access spacing standards.
- If spacing standards cannot be met, effort should be made to consolidate access points with neighboring properties.

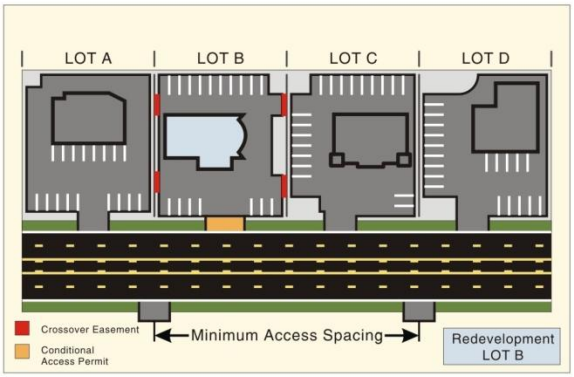
- Where standards cannot be met and joint access is not feasible, temporary conditional access can be granted with the provision of crossover easements on compatible parcels (considering topography, access, and land use) to facilitate future access between adjoining parcels.
- Right-of-way dedications may be provided to facilitate the future planned roadway system in the vicinity of proposed developments, thus creating additional off-street access locations.
- Half-street improvements (sidewalks, curb and gutter, bike lanes/paths, and/or travel lanes) shall be provided along site frontages that do not meet applicable roadway cross-sections standards at the time of development unless otherwise directed by the public works director.

Exhibit 4-2 on the following page illustrates the application of cross-over easements and conditional access permits that can be implemented over time to achieve the desired access management objectives. The individual implementation steps are described in Table 4-4. As illustrated in the figure and supporting table, through the application of these guidelines, all driveways along city, county, and state roadways can eventually move in the overall direction of the access spacing standards as development and redevelopment occur along a given street.

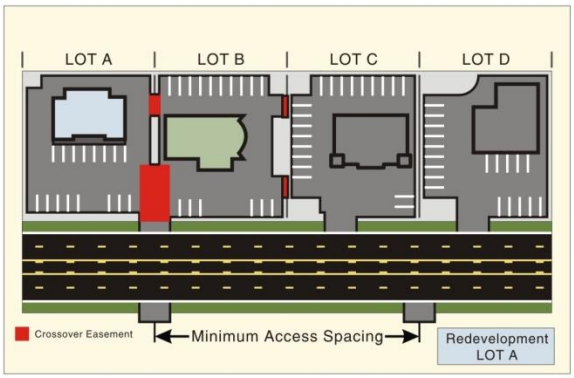
EXHIBIT 4-2 EXAMPLE OF CROSS-OVER EASEMENT/INDENTURE/CONSOLIDATION/CONDITIONAL ACCESS PROCESS



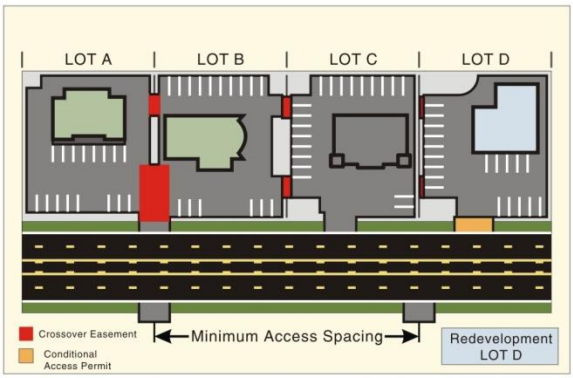
EXISTING CONDITIONS



STEP 1
REDEVELOPMENT OF LOT B



STEP 2



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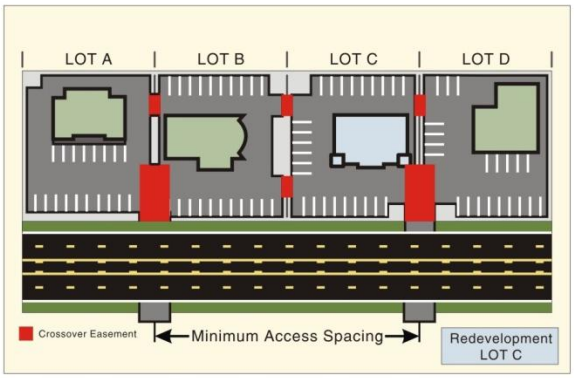
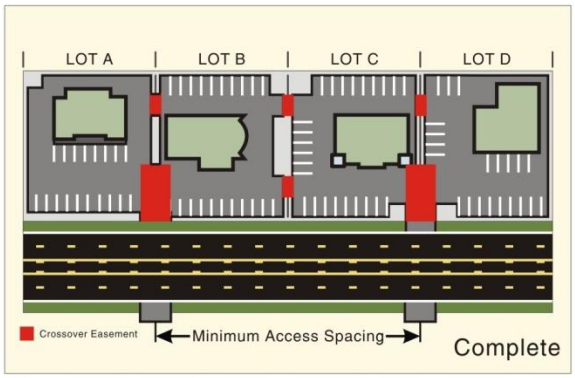


STEP 4



STEP 5

TABLE 4-4: EXAMPLE OF CROSSOVER EASEMENT/INDENTURE/CONSOLIDATION - CONDITIONAL ACCESS PROCESS

Step	Process
1	EXISTING – Currently Lots A, B, C, and D have site-access driveways that neither meet the access spacing criteria of 300 feet nor align with driveways or access points on the opposite side of the roadway. Under these conditions motorists are into situations of potential conflict (conflicting left turns) with opposing traffic. Additionally, the number of side-street (or site-access driveway) intersections decreases the operation and safety of the roadway.
2	REDEVELOPMENT OF LOT B – At the time that Lot B redevelops, the City or County would review the proposed site plan and make recommendations to ensure that the site could promote future crossover or consolidated access. Next, the City/County/ODOT would issue conditional permits for the development to provide crossover easements with Lots A and C, and City/County/ODOT would grant a conditional access permit to the lot. After evaluating the land use action, the City/County/ODOT would determine that LOT B does not have either alternative access, nor can an access point be aligned with an opposing access point, nor can the available lot frontage provide an access point that meets the access spacing criteria set forth for segment of roadway.
3	REDEVELOPMENT OF LOT A – At the time Lot A redevelops, the City/County/ODOT would undertake the same review process as with the redevelopment of LOT B (see Step 2); however, under this scenario the City/County/ODOT would use the previously obtained cross-over easement at Lot B consolidate the access points of Lots A and B. City/County/ODOT would then relocate the conditional access of Lot B to align with the opposing access point and provide and efficient access to both Lots A and B. The consolidation of site-access driveways for Lots A and B will not only reduce the number of driveways accessing the roadway, but will also eliminate the conflicting left-turn movements the roadway by the alignment with the opposing access point.
4	REDEVELOPMENT OF LOT D – The redevelopment of Lot D will be handled in same manner as the redevelopment of Lot B (see Step 2)
5	REDEVELOPMENT OF LOT C – The redevelopment of Lot C will be reviewed once again to ensure that the site will accommodate crossover and/or consolidated access. Using the crossover agreements with Lots B and D, Lot C would share a consolidated access point with Lot D and will also have alternative frontage access the shared site-access driveway of Lots A and B. By using the crossover agreement and conditional access permit process, the City/County/ODOT be able to eliminate another access point and provide the alignment with the opposing access points.
6	COMPLETE – After Lots A, B, C, and D redevelop over time, the number of access points will be reduced and aligned, and the remaining access points will meet the access spacing standard.

ADDITIONAL ACCESS MANAGEMENT TREATMENTS

Several corridors including Washburn Way, Shasta Way, and South 6th Street, warrant more attention to access management than the above proposed programmatic improvement of access spacing over time as part of land use actions. Sound access management principals should be emphasized at these locations to improve access management more rapidly as development and redevelopment occur. In addition, more proactive improvements to control permitted turning movements should be considered.

This could include treatments such as center raised medians that restrict access to right-in/right-out only, or right-in/right-out/left-in in some cases. Medians with openings for left-turn lanes off of a facility resulting in right-in/right-out/left-in access points provide significant improvement in safety while still providing a high level of property access. Consolidating driveways from multiple parcels to mid-block locations is critical to being able to provide effective right-in/right-out/left-in access in locations where medians are warranted due to safety concerns.

According to Action 3B.3 of the Oregon Highway Plan, non-traversable medians should be considered on state highways when any of the following criteria are met. Similar consideration should be given on City and County major arterials and collectors:

- Forecast average daily traffic is anticipated to be 28,000 vehicles per day during the 20-year planning period;
- The annual crash rate is greater than the statewide annual average accident rate for similar roadways;
- Pedestrians are unable to safely cross the highway, as demonstrated by an crash rate that is greater than the statewide annual average crash rate for similar roadways; and/or
- Topography and horizontal or vertical roadway alignment result in inadequate left-turn intersection sight distance and it is impractical to relocate or reconstruct the connecting approach road or impractical to reconstruct the highway in order to provide adequate sight distance.

Based on this criteria, the following roadways in Table 4-5 should take into consideration the installation of medians during capital improvements and/or private development related projects.

TABLE 4-5: OBSERVED AVERAGE ACCESS POINT SPACING VS. STANDARD

Corridor	Segment	Jurisdiction	Average Spacing	Spacing Standard
South 6th Street	Shasta Way to Washburn Way	City	145 feet	300 feet
	Washburn Way to Altamont Drive	City	150 feet	300 feet
	Altamont Drive to Crater Lake Parkway	County	120 feet	300 feet
Washburn Way	Shasta Way to South 6th Street	City	120 feet	300 feet
	South 6th Street to Hilyard Avenue	City	290 feet	300 feet
	Hilyard Avenue to Laverne Avenue	City	245 feet	300 feet
Shasta Way	South 6th Street to Washburn Way	City	130 feet	100 feet
	Washburn Way to Avalon Street	City	130 feet	100 feet
	Avalon Street to Crater Lake Parkway	County	160 feet	100 feet

Washburn Way

Washburn Way south of Shasta Way serves as a major commercial area within Klamath Falls. Many existing developments along this corridor have undefined access to and from Washburn Way. This arrangement creates operational and safety concerns that will likely increase as future develop occurs in the area. The intersection of Washburn Way/Shasta Way has been identified as having a crash rate that exceeds the critical crash rate.

South 6th Street

South 6th Street serves as a commercial center for Klamath Falls residents as well as a route for regional trips passing through the urban area. As such, access and mobility along this corridor should be carefully considered and balanced. The segments along South 6th Street from Summers Lane to Fargo Street and from Homedale Road to Madison Street have been identified as having a crash rate that exceeds the critical crash rate.

Shasta Way

Shasta Way is a corridor that runs parallel to South 6th Street and serves as an alternative route. As development occurs within the urban area, congestion along Shasta Way will likely increase. As such, specific standards should be outlined that maintain a high level of mobility while allowing for additional development in the area to occur.

The intersection of Washburn Way/Shasta Way and the segment along Shasta Way from South 6th Street to Crater Lake Parkway have been identified as having a crash rate that exceeds the critical crash rate.

Roadway Policies and Studies

The following subsection describe polices related to the future management of the transportation system as well as recommended studies to better plan for the long term vision of specific corridors or transportation management areas.

TRAFFIC IMPACT STUDY REQUIREMENTS/DEVELOPMENT REVIEW STANDARDS

Uniform requirements for development review with regard to the triggers, analysis level, and study area required for Traffic Impact Letter and Traffic Impact Analyses are included in *Technical Appendix 1C*. The scoping process includes coordination with the City, County and ODOT where the study area would include roadways within their jurisdiction. All development should document their level of

reliance on the state highway system and how their site plan could help reduce reliance on the state highway system.

ALTERNATIVE MOBILITY STANDARDS ON STATE HIGHWAY

Alternative mobility standards should be considered for key intersections on the state highway system in the Klamath Falls urban area in cases where applicable mobility standards are expected to be exceeded and feasible mitigation measures do not exist or are not economically feasible.

Because facilities that exceed mobility standards can limit economic development in the vicinity of that facility, alternative mobility standards allow some development to occur in exchange for higher levels of congestion.

Locations where an alternative mobility standard may be necessary if the identified improvements remain unfunded include the following:

- OR 39/Biehn Street/Campus Drive
- Main Street/OR 39
- OR 39/Shasta Way
- OR 39/Fargo Street

TRANSPORTATION DEMAND MANAGEMENT

Transportation Demand Management (TDM) measures include any method intended to shift travel demand from single occupant vehicles to non-auto modes or carpooling, travel at less congested times of the day, or to locations with more available vehicle capacity. Some common examples of TDM strategies include programs such as carpool matching assistance or flexible work shifts; parking management strategies; direct financial incentives such as transit subsidies; or facility or service improvements, such as bicycle lockers or increased bus service.

Some of the most effective TDM strategies are best implemented by employers and are aimed at encouraging non-single occupancy vehicle (SOV) commuting. Strategies include preferential carpool parking, subsidized transit passes, and flexible work schedules. The City and County can play a critical role in support of TDM through provision of facilities and services, as well as development policies that encourage TDM.

Towards this end the City and County should practice access management and connectivity strategies that support TDM. Other strategies include provision of facilities (sidewalks, bicycle lanes, transit amenities) and management of existing resources (parking). Another critical role that cities play is in the policies related to development activities. Through support, incentive, and mandate, the City and

County can ensure that new development supports a balanced transportation system. Several broad TDM strategies and their typical implementation strategies are summarized in Table 4-6.

TABLE 4-6: TDM STRATEGIES AND TYPICAL IMPLEMENTING ROLES

	TDM Strategy	City/County	Transportation Management Association[1]	Developers	Transit Provider	Employers	State
TDM-1	Public parking management	P		S	S	S	
TDM-2	Flexible parking requirements	P		S		S	
TDM-3	Connectivity standards	P		S			P
TDM-4	Pedestrian facilities	P		S		S	S
TDM-5	Bicycle facilities	P		S			S
TDM-6	Transit stop amenities	S		S	P		
TDM-7	Parking management	P		S		S	
TDM-8	Limited parking requirements	P		S			
TDM-9	Carpool match services	S	P			S	
TDM-10	Parking cash out		S		S	P	
TDM-11	Subsidized transit passes				S	P	
TDM-12	Carsharing program support	P	S	S	S	S	

Note: [1]A Transportation Management Association does not currently exist in Klamath Falls
P: Primary role
S: Secondary/Support role
* Primary implementation depends on roadway jurisdiction

While all the strategies listed in Table 4-7 could be implemented in Klamath Falls, the urban area faces difficult challenges related to TDM strategies. Given the climate and culture, not all of the options listed would receive strong public support or involvement. As such, care should be taken to implement strategies that are consistent with Klamath Falls lifestyles, while still effectively reducing travel demand. Below is a list of specific strategies with the greatest potential to be effective in Klamath Falls

- Connectivity Standards
- Pedestrian Facilities
- Bicycle Facilities
- Parking Management
- Developer Incentives

Incentives can also be used to encourage development to incorporate facilities, strategies and programs that promote TDM. For example, a tiered system of System Development Charge (SDC) credits could be provided to developers that implement two or more TDM strategies such as paid parking, special carpool parking, free transit passes, shower facilities, electric vehicle charging stations, etc.

Many of the above TDM strategies would require coordination between the City/County and future developments that occur within the Klamath Falls Urban Area. This can be accomplished by outlining clear standards related to access management, connectivity, complete street design, and parking requirements, to name a few. When developing these standards, however, it is important for consistency between the City and County to maximize the effectiveness of those standards.

NEIGHBORHOOD TRAFFIC MANAGEMENT

Neighborhood Traffic Management (NTM) is used to describe traffic control devices typically used in residential neighborhoods to slow traffic or possibly reduce the volume of traffic. NTM is often called traffic calming due to its ability to improve neighborhood livability. The following subsections provide illustrations and descriptions of neighborhood traffic management strategies that could be applied in the Klamath Falls urban area to address traffic issues that arise over time:

Speed Wagon (reader board that displays vehicle speed)

Pros:

- Inexpensive
- Low operating costs
- Mobile

Cons:

- Penalties for speeding not enforced
- Not permanent

Speed Humps

Pros:

- Permanent
- Can be used to provide raised pedestrian crossings
- Can be modified to accommodate emergency vehicles

Cons:

- Placement of speed humps can be contentious
- Can impede snow removal
- Requires maintenance

Traffic Circles

Pros:

- Can have aesthetic value
- Physical barrier encourages lower speeds

Cons:

- Can impede snow removal
- Can impede emergency vehicles or freight/delivery truck movement
- Increased maintenance costs

Medians

Pros:

- Eliminates potential conflict points
- Provides pedestrian refuge
- Can benefit access management

Cons:

- Expensive to construct
- Can impede roadway connectivity
- Can impact business access

Landscaping

Pros:

- Aesthetic value
- Provides buffer for pedestrians
- Can have traffic calming effect

Cons:

- Requires additional maintenance, including weed management
- Requires additional right-of-way allocation
- Can impede sight distance

Curb Extensions

Pros:

- Reduces pedestrian crossing distance
- Can have a traffic calming effect

Cons:

- Expensive to construct
- Can impede snow removal
- Can impede freight movements

Chokers (narrows roadway at spots in street)

Pros:

- Can be used in conjunction with a midblock pedestrian crossing
- Can have traffic calming affect

Cons:

- Expensive to construct
- Can impede snow removal

Narrow Streets

Pros:

- Reduces pedestrian crossing distance
- Can have a traffic calming effect
- Less asphalt to maintain

Cons:

- Can impede emergency vehicles
- Can limit availability of on-street parking
- Can impede snow removal

Closing Streets

Pros:

- Lack of direct through routes can reduce speeds

Cons:

- Can create connectivity issues, counter to TSP goals
- May increase speeds on alternative routes
- May increase volumes on alternative routes

Photo Radar

Pros:

- Permanent speed enforcement
- Strong deterrent for excessive speeds

Cons:

- Expensive initial investment required
- Not portable

On-Street Parking

Pros:

- Increase available parking
- Naturally narrows the street

Cons:

- Adequate right-of-way must exist or be created
- Can conflict with bicycle lanes
- Can create additional conflict points for vehicles
- Can impede snow removal
- Can reduce sight distance

Selective Enforcement

Pros:

- Mobile
- Can target identified problem areas

Cons:

- Requires allocation of enforcement resources
- May only result in temporary improvement

Neighborhood Watch

Pros:

- Constant presence
- Operated on a volunteer basis
- Enforcement personal have vested interested

Cons:

- Requires large neighborhood commitment
- Interest may wane over time

NTM should be considered in an area-wide manner to avoid shifting impacts between areas and should only be applied where a majority of neighborhood residents agree that it should be done. Research of traffic calming measures demonstrates their effectiveness in reducing vehicle speeds. Table 4-7 summarizes nationwide research of over 120 agencies in North America.

TABLE 4-7: NEIGHBORHOOD TRAFFIC MANAGEMENT PERFORMANCE

Measures	No. of Studies	Speed Reduction (MPH)			Volume Change (ADT)			Public Satisfaction
		Low	High	Ave.	Low	High	Ave.	
Speed Humps	262	1	11.3	7.3	0	2,922	328	79%
Speed Trailer	63	1.8	5.5	4.2	0	0	0	90%
Diverters	39	-	-	0.4	85	3,000	1102	72%
Circles	26	2.2	15	5.7	50	2,000	280	72%
Enforcement	16	0	2	2	0	0	0	71%
Traffic Watch	85	0.5	8.5	3.3	0	0	0	98%
Chokers	32	2.2	4.6	3.3	45	4,100	597	79%
Narrow Streets	4	5	7	4.5	0	0	0	83%

Source: Survey of Neighborhood Traffic Management Performance and Results, ITE District 6 Annual Meeting, by R S. McCourt, July 1997.

Typically, NTM receives a favorable reception by residents adjacent to streets where vehicles travel at speeds above 30 MPH. However, NTM can also be contentious because it may be perceived by one neighborhood as just moving the problem from one neighborhood to another rather than solving it. Traffic calming may also be perceived as impacting emergency travel or raising liability issues.

PLANNED STUDIES

Klamath Falls has key transportation corridors that would benefit from a detailed refinement plans to help guide future development and transportation improvements. In addition, the need for a more advanced traffic signal system within the urban area has been discussed and should be evaluated.

In response to those needs, the TSP identifies the need to conduct the following studies described in Table 4-8.

TABLE 4-8: RECOMMENDED STUDIES

Project Number	Name	Description	Cost	Priority
ST1	Crater Lake Parkway Corridor Improvement Study	Would conduct a study that would identify and evaluate key intersections along the corridor and identify improvements needed to serve users.	$100,000	High
ST2	Shasta Way Corridor Improvement Study	Would conduct a study that would identify and evaluate key intersections along the corridor and identify improvements needed to serve users.	$100,000	Low
ST3	Traffic Signal Retiming Study	Would conduct a study that would evaluate existing signalized intersections and optimize timing plans to better serve traffic conditions, resulting in a more efficient traffic signal system.	$150,000	High
ST4	Advanced Signal Systems Study	Would conduct a study that would evaluate adaptive signal systems in Klamath Falls focused on study and implementation along key travel corridors.	$150,000	High
		Total:	$500,000	

Planned Safety Improvements

A number of safety focus intersections have been identified through this planning process that each warrant a more in-depth evaluation to determine the countermeasures that have the potential to provide the most benefit. In addition, the critical crash areas are likely to change over the course of the plan horizon. As such, a programmatic approach to safety (i.e., dedicating a specified sum of capital improvement dollars to studying and improving identified safety deficiencies each year) is planned, including:

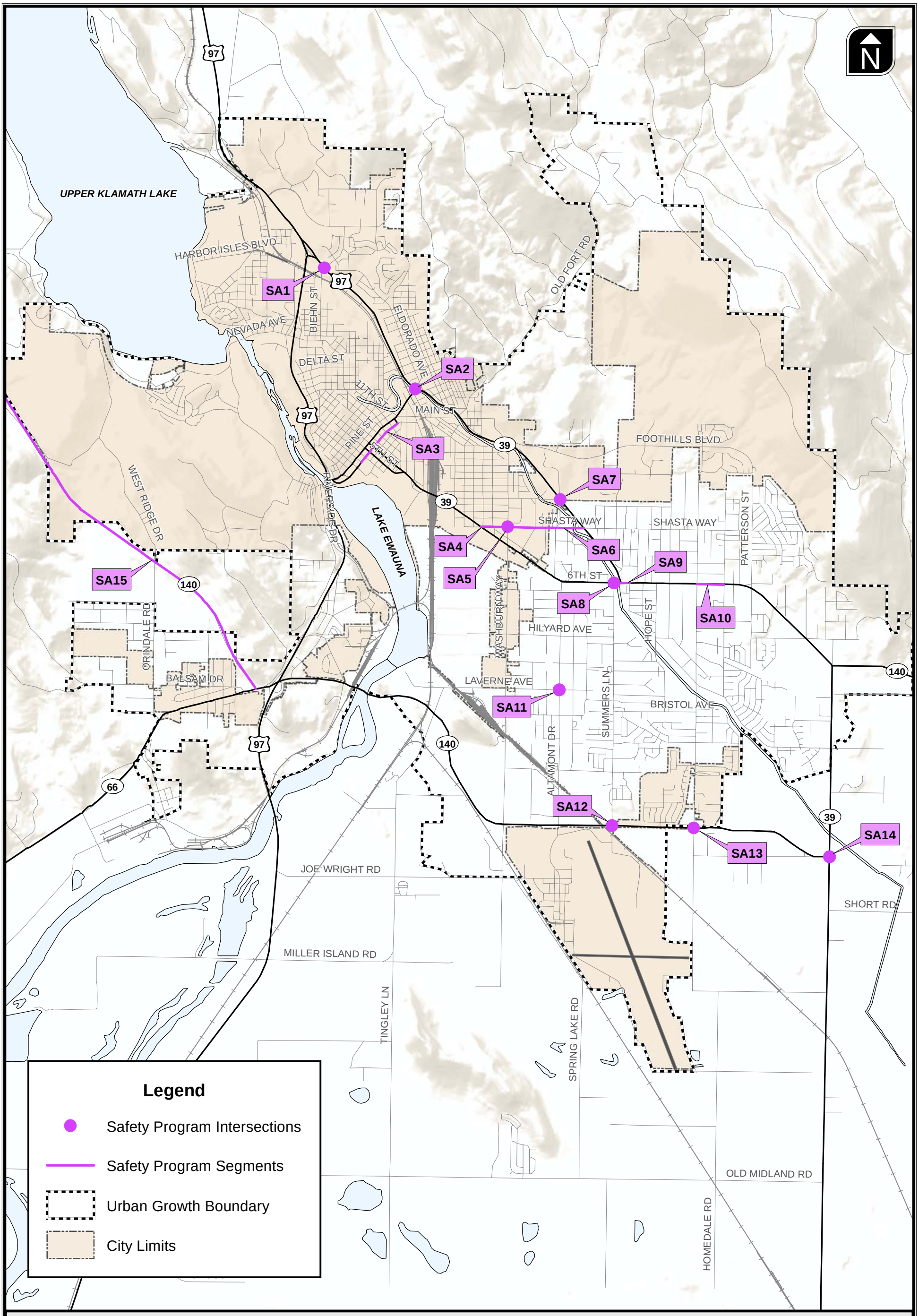
- $30,000 - $50,000/year – Study of safety deficiencies
- $100,000 - $120,000/year – Safety related capital improvements

Table 4-9 outlines the locations where safety deficiencies were identified and potential mitigation measures identifed. These projects are also shown in Figure 4-8.

TABLE 4-9: PLANNED SAFETY STUDIES

Project Number	Name	Description	Cost	Priority
SA1	Improve bicycle facilities at the intersection of Biehn Street/Campus Drive	Would provide clearer routes through the intersection for bicycle users.	$30,000	High
SA2	Bicycle crossing of OR 39	Would provide a bicycle connection across OR 39 from Esplanade Avenue to Melrose Street	$30,000	High
SA3	Safety Improvements on Klamath Avenue from Main Street to 3rd Street	City monitor on an annual basis.	$50,000	Low
SA4	Safety Improvements on Shasta Way from South 6th Street to Washburn Way	Conduct access management project to decrease the number of access driveways and increase access spacing between driveways along South 6th Street. Investigate feasibility of installing a raised median.	$50,000	Low
SA5	Safety Improvements at Washburn Way & Shasta Way	Conduct site visit to confirm traffic signal head visibility on southbound approach. Depending on visibility, investigate ways to improve signal head visibility such as installing near-side traffic signals for approaching vehicles.	$30,000	Low
SA6	Safety Improvements on Shasta Way from Washburn Way to OR 39	Conduct a focused safety study of the segment in conjunction with Project I4. Focus of study to identify contributing factors to crashes and determine potential countermeasures to reduce crashes.	$50,000	Medium
SA7	Safety Improvements at OR 39 & Eberlein Avenue	Conduct sight distance and speed studies to determine adequate sight distance for prevailing speeds. Consult and apply treatments from the Highway Safety Manual, NCHRP 613 Guidelines for Selection of Speed Reduction Treatments at High Speed Intersections and other similar resources as appropriate. Evaluate possible realignment options.	$30,000	Low
SA8	Improve bicycle facilities at the intersection of Summers Lane/South 6th Street	Would improve bicycle and pedestrian facilities at the intersection of Summers Lane/South 6th Street. Should be considered in conjunction with project I18.	$30,000	High
SA9	Safety Improvements on South 6th Street from Summers Lane to Fargo Street	Conduct access management project to decrease the number of access driveways and increase access spacing between driveways along South 6th Street.	$50,000	High
SA10	Safety Improvements on South 6th Street from Homedale Road to Madison Street	Conduct access management project to decrease the number of access driveways and increase access spacing between driveways along South 6th Street. Investigate feasibility of installing a raised median.	$50,000	Medium
SA11	Safety Improvements at Altamont Drive & Laverne Avenue	Conduct intersection study to determine existing available sight distance, prevailing speeds on major street, and feasibility of a roundabout. Develop and compare alternative improvement measures to reduce crashes.	$30,000	High

Project Number	Name	Description	Cost	Priority
SA12	Safety Improvements at OR 140 & Summers Lane	Conduct sight distance and speed studies to determine adequate sight distance for prevailing speeds. Consult and apply treatments from the Highway Safety Manual, NCHRP 613 Guidelines for Selection of Speed Reduction Treatments at High Speed Intersections and other similar resources as appropriate. Consider rail crossing treatments.	$30,000	Medium
SA13	Safety Improvements at OR 140 & Homedale Drive	Conduct sight distance and speed studies to determine adequate sight distance for prevailing speeds. Consult and apply treatments from the Highway Safety Manual, NCHRP 613 Guidelines for Selection of Speed Reduction Treatments at High Speed Intersections and other similar resources as appropriate.	$30,000	Low
SA14	Safety Improvements at OR 140 & OR 39 (South of Big Y)	Conduct sight distance and speed studies to determine adequate sight distance for prevailing speeds. Consult and apply treatments from the Highway Safety Manual, NCHRP 613 Guidelines for Selection of Speed Reduction Treatments at High Speed Intersections and other similar resources as appropriate.	$30,000	Medium
SA15	Safety Improvements on OR 140 from Western UGB to OR 66	Conduct study to determine feasibility of shoulder rumble strips, increased roadside delineation and other similar measures to mitigate crashes. Based on study, implement mitigation measures.	$50,000	Low
		Total:	$570,000	



Planned Safety Projets

Figure 4-8

H:\projfile\11172 - Klamath Falls TSP\gis\Draft TSP\Figure 4-8_Planned Safety Projects.mxd

Planned Roadway Projects

The projects presented in Table 4-10 have been identified as future roadway extensions needed throughout the urban area. Many are labeled as "development driven," meaning that the need for these particular projects will be determined based on future development patterns. As such, public capital improvement funds will likely not play a major role in financing the future construction of these projects. These projects are also shown in Figure 4-9. Figure 4-10 shows the proposed lane configuration changes at applicable study intersections. Further, these projects are described in more detail in *Appendix 1D*.

The development of these projects, as wells as the subsequent multimodal focused projects, are described in more detail in *Technical Appendix #5*: Alternatives Analysis which is included in the *Technical Appendix 2E*.

No improvement is proposed at the intersection of Fargo Street/OR 39 due to the intersection's close proximity to the prominent South 6th Street/OR 39 intersection. As such, an alternative mobility standard will be considered as needed at this location. 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.

TABLE 4-10: PLANNED ROADWAY IMPROVEMENTS

Project Number	Name	Description	Cost	Priority
R1	New Minor Collector from Dan O'Brien Way to Dahlia Street	Would create a new connection from Dan O'Brien Way to Dahlia Street.	$8,216,000	Development Driven
R2	Daggett Avenue Extension	Would extend existing Daggett Avenue alignment north to Dan O'Brien Way.	$1,738,000	Development Driven
R3	Dahila Street Extension	Would extend existing Dahila Street alignment north to Dan O'Brien Way (near Industrial Park Drive)	$882,000	Development Driven
R4	Crescent Avenue Extension	Would extend the existing Crescent Avenue alignment north to Biehn Street.	$6,753,000	Development Driven
R5	Basin View Roadway	Roadway would serve Basin View development area.	$8,654,000	Development Driven
R6	Roadway from Foothill Blvd to Old Fort Road	Roadway would extend north from Foothills Boulevard to Old Fort Road.	$17,455,000	Development Driven
R7	East Main Street Extension	Would extend East Main Street from the intersection of East Main Street/South 6th Street to the intersection of Washburn Way/Crosby Avenue.	$11,820,000	High
R8	Upgrade Emerald Street	Would upgrade Emerald Street south of OR 66 to serve future development in the area.	$1,666,000	Development Driven
R9	New Roadway South of OR 66/OR140	Would construct a new roadway that would extend south from the OR66/OR140 intersection.	$2,574,000	Development Driven
R10	Hilyard Avenue Extension	Would connect the eastern portion of Hilyard Avenue to Homedale Road.	$2,169,000	Medium
R11	New Collector from Hilayrd Avenue to Harlan Drive	Would create a new connection from Hilyard Avenue to Harland Drive.	$6,651,000	Development Driven
R12	Washburn Way Realignment	Would realign Washburn Way to connect with Joe Wright Road east of the railroad track alignment	$2,389,000	High
R13	Brett Way Extension	Would extend Brett Way from Summer Lane to Homedale Road	$9,824,000	Development Driven
I1	OR 39/Biehn Street/Campus Drive Intersection	Construct a northbound left-turn lane. Would require the construction of an additional receiving lane.	$839,000	Low
I2	Biehn Street/Oregon Avenue Intersection	Construct a southbound left-turn lane.	$164,000	Medium
I3	Main Street/OR 39 Intersection	Modify signal timings to better serve existing and future demand.	$195,000	Low
I4	OR 39/Washburn Way Intersection	Modify signal phasing to provide protected/permitted phasing northbound, permitted phasing southbound, overlap phasing for eastbound right-turn, and overlap phasing for southbound right-turn.	$195,000	High
I5	Eberlein Avenue/OR 39 Intersection	Install traffic signal.	$507,000	Medium
I6	OR 39/Shasta Way Intersection	Modify signal phasing to provide protected/permitted phasing on Shasta Way.	$195,000	Low

Project Number	Name	Description	Cost	Priority
I7	Shasta Way/Homedale Road Intersection	Install traffic signal.	$507,000	Development Driven
I8	Homedale Road/OR 39 Intersection	Construct eastbound right-turn lane. Would likely impact adjacent parking lot.	$743,000	High
I9	Summers Lane/Clinton Avenue Intersection	Install traffic signal.	$507,000	Medium
I10	OR 39/OR 140 (Big Y) Intersection	Construct southbound left-turn lane. Would require second receiving lane and would likely impact adjacent parcels.	$825,000	High
I11	Washburn Way/OR 140 Eastbound Ramps Intersection	Install traffic signal	$507,000	High
I12	OR 39/OR 140 (South of Big Y) Intersection	Install traffic signal	$507,000	Medium
		Total:	$86,482,000	

Table 4-11 summarizes the total cost estimates for the planned roadway studies, safety improvements/studies, roadways projects, and intersections projects that are detailed in the Roadway Facilities Plan.

TABLE 4-11: TOTAL ROADWAY FACILITY PLAN COST SUMMARY

Priority	Studies	Safety	Roadway	Intersection	Total Needs
High	$400,000	$170,000	$14,209,000	$2,270,000	
Medium	$0	$160,000	$2,169,000	$1,685,000	
Low	$100,000	$240,000	$0	$1,229,000	
Total	$500,000	$570,000	$16,378,000	$6,912,000	
Development Drive	-	-	$64,413,000	$507,000	
Total	$500,000	$570,000	$80,791,000	$5,591,000	$87,552,000

Detailed project descriptions and complete cost estimates can be found in *Appendix 1D and 1E*, respectively.

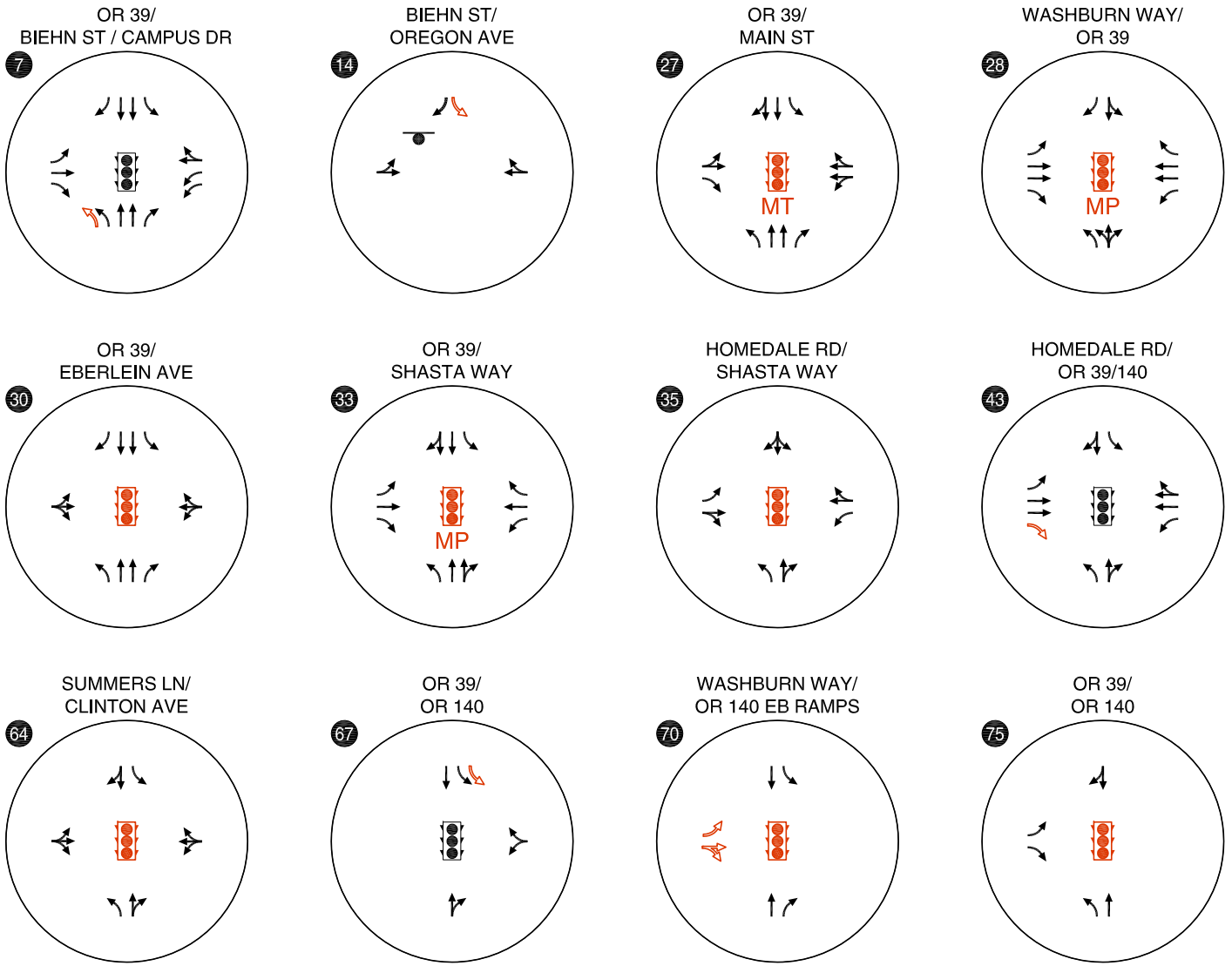
UPPER KLAMATH LAKE
LAKE EWAUNA
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
I1
I2
I3
I4
I5
I6
I7
I8
I9
I10
I11
I12
97
39
140
66
FRONT ST
LAKESHORE DR
3RD ST
SPRING ST
FOOTHILLS BLVD
6TH ST
WASHBURN WAY
PATTERSON ST
HOPE ST
KELLER RD
ALTAMONT DR
SUMMERS LN
HOMEDALE RD
SPRING LAKE RD
ORINDALE RD
BALSAM DR
GREENSPRINGS DR

Legend

- Statewide Hwy (Expressway)
- Statewide Hwy
- Regional Hwy
- District Hwy
- Major Arterial
- Collector
- Local Street
- New Arterial
- New Collector
- I# Intersection Projects
- Urban Growth Boundary
- City Limits

Roadway Projects Map

Figure 4-9



- STOP SIGN
- TRAFFIC SIGNAL
- YIELD SIGN
- PROPOSED IMPROVEMENTS

MT - MODIFY SIGNAL TIMING
MP - MODIFY SIGNAL PHASING

INTERSECTION IMPROVEMENTS

Figure 4-10

Section 5 Pedestrian Facilities Plan

5 PEDESTRIAN FACILITIES PLAN

The pedestrian system within the Klamath Falls urban area currently consists of on-street pedestrian facilities and a small network of multi-use trails. Future plans for improvements to the pedestrian system are focused on strategic additions to the multi-use path system and enhancements to the on-street pedestrian facility network to better serve area schools and facilitate local walking trips. The following sections describe the existing pedestrian network inventory and the specific pedestrian projects planned.

Existing Pedestrian Network

Pedestrian facilities serve a variety of needs, including:

- Relatively short trips (generally considered to be under a mile) to major pedestrian attractors, such as schools, parks, and public facilities;
- Recreational trips (e.g., jogging or hiking) and circulation within parks;
- Access to transit (generally trips under 1/2-mile to bus stops); and,
- Commute trips, where mixed-use development is provided and/or people have chosen to live near where they work.

Pedestrian facilities should be integrated with transit stops and effectively separate pedestrians from conflicts with vehicular traffic. Furthermore, pedestrian facilities should provide continuous connections among neighborhoods, schools, employment areas, and nearby pedestrian attractors. Pedestrian facilities usually refer to sidewalks or paths, but also include pedestrian crossing treatments for high volume roadways.

Within the Klamath Falls urban area, sidewalks are provided on one or both sides of some of the major roadways (i.e., arterials and collectors). Noticeable gaps in the sidewalk network exist along Nevada Avenue, Eldorado Boulevard, Spring Street, Washburn Way, Altamont Drive, Hope Street, Patterson Street, Laverne Avenue, Clinton Avenue, Harlan Drive, and Keller Road. Existing pedestrian facilities within the urban area are shown in Figure 5-1.

Planned Pedestrian Projects

Table 5-1 describes the planned pedestrian projects intended to provide better pedestrian connections within the urban area and facilitate an increase of pedestrian trips in the future.

TABLE 5-1: PLANNED PEDESTRIAN PROJECTS

Project Number	Name	Description	Cost	Priority
P1	Daggett Avenue Sidewalks: El Dorado Avenue to Clairmont Drive	Would add sidewalks to both sides of the street	$355,000	High
P2	El Dorado Avenue Sidewalks: Van Ness to Daggett Avenue	Would add sidewalks to one side of the street	$820,000	High
P3	Washburn Way Sidewalks: Crater Lake Parkway to Shasta Way	Would add sidewalks to both sides of the street	$1,523,000	High
P4	Eberlein Avenue Sidewalks: Washburn Way to Canal	Would add sidewalks to both sides of the street	$620,000	High
P5	Crest Street and Clinton Street Sidewalks: Hilyard Avenue to Summers Lane	Would add sidewalks to both sides of the street	$2,900,000	High
P6	Laverne Avenue Sidewalks: Washburn Way to Crest Street	Would add sidewalks to both sides of the street	$1,665,000	High
		Total:	$7,883,000	

Figure 5-1 shows the location and extent of the planned pedestrian improvements relative to the existing pedestrian facilities within the Klamath Falls urban area. Figure 5-1 includes the projects identified in Table 5-1 to fill in sidewalk gaps in the existing roadway network (shown in red dashed lines) as well as sidewalk facilities that will be constructed as a result of planned future roadways (shown in blue and green).

Table 5-2 summarizes the total cost estimates for the planned pedestrian projects that are detailed in the Pedestrian Facilities Plan.

Detailed project descriptions and complete cost estimates can be found in *Appendix 1D and 1E*, respectively.

TABLE 5-2: TOTAL PEDESTRIAN FACILITY PLAN COST SUMMARY

Priority	Pedestrian Projects
High	$7,883,000
Medium	$0
Low	$0
Total	$7,883,000

Miles
0 0.5 1 1.5 2

N

UPPER KLAMATH LAKE
LAKE EWAUNA

P1 P2 P3 P4 P5 P6 M1 M2

97 39 140 66

LAKEPORT BLVD
CAMPUS DR
FRONT ST
LAKESHORE DR
NEVADA AVE
BIEHN ST
OLD FORT RD
MAIN ST
SPRING ST
3RD ST
5TH ST
6TH ST
FOOTHILLS BLVD
SHASTA WAY
SUMMERS LN
PATTERSON ST
HOPE ST
HOMEDALE RD
HILYARD AVE
HARLAN DR
WASHBURN WAY
ALTAMONT DR
WEST RIDGE DR
RIVERSIDE DR
ORINDALE RD
BALSAM DR
GREENSPRINGS DR
JOE WRIGHT RD
TINGLEY LN
MILLER ISLAND RD
SPRING LAKE RD
SHORT RD
MIDLAND RD

Legend

- Sidewalks on Both Sides of Street
- Sidewalk on One Side of Street
- Planned Sidewalk Project
- Multi-Use Path - Motorized Vehicles Prohibited
- Planned Multi-Use Path Project
- New Arterial
- New Collector
- High Schools
- Elementry and Junior High Schools
- UGB
- City Limits

Pedestrian Network Map

Figure 5-1

H:\profile\11172 - Klamath Falls TSP\gis\Draft TSP\Figure 5-1_Pedestrian Network Map.mxd

Section 6 Bicycle Facilities Plan

6 BICYCLE FACILITIES PLAN

The existing bicycle facilities within the Klamath Falls urban area currently exist on portions of Washburn Way, Biehn Street, and Nevada Avenue. Other bicycle travel within the urban area is on facilities with paved shoulders wide enough to accommodate bicycle travel, on facilities where bicycles can safely be accommodated with vehicular traffic, or on existing multi-use pathways. The following sections describe the existing bicycle facility network and planned improvements for the future.

Existing Bicycle Network

Similar to pedestrian facilities, bicycle facilities (including dedicated bicycle lanes in the paved roadway, multi-use paths shared with pedestrians, etc.) serve a variety of trips. These include:

- Trips to major attractors, such as schools, parks and open spaces, retail centers, and public facilities;
- Commute trips;
- Recreational trips; and
- Access to transit, where bicycle storage facilities are available at the stop, or where space is available on bus-mounted bicycle racks.

Bike lanes are currently provided in relatively limited areas scattered throughout the urban area collectively amounting to 5.5 miles in length. There are approximately 11.8 miles of multiuse path facilities for bicycles and pedestrians generally traversing the urban area from the southeast to northwest along the abandoned OC&E (Oregon, California and Eastern) railroad right-of-way as well as along the "A" Canal. The "A" Canal parallels the western side of OR 39 (Klamath Falls-Malin Highway). Existing bicycle and multi-use facilities are shown in Figure 6-1.

Planned Bicycle Projects

The City and County have agreed that bicycle facilities will be constructed on new collectors and arterials built within the urban area. In addition, an effort will be made by each agency to constructed bicycle facilities on existing collectors and arterials that do not currently have dedicated bicycle facilities. These facilities will be addressed by the following approach:

- Evaluate the feasibility and cost of installing bicycle facilities on arterials and collectors, starting with the highest traveled arterials.
- If retrofitting is feasible, explore the advantages and disadvantages of striping actual lanes versus using bicycle symbols.

This approach will systematically evaluate the existing transportation system and install bicycle facilities where appropriate throughout the urban area.

In addition to systematically evaluating the existing roadway system, specific bicycle and multi-use pathway projects have been identified as priorities for the urban area. The purpose of these projects is to provide more connected bicycle facilities within the urban area and better accommodate both recreational and commuter trips. Table 6-1 describes these specific projects.

TABLE 6-1: BICYCLE AND MULTI-USE PATHWAY PROJECTS

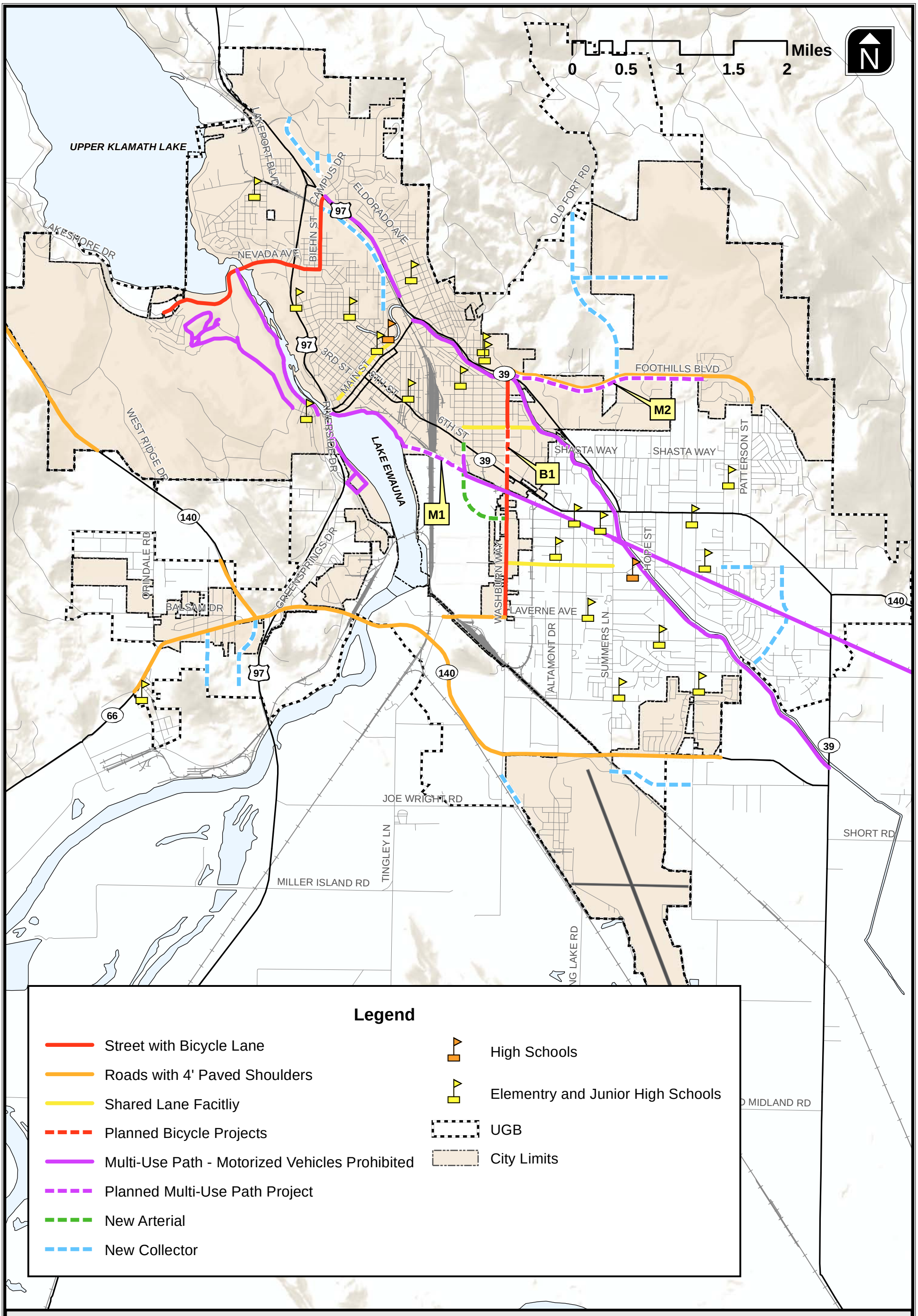
Project Number	Name	Description	Cost	Priority
B1	Washburn Way Bicycle Lanes: Eberlein Avenue to South 6th Street	Would add bike lanes to both sides of the street	$2,570,000	High
M1	Extend OC&E trail to downtown	Would extend the existing alignment of the OC&E trail to serve downtown Klamath Falls	$5,485,000	High
M2	New Multi-Use Path Along Foothillls Boulevard	Would construct a multi-use path along Foothills Boulevard to serve users in the area.	$1,410,000	High
		Total:	$9,465,000	

Figure 6-1 shows the location and extent of the planned bicycle and multi-use pathway projects relative to the existing bicycle and multi-use pathway network. Figure 6-1 includes the projects identified in Table 6-1 to fill in high priority gaps in the existing roadway/multi-use path network as well as bicycle lanes that will be constructed as a result of planned future roadways.

Table 6-2 summarizes the total cost estimates for the planned pedestrian projects that are detailed in the Pedestrian Facilities Plan. Detailed cost estimates and complete cost estimates can be found in *Appendix 1D and 1E*, respectively.

TABLE 6-2: TOTAL BICYCLE FACILITY PLAN COST SUMMARY

Priority	Bicycle Projects	Multi-use Path Projects
High	$2,570,000	$1,410,000
Medium	$0	$0
Low	$0	$0
Total	$2,570,000	$6,895,000



Legend

- Street with Bicycle Lane
- Roads with 4' Paved Shoulders
- Shared Lane Facitliy
- Planned Bicycle Projects
- Multi-Use Path - Motorized Vehicles Prohibited
- Planned Multi-Use Path Project
- New Arterial
- New Collector
- High Schools
- Elementry and Junior High Schools
- UGB
- City Limits

Bicycle Network Map

Figure 6-1

H:\proj\file\11172 - Klamath Falls TSP\gis\Draft TSP\Figure 6-1_Bicycle Network Map.mxd

Section 7 Transit System Plan

7 TRANSIT SYSTEM PLAN

Existing Transit System

Basin Transit Services (BTS) is the public transit agency for the Greater Klamath Falls Urban Area. The Transit District extends from Terminal City in the north to Kingsley Field (i.e., Klamath Falls Airport) in the south and from the Klamath Falls city limits to an area just beyond OR 39 in the east. Within this area, BTS provides three forms of service: 1) Fixed Route Bus Service; 2) Dial-A-Ride Services and 3) Historical Trolley Tours. Each of these services is discussed below.

FIXED ROUTE BUS SERVICE

As can be seen in Figure 7-1, there were six fixed routes in operation in the Klamath Falls urban area in 2011 and two key transit centers: 1) Downtown Transit Center at 7th Street & Pine Street; and 2) Fairgrounds Transit Center at Altamont Drive & South 6th Street. Routes 1 and 2 are considered the mainline providing a northwest to southeastern backbone of service from Oregon Institute of Technology (OIT) to Klamath Community College (KCC) and points in between. Routes 3 through 6 provide supplemental coverage in the area. Routes 3 and 5 serve the western portions of the urban area, Route 4 provides coverage in the northeastern portion of the urban area and Route 6 covers the southern portion. No bus routes currently extend far enough south to provide service to the airport. The fixed bus routes do have stops located within ¼-mile of the Amtrak Station in downtown Klamath Falls; however, there are no stops at the train station.

BTS provides service on their fixed routes Monday through Saturday; service is not provided on Sundays. Headways on all fixed routes are approximately 1 hour with stops in downtown and on South 6th Street being served multiple times per hour due to the over lapping routes in these areas.

DIAL-A-RIDE SERVICE

Dial-A-Ride service by BTS provides curb-to-curb transportation within the Basin Transit Service District for customers over 60 years old and/or those with disabilities who are unable to use the fixed route bus service. The specific qualifying definition of disabled/handicapped is:

Handicapped persons means those individuals who, by reason of illness, injury, age, congenital malfunction, or other permanent or temporary incapacity or disability, including those who are non-ambulatory wheelchair bound and those with semi-ambulatory capabilities are unable without special facilities or special planning or design to utilize mass transportation facilities and services as effectively as persons who are not so affected (49 CFR, Chapter IV, Part 609.3).

Customers must be pre-certified to use the BTS dial-a-ride service; the certification includes filling out a form available online. http://www.basintransit.com/download.shtml

Dial-A-Ride service is available Monday through Friday from 6:00 a.m. to 7:00 p.m. and Saturday from 10:00 a.m. to 4:00 p.m. Service is not provided on Sundays, New Years Day, Presidents Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, or Christmas Day.

HISTORICAL TROLLEY TOURS

Historical bus tours on a rubber-tired trolley are provided Tuesday through Saturday starting and ending at the Klamath County Museum in downtown Klamath Falls. The trolley is operated under Linkville Trolley Company, which is funded through cooperative efforts by the City of Klamath Falls, Klamath County and Basin Transit Service.

Future Transit System Improvements

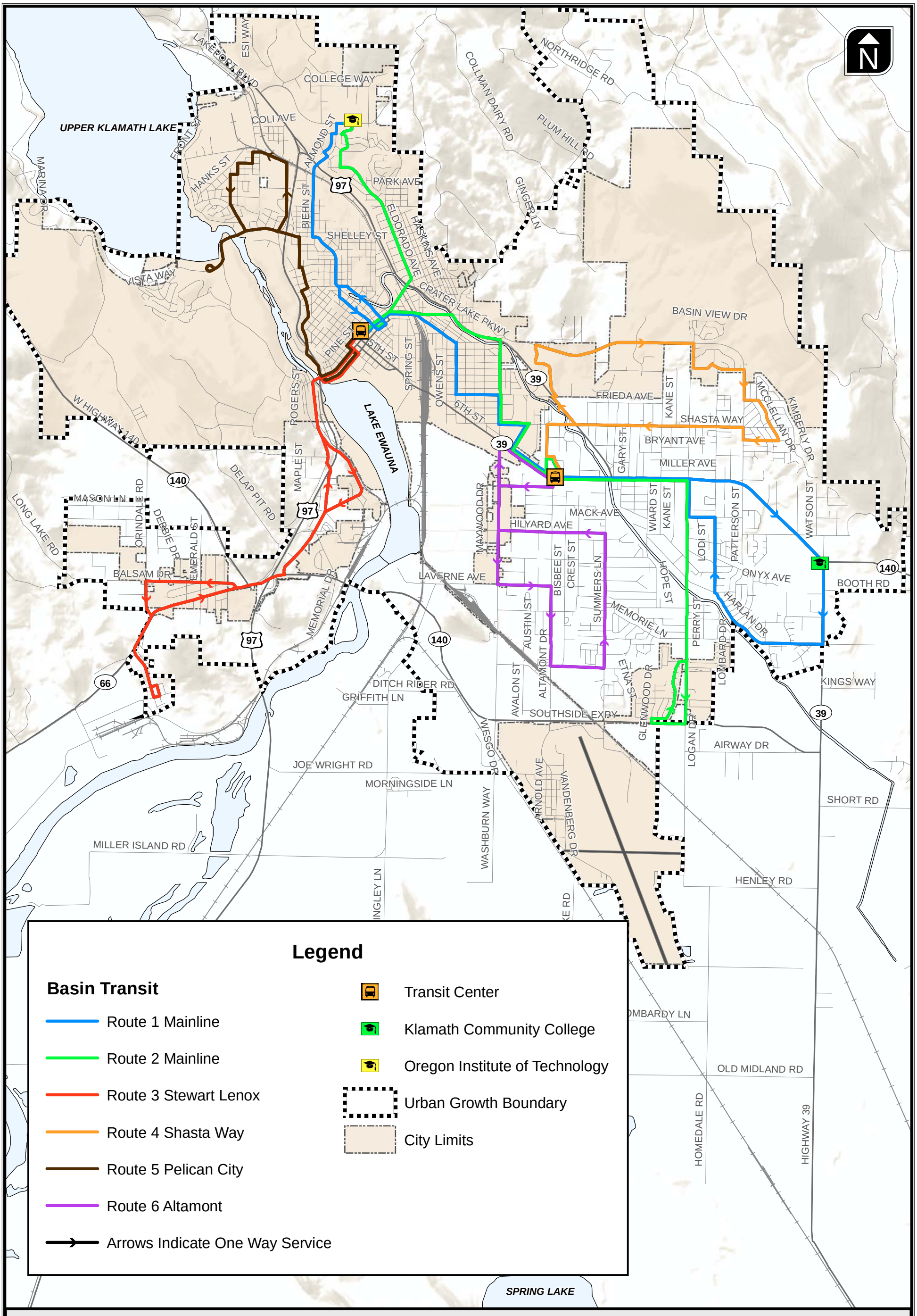
Future improvements to the BTS system were developed based on forecasted land use densities and the identification of areas that would be transit supportive. The projects shown in Table 7-1 are intended to better serve this increase in transit supportive areas.

TABLE 7-1: TRANSIT PROJECTS

Project Number	Name	Description	Operations Costs	Priority
T1	Route 1 frequency	Would increase frequency of service on Route 1	$1,300,000/year	Low
T2	Route 1 operating hours	Would extend operating hours of Route 1	$300,000/year	Low
T3	Route 2 route modification	Would modify Route 2 to serve downtown and South 6th Street	N/A	Low
T4	Route 5 route modification	Would modify Route 5 to serve OIT, Dan O'Brien Way, Pelican City, and Downtown	N/A	Low
		Total:	$1,600,000/year	

Future Transit Study

As of September 2011, the BTS is scheduled to update the transit system plan for the Klamath Falls Urban Area. Upon completion of this study, the updated plan should be referenced for future planned improvements to the transit system.



Legend

Basin Transit

- Route 1 Mainline
- Route 2 Mainline
- Route 3 Stewart Lenox
- Route 4 Shasta Way
- Route 5 Pelican City
- Route 6 Altamont
- Arrows Indicate One Way Service

- Transit Center
- Klamath Community College
- Oregon Institute of Technology
- Urban Growth Boundary
- City Limits

Basin Transit Service Fixed Bus Routes

Figure 7-1

H:\proj\file\11172 - Klamath Falls TSP\gis\Draft TSP\Figure 7-1_Basin Transit Service Fixed Bus Routes.mxd

Section 8 Rail, Air, Pipeline, & Surface Water Plans

8 RAIL, AIR, PIPELINE, & SURFACE WATER PLANS

This section addresses the rail, air, pipeline, and surface water plans for the Klamath Falls urban area. Each subsection below describes each respective network and how it operates within the urban area. No future projects have been identified for any of these service areas as the service is provided by private entities.

Rail Service

The primary track owners and freight line operators in the Klamath Basin are Union Pacific (UP) and Burlington Northern Santa Fe (BNSF) railroads. Freight rail lines connect Klamath Falls to Redding, California in the south via UP's Cascade Line and to Keddie, California via BNSF's line. To the north, Klamath Falls is connected to Eugene through UP's Cascade Line and to Bend through shared trackage rights between UP and BNSF. Amtrak's Coast Staralight Line operates on UP's Cascade Line. The Cascade Line is a Class 4 Line per the Federal Rail Administration's standards; the maximum speed for freight trains on the line is 60 mph and the maximum speed for passenger trains is 80 mph. The railroad system within the urban area and the rail line owners are shown in Figure 8-1.

Air Service

Klamath Falls Airport serves the City of Klamath Falls, Klamath County and surrounding local region. The airport facility, Kingsley Field, is located about 5 miles southeast of downtown Klamath Falls; it is operated by the City of Klamath Falls. The most recent airport planning document (currently the *Klamath Falls Airport Master Plan, January 2005)* should be referenced for airport planning issues.

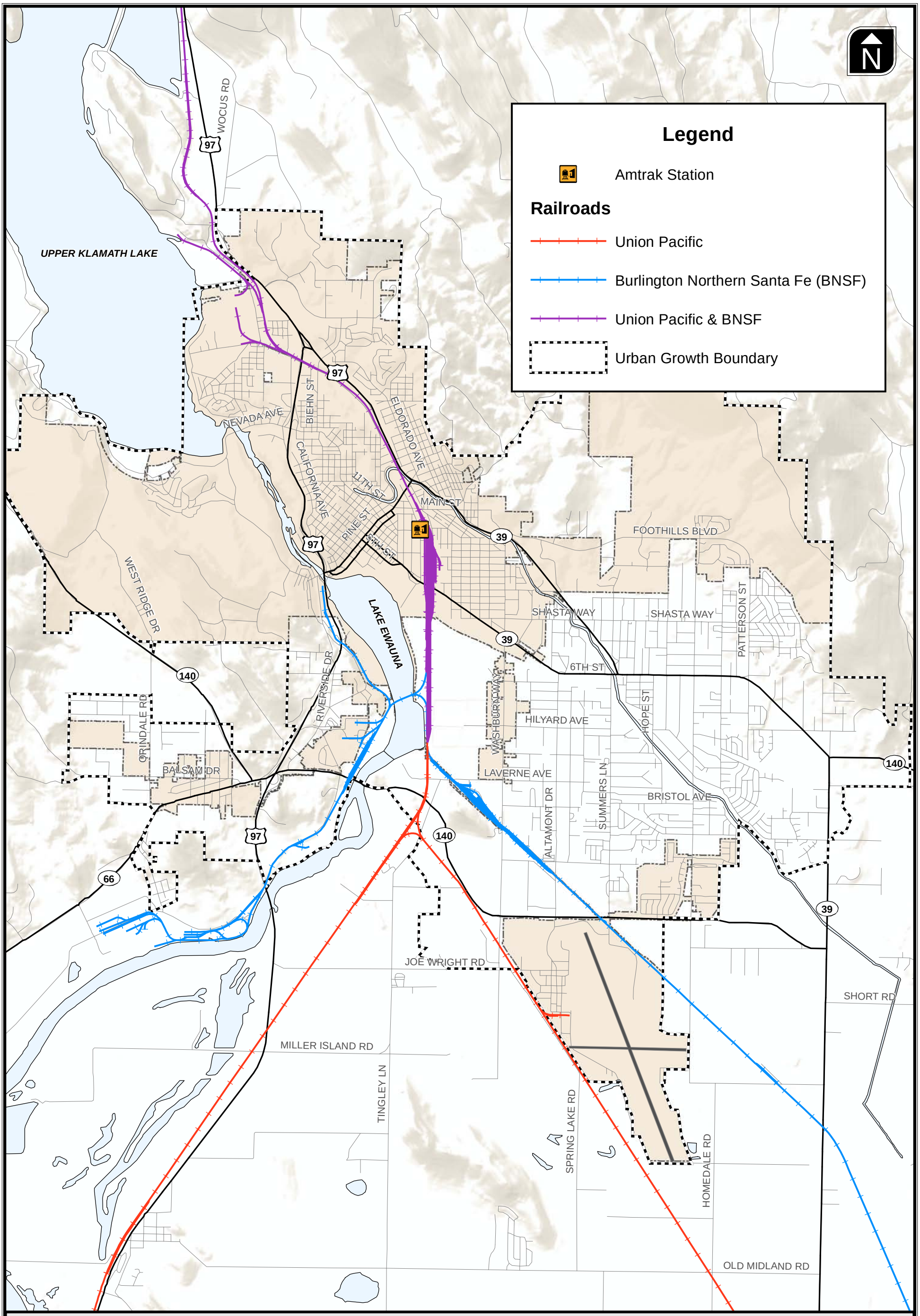
Klamath Falls Airport is classified as a non-hub primary commercial service airport in the National Plan of Integrated Airport Systems 2001-2005, and is classified in the Oregon Aviation Plan as a Category 1, Commercial Service Airport. It serves virtually all of the aviation needs of the Greater Klamath Basin, including all of Klamath County and parts of Siskiyou and Modoc Counties in California. The Klamath Falls Airport serves a mixture of military, commercial, and general aviation use. Much of the airport's use, however, is from general aviation (non-military, non-scheduled) users, such as non-scheduled air-taxi service, U.S. Forest Service fire suppression, agricultural spray applicators, flight school, scenic flights, corporate aviation, and air cargo. Military use of the Klamath Falls Airport is also substantial, and includes refueling of military aircraft; emergency support, air traffic control, and disaster relief by the Oregon Air National Guard; and military training.

Pipeline Service

Pipeline transportation within the Klamath Falls urban area includes transmissions lines for electricity, television, telephone services as well as transport of water, sanitary sewer, and a major north-south transmission line for natural gas.

Surface Water Transportation

While Klamath Falls is located on one of the largest lakes in Pacific Northwest, Upper Klamath Lake, water transportation is limited to recreational uses of the lake. The nearest port is located in Coos Bay, Oregon and is an international/national shipping facility.



Railroad System & Operators

Figure 8-1

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Section 9 Vision Projects

9 VISION PROJECTS PLAN

Several studies have been conducted within the Klamath Falls urban area in recent years that analyzed particular areas in detail and developed plans to accommodate specific future growth scenarios. These studies often assumed build-out of the area being analyzed, thus assessing the "worst-case" scenario for that are in terms of future trip generation. However, the TSP analysis assumed a more broad-based future scenario based on the Klamath Falls Urban Area Travel Demand Model where development was spread throughout the urban area rather than focused in one particular location. As such, the sub-area plans that were developed identified projects that were not observed to be necessary with the 2035 forecast year for the TSP. These sub-area plans include:

- Klamath Falls Westside Refinement Plan (2006) (Reference 5)
- Orindale/Balsam Sub-Area Master Plan (2007) (Reference 6)
- Klamath Falls Campus Sub-Area Master Plan (2008) (Reference 7)

These plans are provided in *Technical Appendix 2F, Technical Appendix 2G, and Technical Appendix 2H*, respectively.

If concentrated development occurs in the future, one or more of the projects identified by the sub-area plans may be necessary within the TSP horizon. As such, projects identified in the sub-area plans and not previously mentioned in the TSP have been identified as "vision projects," meaning the need for these projects is anticipated to be beyond the horizon year of the TSP but could occur sooner if growth and development over the next 20 years is more concentrated in some areas than others. Therefore, development projects shall be responsible for dedicating and preserving the appropriate right-of-ways and, if deemed necessary, construct the improvements to accommodate their respective impacts.

TABLE 9-1: VISION PROJECTS

Project Number	Name	Description	Priority
I13	Dan O'Brien Way Interchange	Would construct an interchange at the US 97/Dan O'Brien Way intersection	Vision
I14	Campus Way/Dahlia Street Intersection Improvements	Would install additional turn lanes at the Campus Way/Dahlia Street intersection	Vision
I15	Campus Way/Biehn Steet/OR 39	Would construct a flyover at the Campus Way/Biehn Street/OR 39 intersection	Vision
I16	Main Street Ramp Improvements	Would improve the US 97/Main Street interchange	Vision
I17	Summers Lane/Crater Lake Parkway Intersections	Would align Crater Lake Parkway with the existing Summers Lane/South 6th Street Intersection	Vision
I18	Greensprings Drive/Dover Avenue/Riverside Drive Improvements	Would reconstruct the existing 5-legged intersection	Vision
I19	Memorial Drive Undercrossing	Would construct an undercrossing at the Memorial Drive/OR 140 intersection	Vision
I20	Homedale Road Interchange	Would construct an interchange at the Homedale Road/OR 140 intersection	Vision
I21	Orindale Road Interchange	Would construct an interchange at the Orindale Road/OR 140 intersection	Vision
R14	New Roadway	Would construct a new roadway from OR 140 to Lakeshore Drive	Vision
R15	Cypress Avenue Extension	Would extend Cypress Avenue to serve planned development in west Klamath Falls	Vision
R16	OR 140 Upgrade	Would upgrade OR 140 west of OR 66 to a 5-lane section with bike lanes	Vision
R17	Orindale Road Upgrade	Would upgrade Orindale Road to a minor collector	Vision
R18	Balsam Drive Upgrade	Would upgrade Balsam Drive to a minor collector	Vision
R19	OR 66 Upgrade	Would upgrade OR 66 to a 5-lane major arterial between OR 140 and Orindale Road	Vision
R20	New Minor Collector Construction	Would construct a new minor collector between Emerald Street and planned roadway south of the OR 140/OR 66 intersection	Vision
R21	Anderson Avenue Extension	Would extend Anderson Avenue from Gettle Street to Glenwood Drive	Vision

UPPER KLAMATH LAKE
LAKE EWAUNA
I13
I14
I15
I16
I17
I18
I19
I20
I21
R14
R15
R16
R17
R18
R19
R20
R21
97
39
140
66
NEVADA AVE
BIEHN ST
DELTA ST
11TH ST
ELDORADO AVE
MAIN ST
PINE ST
5TH ST
OLD FORT RD
FOOTHILLS BLVD
WEST RIDGE DR
RIVERSIDE DR
SHASTA WAY
PATTERSON ST
6TH ST
WASHBURN WAY
HILYARD AVE
HOPE ST
LAVERNE AVE
SUMMERS LN
BRISTOL AVE
ALTAMONT DR
BALSAM DR
JOE WRIGHT RD
SHORT RD
MILLER ISLAND RD
TINGLEY LN
SPRING LAKE RD
OLD MIDLAND RD
HOMEDALE RD

Legend

- Vision Intersection Projects
- Vision Roadway Projects
- Urban Growth Boundary
- City Limits

Vision Projects

Figure 9-1

H:\projfile\11172 - Klamath Falls TSP\gis\Draft TSP\Figure 9-1_Vision Projects.mxd

Section 10 Transportation Funding Plan

10 TRANSPORTATION FUNDING PLAN

Transportation facilities within the Klamath Falls urban area fall under the jurisdiction of: 1) City of Klamath Falls; 2) Klamath County; or 3) ODOT. This section discusses the City and County's existing funding sources for capital improvement project as well as operations and maintenance activities.

Planned Capital Improvements

Table 10-1 summarizes the estimated costs for capital improvement projects that are planned for in this TSP. This list excludes recommended studies and rather focuses are projects that would typically be funded by capital improvement dollars from the City or County.

TABLE 10-1: TOTAL CAPITAL IMPROVEMENT PROJECTS

Priority	Safety[1]	Roadway	Intersection	Pedestrian	Bicycle	Multi-use Path	Total
High (0-5 years)	$150,000/year -or- $3,750,000/25 years	$14,209,000	$2,270,000	$7,883,000	$2,570,000	$5,485,000	$32,417,000
Medium (5-15 year)		$2,169,000	$1,685,000	$0	$0	$0	$3,854,000
Low (15-25 years)		$0	$1,229,000	$0	$0	$0	$1,229,000
Total		$16,378,000	$5,184,000	$7,883,000	$2,570,000	$5,485,000	$37,500,000
Development Drive	-	$64,413,000	$507,000	-	-	-	$64,920,000
Grand Total							**$102,420,000**

Note: [1]The safety program would dedicate a total of $150,000/year to the study of safety concerns within the urban area and the construction of planned improvements.

City of Klamath Falls

Funding sources for capital projects as well as operation and maintenance for transportation facilities within the city limits come from the City's Street Division. For capital improvement projects, the Street Division currently receives monies from an area specific System Development Charges (SDC), from

ODOT via the Surface Transportation Program (STP), and from Klamath County. A breakdown of each is below (as of 2010).

- **Area Specific System Development Charges** – These are received from the Stewart Lennox area at a rate of $2,258.52 per single-family home.
- **STP Monies** – On an annual basis, the City receives an average of approximately $200,000 in STP funds from ODOT, though distributions fluctuate slightly from year to year.
- **Klamath County** – On an annual basis, the City has historically received funding from Klamath County through the Secure Rural Schools Fund (Federal Forest Receipts) in the amount of approximately $750,000 to $800,000 (approximate average amount over the last 24 years). Approximately $150,000 of these funds is allocated to operations and maintenance activities. It should be noted that, this funding source is anticipated to cease in 2012 unless new federal legislation is passed.

Other funding sources such as gas tax revenues and franchise fees supplement the Federal Forest Receipts and STP funds and are used for operations and maintenance activities. Combined, these monies makeup the City's operations and maintenance budget. A summary of these funds from 2007-2010 is provided in Table 10-1.

TABLE 10-1: FUNDING SOURCES FOR CITY OF KLAMATH FALLS PUBLIC WORKS

Year	Federal Forest Receipts	Gas Tax	Franchise Fees	STP Funds	Total[1]
2007	$150,000	$946,362	$607,748	$200,000	**$1,904,110**
2008	$150,000	**$**897,845	$702,432	$224,040	**$1,974,317**
2009	$150,000	**$**807,471	$716,559	$211,460	**$1,885,490**
2010	$150,000	**$**879,105	$716,858	$218,393	**$1,964,356**
Forecasted 2011	TBD	TBD	TBD	TBD	**TBD**
Forecasted 2012	TBD	TBD	TBD	TBD	**TBD**
Forecasted 2013	TBD	TBD	TBD	TBD	**TBD**

Notes: [1]Amounts rounded to nearest dollar.

The balance of the Federal Forest receipt dollars has historically been used for capital projects, which the City has assumed to be $550,000/year for budgeting purposes. However, this money has at times needed to be allocated towards activities other than capital improvement projects, making $550,000 the maximum amount available, though not a certainty.

FORECASTED FUNDS

Monies from the Federal Forest Receipts comprise approximately 17% ($370,000) of their funding and the federal forest receipts funds are expected to cease in two years. Without alternative funding sources, the City's funds available for capital improvement projects will likely decrease.

Klamath County

Funding sources for capital projects as well as operation and maintenance for County roadways consist of Federal Forest Receipts, Motor Vehicle Apportionment, and STP Funds. Table 10-2 summarizes the amount from each of these sources in the last three years as well as the forecasted allotment from each source for the next three years.

TABLE 10-2: FUNDING SOURCES FOR KLAMATH COUNTY PUBLIC WORKS

Year	Federal Forest Receipts	Motor Vehicle Apportionment	STP Funds	Total[1]
2008	$10,962,222	$3,446,505	$479,172	**$14,887,899**
2009	$9,876,312	$3,079,096	$437,260	**$13,392,668**
2010	$8,883,833	$3,361,938	$455,859	**$12,701,630**
Forecasted 2011	$7,534,300	$3,862,000	$457,890	**$11,854,190**
Forecasted 2012	$4,944,226	$4,988,000	$450,000	**$10,382,226**
Forecasted 2013	$674,106	$5,000,000	$450,000	**$6,124,106**

Notes: [1]Amounts rounded to nearest dollar.

The majority of this money is used for the operation and maintenance of the existing County transportation system. For planning purposes, the County has historically had approximately $750,000 available per year for capital projects, though actual expenditures have varied from year to year.

FORECASTED FUNDS

Klamath County Public Works Department budget has been steadily declining in recent years from a high of $14.8 million in 2008 to $12.7 million in 2010. The declining trend is forecasted to continue with an anticipated 2013 budget of $6.1 million. Similar to the City, the primary cause of the decrease is the decreasing amount of funds from Federal Forest Receipts. In 2010, Federal Forest Receipts comprised 70% ($8,883,833) of Klamath County's budget. To maintain funds near current values, the

County will also need to consider alternative funding sources, assuming the Federal Forest Receipts cease in the future.

Financially-constrained Plan

As has been suggested, if the Federal Forest Receipt revenue source ceases in the future, the City and County both expect to have effectively $0 to spend on capital improvement projects without the introduction of an additional revenue source. Given the present uncertainty surrounding the future of the Federal Forest Receipts, the cost constrained plan for projects within the urban area is effectively nothing, meaning no future funds for capital improvement projects are currently reliable.

Section 11 Implementation Ordinances

11 IMPLEMENTATION ORDINANCES

The TPR requires that local jurisdictions amend land use regulations to reflect and implement the TSP. To that end, regulatory language was developed for both the City of Klamath Falls and Klamath County in order to comply with the TPR and to ensure that local ordinances are consistent with the updated Klamath Falls Urban Area TSP. Implementation language can be found in *Technical Appendix 1B*, Recommended Ordinance Amendments and is based on *Tables 1 and 2 in Technical Appendix 1B*.

The ordinance language in *Technical Appendix 1B* provides specific text amendments to the City of Klamath Falls Community Development Ordinance (CDO) and Klamath County Land Development Code (LDC) that meet TPR requirements. To the extent possible, proposed language was developed and formatted to be consistent with the existing structure of the subject regulatory document in order to expedite a code amendment process. Amendments in *Technical Appendix 1B* will be adopted by the City and County concurrently with the adoption of the Urban Area TSP or through a subsequent hearing process, to amend the respective local ordinances. Further amendments to the CDO or LDC may result from the public hearing process, or may be necessary in order to ensure consistency within the ordinance documents and to more seamlessly integrate new criteria with existing requirements.

Section 12 References

12 REFERENCES

1. The Oregon Department of Transportation. *Oregon Highway Plan*. 1999.

2. Transportation Research Board, *Highway Capacity Manual,* 2000.

3. Transportation Research Board, *National Corporative Highway Research Program (NCHRP), Report 255,* 1982.

4. Transportation Research Board, *Access Management Manual,* 2003.

5. Kittelson & Associates, *Klamath Falls Westside Refinement Plan,* 2006.

6. Kittelson & Associates, *Orindale/Balsam Sub-Area Master Plan,* 2007.

7. Kittelson & Associates, *Klamath Falls Campus Sub-Area Master Plan*, 2008.