CITY OF ROSEBURG
TRANSPORTATION SYSTEM PLAN UPDATE

Final Technical Memorandum #4
(Task 6.4 – Future Transportation Operations)

Prepared for

City of Roseburg
900 SE Douglas Avenue
Roseburg, Oregon

Prepared by

David Evans and Associates, Inc.
2100 SW River Parkway
Portland, Oregon

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The Transportation System Tomorrow

The purpose of this section is to describe the future traffic forecast methodology and assumptions used for future forecasting and analysis of intersections and roadway segments for the City of Roseburg Transportation System Plan Update.

This memorandum provides an overview of the future transportation system operations and deficiencies for all modes within Roseburg's Urban Growth Boundary (UGB). The information included in this memorandum will be used in conjunction with *Technical Memorandums #1, 2 and 3* and input from the project team to determine the future transportation system needs for the Roseburg Transportation System Plan (TSP) update.

Roseburg TSP - A Comprehensive, Citywide Assessment

A TSP examines the City's multimodal transportation system as a whole, considers planning for street maintenance, connectivity, access, safety and the impact of future growth throughout the network. In order to review the system that is most likely to affect an average Roseburg citizen or visitor, and to efficiently use time and resources for analysis, TSPs generally focus on the higher-order, arterial and collector street system. Arterials and collectors, by definition, are meant to provide connections across a city and between neighborhoods and activity centers. As such, Roseburg's arterial and collector street intersections and corridors are the focus of the TSP Update.

Introduction

This memorandum summarizes the future baseline conditions of Roseburg's transportation system through the year 2040 planning horizon. Included is a summary of the forecast for Roseburg's population and employment, how future transportation needs are determined, future transportation demand, a description of what Roseburg's transportation system is expected to look like in 2040 and next steps. In addition to vehicular, pedestrian and bicycle performance deficiencies, this memorandum addresses missing links, geometric deficiencies and safety issues for each transportation modal element (e.g. transit, freight, rail and air).

Purpose

The purpose of this document is to provide the transportation data and analysis to assist the City of Roseburg in their decision-making process and enable them to prioritize the most critical transportation projects. The analysis process builds upon the existing conditions summary (*Technical Memorandum #3*), considers near-term transportation system investments in projects with approved funding. Assumed projects were compiled from fiscally-constrained projects listed in the City Capital Improvement Plan (CIP), State Transportation Improvement Program (STIP), 2006 Transportation System Plan (TSP) and adopted Interchange Area Management Plans (IAMPs).

Future Population and Employment

The amount of people living and working in Roseburg and the surrounding communities will impact the future of the transportation system. The assumptions that are made about land use also has an impact on transportation. For example, retail land uses generate more trips than residential. Balancing the locations of different land use types can reduce the need for residents to travel long distances, thus reducing stress on the transportation network.

The Oregon Department of Transportation (ODOT) Transportation Planning and Analysis Unit (TPAU) developed *Base Year 2010 and Future Year 2035 Scenario Travel Demand Forecasting Model Documentation* (see Appendix B) that summarizes the expected household and employment growth forecasts in the Roseburg Travel Demand Model Area. The population and employment growth forecasts are consistent with current land use zoning and State-approved population forecasts for the Roseburg urban area.

The Roseburg Travel Demand Model estimates the City of Roseburg and the surrounding communities are home to over 20,000 households and over 27,000 jobs. Many jobs are held by residents outside of Roseburg's UGB and vice versa. Within its boundary, the Roseburg Travel Demand Model (boundary shown in Figure 1, page 4) estimates that between 2017 and 2040, the number of jobs is expected to increase by 37 percent and the number of households is expected to increase by 41 percent (Table 1). This high rate of growth, in addition to increased tourism activity, will greatly increase traffic demand on Roseburg's transportation network through the year 2040 planning horizon.

TABLE 1. ROSEBURG TRAVEL DEMAND MODEL SUMMARY (2010-2040)

Description	2010	2017[1]	2035	2040[1]	Percent Change (2017-2040)
Household	19,651	22,486	29,778	31,803	41%
Employment	24,315	27,381	35,263	37,453	37%

Source: *Base Year 2010 and Future Year 2035 Scenario Travel Demand Forecasting Model Documentation, ODOT TPAU*
1. Year 2017 and year 2040 values were calculated using a linear growth equation

Employment Growth

The areas of highest employment growth are anticipated in commercial and industrial lands within the area bounded by Stewart Parkway (west and north), Stephens Street (east) and Harvard Avenue (south). Employment growth is also expected in east Roseburg along the Diamond Lake Corridor; the Roseburg City Council has voted to work toward creating a new urban renewal area which could encourage development along the corridor.

Housing Growth

Significant housing growth is expected in several Roseburg subareas (currently zoned for residential development):

- Northwest Roseburg off of Troost Street and south of Edenbower Boulevard
- Southwest Roseburg near Lookingglass Road
- Ramp Canyon south of Douglas Avenue

- Charter Oaks
- Riversdale (Del Rio Road)
- Green (Outside UGB)
- Melrose (Outside UGB)
- Winston (Outside UGB)

Future Travel Demand

With the level of forecasted household and employment growth, Roseburg is expected to see significantly more traffic during the future PM peak hour. Significant increases in vehicle trip ends are expected within areas of higher residential and commercial growth, as shown in Appendix B.

The long-range regional travel forecasts are consistent with current land use zoning and funded transportation projects within the Roseburg UGB.

Future Vehicular Traffic Volume Development

Future baseline traffic volume forecasts for year 2040 were developed using the 2010 and 2035 Roseburg travel demand forecasting models in combination with the 2016 existing traffic data. The planning horizon for the TSP extends to 2040; thus, year 2035 model volumes were extrapolated to 2040.

Travel demand models are tools used to help predict the patterns of future commuters, school traffic, and recreational traffic. The model relies on socioeconomic data (e.g., households and employment) to determine the travel demand, and system attributes (e.g., roadway capacity, speeds, and distances) to represent the transportation supply. The long-range regional growth forecasts are consistent with current land use zoning. The detailed model assumptions are described in detail in Appendix B in a memorandum developed by TPAU.

The volumes were post-processed following the methodologies outlined in the TPAU *Analysis Procedures Manual* (APM) *Volume 2* and National Cooperative Highway Research Program (NCHRP) *Report 765* guidelines. The methodologies used are described in detail in *Technical Memorandum #1, Appendix A (Methodology and Assumptions Memorandum).*

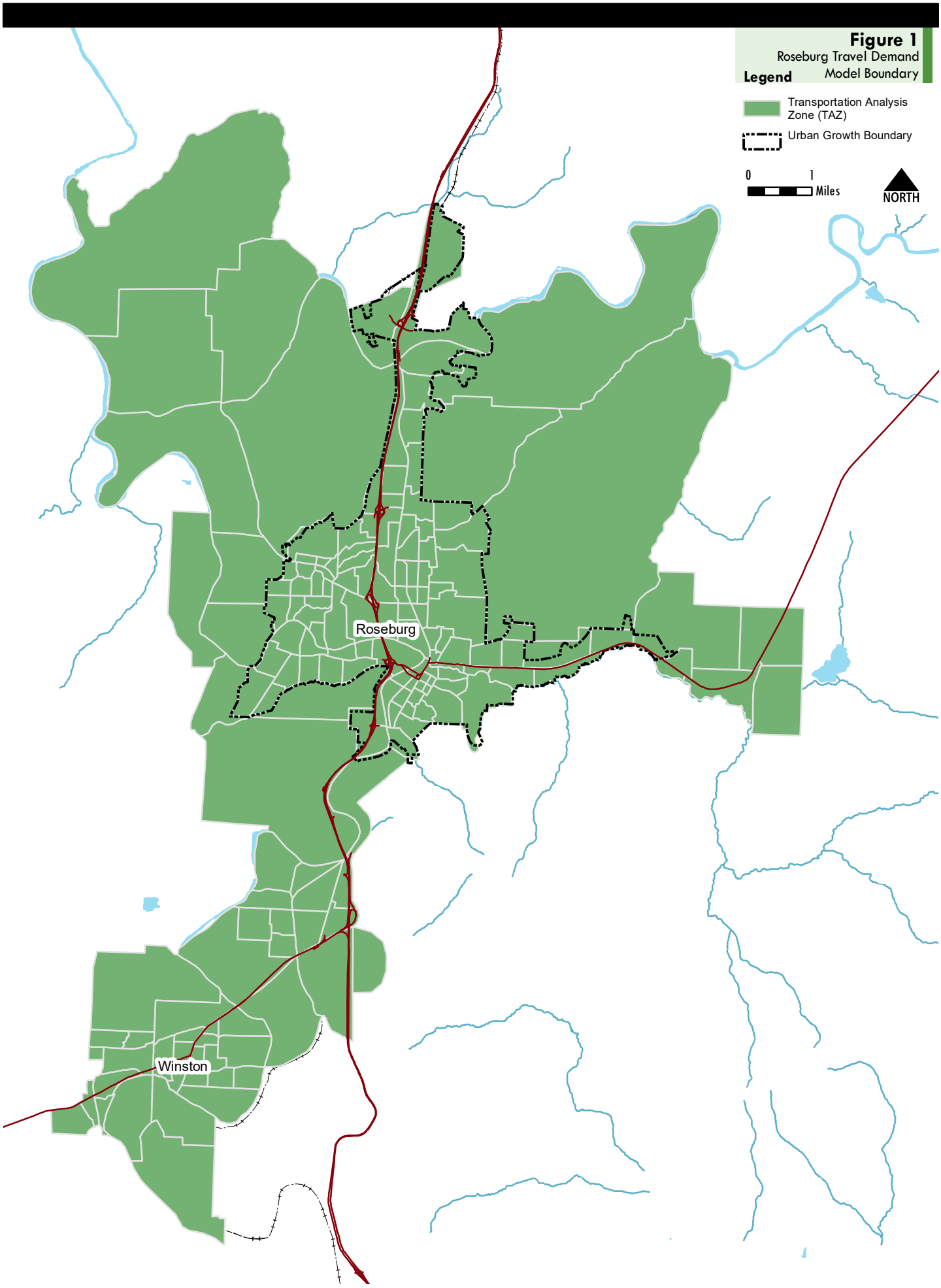


Figure 1
Roseburg Travel Demand
Model Boundary
Legend
Transportation Analysis
Zone (TAZ)
Urban Growth Boundary
0
1
Miles
NORTH
Roseburg
Winston

Future Estimates of Walking, Biking and Transit

While there is great interest in developing forecasting models for bicycles and pedestrians, the traditional travel demand methodology used for estimating motor vehicle activity does not easily apply to bicycle and pedestrian travel for a number of reasons, including:

- Data on walking and biking is typically too limited or inaccurate to develop accurate models.
- The nature of bicycle and pedestrian travel and decision-making is not easily understood and the cost to analyze and develop walk and bike models is prohibitive.

As such, the future needs for walking, biking and transit in Roseburg are determined by reviewing areas of future growth in the City, how well the City is served by existing facilities and how planned/funded projects might improve future systems. Key Roseburg destinations (such as schools, parks, transit stops, shopping and employment) will likely attract future walking and biking trips.

Future Travel Conditions

Street and Highway System

Future Roadway Network

The network used in the forecasts for the Roseburg TSP is a future network that includes roadway projects and safety improvements that are expected to occur by year 2040 on study area roadways. These projects have known funding sources or are programmed to be funded within the next 20 years:

- **Stewart Parkway Widening** – Widen to four lanes between Harvey Avenue and Garden Valley Parkway, straighten S-curves, build new bridge over South Umpqua River, and install new sidewalks and new bike lanes (CIP).
    - Phase I (under construction – expected to finish by the time the TSP update is complete): Garden Valley Boulevard to Harvey Avenue
- **Garden Valley Boulevard/Stewart Parkway Intersection Improvements** – Add dedicated northbound right-turn lane (under construction – expected to finish by the time the TSP update is complete) (CIP)
- **Edenbower Boulevard/Stewart Parkway Intersection Improvements** – Dual eastbound left-turns at (CIP/IAMP 127) (Expected to be constructed by the time the TSP update is complete)
- **I-5: Exit 124 Signal Upgrades & Bellows Street Realignment** – Replace signal poles and hardware at the northbound and southbound ramp terminals. Add turn lanes and realign Bellows St. and the southbound off-ramp (2018-2021 STIP)
- **North Bank Road Reconstruction –** Replacement of two culverts, Full Depth Reclamation, excavation and embankment, aggregate subbase and base, paving & installation of guardrail (2018-2021 STIP)
- **Douglas County Warning Sign Upgrades –** Install curve signs, chevrons and flashing beacon on North Bank Road. Install Curve signs and chevrons on Glenbrook Loop/Riddle Bypass Rd/Sixth Ave., Tiller Trail Highway and Garden Valley Rd. (2018-2021 STIP)

The City has identified additional projects as part of their CIP that would help fill previously identified gaps in the transportation system. These planned projects do not yet have a secured funding source, but will be considered during the solutions development phase of the TSP update. The second phase of the Stewart

Parkway Widening (Harvey Avenue to Harvard Avenue) is an example of such a project. For reference, the City's current CIP is included as an appendix to this memorandum.

Operational Criteria

The City's mobility performance targets are discussed in Technical Memorandum #3. V/C and LOS thresholds are the key technical and policy benchmarks for measuring street/vehicle performance, used to help identify future improvements and to manage growth. Appendix A provides detailed descriptions of the operational criteria and mobility targets.

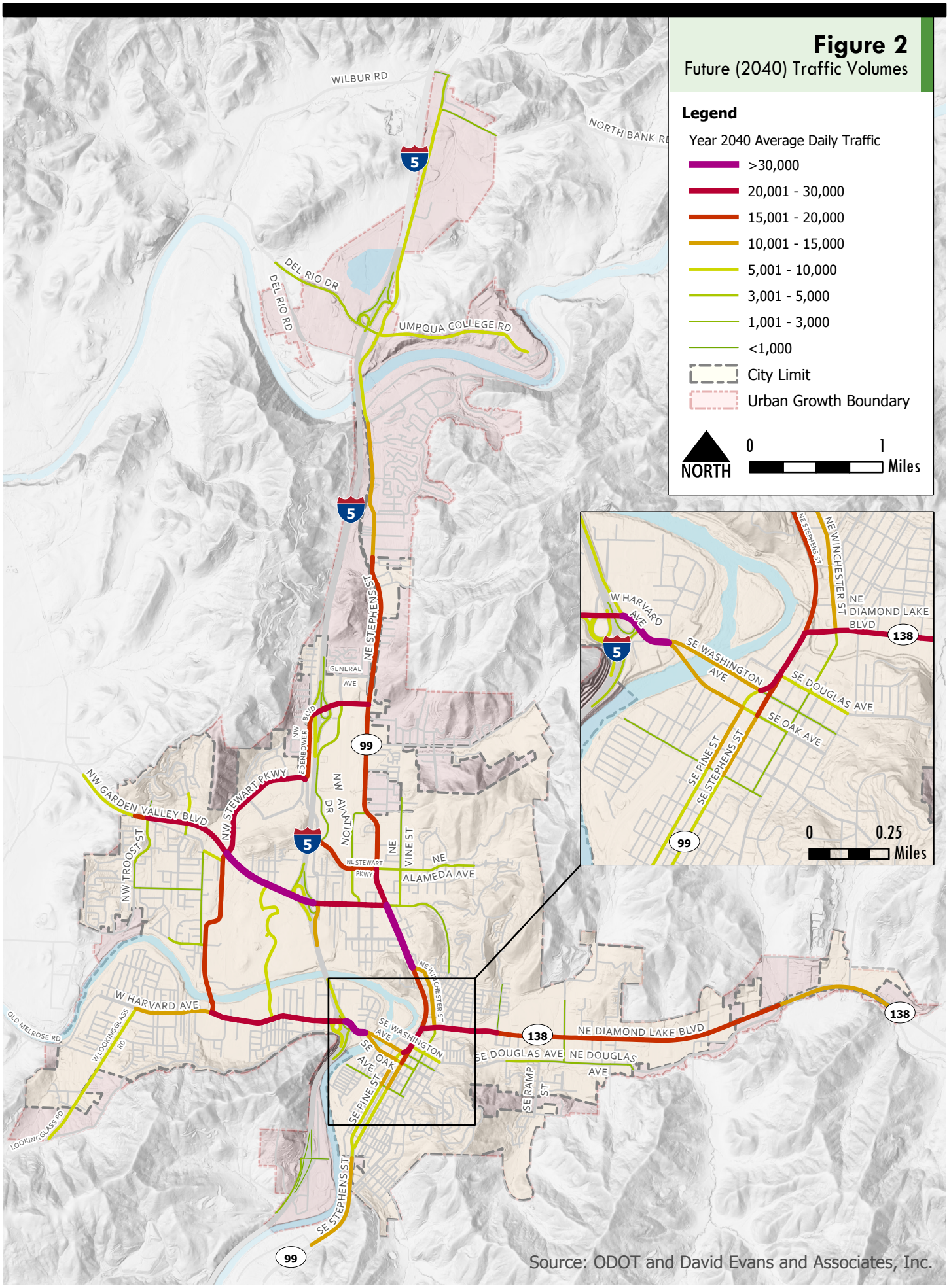
Future Driving Conditions

If there are additional peak hour trips on the system without planned improvements, the result will be increased delay, higher v/c ratios and worse LOS ratings at the study area roadways and intersections. In addition to the peak hour commuting trips, the region is expected to experience more tourism traffic, as well as increased congestion in neighboring communities.

Year 2040 average daily traffic volumes (ADT) were estimated from the peak hour traffic volumes. Figure 2 summarizes the 2040 forecasted ADT along the study area roadways. As shown in the figure, sections of Garden Valley Boulevard, Stephens Street and Harvard Avenue are expected to serve the highest number of traffic volumes. How well a roadway functions and operates is influenced by a number of factors: speed, traffic volumes, percentage of trucks, roadway grade, traffic signals, number of accesses/driveways and number of lanes. When looking at the future traffic demand on Roseburg roadways, how well these high-volume roadways are going to operate will be influenced by traffic signal timing, number of accesses, speed and number of lanes.

Figure 3 reports a summary of the anticipated future (year 2040) vehicular traffic operational results for each analysis intersection. Level of service is indicated by color of intersection marker, with the v/c indicated in text. If an intersection marker is outlined in bold, it exceeds the applicable mobility target.

Analysis of the future 2040 PM peak hour indicates that of the 75 study intersections, 15 are forecasted to exceed applicable mobility targets. Table 2 (Page 9) below provides a detailed summary of the existing operations for each study area intersection. The intersections exceeding mobility targets are shaded in grey.



Source: ODOT and David Evans and Associates, Inc.

Figure 3

Traffic Operations Summary

Future (2040) Baseline PM Peak Hour

Legend

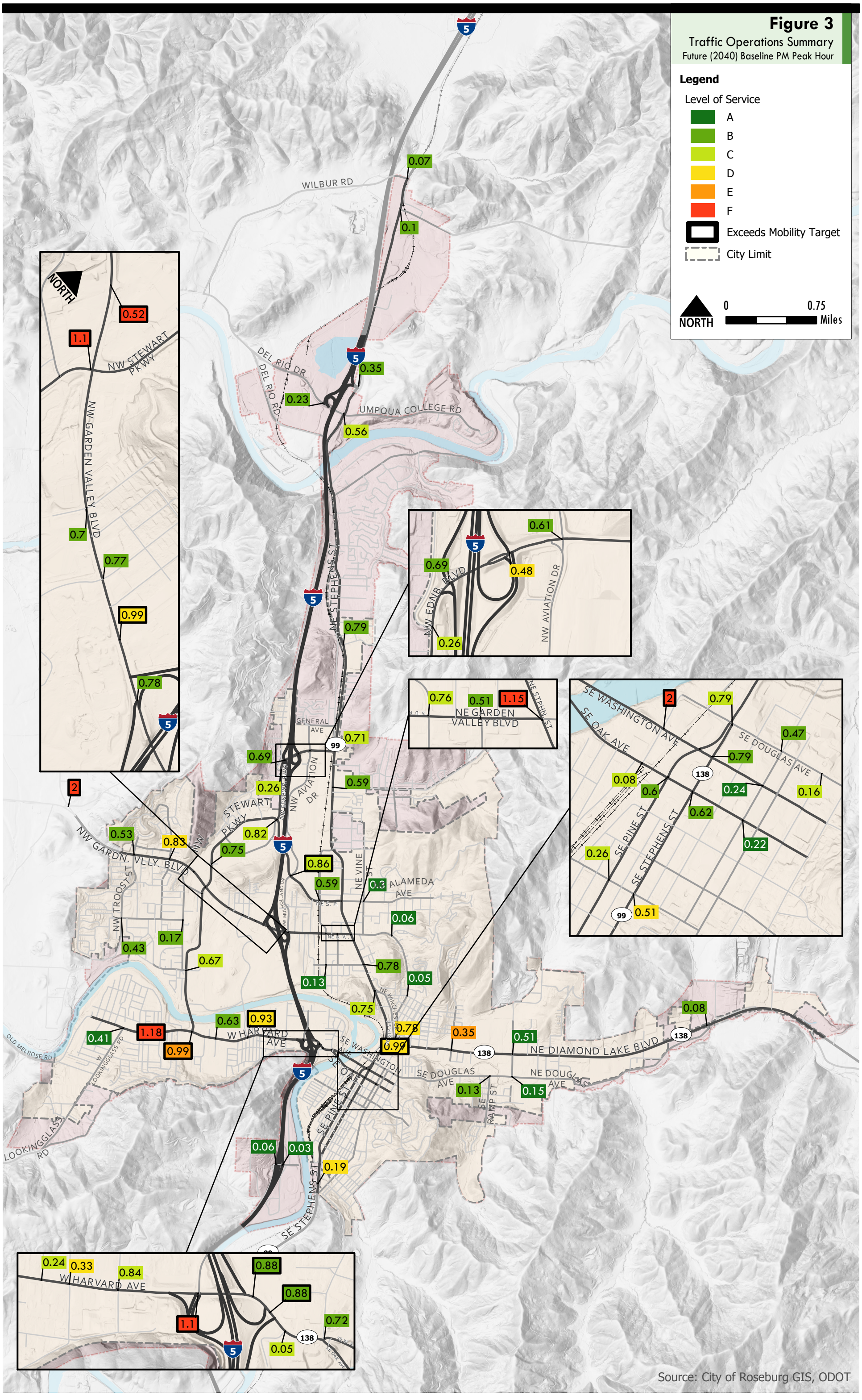
Level of Service

- A
- B
- C
- D
- E
- F

Exceeds Mobility Target

City Limit

NORTH 0 0.75 Miles



Source: City of Roseburg GIS, ODOT

TABLE 2. FUTURE (2040) BASELINE PM PEAK HOUR TRAFFIC OPERATIONS

	Intersection	Traffic Signal	Critical Movement[1]	V/C[2]	LOS[2]	Mobility Target[3]
1	OR 99 at Wilbur Rd		EB L/R	0.07	B	0.85
2	OR 99 at N Bank Rd		WB L/R	0.10	B	0.85
3	OR 99 at I-5 Exit 129 NB Ramps	✓	Overall	0.35	B	0.75
4	I-5 Exit 129 SB Ramps at Del Rio Rd		SB L	0.23	B	0.95
5	OR 99 at Del Rio Rd at Umpqua College Rd	✓	Overall	0.56	C	0.85, LOS D
6	Stephens St at Kenneth Ford Dr	✓	Overall	0.79	B	0.85, LOS D
7	Edenbower Blvd at Broad St*		EB L/R	0.26	C	0.85, LOS E
8	I-5 Exit 127 SB Ramps at Edenbower Blvd*		Overall	0.69	B	0.85
9	I-5 Exit 127 NB Ramps at Edenbower Blvd*		NB R	0.48	D	0.85
10	Edenbower Blvd at Aviation Dr*	✓	Overall	0.61	B	0.85, LOS D
11	Edenbower Blvd at Stephens St*	✓	Overall	0.71	C	0.85, LOS D
12	Stephens St at Newton Creek Rd	✓	Overall	0.59	B	0.85, LOS D
13	Stewart Pkwy at Edenbower Blvd*	✓	Overall	0.82	C	0.85, LOS D
14	**Garden Valley Blvd at Melrose Rd**		**EB L/T**	**>2.0**	**F**	**0.85**
15	Garden Valley Blvd at Troost St	✓	Overall	0.53	B	0.85, LOS D
16	Garden Valley Blvd at Kline St	✓	Overall	0.83	D	0.85, LOS D
17	**Garden Valley Blvd at Roseburg Valley Mall (Middle Entrance)**		**SB L/R**	**0.52**	**F**	**0.85, LOS E**
18	Stewart Pkwy at Roseburg Mall Entrance	✓	Overall	0.75	B	0.85, LOS D
19	**Stewart Pkwy at Aviation Dr/Mullholland Dr**	✓	**Overall**	**0.86**	**C**	**0.85, LOS D**
20	**Garden Valley Blvd at Stewart Pkwy****	✓	**Overall**	**1.10**	**F**	**0.85, LOS D**
21	**Stewart Pkwy at Valley View Dr**		**EB L**	**1.27**	**F**	**0.85, LOS E**
22	Stewart Pkwy at Airport Rd	✓	Overall	0.59	B	0.85, LOS D
23	Vine St at Alameda Ave		EB L/T/R	0.30	A	0.90, LOS E
24	Troost St at Calkins Rd		WB L/T/R	0.43	B	0.90, LOS E
25	Keasey St at Calkins Rd		EB L/R	0.17	B	0.90, LOS E
26	Garden Valley Blvd at Goetz St/Duck Pond St	✓	Overall	0.72	B	0.85, LOS D
27	Garden Valley Blvd at Centennial Dr at Estelle St**	✓	Overall	0.77	B	0.85, LOS D
28	**Garden Valley Blvd at Garden Valley Shopping Center****	✓	**Overall**	**0.99**	**D**	**0.85, LOS D**
29	I-5 Exit 125 SB Ramps at Garden Valley Blvd**	✓	Overall	0.78	B	0.85
30	**I-5 Exit 125 NB Ramps at Garden Valley Blvd at Mulholland Dr****	✓	**Overall**	**0.99**	**D**	**0.85**
31	Garden Valley Blvd at Airport Rd at Cedar St**	✓	Overall	0.76	C	0.85, LOS D
32	Garden Valley Blvd at Walnut St	✓	Overall	0.54	A	0.85, LOS D
33	**Garden Valley Blvd at Stephens St****	✓	**Overall**	**1.15**	**F**	**0.85, LOS D**
34	Garden Valley Blvd at Rocky Ridge Dr		EB L/T	0.06	A	0.85, LOS E
35	Stewart Pkwy at Harvey Ave	✓	Overall	0.66	C	0.85, LOS D
36	Chestnut Ave at Cedar St		WB L/T/R	0.13	A	0.90, LOS E
37	Stephens St at Chestnut Ave	✓	Overall	0.78	B	0.85, LOS E
38	Stephens St at Winchester St		SB L	0.75	C	0.85, LOS E
39	Lincoln St at Malheur Ave		WB L/T/R	0.05	A	0.90, LOS E
40	Harvard Ave at Lookingglass Rd		WB L	0.41	A	0.85, LOS E
41	**Harvard Ave at W Broccoli St**		**SB L/T/R**	**1.18**	**F**	**0.85, LOS E**
42	**Harvard Ave at Stewart Pkwy****	✓	**Overall**	**0.99**	**E**	**0.85, LOS D**
43	Harvard Ave at W Keady Ct.	✓	Overall	0.63	B	0.85, LOS D
44	**Harvard Ave at Centennial Dr**	✓	**Overall**	**0.93**	**D**	**0.85, LOS D**
45	Harvard Ave at Maple St **		SB L/R	0.24	C	0.85, LOS E

TABLE 2. FUTURE (2040) BASELINE PM PEAK HOUR TRAFFIC OPERATIONS

	Intersection	Traffic Signal	Critical Movement[1]	V/C[2]	LOS[2]	Mobility Target[3]
46	Harvard Ave at Harrison St **		NB L/T/R	0.33	D	0.85, LOS E
47	Harvard Ave at Umpqua St **	✓	Overall	0.84	C	0.85, LOS D
48	**I-5 Exit 124 SB Ramps at Harvard Ave****	✓	**Overall**	**1.10**	**F**	**0.85**
49	**I-5 Exit 124 NB On-Ramps at Harvard Ave****		**Overall**	**0.88**	**B**	**0.85**
50	**I-5 Exit 124 NB Off Ramp at Harvard Ave****	✓				
51	Harvard Ave at Corey St **		NB L/R	0.05	C	0.90
52	Washington Ave at Madrone St **	✓	Overall	0.72	B	0.90
53	**Diamond Lake Blvd at Stephens St**	✓	**Overall**	**0.99**	**D**	**0.90**
54	Diamond Lake Blvd at Jackson St at Winchester St	✓	Overall	0.78	D	0.90
55	Diamond Lake Blvd at Fulton St		SB L/T/R EB L	0.35 0.04	E A	0.95 (N/S) 0.90 (E/W)
56	Diamond Lake Blvd at Rifle Range St	✓	Overall	0.51	A	0.90
57	Diamond Lake Blvd at Douglas Ave		NB L/R WB L	0.08 0.02	B B	0.90 (N/S) 0.85 (E/W)
58	**Washington Ave at Spruce St ****		**NB L/T** WB L/T	**>2.0** 0.42	**F** A	**0.95, LOS E** 0.90
59	Stephens St at Douglas Ave	✓	Overall	0.79	C	0.90
60	Washington Ave at Pine St[4]	✓	Overall	-	-	0.90
61	Washington Ave at Stephens St	✓	Overall	0.79	B	0.90
62	Douglas Ave at Jackson St		EB L/T/R	0.47	B	0.95, LOS E
63	Oak Ave at Spruce St **		SB L	0.08	C	0.90
64	Oak Ave at Pine St	✓	Overall	0.60	B	0.90
65	Oak Ave at Stephens St	✓	Overall	0.62	B	0.90
66	Washington Ave at Jackson St		WB T	0.24	A	0.95, LOS E
67	Douglas Ave at Kane St		NB L	0.16	C	0.95, LOS E
68	Douglas Ave at Ramp Rd		NB L	0.13	B	0.90, LOS E
69	Douglas Ave at Rifle Range St		SB L/R	0.15	A	0.90, LOS E
70	Oak Ave at Jackson St		EB T	0.22	A	0.95, LOS E
71	Pine St at Mosher Ave		EB T/R	0.26	C	0.95, LOS E
72	Stephens St at Mosher Ave		EB L/T	0.51	D	0.95, LOS E
73	I-5 Exit 123 SB Ramps at Portland Ave		WB T/R	0.06	A	0.95
74	I-5 Exit 123 NB Ramps at Portland Ave		EB L/T	0.03	A	0.95
75	Stephens St at S Gate Shopping Center		WB L/T	0.19	D	0.85, LOS E

Shaded rows exceed applicable mobility targets; Acronyms: EB = eastbound; WB = westbound; NB = northbound; and SB = southbound. L = left; T = through; and R = right.

* Intersection operations reported from Interchange Area Management Plan (IAMP) 127 (December 2014) for year 2035

** Intersection operations reported from IAMPs 124/125 (October 2013) for year 2035

1. At unsignalized intersections the results are reported for the worst operating movements on major and minor approaches that must stop or yield the right of travel to other traffic flows. For signalized intersections, the overall operations are reported.
2. The v/c ratios and LOS are based on the results of the macrosimulation analysis using Synchro, which does not account for the influence of adjacent intersection operations.
3. Unsignalized intersections may have unique mobility targets for the major and minor approaches.
4. Intersection consolidated with Washington Avenue at Stephens Street as part of the OR 138E Corridor Solutions Project.

Due to the topography, river, current land uses and the railroad, Roseburg's primary arterial system (Garden Valley Boulevard, Stewart Parkway, Harvard Avenue and Stephens Street) has been limited in its ability to expand and further connect areas of the city. As identified in *Technical Memorandum #3,* the operational concerns at high-demand roadways and intersections such as Garden Valley Boulevard at Stewart Parkway and Garden Valley Boulevard at Stephens Street is due to the lack of alternate routes; Garden Valley Boulevard and its intersections accommodate more traffic than it can handle.

Signalized Intersection Operations

Under the No Build scenario, traffic operations are expected to continue to worsen in the future. There are ten signalized intersections expected to exceed mobility targets under the 2040 future no build conditions. This is eight more than under the 2016 existing condition. The ten signalized intersections are listed below:

Stewart Parkway at Aviation Drive/Mullholland Drive – This intersection operates at a v/c of 0.86 and LOS C, which exceeds the City's dual standard of v/c no worse than 0.85 and LOS D or better. The eastbound traffic on Stewart Parkway is approaching capacity.

Garden Valley Boulevard at Stewart Parkway** – This intersection operates at a v/c of 1.10 and LOS F, which exceeds the City's dual standard of v/c no worse than 0.85 and LOS D or better. Similar to existing conditions, the left-turn movements exceed its capacity. The newly constructed northbound left-turn lane should improve traffic conditions, but traffic turning off of Garden Valley Boulevard will continue to experience delays without additions turn lanes.

Garden Valley Boulevard at Garden Valley Shopping Center** – This intersection operates at a v/c of 0.99 and LOS D, which exceeds the City's dual standard of v/c no worse than 0.85 and LOS D or better.

I-5 Exit 125 Northbound Ramps at Garden Valley Boulevard at Mulholland Drive** – This intersection operates at a v/c of 0.99, exceeding the OHP mobility target of 0.85. High volumes from the off-ramp must compete for green time with the equally high volumes traveling east and west along Garden Valley Boulevard.

Garden Valley Boulevard at Stephens Street** – This intersection operates at a v/c of 1.15 and LOS F, which exceeds the City's dual v/c and LOS standard. This intersection was the only intersection exceeding a v/c of 1.0 under existing conditions, and the operations are worsened by the added vehicular volume and lack of any planned improvements at this location.

Harvard Avenue at Stewart Parkway** – This intersection operates at a v/c of 0.99 and LOS E, which exceeds the City's dual v/c and LOS standard. Many residents living in west Roseburg travel through this intersection on their way home after school and work, which is apparent from the higher westbound through and right turns.

Harvard Avenue at Centennial Drive – This intersection operates at a v/c of 0.93 and LOS D, which exceeds the City's dual standard of v/c no worse than 0.85 and LOS D or better. Traffic volumes for the southbound left-turn exceed the available capacity.

I-5 Exit 124 Southbound Ramps at Harvard Avenue** - This intersection operates at a v/c of 1.10, exceeding the OHP mobility target of 0.85. The future traffic is expected to significantly increase for the eastbound and westbound movements, which puts stress on the amount of time that can be given to turn movements and the ramps.

I-5 Exit 124 Northbound Ramps at Harvard Avenue** - This intersection operates at a v/c of 0.88 which just exceeds the OHP mobility target of 0.85. The worsening conditions at this intersection from existing conditions are due to the increase in traffic volumes.

Diamond Lake Boulevard at Stephens Street – By year 2040, this intersection is expected to operate at a v/c of 0.99, exceeding the OHP target of 0.90. Downtown visitors and employees, as well as tourists and freight traveling along Diamond Lake Boulevard stress the intersection capacity for nearly all movements.

***Indicates intersection results were obtained from the draft Interchange Area Management Plans (IAMPs) for I-5 Exits 124 and 125*

Three of these intersections have an overall v/c exceeding 1.0, and most have at least one movement with a v/c exceeding 1.0. When the traffic demand exceeds the available capacity (v/c greater than 1.0) vehicles experience excessive delay and queuing. It is also expected that vehicles may require more than one signal cycle to pass through the intersection. Signalized intersections can cease to operate at their intended level of service due to changes in traffic patterns and traffic volumes; the original signal timing may no longer be applicable or as efficient.

Unsignalized (STOP Controlled) Intersection Operations

There are five unsignalized intersections expected to exceed mobility targets under the 2040 future no build conditions. This is four more than under the 2016 existing condition. The five intersections are listed below:

Garden Valley Boulevard at Melrose Road (outside UGB) – The eastbound shared left-thru movement exceeds Douglas County's standard of v/c no worse than 0.85. Although the volumes for this movement are only expected to increase by 15 vehicles, the delay drivers are expected to incur while waiting for an acceptable gap in cross-traffic increases.

Garden Valley Boulevard at Roseburg Valley Mall (Middle Entrance) – The southbound movements operate at a v/c of 0.52 and LOS F, exceeding the City's dual v/c and LOS standard. This is due to less available gaps in traffic along Garden Valley Boulevard to for vehicles exiting the mall.

Stewart Parkway at Valley View Drive – The eastbound left-turn operates at a v/c of 1.27 and LOS F, exceeding the City's dual v/c and LOS standard. This intersection was noted during the existing conditions analysis as approaching capacity.

Harvard Avenue at Broccoli Street – The southbound movements operate at a v/c of 1.18 and LOS F, exceeding the City's dual v/c and LOS standard. The traffic entering and exiting the residential neighborhood is not expected to significantly increase, however the available gaps in cross traffic on Harvard Avenue are expected to decrease with additional traffic.

Washington Avenue at Spruce Street** – This northbound movements operate at a v/c greater than 2.0 and LOS F, which exceeds the City's dual v/c and LOS standard. The forecasted volumes traveling from Spruce Street indicate increased delays on the side streets, however the actual delays may be smaller if traffic chooses an alternate route.

Critical movements at unsignalized intersections are typically the minor-street left turns or, in the case of single-lane approaches, the minor street approaches. These movements are required to yield to all other movements at the intersection and thus are subject to the longest delays and have the least capacity. Left turns from the major street are also subject to delays, since motorists making these maneuvers must also yield to oncoming major-street traffic. At unsignalized intersections, an increase in traffic volumes on the major roadway can result in a decrease in the available gaps in cross traffic, which increases the delay for side streets (minor approach) attempting to enter or cross the major roadway.

System Queuing Analysis

In addition to the operational criteria that measure intersection performance, it is also important to examine queuing and where demand may exceed available storage. Queues that spill out of storage bays and into adjacent travel lanes impair intersection performance by reducing capacity and creating potential safety concerns. Queues may also extend from one intersection through another upstream intersection which also impairs performance. The 95th percentile queue length (meaning 95 percent of all queues will be shorter) is used for this analysis.

There are several factors that can impact queueing. A proliferation of driveways and minor street intersections multiplies the number of conflicts along a roadway segment, thus reducing the capacity of intersections, increasing the probability of crashes, and generally degrading service for all system users. If a roadway segment has a closely spaced traffic signals, signal coordination can reduce delay on the main roadway. Signal coordination can be disrupted if there are vehicles entering the roadway via unsignalized accesses between signals, or if traffic volumes change and make the existing signal coordination obsolete.

Intersections that meet mobility targets are able to successfully serve vehicles throughout the day. That said, users may still encounter areas of slowing that are considered acceptable by operational standards, but can influence how a driver perceives traffic congestion along their route.

The areas that experienced the most congestion under existing conditions will remain congested in the future if no improvements are constructed. These locations are the main arterial corridors at intersections and in areas with increased accesses/driveways. Increases in traffic can influence how a roadway operates.

In addition to the roadways and congestion identified in *Technical Memorandum #3*, the anticipated growth in traffic is expected to increase queuing concerns along Stewart Parkway between Garden Valley Boulevard and Edenbower Boulevard and compound queuing of the side streets at stop-controlled intersections along Garden Valley Boulevard, Harvard Avenue, and Diamond Lake Boulevard. Though not included in the TSP analysis, local observations indicated that congestion on I-5 between Exit 123 (fairgrounds) and Exit 125 (Garden Valley Boulevard) is expected to worsen through the planning horizon. An upcoming project in the Roseburg area is plan to analyze recurring traffic flow bottlenecks on the I-5 mainline between Exits 119 and 129.

For further details on specific movements that exceed available capacity and detailed simulation results, see Appendix A.

Pedestrian System

Future Pedestrian Network

The City of Roseburg's pedestrian system include sidewalks, stairs, ramps, trails, multiuse paths, crosswalks at intersections, and mid-block crossings, as well as the amenities that enhance them (e.g. illumination and benches). The future pedestrian network assumed the following pedestrian projects. These projects are currently funded:

- **Stewart Parkway Widening** – Widen to four lanes between Harvey Avenue and Garden Valley Parkway, straighten S-curves, and install new sidewalks and new bike lanes (CIP).
    - Phase I (under construction): Garden Valley Boulevard to Harvey Avenue
- **Parks and Recreation – Riverfront Park Trail Improvement** – Awarded grant funding to do a trail improvement project on a 1,800 foot section of path through Riverfront Park. The path will be resurfaced and widened from eight feet to ten feet (2018-2021 STIP).
- **Parks and Recreation – Deer Creek Path Stabilization** – Will address ongoing erosion concerns with the path.
- The City is currently updating its American Disabilities Act (ADA) Transition Plan which will help identify important pedestrian accessibility improvements within the City's public rights-of-way (ROW).
- **Roseburg Pedestrian Upgrades –** Install rapid flasher on Stephens Street at Roseland; Countdown pedestrian signals on Stephens Street at Edenbower Boulevard, Newton Creek Road and Stewart Parkway, and on Harvard Avenue at Stewart Parkway, Keady Court, Centennial Drive and Umpqua Street (2018-2021 STIP).

This list does not consider potential pedestrian system improvements made by private development. The City of Roseburg requires that sidewalks are constructed along new collector and arterial facilities. The City's current requirements for sidewalks meet or exceed both the Transportation Planning Rule (TPR) requirement and recommended sidewalk standards of the Oregon Bicycle and Pedestrian Plan.

The City has identified additional projects as part of their CIP and *2009 Bicycle and Pedestrian Plan* that would help fill previously identified gaps in the pedestrian system. These planned projects do not yet have a secured funding source, but will be considered during the solutions development phase of the TSP update. For reference, the City's current CIP is included as an appendix to this memorandum.

Future Pedestrian Network Assessment

As mentioned in previous memorandums, walking is the most affordable and accessible of all transportation modes. Whether an entire trip is on foot or with a mobility device, people must walk for at least part of every trip, even when the trip takes place on transit, in an automobile, or on a bicycle.

A pedestrian qualitative assessment for the existing conditions rated all of the arterial and collector routes within the UGB. The planned projects, as previously described, will improve the pedestrian experience at those locations. In addition, some recently completed projects have improved the pedestrian network, including the

Spruce-Parrott, OR 138 Solutions, and new pathway network improvement projects have all contributed to bettering pedestrian mobility, connectivity, access, comfort and safety.

Of the 11 critical routes the Bicycle and Pedestrian Plan (2009) has identified as connections to important destinations within Roseburg, only five of the critical routes were identified as "good" during the existing qualitative assessment. Additional congestion on these roadways resulting from the expected growth will increase the barriers to pedestrian travel, especially if speeds along these roadways are not reflective of pedestrian uses. Higher traffic volumes decreases the opportunities for safe crossing of roadways and driveways and increases the level of discomfort. Enhancing or expanding the multi-use path and trail system could improve the pedestrian network. Increasing connections from the existing multi-use path network to the bicycle network, the downtown, waterfront area, and the high use area along Stewart Park Drive could also benefit the pedestrian network.

The funded projects expected to be constructed within the planning horizon are not expected to alter the qualitative assessment included in *Technical Memorandum #3*. Given the expected increase in population and vehicular traffic, the existing connectivity and safety concerns for pedestrians as documented in *Technical Memorandum #3* are expected to persist in the future.

Bicycle System

Future Bicycle Network

Bicycles are legally classified as vehicles in Oregon, and roadways must be designed to allow bicyclists to ride in a manner consistent with the vehicle code. The basic design treatments to accommodate bicycle travel on the road are: shared roadway (sharrows), shoulder roadway, or bicycle lane. Another type of facility is separated from the roadway: multi-use path. The future bicycle network includes the same projects listed in the future pedestrian network, as listed below:

- **Stewart Parkway Widening** – Widen to four lanes between Harvey Avenue and Garden Valley Parkway, straighten S-curves, and install new sidewalks and new bike lanes (CIP).
    - Phase I (under construction): Garden Valley Boulevard to Harvey Avenue
- **Parks and Recreation – Riverfront Park Trail Improvement** – Awarded grant funding to do a trail improvement project on a 1,800 foot section of path through Riverfront Park. The path will be resurfaced and widened from eight feet to ten feet (2018-2021 STIP)
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This does not consider potential improvements made by private development. The City has identified additional projects as part of their CIP that would help fill previously identified gaps in the bicycle system. These planned projects do not yet have a secured funding source, but will be considered during the solutions

development phase of the TSP update. For reference, the City's current CIP is included as an appendix to this memorandum. Since the assessment of future conditions can only assume funded projects, the bicycle system qualitative assessment included in *Technical Memorandum #3* would apply to future conditions as well.

Future Bicycle Network Assessment

The City of Roseburg continues to improve bicycle facilities as part of new development and other capital improvement projects. The existing conditions analysis evaluated Bicycle Level of Traffic Stress (LTS) on the arterial and collector roadway network. In the future, the projected increase in vehicular volumes added to the existing system will exacerbate the level of stress a cyclist feels.

With limited availability in the existing right-of-way, future improvements to bicycle infrastructure may include new pathway connectors separate from the roadway network. As mentioned in *Technical Memorandum #3*, bicycle connections are lacking to the north of Garden Valley Boulevard. Pedestrian and bicycle access is limited to the use of sidewalks and roadway bike lanes where they exist. Connectivity is limited, specifically to the Winchester area north of Roseburg and the Umpqua Community College Campus. With the areas of increased employment and households forecasted north of Garden Valley Boulevard, safe and convenient bicycle routes will be needed.

Transit System

Future Transit Network

The transit network includes transit routes, bus shelters, bus pull-outs and transit/paratransit services. Douglas County has established a Transit District to serve Roseburg and other Douglas County cities and destinations.

Future Transit Network Assessment

As identified in previous memoranda, Public transportation in Roseburg is provided by UTrans, operated by United Community Action Network (UCAN) through a contract with Douglas County. UTrans provides fixed-route and paratransit service for the greater Roseburg area, with commuter services to nearby cities and six transit lines provide service within Roseburg.

As part of any new transit system start-up, there are notable system and support gaps as summarized below:

- **Limited bus stop shelters and amenities**: Less than half of the transit stops have shelters with seating amenities (45%). Additional shelters and consistent route signs with scheduled service would increase the convenience and comfort of riders, and may encourage new transit riders in the future.
- **Transit service frequency**: With bus headways of an hour or greater, fixed-route bus transit serves mostly *captive* riders. Increased service frequency can attract more *choice* riders by providing greater and more reliable time-of-day ride options.
- **Limited Transit Access:** Greater walking and biking route options linking Roseburg's residential neighborhoods to fixed-route bus service will help expand transit utility. Completing important gaps in the bicycle network, and enhancing pedestrian crossings on arterial streets will also improve transit access, especially at important bus stops serving key transit trip destinations.

Freight System

Future Freight Network

The freight network supports the movement of goods and commodities into, out of, and through the Roseburg UGB. Freight is heavily dependent on the highway and roadway network, but freight also occurs via rail. Freight facilities can include freight routes, major shippers, loading zones, switchyards and truck stops. The upcoming Roseburg I-5 Bottleneck Study will include a detailed traffic analysis of recurring traffic flow bottlenecks on the I-5 mainline between Exits 129 and 119.

In October 2017, a reduction in the speed limit from 65 mph to 60 mph was approved for the I-5 mainline from mile post 123 to 127 due to concerns related to crash data, traffic weaving and spacing of interchange ramps. The speed limit for semitrucks, which is currently 55 mph, will remain the same.

There are no other known funded truck or rail freight projects within the study area.

Future Freight Network Assessment

The freight routes within Roseburg were reviewed following the same methodology as *Technical Memorandum #3*.

Truck Freight

As shown in Table 2 (page 9), there are two local intersections along Garden Valley Boulevard that play an important role in the freight network and are expected to exceed its mobility target under year 2040 traffic conditions. In addition to the local network concerns, the ramp terminals at I-5 Exits 124 and 125 are expected to experience congestion and delays during the future 2040 PM peak hour.

It will be important to maintain adequate road geometry to maintain ODOT's "hole in the air" along OR 138 pursuant to Oregon Revised Statutes 366.215. The term "hole in the air" means that an identified freight route cannot undergo permanent changes that would reduce the vehicle-carrying capacity of the roadway. Any future improvements should maintain adequate geometry for larger vehicles along local freight routes, including Stephens Street, Pine Street, and Diamond Lake Boulevard. In addition to these corridors, I-5 and the interchange ramps in the study area are important routes for serving regional freight shipping.

Rail Freight

As mentioned in *Technical Memorandum #3,* the relocation of the rail switchyard from downtown Roseburg to the Winchester area causes vehicular delays and congestion at the north end of the UGB, though it improved the traffic conditions downtown. When trains are stacked at the rail switchyard, traffic on North Bank Road experiences delays and emergency service response could be impacted. The impact and delay for medical related emergencies is the resident's major concern.

The Douglas County Public Works Department has looked at providing an alternative route around the railroad tracks and switchyard to North Bank Road, but has yet to find an alternative alignment or funding source for this project.

Air Freight

The airport master plan is currently undergoing an update. Future air freight is not expected to change in the planning horizon. In the unlikely event that it does increase, the existing transportation system is equipped to accommodate the growth.

Water and Pipeline System

The South Umpqua River winds through the City of Roseburg, providing opportunities for recreational activities. It is not a navigable waterway and is not used for freight movement. No future changes are anticipated to the water transportation system.

The natural gas pipeline in the Roseburg UGB and distribution lines that spur off the mainline provide gas to residences and businesses. The major pipeline is part of a system operated by Northwest Pipeline LLC and no future changes are anticipated.

Funding

An important aspect of the TSP update will be to develop a Transportation Funding Program. The Transportation Funding Program will define the range of federal, state and local transportation funding. The funding estimates will support the city and state in the identification and prioritization of TSP projects as well as helping set policy to fund the TSP. This section offers a snapshot of the City's current and primary revenue sources to fund transportation system maintenance, operations and capital improvements.

City Transportation Revenue and Expense Estimate: FY 2017-2018

City of Roseburg

The city's current and primary revenue sources to fund transportation system maintenance, operations and capital improvements include State Highway Fund (gas tax, vehicle registration fees and truck weight-mile fees), new HB 2017 funding package, statewide funding, city franchise fees, and city transportation system development charges (SDCs). Figure 4 summarizes the City's estimate of transportation revenue and expense for Fiscal Year, 2017-2018. Applicable State and Douglas County funding will be included in the final transportation improvement finance program.

FIGURE 4. ROSEBURG'S TRANSPORTATION REVENUE AND EXPENSES – FY 2017-2018

Revenue	
STBG	$260,000
Gas Tax	$1,301,514
HB 2017	$248,886
Franchise Fees	$507,100
SDC Revenues	$200,000
Miscellaneous	$20,000
	$2,537,500
Expense	
Materials and Services	**$2,146,024**

Capital Expenditures	**$331,440**
	$2,477,464

Source: *City of Roseburg*
All figures in 2018 dollars.

REVENUE

- ***STBG*** – is the federal Highway Trust Fund, largely sourced by the federal gas tax and is distributed by formula to individual states through the Surface Transportation Block Group (STBG) program.
- ***HB 2017*** – Oregon Legislative Transportation Package, additional vehicle registration fees, title fees and fuels tax apportioned to local city governments by population; four increases, stair-stepped over 6-year period and last 3 increases are conditional on accountability measures. Roseburg estimate is year 1 of HB 2017.

EXPENSE

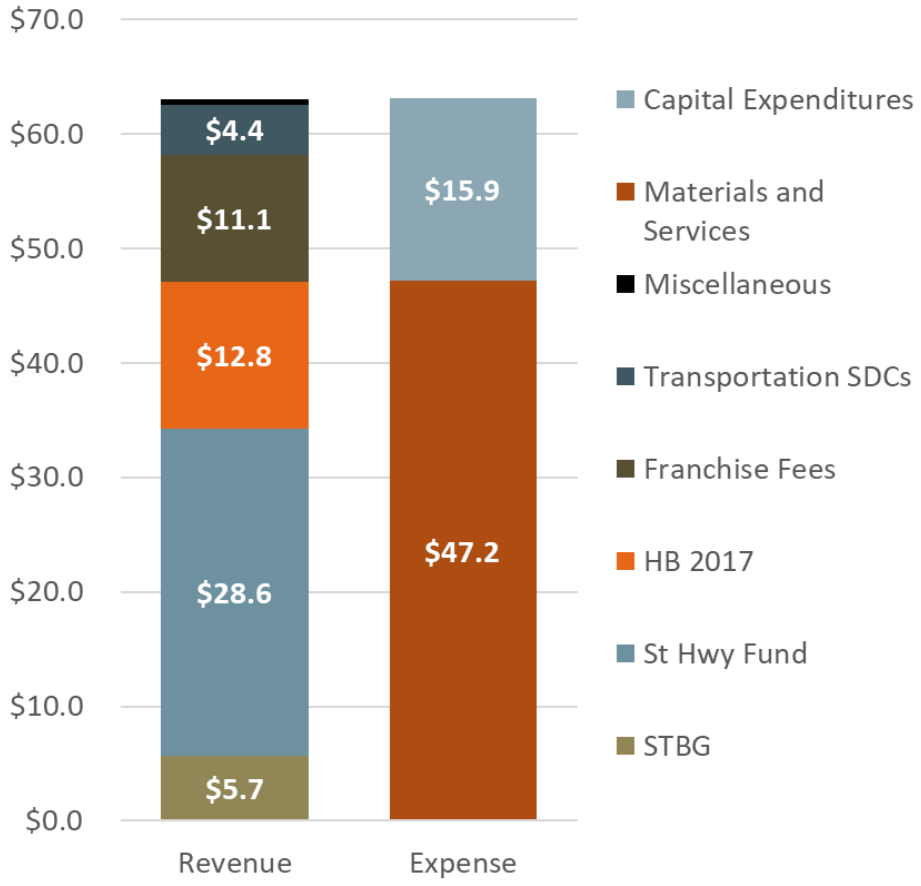
Materials and Services - includes Pavement Management Plan expense assumed at $1.2 million (annual), approximately $0.2 million short of $1.4 million 'need' identified in 2016.

Future Transportation Funding Revenue and Expense Estimate: 2018-2040

City of Roseburg

The city's estimated, 20-year transportation revenue and expenses are summarized in Figure 5**.**

FIGURE 5. CITY OF ROSEBURG TRANSPORTATION REVENUE AND EXPENSE ESTIMATE: 2018-2040 (IN MILLIONS OF DOLLARS)



Sources: City of Roseburg and Oregon Department of Transportation, Legislative Office (all figures rounded to nearest $100,000). All figures in 2018 dollars.

REVENUE

- ***STBG*** - assumes continued and consistent funding through Oregon, assumed at $200,000 per year.
- ***State Highway Fund*** – assumes a 3.5% increase in Roseburg's SHF receipts for 2018 (FY 2017/2018), averaged for 22-years to 2040. Does not account for variation in future population growth rates of Roseburg in relationship to other Oregon cities, nor other factors affecting declining fuel tax revenue and variable highway & street user growth impact trends.
- ***HB 2017*** – Assumes full, 10-year funding allocation to Roseburg with stair-stepped increases through first ten (10) years, then a tenth-year annual average thereafter to year 2040. If HB 2017 conditional performance measures are not met by 2021, and later increases in the fee and fuel tax rates are not implemented, the total, 20-year HB 2017 revenue for Roseburg will be in the range of $8.9-$9.0 million, rather than $12.8 million.
- ***Franchise Fees*** - assumes an annual average revenue of $507,100 for planning horizon.
- ***Transportation SDCs*** - assumes an annual average revenue of $200,000 for planning horizon.

EXPENSE

- ***Materials and Services*** - includes Pavement Management Plan (PMP) expense assumed at $1.2 million per year, approximately $0.2 million short of $1.4 million annual 'need' identified in 2016 PMP.
- **Capital Expenditures** – is the product of *Total 22-year Revenue* ($63 million) less 22-year *Material and Services Expense ($47.2 million)*

Findings

The gaps noted in Roseburg's existing transportation system (see *Technical Memorandum #3: Existing Conditions)* will widen in the future as a result of increased travel demand. The City and State's completion of their current capital improvement plans will help abate some of these concerns. The next steps to drafting Roseburg's TSP Update will consider how to align funding sources with future transportation improvements that help bridge those gaps identified in this memorandum, resulting in a series of connected and interconnected multimodal systems. Key findings for each system are summarized below.

Streets and Highways System:

- A limited network of arterial and collector streets in the core Roseburg area forces greater reliance on key arterials to carry future traffic demand beyond their capacity.
- There are 15 intersections expected to operate at levels above their corresponding mobility targets (See Table 2 for more detail). These intersections are mostly found in commercial areas along Garden Valley Boulevard, Stephens Street and Harvard Avenue.
- The presence of multiple full access driveways contributes to queuing concerns along Garden Valley Boulevard.
- Signal timing and progression could change by year 2040. Queuing can be impacted by increased traffic demand, access spacing, capacity (number of lanes), adequate signage and travel speeds.

Pedestrian System:

- Opportunities for increasing safe crossings and travel of arterial roadways:
    - Stephens Street north of Edenbower Boulevard
    - Stewart Parkway
    - East Diamond Lake Boulevard
- There are lighting and comfort concerns for existing trail system.
- Increased traffic volumes at accesses and along roadways will impact level of comfort for pedestrians, specifically on Garden Valley Boulevard.

Bicycle System:

- Roseburg lacks a fully connected bike route system that adequately connects neighborhoods with commercial and institutional centers, recreational areas, and transit corridors, specifically north of Garden Valley Boulevard.

Transit System:

- There are a limited number of covered transit stops and there are gaps in service and frequency. Some neighborhoods to the south and west of downtown are not within convenient walking distance to a nearby transit stop.
- Areas of the City located in a major residential and/or employment growth areas should incorporate transit amenities and ensure pedestrian and bicycle connectivity in preparation for transit service. While biking can increase access to transit for people living in neighborhoods distant from bus stops, gaps in the existing bicycle network and a lack of bicycle parking near stops limits the attractiveness of biking to transit, which would be exacerbated by projected increases in traffic in Roseburg by 2040.

Freight System:

- It is important that future improvements maintain the geometry required to accommodate large freight vehicles along I-5, OR 138 and local freight routes.

As mentioned in this memorandum, the city continues to add bicycle facilities and improve pedestrian routes, usually as part of larger roadway capital improvement projects. Developing these projects in tandem allows for a more cohesive transportation system.

In the future, there will continue to be an underlying network connectivity concern that will only increase congestion and accessibility concerns with future growth. Potential for land use changes may be needed to compliment transportation improvements to reduce travel demand on impacted transportation facilities.