South Medford (Exit 27)
Interchange Area Management Plan
(Volume I)

Oregon Department of Transportation, Region 3
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September 2023

Oregon Department of Transportation

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IAMP 27 (South Medford)

Recommend for Approval:

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South Medford (Exit 27)
Interchange Area Management Plan

Medford, Oregon

Oregon Department of Transportation, Region 3
3500 NW Stewart Parkway Roseburg, OR 97470
(541) 957-3500

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PREFACE

The development of the South Medford (Exit 27) IAMP was guided by the Project Management Team (PMT). The substantial time and effort the PMT devoted was instrumental in producing the recommendations that are presented in the IAMP. The members of the PMT are identified below.

PROJECT MANAGEMENT TEAM

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List of Acronyms

AMS	Access Management Strategy
DLCD	Department of Land Conservation and Development
I-5	Interstate 5
IAMP	Interchange Area Management Plan
IMSA	Interchange Management Study Area
ITS	Intelligent Transportation Systems
LOS	Level of Service
MPO	Metropolitan Planning Organization
OAR	Oregon Administrative Rule
ODOT	Oregon Department of Transportation
OHP	Oregon Highway Plan
OTC	Oregon Transportation Commission
RTP	Regional Transportation Plan
RVMPO	Rogue Valley Metropolitan Planning Organization
RVTD	Rogue Valley Transportation District
SFR	Single-Family Residential
SPUI	Single Point Urban Interchange
TDM	Transportation Demand Management
TEV	Total Entering Volume
TPR	Transportation Planning Rule
TSM	Transportation System Management
TSP	Transportation System Plan
UGB	Urban Growth Boundary
V/C	Volume-to-Capacity

Disclaimer

Inclusion of an improvement in the IAMP does not represent a commitment by ODOT to fund, allow, or construct the project. Projects on the State of Oregon Transportation System that are contained in the IAMP are not considered "Planned" projects until they are programmed into the Statewide Transportation Improvement Program (STIP). As such, projects proposed in the plan that are located on a State system cannot be considered as mitigation for future development or land use actions until they are programmed into an adopted STIP or ODOT provides a letter indicating that a project is "Reasonably Likely" to be funded in the STIP. State Highway Projects that are programmed to be constructed may have to be altered or canceled at a later time to meet changing budgets or unanticipated conditions such as environmental constraints.

SECTION 1 EXECUTIVE SUMMARY

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Executive Summary

The 2022 South Medford (Exit 27) Interchange Area Management Plan (IAMP) is a planning document used to help manage the function of the Interstate 5 (I-5) South Medford (Exit 27) Single Point Urban Interchange (SPUI) located at Garfield Street. The IAMP identifies long-range interchange needs, roadway improvements, Alternative Mobility Targets (AMT), and Travel Demand Management (TDM) measures to manage the South Medford (Exit 27) SPUI through Year 2045.

The Oregon Department of Transportation (ODOT) Region 3, in collaboration with the City of Medford, updated the 2007 South Medford (Exit 27) IAMP to reflect existing traffic operations in Base Year 2020, and forecasted traffic operations through Future Year 2045. The IAMP analyzed base year and future year traffic operations to identify additional solutions supported by AMTs for the South Medford (Exit 27) SPUI.

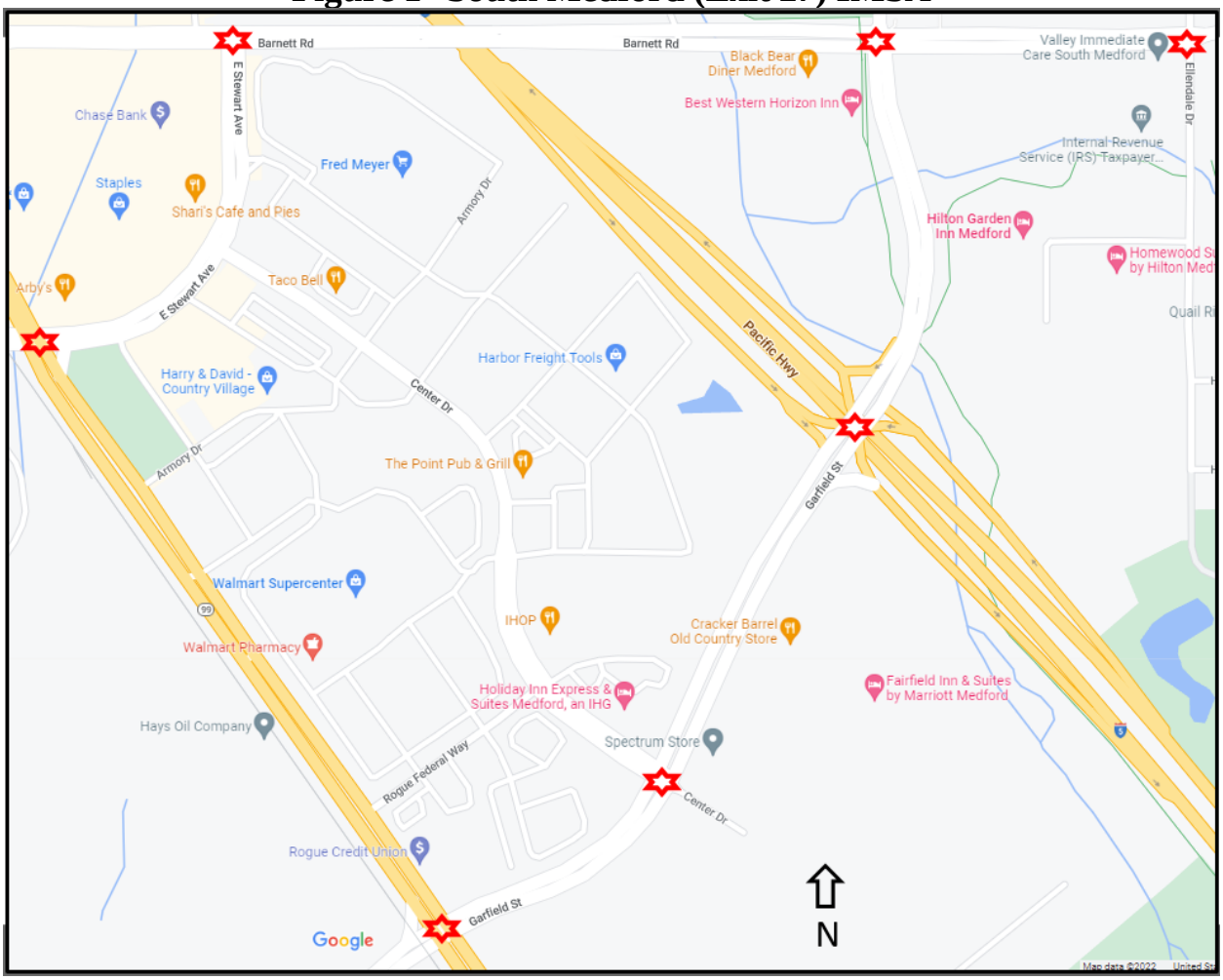
Interchange Function
The South Medford (Exit 27) SPUI functions as an urban interchange that serves primarily regional traffic. It also serves some local traffic movement between the north and south parts of Medford. It replaced the old South Medford (Exit 27) Interchange at Barnett Road with Barnett Road remaining as an I-5 overpass. The overpass functions as a local east-west arterial with related bike and pedestrian improvements. The South Medford (Exit 27) SPUI ramp terminals are classified as an interstate highway. The Highland-Garfield Connector (Connector 001WU) is classified as an Urban Other Principal Arterial.

Interchange Management Study Area (IMSA)
The Interchange Management Study Area (IMSA) intersections include the South Medford (Exit 27) SPUI ramp terminals and seven (7) local street intersections that affect the SPUI's safety and operations (See Figure 1 below).

The IMSA centers around the South Medford (Exit 27) SPUI bordered by:

- Stewart Avenue/Barnett Road intersection to the northwest;
- Barnett Road/Ellendale Drive intersection to the northeast; and
- OR 99/Garfield Street intersection to the southwest.

Figure 1 - South Medford (Exit 27) IMSA



Traffic Conditions and Operations

Traffic volumes within the IMSA, and in particular through the South Medford (Exit 27) SPUI, has increased more quickly than expected. The South Medford (Exit 27) SPUI at Garfield Street was built in Year 2009 with a forecasted 20-year facility design life to Future Year 2030. The IAMP's Base Year 2020 traffic analysis found that traffic volumes in the PM peak hour already exceed the Future Year 2030 traffic forecast.

The Base Year 2020 traffic analysis shows an existing deficiency on the South Medford (Exit 27) SPUI Southbound Off-Ramp where traffic backs-up onto the I-5 mainline. This traffic back-up presents a traffic safety hazard and increased risk of vehicle crashes. The sidewalks and pedestrian crossings within the IMSA are in good condition, and bike lanes are included on many of the roadway segments. A multi-use path along the Bear Creek Parkway provides grade-separated passage north-to-south for pedestrians and bicyclists, with connection to the bicycle and pedestrian network at the Barnett Road/Highland Drive intersection. These multi-modal facilities have a positive effect on the traffic level-of-service within the IMSA.

The Future Year 2045 traffic analysis shows increased traffic volumes will adversely impact the South Medford (Exit 27) SPUI safety and operations, and roadway segment Multi-Modal Level-of-Service for bicyclists and pedestrians. Half of the SPUI's Off-Ramp traffic volume is forecasted to come from short I-5 trips of eight miles or less. The traffic analysis found that travel time considerations and route desirability are leading to I-5 being used for local traffic and increasing traffic volumes loading onto the South Medford (Exit 27) SPUI.

Traffic Safety Issues

1. South Medford (Exit 27) SPUI Southbound Off-Ramp backs-up onto the I-5 mainline on weekdays for approximately 15 minutes during the AM peak hour. This traffic back-up presents a traffic safety hazard and increased risk of vehicle crashes when I-5 mainline traffic approaches the SPUI's Southbound Off-Ramp at speeds too high to stop before colliding with queued (stopped) vehicles on the off-ramp.

2. Major attractors/generators located to the northeast of the IMSA are St. Mary's School, the Rogue Valley Manor Planned Unit Development, and the Asante Medical Center Hospital, along with other medical offices and supporting businesses around the hospital.

   - During the morning 7:30 – 8:30 am peak hour, there is high traffic volume travelling north on Garfield Street-Highland Drive to turn right (east) onto Barnett Road. The South Medford (Exit 27) SPUI Southbound Off-Ramp has dual left turn lanes. The outer left lane of those two turn lanes is underutilized because vehicles stage themselves in the rightmost turn lane to turn right onto Barnett Road. This travel behavior causes blockage of the SPUI's Northbound Off-Ramp, such that vehicles cannot progress into the rightmost lane on Highland Drive.

South Medford (Exit 27) Solutions

Traffic solutions include traffic safety and operations improvements at the South Medford (Exit 27) SPUI ramp terminals, and Multi-Modal and Transit improvements within the IMSA.

Table 1 - South Medford (Exit 27) Safety & Operations Projects

South Medford (Exit 27) Improvements	Description	Cost
M3b	Barnett Road/Highland Drive Intersection - Add Dual Northbound Right Turn Lanes	$4,900,000
M5a2	South Medford (Exit 27) SPUI Lengthen/Widen Southbound Off-Ramp (Lengthened to 3,000')	$9,800,000
M5b	South Medford (Exit 27) SPUI Widen Northbound Off-Ramp	$2,911,000
M5f	North Medford (Exit 30 Southbound On-Ramp) and Phoenix (Exit 24 Northbound On-Ramp) Ramp Metering	$3,498,000
M8b	OR 99/Garfield Street Intersection - Restripe East Leg (Westbound) left, left, through, through/right	$35,000

Table 2 - South Medford (Exit 27) Multi-Modal Projects

Multi-Modal Projects	Description	Cost
B1	Multi-Use Path along OR 99	$524,000
B2a	Add Buffered Bike Lanes along Garfield Street-Highland Drive segment between OR 99 and Barnett Road	$25,000
B5	Connect Highland Drive using the Undercrossing to Larsen Creek/Bear Creek	$176,000

Table 3 - South Medford (Exit 27) Transit Projects

Transit Projects	Description	Cost
T1	Move transit stop on Eastbound Barnett Road between Highland Drive and Ellendale Drive	$3,000
T3	TDM Solutions	$100,000 to $500,000

Alternative Mobility Targets

The South Medford (Exit 27) IAMP includes Alternative Mobility Targets (AMTs) to manage traffic safety and operations at the South Medford (Exit 27) SPUI. The traffic analysis shows the following AMTs are adequate to support future planned development of the 2020 Medford Comprehensive Plan Land Uses in South Medford.

Table 4 – South Medford (Exit 27) Alternative Mobility Targets

	Maximum Ramp Queue Length
South Medford (Exit 27) SPUI Southbound Off-Ramp	1,070 feet
South Medford (Exit 27) SPUI Southbound Off-Ramp w/Ramp Extension	2,360 feet
South Medford (Exit 27) SPUI Northbound Off-Ramp	730* feet

Note: The queues developed for the AMT are 95th percentile queues from a calibrated micro-simulation model. As such any queues used in comparison to these must also be from a calibrated micro-simulation model as described in the Analysis Procedures Manual (APM). Ramp queues measured as part of an applicant's TIA shall be based on the calibrated micro-simulation that was used to determine the I-5 Exit 27 South Medford Interchange Maximum Ramp Queues in Table 4. If the methodology used to create ramp queues in a TIA are not consistent with the methodology used to create the I-5 Exit 27 South Medford Interchange AMT Maximum Ramp Queue Lengths (e.g., using Synchro queues instead of SimTraffic, Vistro instead of Vissim, or failing to properly calibrate) then the comparisons of ramp queues in an applicant's TIA to the I-5 Exit 27 South Medford Interchange Maximum Ramp Queues will be invalid. The applicant will be required to use 30th highest hour volumes and peak hour factors to ensure consistency in comparing the ramp queues. *The City of Medford will continue to work with ODOT Region 3 Traffic Section to facilitate lowering the speed limit on I-5 mainline to 55 MPH just south of the NB Off Ramp to reduce the Decel Length required to 640 feet and increase the Maximum Ramp Queue Length to 830 feet.

Management Measures
Management Measures are needed to support the Oregon Transportation Commission's (OTC) adoption of the AMTs for the South Medford (Exit 27) SPUI. They include Travel Demand Management (TDM) measures to reduce traffic demand at the South Medford (Exit 27) SPUI including, but not be limited to, any applicable measures required by the Transportation Planning Rule (TPR) update, and applicable measures identified in the City of Medford's 2018 Transportation System Plan (TSP).

Oregon Highway Plan (OHP) Policy 1F requires the South Medford (Exit 27) IAMP to include feasible actions for providing a network of local streets to help relieve traffic demand on state highways. The South Medford Transportation Solution Project Phase II begins a planning-level study to evaluate the benefit-to-cost of a new South Stage overcrossing/interchange. In Phase III, the City of Medford will evaluate long-range transportation alternatives that help with major congestion problems in case the South Stage study does not reveal major improvements or defendable benefit-to-cost improvements.

Public and Agency Participation
The South Medford (Exit 27) IAMP has been prepared with participation from the City of Medford, Oregon Department of Transportation (ODOT) and with input from a variety of interested participants and the general public through the City of Medford's local adoption process. The steps of the process and their results were documented through City agendas and meeting minutes.

SECTION 2 PROJECT BACKGROUND AND PURPOSE

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Background

This section summarizes the purpose of the South Medford (Exit 27) IAMP including background information, the South Medford (Exit 27) SPUI function, IAMP goals and objectives, IAMP development process, and a description of the IMSA. The Oregon Administrative Rules (OAR) address IAMPs, with OAR 734-051-0155 establishing a requirement for IAMPs for new or substantially modified interchanges. In addition, OHP policies direct ODOT to plan and manage interchange areas for safe and efficient operation.

Purpose

The South Medford (Exit 27) IAMP is a strategic transportation plan to manage the long-term function of the South Medford (Exit 27) SPUI. This IAMP identifies transportation improvements within the IMSA that intend to maximize safe movement of traffic on the I-5 mainline and provide safe and efficient operations between connecting roadways.

The IAMP solutions include the South Medford (Exit 27) SPUI ramp extensions, multi-modal and transit facility improvements within the IMSA. The intent of the IAMP is that recommended policies, provisions, and other ordinances are carried over to upcoming additional planning efforts for the South Medford Transportation Solutions Phase II (South Stage Road Overcrossing/Extension/Interchange) and Phase III (South Medford Circulation Plan).

- Phase II begins a planning-level study to evaluate the benefit-to-cost of a new South Stage overcrossing/interchange.

- Phase III, the city will evaluate long-range transportation alternatives that help with major congestion problems in case the South Stage study does not reveal major improvements or defendable benefit-to-cost improvements.

Interchange Function

The South Medford (Exit 27) SPUI functions as an urban interchange and is intended to serve primarily regional traffic. It also serves some local traffic movement on I-5 between north and south Medford. At a SPUI, all four left-turn movements (from both exit ramps and from the cross street to both entrance ramps), and the through movements on the cross street all go through the central signalized portion of the interchange.

Interchange Management Study Area

The IMSA is focused on the study area of the South Medford (Exit 27) SPUI extending to the OR 99/Garfield Street intersection to the southwest; the Barnett Road/Ellendale Drive intersection to the northeast; and the Barnett Road/East Stewart Avenue intersection to the northwest (See Figure 2 below).

Figure 2 - South Medford (Exit 27) IMSA

Notes: Yellow star is location of Wal-Mart; Blue star is location of development south of Garfield Street on Center Drive.

Goals and Objectives

The primary goal is to manage the function of the South Medford (Exit 27) SPUI for the next 20 years while accounting for changes in land use and traffic patterns. As stated in OHP Policy 3C, "it is the policy of the State of Oregon to plan for and manage grade-separated interchange areas to ensure safe and efficient operation between connecting roadways."

Goal 1 - Maintain the Function of the South Medford (Exit 27) SPUI over the 20-Year Planning Period to Preserve the Investment in the Facility

- **Objective A** - Assess traffic operations at the South Medford (Exit 27) SPUI using the most recent available data and most recent traffic forecasts to Year 2045, to determine whether the Alternative Mobility Targets prescribed in this IAMP will be met for at least 20 years.
- **Objective** B - Manage access on state facilities within the IMSA in compliance with applicable OAR 734 Division 51.

Goal 2 - Minimize the Need for Future Major Improvements to the South Medford (Exit 27) SPUI

- **Objective A** - Identify whether future land uses may be inconsistent with the traffic safety and operations of the South Medford (Exit 27) SPUI, and, if such land uses were identified and developed, recommend strategies for land use controls.
- **Objective** B – Ensure ODOT is involved in future land use decisions that could affect the function of the South Medford (Exit 27) SPUI.

Goal 3 - Accommodate the Planned Growth in Medford and Not Push Growth Farther from the Jobs in South Medford Resulting in More Unmitigated Congestion in the Future

- **Objective A** - Identify projects/strategies to ensure safe traffic operations given the amount of expected growth.
- **Objective B** - Enhance multi-modal safety and comfort within the IMSA.

Base Year 2020 Conditions

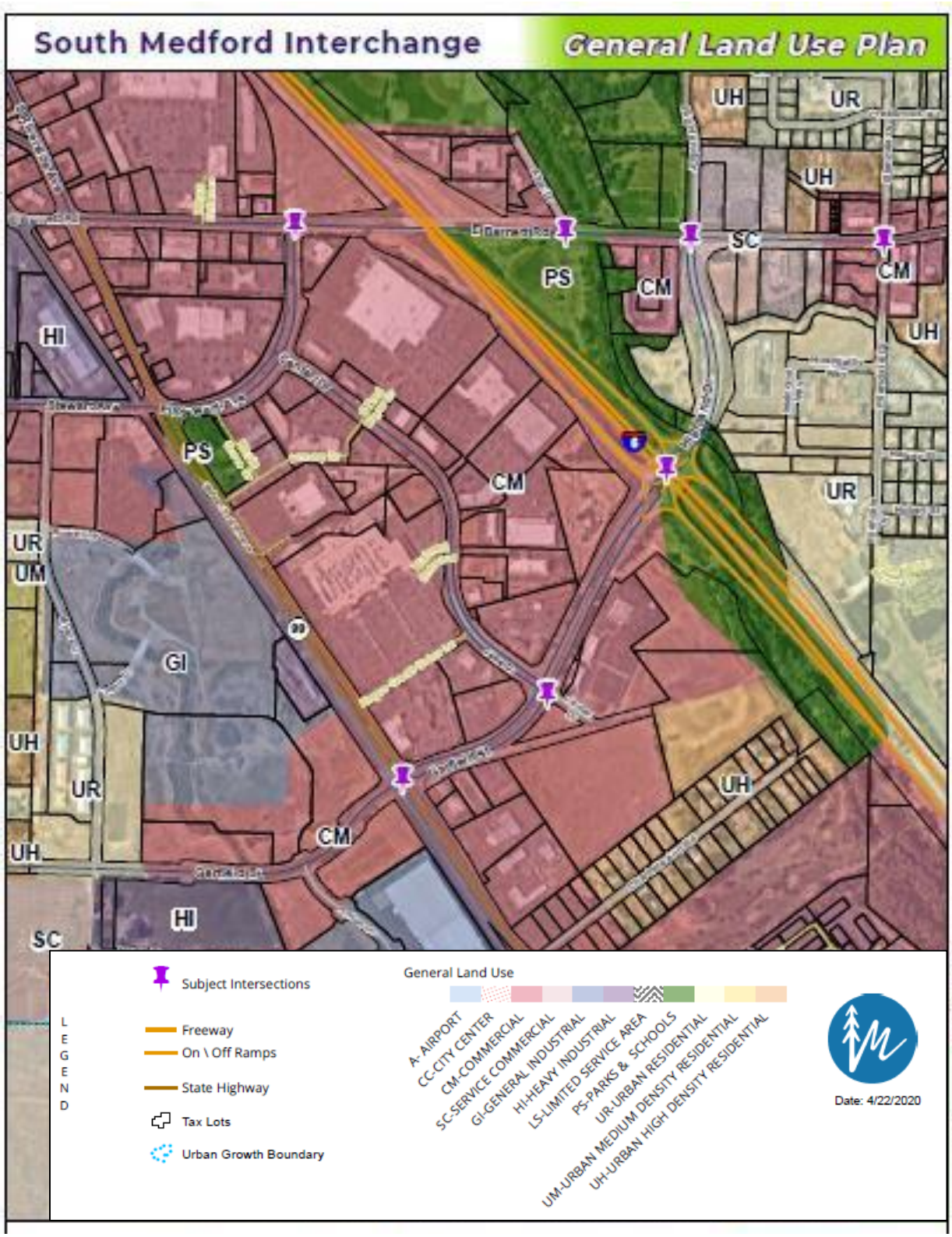
The Base Year 2020 conditions used the best available information documented in the 2007 South Medford (Exit 27) IAMP, 2018 Medford TSP and other supporting documents within the South Medford (Exit 27) IMSA (See the South Medford (Exit 27) IAMP Volume II – Appendices TM #1 for more information).

2018 Medford TSP - The 2018-2038 Medford TSP identifies existing and future transportation facilities located within the Medford City Limits and an additional 4,000 acres located within its Urban Growth Boundary (UGB). The UGB provides the city with a 20-year supply of land for future growth. The TSP is based on the City of Medford's Comprehensive Plan land uses and provides for a transportation system that accommodates the expected population and employment growth resulting from development of the planned land uses.

Land Uses - Land use is a key factor in developing a functional transportation system; the amount of land planned for development, the types of land uses, and how they relate to each other have a direct relationship to the anticipated traffic demands on the transportation system. Similarly, the make-up of the population influences the types of transportation facilities and programs needed to move the residents and visitors within the community.

- The Medford Comprehensive Plan provides a long-term guide for where and how future development will occur within the IMSA. Segregated, low-density land uses tend to limit transportation choices by separating trip origins and destinations and increasing average trip lengths. This makes walking and bicycling to destinations less convenient and makes transit less efficient. Alternatively, mixed land uses at higher densities tend to bring a larger number of origins and destinations closer together, thereby shortening average trip lengths and making walking, biking, and transit more feasible for a larger number of trips (See Figure 3 below).

Figure 3 - City of Medford Comprehensive Plan Land Use Map



SECTION 3 EXISTING & FUTURE TRAFFIC ANALYSIS

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Base Year 2020 Traffic Analysis

This section summarizes the key information from the Base Year 2020 traffic analysis (See the South Medford (Exit 27) IAMP Volume II - Appendices Technical Memo #2 for more information).

SPUI Capacity - In Base Year 2020, the South Medford (Exit 27) SPUI fails the meet the OHP V/C standards during the AM peak hour with a V/C of 0.89 (See Table 5 below). A contributing factor to this failure is the back-up from the Highland Drive/Barnett Road intersection northbound right turn (NBR). Traffic at the Highland Drive/Barnett Road intersection backs-up to the South Medford (Exit 27) SPUI for about 15 minutes during the AM peak hour. Additionally, the SPUI's Southbound Off-Ramp traffic turning left onto Highland Drive use the rightmost of the two left-turn lanes on Highland Drive to turn right onto Barnett Road at the Barnett Road/Highland Drive intersection. This traffic back-up also impacts the SPUI's Northbound Off-Ramp right-turns onto Highland Drive.

Table 5 - Base Year 2020 South Medford (Exit 27) SPUI Capacity

Intersection	OHP V/C Target	LOS Standard	AM (2020)		PM (2020)	
			V/C	LOS	V/C	LOS
Highland Drive/Barnett Road Intersection	N/A	E	1.13	D	1.18	E
South Medford (Exit 27) SPUI Ramps	0.85	N/A	**0.89**	D	0.81	C
Garfield Street/Center Drive Intersection	0.95	N/A	0.56	B	0.72	C
Garfield Street/OR 99 Intersection	0.95	N/A	0.67	C	0.75	C

Notes: Table 5 shows the calculated LOS and V/C for each of the IMSA intersections under Base Year 2020 conditions. Table 5 also shows the LOS standard for the City of Medford intersections. For signalized intersections that fall under the jurisdiction of the City of Medford, LOS is calculated with a peak hour factor of 1.0 to match their standards. The three intersections under the jurisdiction of ODOT have the Oregon Highway Plan V/C standard and LOS shown. [1] LOS for comparison to the Medford standard is computed with PHF set = 1.0 for all movements throughout the network.

Interchange Trip Volumes & Distribution - The Base Year 2020 traffic volumes shows travel between the South Medford (Exit 27) SPUI, and points located north of the SPUI along I-5. A select link analysis indicates that half of the South Medford (Exit 27) SPUI Northbound Off-Ramp traffic volume comes from short I-5 trips of eight miles or less travelling northbound from the three interchanges located to the south:

- Phoenix (Exit 24) Interchange;
- Talent (Exit 21) Interchange; and
- Valley View (Exit 19) Interchange

The traffic analysis shows that more than a quarter of the traffic volume exiting the South Medford (Exit 27) SPUI Northbound Off-Ramp turns left onto Garfield Street to the traffic signal at the Garfield Street/OR 99 intersection, then turns left at the Garfield Street/OR 99 intersection to travel south on OR 99.

- Additionally, traffic volumes exiting the South Medford (Exit 27) Northbound Off-Ramp travel north on Highland Drive (e.g., AM peak 73%, PM peak 66%).

The traffic analysis indicates that half of the South Medford (Exit 27) SPUI Southbound Off-Ramp traffic volume comes from short I-5 trips travelling southbound from two interchanges located to the north:

  - North Medford (Exit 30) Interchange; and
  - Central Point (Exit 33) Interchange

- Nearly half of the traffic volume exiting the South Medford (Exit 27) SPUI Southbound Off-Ramp loaded onto I-5 at the North Medford (Exit 30) Interchange. An additional 26% of the South Medford (Exit 27) SPUI Southbound Off-Ramp traffic volume loaded onto I-5 at the Central Point (Exit 33) Interchange.

- Traffic volume exiting the South Medford (Exit 27) SPUI Southbound Off-Ramp has a higher percentage of the traffic travelling northbound to the traffic signal at the Barnett Road/Highland Drive intersection (e.g., AM peak (46%) than in the PM peak (41%). Nearly 40% of this traffic volume then travels eastbound onto Barnett Road (e.g., AM peak 40%, PM peak 37%).

- Of the traffic volume exiting the South Medford (Exit 27) SPUI Southbound Off-Ramp, 18% travels south on Garfield Street to the traffic signal at the Garfield Street/Center Drive intersection, then turns right onto Center Drive to major shopping, food, and lodging attractors.

The traffic analysis shows that the Barnett Road/Highland Drive intersection meets the City of Medford LOS standard of E.

- During the 7:30 – 8:30 am peak hour, the northbound right turn lane at the Barnett Road/Highland Drive intersection backs-up to the South Medford (Exit 27) SPUI and can lead to the South Medford (Exit 27) SPUI Southbound Off-Ramp backing-up onto the I-5 mainline.

- In the 4:30 – 5:30 pm peak hour, there is high traffic volume travelling westbound on Barnett Road to turn left onto Highland Drive, then to travel south on Highland Drive to the South Medford (Exit 27) SPUI. Rear-end and sideswipe traffic accidents at the Barnett Road/Highland Drive intersection made up 65% of the crashes. Turning crashes at the intersection were also prevalent (e.g., 29% of the intersection crashes and 18% of the roadway segment crashes).

Operational Analysis - The Base Year 2020 traffic analysis shows that the South Medford (Exit 27) SPUI AM peak V/C of 0.89 is higher than the 0.85 V/C OHP Mobility Target. During the AM peak, the Highland Drive northbound approach to the Barnett Road/Highland Drive intersection blocks storage 59% of the time and causes upstream blockage in the South Medford (Exit 27) SPUI roughly 58% of the time.

The traffic analysis shows that traffic spill back and upstream blockage can be seen on four approaches to the South Medford (Exit 27) SPUI (i.e., Northbound Off-Ramp, Southbound Off-Ramp, Garfield Street/Center Drive intersection, and Highland Drive/Barnett Road intersection). During the AM peak, the South Medford (Exit 27) SPUI Southbound Off-Ramp traffic volume turning left onto Highland Drive has a high traffic volume. Traffic uses the rightmost travel lane on Highland Drive to stage for a right-turn at the Barnett Road/Highland Drive intersection.

Safety Improvement Areas - 44% of the crashes within the IMSA were intersection or intersection related. Rear-end and sideswipe overtaking made up 65% of the crashes, typical collision types as vehicles approach intersections or congestion. Turning crashes were prevalent: 29% of the intersection crashes; 18% of the roadway segment crashes. Most crashes (34%) occurred in the 3 pm – 6 pm time frame; only 8% of crashes were in the 6 am – 9 am time frame.

At the intersection locations, the prevalent crash patterns were turning crashes, not yielding right of way and rear end crashes from following too closely. The intersection crashes have a higher proportion of occurrence during the PM hours when the majority of traffic is heading westward.

On I-5 segments the shared crash pattern was rear-end crashes. Of particular concern within the IMSA would be the South Medford (Exit 27) SPUI Off-Ramp back-ups that spill back onto the I-5 mainline. The most common crash pattern among crashes on roadway segments was found to be rear-end crashes resulting from vehicles following too closely.

Queue Lengths & Blockages – At the Barnett Road/Highland Drive intersection both AM and PM peak hours experience lengthy traffic queues in all directions. During the AM peak:

- Northbound approach blocks storage and backs-up to the South Medford (Exit 27) SPUI roughly 60% of the time, due to the high northbound right turn volume at the Barnett Road/Highland Drive intersection.

- Southbound approach blocks storage and backs-up to Greenwood Street most of the time, likely due to high left turn volumes. During the PM peak, westbound traffic making a left turn to travel south on Highland Drive to the South Medford (Exit 27) SPUI has storage bay blockage a third of the time.

Table 6 – Base Year 2020 95th Percentile Queues

Intersection		Approach	95th Percentile Queue[1] (ft.)		Upstream Blockage (AM or PM, % time, AM PM intersection blocked)[2]
			AM	PM	
Barnett Road at Highland Drive		EB	300	300	
		WB	375	850	
		NB	**1750**	350	AM, 58%, South Medford (Exit 27) SPUI
		SB	325	**975**	PM, 83%, Greenwood St
South Medford (Exit 27) SPUI		EB	1325	850	AM, 6%, SB I-5
		WB	**1850**	250	AM 56%, NB I-5
		NB	**1550**	350	AM, 11%, Center Drive
		SB	325	325	
Garfield Street/Center Drive[3]		EB	900	400	AM, 4%, OR99
		WB	825	975	
		NB	25	100	
		SB	200	800	PM 5%, Rogue Credit Union Ln
Garfield Street/OR 99		EB	550	250	AM, 7%, Anton Dr.
		WB	250	400	
		SEB	175	275	
		NWB	500	375	

Notes: Table 6 summarizes intersection queue lengths and blockage. Blackened box indicates 95th percentile queue > link length; [1] 95 percentile queue rounded up to nearest 25'; [2] Blockage >5% of the time; [3] Directions at the intersection of Garfield Street and Center Drive are east-west for Garfield Street. N-S for Center Drive in Synchro, those directions are followed in these analysis results.

Traffic Safety - The most common crash pattern was found to be rear-end crashes resulting from vehicles following too closely. At intersections, the prevalent crash patterns were turning crashes not yielding right of way and rear-end crashes from vehicles following too closely. The intersection crashes have a higher proportion of occurrence during the PM hours when the majority of traffic is heading westward. On I-5 segments the shared crash pattern was also rear-end crashes.

The Base Year 2020 crash analysis identified several areas as top 10% SPIS sites or having critical crash rate. All of these had crash patterns of rear-end crashes from following too closely; and most also had crash patterns of turning crashes related to not yielding right-of-way (See Table 7 below).

Table 7 - Base Year 2020 Top SPIS & Critical Crash Rates

Top 10% SPIS location	Location Identified for		2014 – 2018 Crash Trend Patterns	
	Critical Crash Rate	Top 10% SPIS	Rear end crashes	Turning crashes
Barnett Road at Highland Drive Intersection		●	59%	33%
Barnett Road east of Ellendale Drive to Hilldale Avenue	●	●	73%	18%
South Medford (Exit 27) SPUI Southbound Off-Ramp		●	80%	
Garfield Street, from Center Drive through the South Medford (Exit 27) SPUI to Barnett Road		●	100%	
Barnett Road west of Stewart Avenue	●		48%	43%
Stewart Avenue west of OR 99 to Myers Lane	●		63%	
OR 99 from Barnett Road to Stewart Avenue	●	●	55%	42%

Multi-Modal MMLOS - The MMLOS criteria is as follows:

- LOS A or B: Conditions should be generally acceptable for the users.
- LOS C or D: Some issues exist that may make the users uncomfortable.
- LOS E or F: Significant issues exist that will make the majority of the users feel uncomfortable. It is likely that this facility will deter users to some degree.

The sidewalks and crossings within the IMSA are in good condition, and bike lanes are included on many of the roadway segments. A multi-use path along the Bear Creek Greenway provides grade separated passage north-to-south for pedestrians and bicyclists, with connection to the pedestrian and bicycle network at the Barnett Road/Highland Drive intersection.

The Pedestrian MMLOS generally scored at LOS C for both AM and PM time periods. There is a clear pattern of roadway segments switching between LOS C and LOS E between AM and PM peak hours as the directional traffic volume increases in certain directions making it uncomfortable for pedestrians.

- Barnett Road between Highland Drive and Ellendale Drive: During the AM peak, traffic is heavier in the eastbound directions as vehicles head to work or to the school and the reverse is true during the PM peak as vehicles leave those locations. At each of those times the corresponding direction has a Pedestrian MMLOS of E.

- The lowest Pedestrian MMLOS score was along OR 99. The OR 99 segment from Charlotte Ann Road north to Stewart Avenue rated as MMLOS E for both AM and PM peak time periods. OR 99 is a higher speed and high-volume facility. Additionally, it lacks a paved sidewalk on the west-side.

The Bicycle MMLOS scores were generally spilt between C-E and E-F. Four roadway segments were rated Bicycle MMLOS F in both directions and shared characteristics such as a high volume of traffic, generally higher speeds, and driveway conflicts. Additionally, these roadway segments do not provide bike lanes for bicyclists.

- The worst roadway segments for bicyclists are at:
    - Stewart Avenue between Myers Lane and OR 99;
    - Stewart Avenue between OR 99 and Center Drive;
    - Barnett Road between Ellendale Drive and Hilldale Avenue; and
    - OR 99 between Stewart Avenue and Garfield Street.

The Transit MMLOS was rated C or D with travel speed generally making the difference. Roadway segments with only Route 1X service had Transit MMLOS of E or F. Route 1X segments include OR 99 between Stewart Avenue and Garfield Street, and Garfield Street westbound from the South Medford (Exit 27) SPUI to Center Drive.

- RVTD (Rogue Valley Transportation District) provides the Rogue Regional Medical Center (RRMC) with support for their Transportation Options program. This program began in Year 2018 and was required by the City of Medford. Asante now employs a part-time Employee Transportation Coordinator to assist employees with using transportation alternatives. RVTD also works with Medical Eye Center, Rogue Valley Manor and St. Mary's school on voluntary Transportation Options programs.

Future Year 2045 Traffic Analysis

This discussion summarizes the key information and deficiencies from the Future Year 2045 No Build Analysis (See Volume II TM# 3 Appendix A – D for more information).

The Future Year 2045 traffic analysis finds that increased traffic volumes within the IMSA will adversely impact the South Medford (Exit 27) SPUI operations, safety, and roadway segment MMLOS for Bicyclists and Pedestrians. Half the South Medford (Exit 27) SPUI Off-Ramp traffic volume is forecasted to come from short I-5 trips of eight miles or less. It also shows AM peak Total Entering 30 Highest Hour Volume (TEV) is 5,565 vehicles and PM peak TEV is 5,955 vehicles.

- The South Medford (Exit 27) SPUI Off-Ramps in both directions will be carrying heavier loads than they were designed for in Year 2045; and

- Most of the City intersections will still meet the City of Medford LOS standards in Year 2045.

Operational Deficiencies - The following deficiencies will make traffic movement through the IMSA difficult during the AM peak hour. In the PM peak, conditions within the IMSA are expected to perform better during the AM peak. These traffic operational deficiencies are expected to lead to longer travel times and more hours of vehicle delay.

- **South Medford (Exit 27) SPUI** - AM Peak V/C is forecasted to increase to 1.35 V/C. A contributing factor the SPUI's AM peak hour V/C not meeting OHP Mobility Targets is the back-up from the Highland Drive/Barnett Road intersection northbound right turn. The SPUI's Southbound Off-Ramp eastbound left movement vehicles use the rightmost of the two left-turn lanes on Highland Drive, to stage themselves for the right turn at Barnett Road/Highland Drive intersection. This back-up also impacts the SPUI's Northbound Off-Ramp right turn onto Highland Drive.

- **Garfield Street/Center Drive Intersection** - In Future Year 2045, traffic conditions are expected to exceed the OHP V/C standard during the AM peak with a 1.0 V/C; Synchro analysis shows queueing traffic backing-up on the three primary approaches: westbound from the South Medford (Exit 27) SPUI; eastbound toward the South Medford (Exit 27) SPUI; and southbound on Center Drive. During Future Year 2045 AM Peak, the westbound approach is expected to back-up to the South Medford (Exit 27) SPUI. The southbound and eastbound approaches also back-up due to the congestion at the South Medford (Exit 27) SPUI spilling back into the Garfield Street/Center Drive intersection.

- **Garfield Street/OR 99 Intersection** - During the PM Peak, traffic conditions are expected to exceed OHP V/C Mobility Targets with a 1.01 V/C. Large traffic volumes travelling north on OR 99 cause blockages to the south past Charlotte Ann Road. Nearly a third of the northbound traffic volume on OR 99 turns right on Garfield Street toward the South Medford (Exit 27) SPUI either to cross over to east Medford, or to access I-5; with the remaining two thirds of the traffic volume continuing north on OR 99 to the OR 99/ Stewart Avenue intersection.

- **Barnett Road/Highland Drive Intersection** – In Future Year 2045, the Barnett Road/Highland Drive intersection is expected to exceed the City of Medford's LOS standards with a LOS F in both AM and PM peak periods. During the AM Peak the northbound traffic on Highland Drive turning right onto Barnett Road backs-up to the South Medford (Exit 27) SPUI. This also contributes to the southbound and westbound approaches at the Highland Drive/Barnett Road intersection experiencing storage bay blockage and upstream queue spillback.

- During the AM peak upstream traffic blockage will be a problem in the entire northeast portion of the IMSA: Traffic on Highland Drive travelling south into the Barnett Road/Garfield Street intersection backs-up and spills into the Barnett Road/Greenwood Street intersection to the north; Barnett Road from Garfield Street backs-up upstream past Ellendale Drive and beyond the IMSA extent impacting all traffic entering the IMSA.

- During the PM peak, the Barnett Road/Highland Drive intersection is expected to exceed the City of Medford's LOS standard and have upstream traffic blockages on Highland Drive headed south into the Barnett Road/Garfield Street intersection; and on Barnett Road from Garfield Street upstream past Ellendale Drive and beyond the IMSA. During the PM peak, the southbound and westbound approaches experience extensive storage bay blocking and traffic queue spillback.

Table 8 - Future Year 2045 Capacity

Intersection	OHP V/C Target	Medford LOS Standard	Future AM (2045)		Future PM (2045)	
			V/C	LOS	V/C	LOS
Highland Drive/Barnett Road	N/A	E	1.53	**F[1]**	1.39	**F[1]**
South Medford (Exit 27) SPUI	0.85	N/A	**1.35**	F	0.84	D
Garfield Street/Center Drive	0.95	N/A	**1.00**	F	0.82	D
Garfield Street/OR 99	0.95	N/A	0.92	E	**1.01**	F

Notes: Table 8 shows the calculated LOS and V/C for each of the study area intersections under Year 2045 Future Year conditions. The table show the LOS standard for the City of Medford intersections. For signalized intersections that fall under the jurisdiction of the City of Medford, LOS is calculated with a peak hour factor of 1.0 to match their standards. The three intersections under the jurisdiction of ODOT have the Oregon Highway Plan V/C standard and LOS shown. The table also show that more of the study area intersections will be failing to meet their respective standards during both AM and PM peak hours under the Year 2045 Future Year conditions. [1] LOS for comparison to the Medford standard is computed with PHF set = 1.0 for all movements throughout the network.

Queue Lengths & Blockages – Table 9, Figures 4 and 5 below show the 95th percentile queue, which is the length of queue that has only a 5% probability of being exceeded.

Table 9 - Future Year 2045 95th Percentile Queues

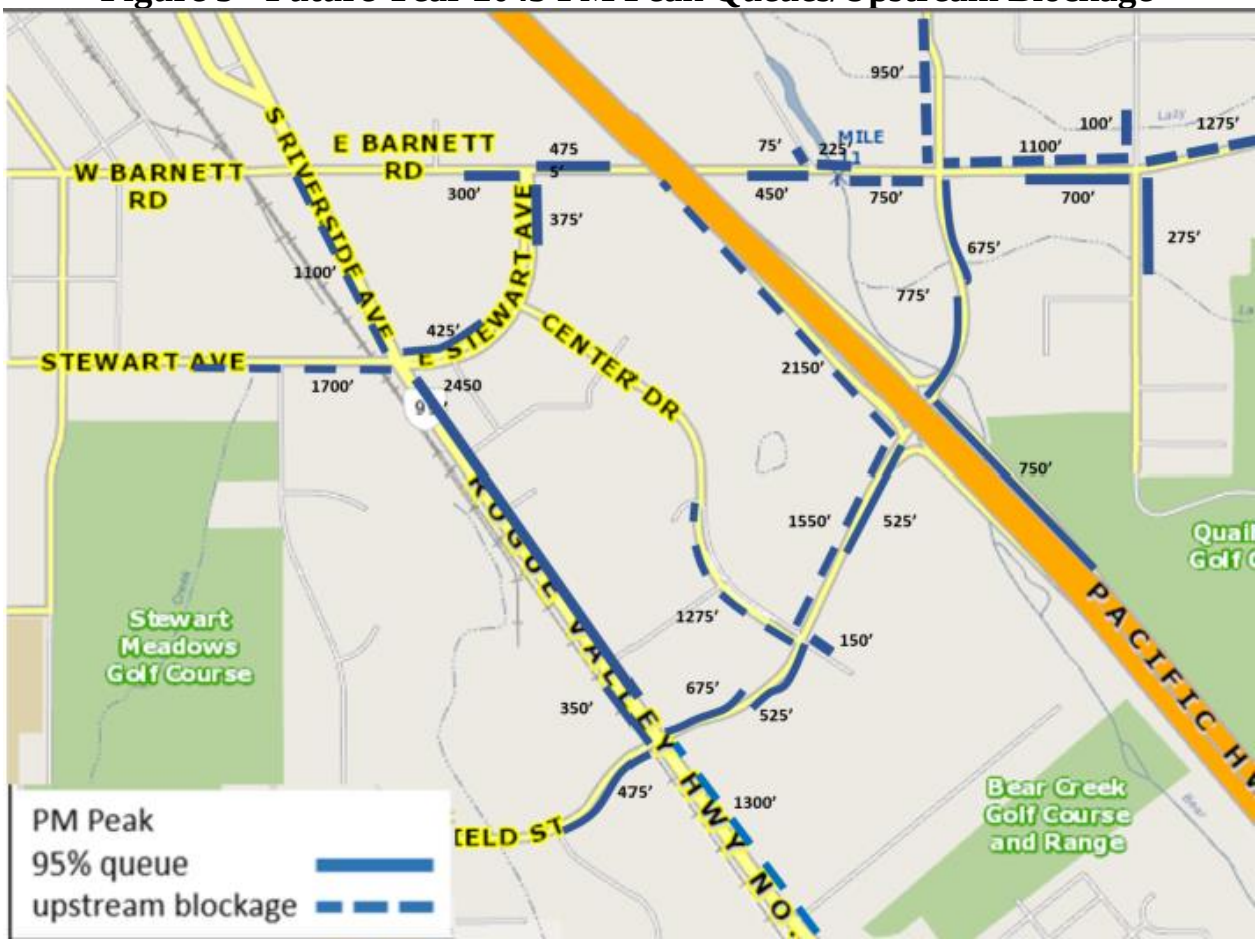
Intersection	Approach	95th Percentile Queue[1] (ft.)		Upstream Blockage (AM or PM, % time, AM PM intersection blocked)[2]
		AM	PM	
Barnett Road at Highland Drive	EB	500	**750**	PM 6%
	WB	**1200**	**1100**	AM 29%, PM 4%
	NB	**1775**	675	AM 61%,
	SB	**1075**	**950**	AM 81%, PM 90%
South Medford (Exit 27) SPUI	EB	**2250**	**2150**	AM 47%, PM 35%
	WB	**1875**	750	AM 56%,
	NB	**1575**	525	AM 37%,
	SB	**1275**	775	AM 4%,
Garfield Street/Center Drive[3]	EB	**1075**	525	AM 41%, PM 7%
	WB	**1650**	**1550**	AM 22%,
	NB	150	150	
	SB	925	**1275**	AM 14%, PM 59%
Garfield Street/ OR 99	EB	**725**	475	AM 79%,
	WB	450	675	
	SEB	**3425**	350	AM 39%,
	NWB	**1675**	**1300**	AM 71%, PM 67%

Notes: Table 9 summarizes intersection queue lengths and blockage. Blackened box indicates 95th percentile queue > link length. [1] 95 percentile queue rounded up to nearest 25'; [2] Blockage >5% of the time; [3] Directions at the intersection of Garfield Street and Center Drive are east-west for Garfield Street, N-S for Center Drive in Synchro, those directions are followed in these analysis results.

Figure 4 - Future Year 2045 AM Peak Queues/Upstream Blockage

Note: Figure 4 shows the AM peak queue lengths and upstream blockage.

Figure 5 - Future Year 2045 PM Peak Queues/Upstream Blockage



Note: Figure 5 shows the PM peak queue lengths and upstream blockage.

Future Year 2045 Safety Deficiencies

Overall, primary traffic safety concerns will be related to the increased traffic queues increasing the risk of rear-end crashes.

- **South Medford (Exit 27) SPUI** - Off ramps from I-5 spilling back onto the I-5 mainline is expected to be an increased safety risk, creating a safety hazard for freeway vehicles coming up unexpectedly on stopped vehicles approaching the off-ramp queues, leading to higher likelihood of high-speed rear end crashes.

Multi-Modal Deficiencies

- **Transit** - The Rogue Valley Metropolitan Planning Organization (RVMPO) 2042 plan adds additional routes and frequency within the IMSA, particularly along Barnett Road and OR 99. Transit MMLOS is expected to be rated E or F in areas near Center Drive and along Garfield Street going through the South Medford South Medford (Exit 27) SPUI.

- **Segment Pedestrian MMLOS** - Segment Pedestrian MMLOS is expected to be rated E along Barnett Road east of Garfield Street, and Garfield Street from Barnett Road to the South Medford (Exit 27) SPUI, and again west of OR 99. High volumes, speeds, and narrow sidewalks contribute to these MMLOS ratings.

- **Segment Bicycle MMLOS** - Segment Bicycle MMLOS is expected to be rated E or F. Poor ratings are due to higher speed limits, and areas with no bicycle lanes such as OR 99 between Stewart Avenue and Barnett Road; Stewart Avenue from Myers Lane to Center Drive; and Barnett Road from Ellendale Drive to Hilldale Avenue. The City of Medford designated the Larson Creek Trail as the bicycle facility for Barnett Road from Ellendale Drive east to North Phoenix Road.

- **Intersection MMLOS** - The Barnett Road/Highland Drive intersection is expected to be rated E for Pedestrian MMLOS due to long traffic signal cycle time and lack of median refuges. The Garfield Street/OR 99 intersection is expected to be rated F for Pedestrian MMLOS due to long pedestrian delay for the traffic signal cycle length, no median refuges, no leading pedestrian indicator, and high speed along OR 99.

SECTION 4 SOUTH MEDFORD (EXIT 27) SOLUTIONS

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South Medford (Exit 27) Solutions

This section summarizes the South Medford (Exit 27) Interchange solutions needed to adequately support future planned development of the 2020 Medford Comprehensive Plan Land Uses and maintain traffic safety by managing traffic queues at the SPUI's Off-Ramps from backing up onto the I-5 mainline.

The following project list includes safety projects to improve the South Medford (Exit 27) SPUI safety and operations.

- Add dual right turn lanes at the Highland Drive/Barnett Road intersection;
- Add ramp meters at the North Medford (Exit 30) Southbound On-Ramp and the Phoenix (Exit 24) Northbound On-Ramp;
- Extend the South Medford (Exit 27) SPUI Southbound Off-Ramp to 3,000 feet; and
- Widen the Northbound Off-Ramp

Future Interstate Project Build Operations - The South Medford (Exit 27) safety and operations projects are shown below in Figure 6 (See the South Medford (Exit 27) IAMP Volume II – Appendices TM 4 Appendix A for more information).

Figure 6 - Future Year 2045 Project Build Locations

South Medford (Exit 27) Safety & Operations Projects

Table 10 - South Medford (Exit 27) Safety & Operations Projects

South Medford (Exit 27) SPUI Improvement	Description	Cost
M3b	Barnett Road/Highland Drive - Add dual northbound right turn lanes on Highland Drive	$4,900,000
M5a2	South Medford (Exit 27) SPUI Lengthen/Widen Southbound Off-Ramp (Lengthened to 3,000')	$9,800,000[1]
M5b	South Medford (Exit 27) SPUI Widen Northbound Off-Ramp	$2,911,000
M5f	North Medford (Exit 30) Southbound On-Ramp Metering and Phoenix (Exit 24) Northbound On-Ramp Metering	$3,498,000
M8b	OR 99/Garfield Street - Restripe East Leg (Westbound) left, left, through, through/right	$35,000

[1]**Notes:** The costs are inflated for a Construction Year 2028, (uninflated costs is $8.3 million). ODOT Region 3 completed the Scoping effort (cost estimates & feasibility) for projects M3b and M5a2 mitigation projects. All projects required by end of planning horizon (Year 2045) to support the Alternative Mobility Targets.

M3b - Barnett Road/Highland Drive – Add Dual Northbound Right Turn

Deficiency: During the AM Peak hour, traffic that uses the right turn lanes on Highland Drive to travel eastbound on Barnett Road backs-up filling out the storage bay and then spilling back into the South Medford (Exit 27) SPUI. This spillback directly contributes to congestion at the SPUI itself, as it blocks several turn movements from progressing through the SPUI.

Vicinity Map

Improvement: Add a second northbound right turn lane on Highland Drive at the Barnett Road/Highland Drive intersection.

Benefits and Considerations: The traffic analysis shows the addition of a second northbound right turn lane on Highland Drive at the Barnett Road/Highland Drive intersection has a positive effect on SPUI operations. The intended reduction in traffic queuing spillback is achieved, as the addition of the second right turn lane reduced the percentage down to roughly 1% of the peak hour. This improvement, however, just stops the spillback and doesn't facilitate a shift in larger amounts of traffic through the intersection as the LOS is still at' F'. The addition of a second turn lane increases the pedestrian and bicycle travel distances and introduces another lane of potential conflict.

Preliminary Cost Estimate: $4.9 million (Cost based on Construction Year 2028)

M5a2 - Lengthen/Widen the South Medford (Exit 27) Southbound Off-Ramp

Deficiency: During both the AM and PM Peak hours, the traffic analysis shows the traffic queues on the South Medford (Exit 27) Southbound Off-Ramp spilling back onto the I-5 mainline. The analysis indicates that the SPUI's Southbound Off-Ramp queues spill back onto the I-5 mainline roughly 47% of the AM Peak and 35% of the PM Peak hour. This is a major traffic safety concern.

Vicinity Map

Improvement: Widen the South Medford (Exit 27) Southbound Off-Ramp to allow 1,000' dual left turn lanes and extend the ramp to 3,000' to accommodate traffic queuing.

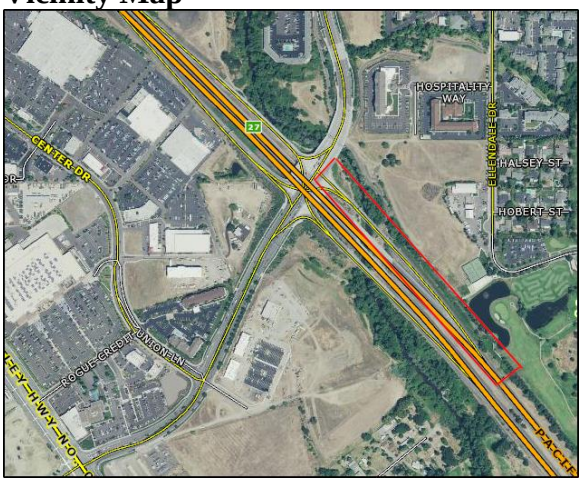
Benefits and Considerations: Traffic queue spill back is reduced to 39% during the AM Peak hour although it increases to 37% during the PM Peak hour. This ramp extension will push the South Medford (Exit 27) SPUI's Southbound Off-Ramp past the current overcrossing that carries Barnett Road over I-5. The Southbound Off-Ramp lanes are anticipated to go under the Barnett Road overcrossing.

Preliminary Cost Estimate: $9.8 million (Cost based on Construction Year 2028)

M5b - South Medford (Exit 27) SPUI Widen Northbound Off-Ramp

Deficiency: During both the AM and PM Peak hour, the traffic queues on the South Medford (Exit 27) Northbound Off-Ramp were shown to be quite long. AM queueing backs-up onto I-5 mainline.

Vicinity Map



Improvement: Widen the South Medford (Exit 27) Northbound Off-Ramp to accommodate a 1,000-foot left turn lane.

Benefits and Considerations: The increase in left turn lane, in conjunction with other projects, shows that it will allow for more traffic to queue on the SPUI's Northbound Off-Ramp without spilling back onto the I-5 mainline. The existing SPUI will need modification to extend the left turn lane, and as such the cost can be quite high.

Preliminary Cost Estimate: $2,911,000

M5f - Exits 24 and 30 Ramp Metering

Deficiency: During the AM Peak hour, the V/C for the South Medford (Exit 27) SPUI exceeds OHP standards with a V/C of 1.35. Additionally, there is substantial traffic queueing on the SPUI's Off-Ramps that extend back onto the I-5 mainline during both the AM Peak and PM Peak Hours. The analysis shows that the South Medford (Exit 27) Southbound Off-Ramp traffic queues spill back onto the I-5 mainline roughly 47% of the AM Peak and 35% of the PM Peak hour. The analysis also indicates roughly 40% of the traffic volumes that use the SPUI's Southbound Off-Ramp travel from the North Medford (Exit 30) and Central Point (33) Interchanges. The analysis also shows that roughly 20% of traffic volumes that use SPUI's Northbound Off-Ramp travel from Phoenix (Exit 24) Interchange to the south.

Vicinity Map

Improvement: Install ramp metering at the North Medford (Exit 30) Southbound On-Ramp and at Phoenix (Exit 24) Northbound On-Ramp.

Benefits and Considerations: The South Medford (Exit 27) Southbound Off-Ramp experiences spillback 47% of the AM peak hour and 35% of the PM peak hour. With the ramp metering at I-5 Exits 24 and 30, the South Medford (Exit 27) Southbound Off-Ramp experienced spillback 6% of the AM peak hour and experienced no spillback issues during the PM peak hour. The installation of ramp meters has been found to have a crash modification factor of 0.64 for all crash types and severities. Both of these improvements are likely tied to the ramp meters spreading out and slowing the traffic volume that is travelling to the South Medford (Exit 27) SPUI. The cost estimate shown is just for the metering of the I-5 Exits 24 and 30 ramps. Additional cost is likely to accommodate traffic queues and will require further analysis and scoping.

Preliminary Cost Estimate: $3,498,000

M8b - OR 99/Garfield Street Restripe East Leg (Westbound)

Deficiency: In Future Year 2045, the OR 99/Garfield Street intersection is expected to exceed the OHP Mobility Targets with a 1.0 V/C and a LOS of F in the AM Peak hour.

Vicinity Map

Improvement: Restripe Garfield Street east leg (westbound) at OR 99 from a dual left lane, through lane, and right turn lane, to dual left turn lanes, a through lane and through/right turn lane.

Benefits and Considerations: Lane restriping was found to have a minor impact on the V/C's of the intersection and was found to have a minor impact on the 95th percentile queues on the restriped leg of the intersection. The PM Peak hour V/C is reduced from 1.01 to 0.96, while the AM Peak hour V/C goes from 0.92 to 0.93. The 95th percentile queues are reduced by a total of three to four hundred feet total across the lanes.

Preliminary Cost Estimate: $35,000

Multi-Modal Projects

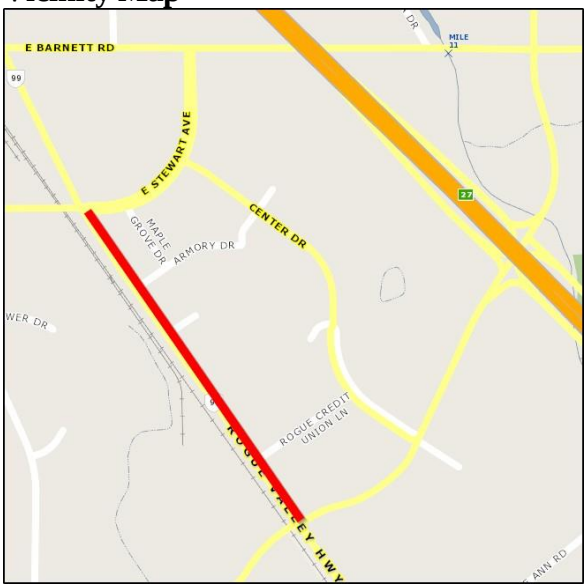
Table 11 - South Medford (Exit 27) Multi-Modal Projects

Multi-Modal Projects	Description	Cost
B1	Multi-Use Path along OR 99	$524,000
B2a	Add Buffered Bike Lanes along Garfield Street/Highland Drive segment between OR 99 and Barnett Road	$25,000
B5	Connect Highland Drive using the Undercrossing to Larsen Creek/Bear Creek	$176,000

B1: Multi-Use Path along OR 99

Deficiency: OR 99 (aka Riverside Avenue) has a bike lane in both southbound and northbound directions, and a sidewalk in only the northbound direction due to railroad tracks next to southbound OR 99. Posted speed on OR 99 is 40 miles per hour (mph) and the Future Year 2045 forecasted Annual Average Daily Trip (AADT) is 25,400.

Vicinity Map



Improvement: The Pedestrian MMLOS is estimated to be an E in both AM and PM peak hours, while the Bicycle MMLOS is estimated to be between an E and an F during the AM and PM peak hours. A future multi-use path on the eastside of OR 99 between Garfield Street and Stewart Avenue will improve the Bicycle and Pedestrian MMLOS ratings.

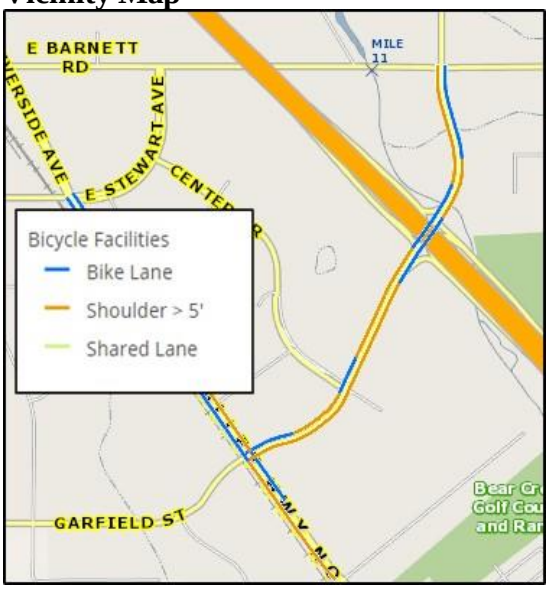
Benefits and Considerations: The multi-use project will include a separated multi-use facility built for pedestrian and bicyclist use. Separating pedestrian and bicycle users from the area close to or shared with vehicles is expected to improve Pedestrian and Bicycle MMLOS to A and B ratings after the path is in place. In order to build the multi-use path, a small amount of land will be needed from the adjacent areas to OR 99. Additionally the smaller roads and driveways crossings along the path would need to be signed correctly.

Preliminary Cost Estimate: $524,000

B2a: Add Buffered Bike Lanes along Garfield Street-Highland Drive

Deficiency: Garfield Street-Highland Drive has gaps in the bike lane in both directions. Posted speed is 35 mph and the Future Year 2045 forecasted AADT averages at 40,000 per day. This environment results in a Bicycle MMLOS between C and E.

Vicinity Map



Improvement: Replace bike lanes and shoulder bike lanes with buffered bike lanes to improve the Bicycle MMLOS rating along Garfield Street-Highland Drive.

Benefits and Considerations: Replacing the bike lanes and missing bike lanes with a buffered bike lane will allow for a comfortable separated space for bicyclists. The buffered bike lanes allow for a complete separation of drivers and bicyclists, and is expected to raise the Bicycle MMLOS rating from a C-E to C-D.

Preliminary Cost Estimate: $25,000

B5: Connect Highland Drive Using Undercrossing to Larsen Creek/Bear Creek

Deficiency: Larsen Creek Trail and Bear Creek Greenway connect together under the north side of the South Medford (Exit 27) SPUI. There is no easy access to either of these paths while going northbound on Highland Drive.

Vicinity Map

Improvement: The multi-use project would add an additional access point for bicyclists and pedestrians to Bear Creek Greenway via the Larson Creek multi-use path. This would help reduce some out of direction travel.

Benefits and Considerations: The multi-use path will add a section of pavement to connect to Larson Creek Trail allowing users to use that trail or to continue to the Bear Creek Greenway. With this connection, pedestrians and bicyclists wouldn't have to travel out of direction by going up to the Barnett Road/Highland Drive intersection cross over to access the Bear Creek Greenway.

Preliminary Cost Estimate: $176,000

Transit Projects

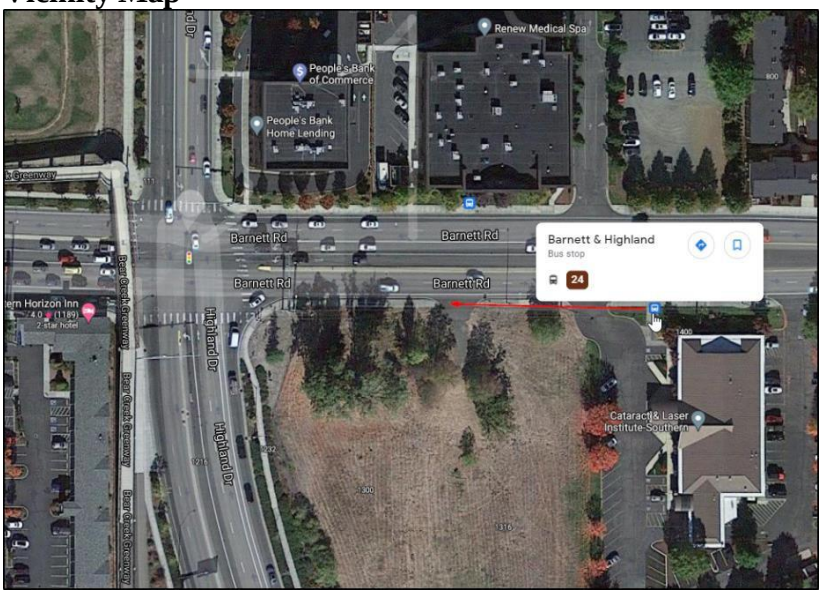
Table 12 - South Medford (Exit 27) Transit Projects

Transit Improvements	Description	Cost
T-1	Move transit stop on eastbound Barnett Road between Highland Drive and Ellendale Drive	$3,000
T-3	TDM Solutions	$100,000 -$500,000

T-1: Move Transit Stop on Eastbound Barnett Road between Highland Drive and Ellendale Drive

Deficiency: The bus stop location requires out of direction travel in order to cross Barnett Road.

Vicinity Map



Improvement: The project will move the bus stop to reduce out of direction travel and help stop people from crossing Barnett Road at mid-block. The empty lot by the Highland Drive/Barnett Road intersection would also allow the option to add a bus pull out.

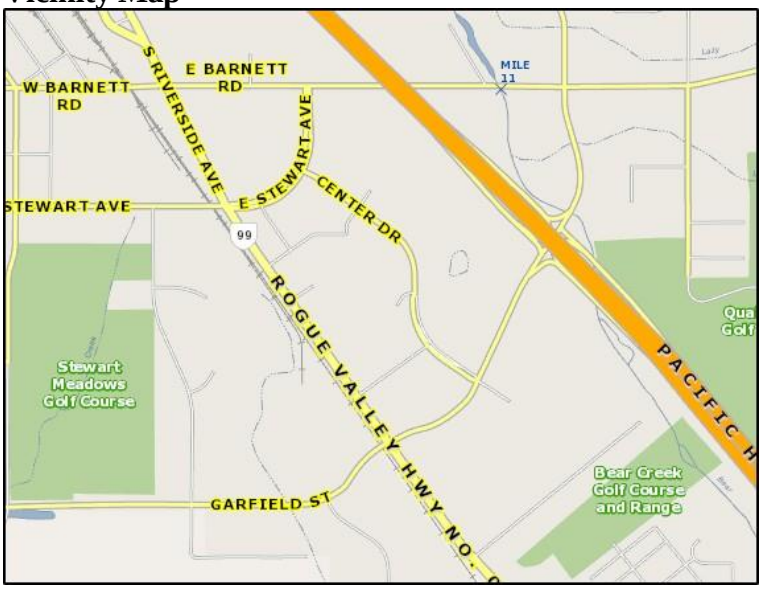
Benefits and Considerations: The new placement of the bus stop is expected to reduce out of direction travel of those needing to get to cross Barnett Road and reduce mid-block crossings.

Preliminary Cost Estimate: $3,000

T-3: TDM Solutions

Deficiency: Congestion is occurring throughout the IMSA including the South Medford (Exit 27) SPUI Off -Ramps where traffic queuing backs-up onto the I-5 mainline.

Vicinity Map



Improvement: Implement Travel Demand Management measures to reduce the need for single occupancy vehicles and reduce congestion within the IMSA.

Benefits and Considerations: TDM measures are needed to support the OHP Policy 1F for OTC adoption of Alternative Mobility Targets for the South Medford (Exit 27) SPUI.

Preliminary Cost Estimate: $100,000 – $500,000

SECTION 5 ALTERNATIVE MOBILITY TARGETS

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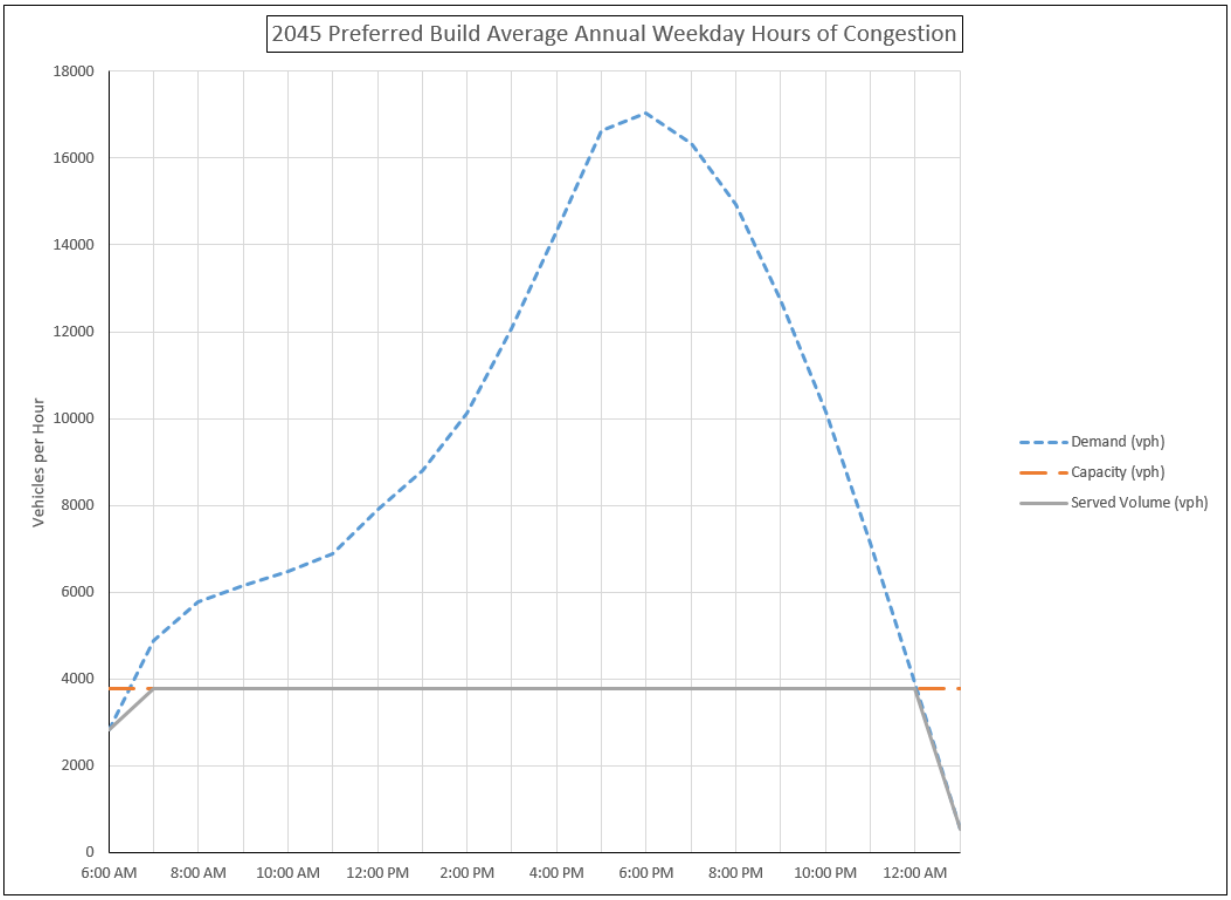
Alternative Mobility Targets

This section summarizes the Alternative Mobility Targets (AMT) for the South Medford (Exit 27) SPUI. All state highway intersections must meet the V/C ratio-based mobility targets specified in OHP Table 6. The OHP Policy 1F recognizes it may not be practical to apply OHP Mobility Targets in all situations – especially where land use plans call for higher-density development, or where the cost of the improvements exceeds the financial capacity of the community. In these cases, AMTs that allow for more congestion may be appropriate.

South Medford (Exit 27) Capacity Analysis – Figure 7 below shows that the South Medford (Exit 27) SPUI would exist in a congested condition for most of the day and that the priority should be to ensure traffic safety. When the stopped traffic queue on the SPUI Off-Ramps extends into the portion of the ramp that is intended for deceleration or extends onto the I-5 mainline, this forces vehicles to substantially slow down or stop in the I-5 mainline travel lanes. A vehicle is supposed to exit the freeway at the speed limit and then decelerate on the off-ramp. These larger speed differentials between the I-5 mainline and diverging traffic significantly increases the risk for high-speed collisions.

Figure 7 - Future Year 2045 Hours of Congestion



South Medford (Exit 27) SPUI Safety Analysis - A maximum ramp queue length of 1,070 feet was set for the South Medford (Exit 27) SPUI's Southbound Off-Ramp and a maximum ramp queue length of 730 feet was set for the SPUI's Northbound Off-Ramp. Table 13 below shows the results of the SPUI's deceleration and ramp queue length evaluation (See the South Medford (Exit 27) IAMP Volume II – Appendices TM #5 for more information).

Table 13 - South Medford (Exit 27) Deceleration & Queue Evaluation

					2019 Queue Length (ft.)		2045 Queue Length (ft.)	
		Ramp Length (ft.)	Deceleration Length (ft.)	Max Allowable Queue (ft.)	AM Peak	PM Peak	AM Peak	PM Peak
Exit 27 Southbound Off-Ramp		1,710	640	1,070	**1,325**	850	**2,100**	292
Exit 27 Southbound Off-Ramp w/Ramp Extension		3,000	640	2,360	**1,325**	850	**2,100**	292
Exit 27 Northbound Off-Ramp		1,470	740	730	**1,850**	250	375	**1,000**

Notes: The traffic analysis applied uniform deceleration equations to determine the SPUI's maximum ramp queue length. *Black shaded cells indicate ramps over queue length. The 2045 Queue Length assumes all the South Medford (Exit 27) SPUI improvement projects are built by Year 2045.

South Medford (Exit 27) SPUI Alternative Mobility Targets - The Maximum Ramp Queue AMT is shown in Table 14 below. **Note:** Additional traffic mitigation above and beyond the South Medford (Exit 27) SPUI improvement projects discussed in Section 4 above may be required if a development application, comprehensive plan amendment or zone change generates traffic demand on the I-5 Exit 27 Off-Ramps that exceed the Maximum Ramp Queue AMT.

- If the applicant's TIA demonstrates that the IAMP 27 safety/operations projects listed in Table 10 are "Not" adequate to mitigate the proposed Zone Change or Comprehensive Plan GLUP Map change "Significant Effects" to the I-5 Exit 27 South Medford Interchange Off-Ramps, the applicant's TIA must recommend additional traffic mitigation to be funded and installed by the end of the 20-year planning period in Future Year 2045. In applying the Alternate Mobility Targets for Maximum Ramp Queue Lengths on the I-5 Exit 27 Off-Ramps to analyze mitigation, ODOT recognizes that there are many variables and levels of uncertainty in calculating traffic queue lengths, particularly over a specified 20-year planning period. After negotiating reasonable levels of mitigation for actions required under OAR 660-012-0060, ODOT considers calculated values for traffic queue lengths that are within 50-feet of the adopted Alternative Mobility Target to be considered in compliance with the Alternative Mobility Target. The adopted Alternative Mobility Target still applies for determining "Significant Effect" under OAR 660-012-0060. The 50-foot traffic queue buffer only applies after reasonable levels of mitigation have been proposed, and not before.

Table 14 - South Medford (Exit 27) Alternative Mobility Targets

	Maximum Ramp Queue (feet)
Exit 27 Southbound Off-Ramp	1,070 feet
Exit 27 Southbound Off-Ramp w/Ramp Extension	2,360 feet
Exit 27 Northbound Off-Ramp	730***** feet

Notes: The Maximum Queue Alternative Mobility Targets can be measured by looking at the 95th percentile queue length output from a calibrated micro-simulation scenario (following Analysis Procedure Manual guidance) using software, such as Synchro or VISSIM, and then comparing the output results for the analysis peak hours against the recommended target. The process to calculate the recommended Maximum Queue Alternative Mobility Targets is included in Appendix A.*****The City of Medford will continue to work with ODOT Region 3 Traffic Section to facilitate lowering the speed limit on I-5 mainline to 55 MPH just south of the Northbound Off Ramp to reduce the Decel Length required to 640 feet and increase the Maximum Ramp Queue Length to 830 feet.

SECTION 6 MANAGEMENT MEASURES

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Management Measures

This section discusses Travel Demand Management (TDM) measures needed to support OHP Policy 1F for OTC's adoption of AMTs for the South Medford (Exit 27) SPUI (See Sections 4 and 5 above for more information).

The South Medford (Exit 27) IAMP includes TDM measures to reduce traffic demand at the South Medford (Exit 27) SPUI. This includes, but not be limited to:

- TDM Ordinances the City of Medford has implemented;
- Any TDM measures required by the Transportation Planning Rule (TPR) update; and
- Any TDM measures already called out in the 2018 Medford Transportation System Plan (TSP).

Transportation Demand Management (TDM)

TDM measures are designed to reduce vehicle miles traveled, especially in the peak periods. These measures focus on the provision of services or facilities intended to shift travelers to different travel modes, or to travel at non-peak times, or to offer trip substitution choices such as telecommuting. It is a policy tool as well as a general term used to describe any action that removes single-vehicle occupant trips from the road network during peak travel demand periods. As growth and development in the City of Medford occurs, the number of vehicle trips and travel demand in the area will increase. The ability to influence driver behavior and provide alternate travel modes may reduce congestion on roadways.

Successful implementation of TDM measures rely on the participation of a variety of public and private entities. Measures include a combination of policies, programs, or physical infrastructure investments. Table 15 below provides a summary of potential measures that can be implemented within the City of Medford and which entities are generally in the position to implement each one.

Table 15 - Transportation Demand Management

TPR Compliant	2018 TSP	Strategy	Type of Investment	Partners				
				City	Developers	Transit	Employers	State
✓	✓	Parking management	Policy	✓	✓	✓	✓	
✓	✓	Limited/flexible parking requirements	Policy	✓		✓	✓	
	✓	Access management	Policy/ Infrastructure	✓	✓			✓
	✓	Connectivity standards	Policy/ Infrastructure	✓	✓			✓
✓	✓	Alternative work schedule	Policy/ Program	✓			✓	
✓	✓	Frequent transit service	Program	✓	✓	✓		
✓	✓	Free or subsidized transit passes	Program	✓		✓	✓	
✓	✓	Preferential carpool parking	Program/ Policy	✓	✓		✓	
✓	✓	Carpool match services	Program	✓			✓	
✓	✓	Parking cash out	Program	✓		✓	✓	
✓	✓	Car sharing program support	Program	✓	✓	✓	✓	
✓	✓	Bicycle facilities	Infrastructure	✓	✓		✓	✓
✓	✓	Pedestrian facilities	Infrastructure	✓	✓			✓
	✓	Traffic Signal Spacing	Infrastructure	✓	✓			✓

Notes: As the City of Medford continues to grow and develop over the next 20 years, the City can review applicability of these strategies. Additional information on potential strategy implementation for the most feasible strategies for the City of Medford are discussed below.

Parking Management

Parking plays a large role in TDM, and effective parking resource management can encourage use of non-single-occupancy vehicle modes. Cities can tailor policies to charge for public parking in certain areas and impose time limits on street parking in retail centers.

Limited and/or Flexible Parking Requirements - Cities set policies related to parking requirements for new development. In order to allow development that encourages multi-modal transportation, cities can set parking maximums and low minimums and/or allow for shared parking between uses. Cities can also provide developers the option to pay in-lieu fees instead of constructing additional parking. This option provides additional flexibility to developers that can increase the likelihood of development, especially on smaller lots where surface parking would cover a high portion of the total property.

Cities can also set policies that require parking provision to the rear of buildings, allowing buildings in commercial zones to directly front the street. This urban form creates a more appealing environment for walking and window-shopping. In-lieu parking fees support this type of development for parcels that do not have rear- or side-access points.

Parking Management Plan - Parking, whether for vehicles or bicycles, is an essential element needed at the beginning and end of each trip. As the regional center for entertainment, shopping, and employment, the location and amount of adequate parking is an important factor in the City's continued growth and prosperity. It also is the City's responsibility to be a leader within the region to manage and implement sound parking principles that help to achieve the State's requirements to achieve a 10 percent reduction in the number of parking spaces per capita in the Metropolitan Planning Organization (MPO) area over the planning period. Careful consideration of the amount and type of parking reductions must be balanced with land use practices that help create vibrant community centers and neighborhoods and provide opportunities to increase travel by other modes. The City of Medford should consider the following strategies to improve parking:

On-Street

- For areas where on-street parking will be added, spaces should be managed to assist in slowing traffic, facilitating pedestrian movement and efficiently supporting local businesses and residences consistent with the land use and mobility goals for each street.
- Use of residential parking permits to limit impacts of overflow parking from nearby employment centers, schools or other institutional uses where parking supply limits are implemented.
- Allowing use of available on-street parking to satisfy parking requirements for development. The availability of parking to meet this demand could be determined through a parking utilization analysis.
- Provide on-street carpool or vanpool parking spaces in preferential locations. These spaces should be given preference in location and allowable parking duration over general purpose on-street parking spaces.

Off-Street

- Review the minimum and maximum parking standards and determine if the standards can be reduced.
- Offer parking incentives for carpools or vanpools such as preferential parking, free parking or other incentives.
- Reduce or waive required off-street parking spaces for new uses in existing buildings.
- Offer incentives, such as elimination or reduction of parking requirements or reduced System Development Charges, for the construction of mixed-use buildings/projects.
- Stipulate that adjacent uses share parking facilities in order to reduce the overall parking need. Reduce the amount of parking by 50 percent of the total required for each separate use and establish appropriate conditions for this reduction.

Access Management

Access Management - Access management is a set of measures regulating vehicular access to streets, roads, and highways from public roads and private driveways. Access management is a policy tool which seeks to balance mobility, the need to provide efficient, safe, and timely travel with access to individual properties. Proper implementation of access management techniques should guarantee reduced congestion, reduced accident rates, less need for roadway widening, energy conservation, and reduced air pollution. Measures may include, but are not limited to, restrictions on the type and amount of access to roadways, and use of physical controls, such as signals and channelization including raised medians, to reduce impacts of approach road traffic on the main facility. Numerous driveways or street intersections increase the number of conflicts and potential for collisions and decrease mobility and traffic flow. **Note:** The City of Medford implements the following access management strategies through Municipal Code Section 10.550.

Driveway Access Spacing Adjustments - Driveway access spacing adjustments may be provided to parcels whose highway/street frontage, topography, natural resources or physical barriers would otherwise preclude access that meets access spacing standards. Approval of an adjustment could impose conditions that: 1) the access may be closed at such time that reasonable access becomes available to a local public street; and 2) the establishment of joint/cross access easements. The review authority may also require a given landowner to work in cooperation with adjacent landowners to provide either joint access points, front and rear cross-over easements, or a rear access upon future redevelopment. **Note:** The requirements for obtaining an adjustment from ODOT's minimum spacing standards are documented in OAR 734-051-3050. The requirements for obtaining an adjustment from the City's minimum spacing standards are documented in Medford Municipal Code Section 10.550**.**

Access Consolidation through Management - From an operational perspective, access management measures limit the number of redundant access points along roadways. This enhances roadway capacity, improves safety, and benefits circulation. The City should complement access spacing enforcement with provision of alternative access points. Under state law each parcel must have access to public right-of-way, but such access may be via an easement on adjoining property. Parcels are not entitled to "direct" access to the public right-of-way.

As part of every land use action, the City should evaluate the potential need for conditioning a given development proposal with the following items in order to maintain and/or improve traffic operations and safety along the arterial and collector roadways.

- Developments with frontage on two roadways should locate their driveways on the lower functional classified roadway.
- Access driveways should align with opposing driveways.
- If spacing standards cannot be met, the City should try to consolidate access points with neighboring properties.
- Where standards cannot be met and joint access is not feasible, the City should grant temporary conditional access by providing cross access easements on compatible parcels (considering topography, access, and land use) to facilitate future access between adjoining parcels.
- By using these guidelines, all driveways can eventually move in the overall direction of meeting driveway access spacing standards as development and redevelopment occur along a given street.

Access Management Plan - The City of Medford should consider the following strategies to improve access and mobility:

- Enforce City access spacing standards according to a roadway's jurisdiction and functional classification;
- Require access consolidation over time to move in the direction of the standards at each opportunity.
- Work with land use development applications to consolidate driveways, where feasible.
- Construct raised medians to provide for right-in/right-out driveways as appropriate.

Transportation System Management (TSM)

TSM strategies are designed to make maximum use of existing transportation facilities and include traffic engineering measures such as signal timing changes, provision of turn lanes, turn restrictions, and restricting on-street parking to increase the number of travel lanes. **Note:** The City of Medford completed traffic signal upgrades including adding several flashing yellow arrows along Barnett Road in Year 2022.

Traffic Signal Spacing - Traffic signals that are spaced too closely on a transportation corridor can result in poor operating conditions and safety issues due to the lack of adequate storage for vehicle queuing. The City's traffic signal spacing standard is 1,320 feet per Medford Municipal Code 10.463. Traffic signals should only be implemented when warranted to enhance safety and promote mobility. ODOT identifies half mile as the desirable spacing of signalized intersections on regional and statewide highways but recognizes that shorter signal spacing may be appropriate due to a number of factors including existing road layout and land use patterns. Signal spacing below, ODOT or City standards, should be studied in detail to consider traffic signal coordination and the impacts of vehicle flow, queuing, and safety within the area. At that time, adjacent signals and the spacing between them can be evaluated.

Street Connectivity Standards - A limited local street network may result in longer trip distances, increased reliance on arterials for local trips, and limited options for people to walk and bike to the places they want to go. By providing connectivity between neighborhoods, out-of-direction travel and vehicle miles traveled will be reduced, congestion will be improved on local arterials. Additionally, improved connectivity will reduce public safety-response time. **Note:** The City's standards for street connectivity and maximum block length are identified in Medford Municipal Code 10.426 and they help ensure that future development results in well-connected streets.

Incremental improvements to the street system are planned to provide route choices for motorists, bicyclists and pedestrians while accounting for potential neighborhood impacts. The quality of the transportation system is enhanced by making connectivity improvements to the pedestrian and bicycle system separate from street connectivity. In most cases, potential local street and neighborhood route connections represent streets to be constructed by future development and extension of existing stub end streets. Pedestrian connections from any cul-de-sac should be considered as future development and redevelopment occurs. The goal is to continue to improve connectivity for all modes of transportation. In each case, the specific alignments may be modified dependent upon future development review.

Active Traffic Management Plan - The City of Medford should consider the following strategies to improve reliability of the transportation network:

- Re-optimize signal timings (i.e., cycle length, green splits, offsets) to clear queues where appropriate;
- Implement "adaptive" signal corridors with upgraded equipment, communications, and timing to maximize traffic efficiency and to respond to changes in traffic demand during peak travel times;
- Real-time display of warning messages (typically on variable message signs (VMS) and possibly coupled with flashing lights) along a roadway to alert motorists that queues or significant slowdowns are ahead, thus reducing rear-end crashes and improving safety;
- Deployment of traffic signal(s) on ramps, to dynamically control the rate at which vehicles enter a freeway facility;
- Ensure street connections are spaced at intervals not to exceed [660] feet (1/8 mile) along each boundary that abuts potentially developable or re-developable land. Blocks longer than [400] feet in length shall have a mid-block pedestrian pathway connecting adjacent blocks. **Note:** Block length and accessway standards are outlined in the Medford Land Development Code Sections 10.426 and 10.464 or as amended; and
- Enhance arterial street capacity to better service regional travel needs.

Employer Based Strategies - The City of Medford should consider the following strategies to reduce traffic demand on the transportation network:

Bicycle Programs: Bicycle racks may be provided for use by employees who commute to the site by bicycle. The bicycle parking area may be established in a secure location and be in close proximity to employee entrances. Provision of connections to existing and planned on-street and off-street bike trails may also be incorporated into the site plans. Development projects may also wish to include shower facilities into their facility design.

Pedestrian Access: Sidewalks and other paved pathways may be provided on site to connect off site external pedestrian circulation systems (planned or existing) to the building site. Sidewalk locations may integrate existing and planned waiting shelters with building entrance(s).

- **Joint Access and Shared Parking**: For applicable developments designed as a worksite, provision of joint access and shared parking across multiple parcels may be incorporated into project design to facilitate integration of TDM measures.
- **Telecommunications**: The employer's use of telecommunications, teleconferencing and telecommuting can be made a part of the measure as it relates to the reduction in peak period trips to the worksite.
- **Commuter Information**: An area within the facility may be provided to disseminate information on alternative transportation modes. This area shall be centrally located and accessible to all employees. The space shall be of sufficient size to provide information on alternative transportation modes, such as maps, routes and schedules for public transit.
- **On Site Support Facilities**: Mixed use developments which include such services as daycare, lunchrooms/cafeterias, banks, restaurants and retail uses.

Intelligent Transportation Systems (ITS) - ITS technology can enable agencies to monitor traffic, respond to traffic accidents faster and communicate with the motoring public in real time. ITS can also be used to control traffic without adding traffic capacity in the vicinity of the South Medford (Exit 27) SPUI, and includes transit signal priority, lane control signals and variable speed limit signs. **Note:** The RVMPO has completed an ITS Architecture Plan for the Rogue Valley area, with the City of Medford assuming a prominent role in guiding plan development.

Ramp Metering - Ramp meters are typically used on the on-ramps to freeways and other limited access highways, to meter the rate of traffic flow entering the highway. Ramp meters can use a fixed-time signal to set minimum intervals between vehicles entering the freeway or they can adjust the rate of entering vehicles in response to the actual, real-time flow on the freeway. The Regional Transportation Plan (RTP) contains policy language regarding the potential use of ramp meters in the MPO area. Ramp meters are successful when deployed throughout the corridor system, which means that to help alleviate congestion at the South Medford (Exit 27) SPUI. **Note:** ODOT's I-5 Corridor Plan evaluates ramp metering on all ramps entering I-5 over the entire MPO area.

SECTION 7 IMPLEMENTATION

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IAMP IMPLEMENTATION

The IAMP Implementation section discusses how to manage traffic queues on I-5 Exit 27 South Medford Interchange Off-Ramps through the State of Oregon's State Transportation Improvement Program (STIP) and the City of Medford's Development Review process to Future Year 2045.

The IAMP's expectation is that:

1. City of Medford will work with ODOT Region 3 to advocate and/or apply for Statewide Transportation Improvement Program (STIP) funds to construct the IAMP 27 safety/operations projects, as identified in IAMP Section 4, to mitigate traffic queue impacts created by development of the City of Medford's 2020 Comprehensive General Land Use Plan (GLUP) Map. The STIP process is not required to mitigate traffic queue impacts created by new Zone Changes that are deemed consistent with the 2020 GLUP Map land uses.

    - The IAMP Implementation section is a tool to guide investment and mitigation strategies to meet the established Alternative Mobility Target (AMT) maximum queue length standard in coordination with the City of Medford's Development Review and ODOT's STIP processes during the 20-year planning period.

2. City of Medford will work with ODOT Region 3 through the City's Development Review process to ensure that traffic queues on the I-5 Exit 27 South Medford Interchange Off-Ramps are managed in compliance with the AMT Maximum Ramp Queue Lengths identified in IAMP Section 3.

    - The IAMP Implementation section requires an applicant to submit a Traffic Impact Analysis (TIA) for new Comprehensive Plan Amendments and/or Zone Changes that increase traffic demand at the South Medford Interchange Off-Ramps and exceed the AMT Maximum Ramp Queue Lengths.

    - The applicant's TIA will need to: (1) determine if the IAMP safety/operation projects are adequate to comply with the AMT Maximum Ramp Queue Lengths; and (2) recommend additional traffic mitigation if the IAMP safety/operations projects are not adequate to comply with the AMT Maximum Ramp Queue Lengths.

- If the applicant's TIA demonstrates that the IAMP 27 safety/operations projects listed in Table 10 are "Not" adequate to mitigate the proposed Zone Change or Comprehensive Plan GLUP Map change "Significant Effects" to the I-5 Exit 27 South Medford Interchange Off-Ramps, the applicant's TIA must recommend additional traffic mitigation to be funded and installed by the end of the 20-year planning period in Future Year 2045. In applying the Alternative Mobility Targets for Maximum Ramp Queue Lengths on the I-5 Exit 27 Off-Ramps to analyze mitigation, ODOT recognizes that there are many variables and levels of uncertainty in calculating traffic queue lengths, particularly over a specified 20-year planning period. After negotiating reasonable levels of mitigation for actions required under OAR 660-012-0060, ODOT considers calculated values for traffic queue lengths that are within 50-feet of the adopted Alternative Mobility Targets to be considered in compliance with the Alternative Mobility Targets. The adopted Alternative Mobility Targets still apply for determining "Significant Effect" under OAR 660-012-0060. The 50-foot traffic queue buffer only applies after reasonable levels of mitigation have been proposed, and not before.

Background Information

- 2020 Medford Comprehensive Plan - IAMP 27's Future Year 2045 Traffic Forecast is based on the City of Medford's November 2020 Comprehensive Plan (GLUP) Map that support the City's expected population and employment growth during the 20-year planning period. This is referred to as the Comprehensive Plan 2020 GLUP Map throughout this document.

- Future Year 2045 Traffic Forecast – IAMP 27's Future Year 2045 Traffic Forecast assumes development of the City of Medford's 2020 Comprehensive Plan GLUP Map land uses, which includes the land brought into the City's Urban Growth Boundary acknowledged by the Department of Land Conservation and Development (DLCD) in June 2018.

Alternative Mobility Targets

IAMP 27 includes the AMTs Maximum Ramp Queue Lengths for I-5 Exit 27 South Medford Interchange Off-Ramps. The purpose of the AMTs is to manage traffic safety and operations at the South Medford (Exit 27) Interchange and provide a mechanism to facilitate new development in South Medford. The AMTs is the accepted safety performance measure to manage traffic queues on the I-5 Exit 27 South Medford Interchange Off-Ramps (See Table 16 below).

Application of the AMTs Maximum Ramp Queue Lengths in Table 16 is set forth and explained in the subsequent section titled "Transportation Planning Rule (OAR 660-012-0060)" described below.

Table 16
Alternative Mobility Targets - Maximum Ramp Queue Lengths

			AMT Ramp Queues	2045 No Build Queue Length (ft.)		2045 Build Queue Length (ft.)	
	Ramp Length (ft.)	Decel Length (ft.)	Max. Ramp Queue (ft.)	AM Peak	PM Peak	AM Peak	PM Peak
Exit 27 SB Off-Ramp	1,710	640	**1,070**	2,250	2,150	**N/A**	**N/A**
Exit 27 SB Off-Ramp w/Extension	3,000	640	**2,360**	**N/A**	**N/A**	2,100	292
Exit 27 NB Off-Ramp	1,470	740*****	**730***	1,875	750	375	******1,000

Note: The queues developed for the AMT are 95th percentile queues from a calibrated micro-simulation model. As such any queues used in comparison to these must also be from a calibrated micro-simulation model as described in the Analysis Procedures Manual (APM). Ramp queues measured as part of an applicant's TIA shall be based on the calibrated micro-simulation that was used to determine the I-5 Exit 27 South Medford Interchange Maximum Ramp Queues in Table 16. If the methodology used to create ramp queues in a TIA are not consistent with the methodology used to create the I-5 Exit 27 South Medford Interchange AMT Maximum Ramp Queue Lengths (e.g., using Synchro queues instead of SimTraffic, Vistro instead of Vissim, or failing to properly calibrate) then the comparisons of ramp queues in an applicant's TIA to the I-5 Exit 27 South Medford Interchange Maximum Ramp Queues will be invalid. The applicant will be required to use 30th highest hour volumes and peak hour factors to ensure consistency in comparing the ramp queues. *****The City of Medford will continue to work with ODOT Region 3 Traffic Section to facilitate lowering the speed limit on I-5 mainline to 55 MPH just south of the NB Off Ramp to reduce the Decel Length required to 640 feet and increase the Maximum Ramp Queue Length to 830 feet. ******The Year 2045 Build Queues on the NB Off Ramp already exceeds the AMT Maximum Ramp Queue Length. An applicant preparing a TIA for a land use change that increases traffic demand on the Northbound Off Ramp may need to rely on the South Medford Solutions Phase II (South Stage) and Phase III (Local Circulation) projects to comply with the AMT Maximum Ramp Queue Length.

Safety/Operations Projects

IAMP 27 adopts several I-5 safety/operations projects needed to support development consistent with the 2020 Comprehensive Plan GLUP Map. Periodic field surveys measuring the I-5 Exit 27 South Medford Interchange Off-Ramp traffic queues will need to be conducted by ODOT Region 3 to collect traffic queue data and compare it to the AMT Maximum Ramp Queue Lengths.

- The procedure for measuring traffic queues in the field is to actively measure vehicles stopped in queue on the I-5 Exit 27 South Medford Interchange Off-Ramps during peak hour. Record the maximum queue results and average over time. This would be conducted by ODOT Region 3 Traffic section, and the data would be shared with the City of Medford.

- Traffic queue data that shows the 95th percentile queue meets or exceeds 90% of the AMT Maximum Ramp Queue Lengths on the I-5 Exit 27 South Medford Interchange Off-Ramps will be used to trigger the need for the City of Medford and ODOT Region 3 to jointly develop a funding plan to construct the IAMP's safety/operations projects identified in the IAMP (See Table 17 below).

Table 17
South Medford (Exit 27) Interchange - Safety & Operations Projects

South Medford (Exit 27) SPUI Improvement	Description	Funding Status
M3b	Barnett Road/Highland Drive – Add dual northbound right turn lanes on Highland Drive	ODOT/City Funded
M5a2	South Medford (Exit 27) SPUI Lengthen/Widen Southbound Off-Ramp (Lengthened to 3,000')	Unfunded
M5b	South Medford (Exit 27) SPUI Widen Northbound Off-Ramp	Unfunded
M5f	North Medford (Exit 30) Southbound On-Ramp Metering and Phoenix (Exit 24) Northbound On-Ramp Metering	Unfunded
M8b	OR 99/Garfield Street – Restripe East Leg (Westbound) left, left, through, through/right	Unfunded*****

Note: See IAMP Section 4 – South Medford (Exit 27) SPUI Solutions and Appendices for a detailed description of IAMP 27 safety/operations projects for modelling purposes in an applicant's TIA. ***** The Centennial Development Project (ZC-21-340/PUD-21-339) is conditioned to complete improvement M8b prior to Phase 12 of the development, or when the PUD reaches 2,386 cumulative weekday PM peak hour trips.

Transportation Planning Rule (OAR 660-012-0060)

The Transportation Planning Rule (TPR) applies to any proposed land use change (e.g., Comprehensive Plan Amendments, Zone Changes and Land Use Regulation Amendments). Traffic demand created by new Zone Changes that are consistent with the 2020 Comprehensive Plan GLUP Map are accounted for as **"background traffic growth"** in the IAMP's Future Year 2045 Traffic Forecast. **Note:** For the South Medford Interchange, Year 2045 is considered the end of the 20-year planning period as defined in OAR 660-012-060.

Step 1 – Preliminary Traffic Assessments: Applicants proposing a Zone Change, or a Comprehensive Plan General Land Use Plan (GLUP) Map change will be required to submit a preliminary traffic assessment to determine whether the proposed land use change(s) is consistent with the 2020 Comprehensive Plan GLUP Map.

The applicant must submit a preliminary traffic assessment comparing trip generation rates in the 2020 Comprehensive Plan GLUP Map with the trip generation rates of the requested land use change.

- If the Average Daily Trips (ADT) in the proposed Zone Change or Comprehensive Plan change on a parcel(s) is consistent with the baseline ADT of the 2020 Comprehensive Plan GLUP Map on the same parcel(s); no further action is required.

- If a proposed Zone Change or Comprehensive Plan GLUP Map change exceeds the baseline ADT identified in the 2020 Comprehensive Plan GLUP Map, the ADT increase as measured against a reasonable worst case development scenario is described as follows:

    - Any proposed Zone Change or Comprehensive Plan GLUP Map change on a parcel(s) that does not increase the baseline ADT of the 2020 Comprehensive Plan GLUP Map on the same parcel(s) by more than 400 is considered a small traffic increase and no further action is required by the applicant.

    - Any proposed Zone Change or Comprehensive Plan GLUP Map change on a parcel(s) that increases the baseline ADT of the 2020 Comprehensive Plan GLUP Map on the same parcel(s) by more than 400 must prepare a TIA as described in Step 2 below.

Step 2 - Traffic Impact Analysis (TIA): Applicants proposing a Zone Change, or a Comprehensive Plan GLUP Map change on a parcel(s) that increases traffic by more than 400 ADT over the baseline ADT of the 2020 Comprehensive Plan GLUP Map on the same parcel(s) will be required to submit a TIA to determine if the increased traffic demand created by the land use change significantly affects the AMT Maximum Ramp Queue Lengths on the I-5 Exit 27 South Medford Interchange Off-Ramps.

- ODOT considers calculated values for the AMT 95th percentile Ramp Queues on the I-5 Exit 27 South Medford Interchange Off-Ramps a significant effect if there is "Any" change in the traffic queue length that exceeds the AMT Maximum Ramp Queue Lengths as measured at the end of the 20-year planning period.

- If the applicant's TIA demonstrates that some or all of IAMP 27 safety/operations projects listed in Table 17 are adequate to mitigate the proposed Zone Change or Comprehensive Plan GLUP Map change significant effects on the I-5 Exit 27 South Medford Interchange Off-Ramps; and ODOT submits a letter to the City of Medford stating that the recommended IAMP safety/operations improvements in Table 17 are "Reasonably Likely" to be funded and installed by the end of 20-year planning period in Future Year 2045; no further action is required.

Traffic Mitigation - If the applicant's TIA demonstrates that the IAMP 27 safety/operations projects listed in Table 17 are "Not" adequate to mitigate the proposed Zone Change or Comprehensive Plan GLUP Map change "Significant Effects" to the I-5 Exit 27 South Medford Interchange Off-Ramps, the applicant's TIA must recommend additional traffic mitigation to be funded and installed by the end of the 20-year planning period in Future Year 2045. In applying the Alternative Mobility Targets for Maximum Ramp Queue Lengths on the I-5 Exit 27 Off-Ramps to analyze mitigation, ODOT recognizes that there are many variables and levels of uncertainty in calculating traffic queue lengths, particularly over a specified 20-year planning period. After negotiating reasonable levels of mitigation for actions required under OAR 660-012-0060, ODOT considers calculated values for traffic queue lengths that are within 50-feet of the adopted Alternative Mobility Targets to be considered in compliance with the Alternative Mobility Targets. The adopted Alternative

Mobility Targets still apply for determining "Significant Effect" under OAR 660-012-0060. The 50-foot traffic queue buffer only applies after reasonable levels of mitigation have been proposed, and not before. This process is further described in Step 3 below.

Step 3 - When addressing a "Significant Effect" under the TPR to the I-5 Exit 27 South Medford Interchange Off-Ramps, ODOT Region 3 will work with the City of Medford to ensure the applicant's TIA adequately mitigates the "Significant Effects" created by the proposed land use change to avoid further degradation to the safety/operations of the interchange area and recommends additional improvements needed to comply with the AMT Maximum Ramp Queue Lengths on the I-5 Exit South Medford Interchange Off-Ramps.

Example Projects:

Example 1 - A proposed Zone Change on a parcel(s) that implements the 2020 Comprehensive Plan GLUP Map on the same parcel(s) (e.g., Zone Change from SFR-00 to SFR-10 implementing the Urban Residential (UR) GLUP land use on a 5-acre parcel).

Example 2 - A proposed Zone Change on a parcel(s) that implements the 2020 Comprehensive Plan GLUP Map on the same parcel(s) (e.g., Zone Change from SFR-00 to MFR-30 implementing the Urban High Density Residential (URH) GLUP land use on a 3-acre parcel).

Example 3 - A proposed Comprehensive Plan GLUP Map Amendment and a proposed Zone Change on a parcel(s) that changes the 2020 Comprehensive Plan GLUP Map designation and Zoning on the same parcel(s) (e.g., Urban Residential (UR) GLUP to Commercial (CM) GLUP) with a concurrent Zone Change from SFR-10 to C-C on a 5-acre parcel).

Example 4 - A proposed Comprehensive Plan GLUP Map Amendment from Urban Residential (UR) to Commercial (CM) with no concurrent Zone Change (e.g., a proposed Zone Change implementing the Comprehensive Plan GLUP Commercial (CM) land use is deferred to a later date).

EXAMPLE 1 - Zone Change Implementing the 2020 Comprehensive Plan GLUP Map

Scenario -An applicant proposes a Zone Change from Single Family Residenial-00 (SFR-00) to Single Family Residential-10 (SFR-10) on a 5-acre parcel that is designated as Urban Residential (UR) on the 2020 Comprehensive Plan GLUP Map.

ITE Factors Calculation for 2020 Comprehensive Plan GLUP Map Background Traffic
The Urban Residential (UR) land use allows a maximum of 10 Single Family Dwelling Units per acre. The applicable ITE Factor for Single Family Residential Dwellings is 9.44 ADT per Single Family Dwelling Unit.

- 10 Dwellings Per Acre x 5-acres = Maximum 50 Single Family Dwelling Units
- 50 Single Family Dwelling Units x 9.44 ADT = Maximum 472 ADT (Parcel Trips)
- 472 ADT on the 5-acre parcel is considered "background traffic growth" in the Future Year 2045 Traffic Forecast.

ITE Factors Calculation for the proposed Zone Change to Single Family Residential-10

- 10 Detached Single Family Dwellings Units per acre x 5 acres = Maximum 50 Detached Single Family Dwellings Units
- 50 Detached Single Family Dwellings Units x 9.44 ADT = Maximum 472 ADT

Preliminary Traffic Assessment Comparison

New Traffic Growth = A total of 472 ADT will be generated on the 5-acre parcel by the proposed Zone Change to Detached Single Family Residential-10 (SFR-10).

Background Traffic Growth – A maximum of 472 ADT is allowed on the 5-acre parcel by the 2020 Comprehensive Plan GLUP Map designation of Urban Residential (UR).

- Net Site Traffic Increase: 472 ADT – 472 ADT = 0 ADT
- No Further Action is required by the applicant because 0 ADT is less than 400 ADT.

EXAMPLE 2 - Zone Change Implementing the 2020 Comprehensive Plan GLUP Map

Scenario -An applicant proposes a Zone Change from Detached Single Family Residential-00 (SFR-00) to Multiple Family Residential–30 (MFR-30) implementing the Urban High Density Residential (UH) GLUP designation on a 3-acre parcel.

ITE Factors Calculation for 2020 Comprehensive Plan GLUP Map Background Traffic
The Urban High Density Residential (UH) GLUP designation allows for a maximum of 30 dwelling units per acre. The applicable ITE Factor for Multiple Family Residential is 6.74 ADT per dwelling unit.

- 30 Dwellings Per Acre x 3-acres = Maximum of 90 dwelling units
- 90 Dwelling Units x 6.74 ADT = Maximum 607 ADT (Parcel Trips)
- 607 ADT on the 3-acre parcel is considered “background traffic growth” in the Future Year 2045 Traffic Forecast.

Preliminary Traffic Assessment Comparison

New Traffic Growth = A total of 607 ADT will be generated on the 3-acre parcel by the proposed Zone Change to Multiple Family Residential – 30 (MFR-30).

Background Traffic Growth – A maximum of 607 ADT is allowed on the 3-acre by the 2020 Comprehensive Plan GLUP Map designation of Urban High Density Residential (UH).

- Net Site Traffic Increase: 607 ADT – 607 ADT = 0 ADT
- No Further Action is required by the applicant because 0 ADT is less than 400 ADT.

EXAMPLE 3 - Comprehensive Plan GLUP Map Amendment & Zone Change

Scenario - An applicant proposes a Comprehensive Plan GLUP Map Amendment from Urban Residential (UR) to Commercial (CM) with a concurrent Zone Change from Detached Single Family Residential-10 (SFR-10) to Community-Commercial (C-C) on a 5-acre parcel.

ITE Factors Calculation for the 2020 Comprehensive Plan GLUP Map Background Traffic
The Urban Residential (UR) GLUP designation allows for a maximum of ten dwelling units per acre. The applicable ITE Factor for Single Family Residential Dwellings is 9.44 ADT per Single Family Dwelling Unit.

- 10 Dwellings Per Acre x 5-acres = Maximum of 50 dwelling units
- 50 Dwelling Units x 9.44 ADT = Maximum 472 ADT (Site Trips)
- 472 ADT on the 5-acre parcel is considered "background traffic growth" in the IAMP's Future Year 2045 Traffic Forecast.

Preliminary Traffic Assessment Comparison

The proposed Commercial (CM) GLUP designation allows for a maximum of 1,500 trips per acre for the first acre, 1,250 trips per acre for the second acre, and 950 trips per acre for the third through fifth acres.

- 1,500 ADT + 1,250 ADT + 950 ADT * 3 acres = Maximum of 5,600 ADT (Parcel Trips)

New Traffic Growth = A total of 5,600 ADT will be generated on the 5-acre parcel by the proposed Commercial (CM) GLUP designation.

Background Traffic Growth – A maximum of 472 ADT is allowed on the 5-acre parcel by the 2020 GLUP Map designation of Urban Residential (UR).

- Net Site Traffic Increase: 5,600 ADT – 472 ADT = 5,128 ADT
- A TIA is required by the applicant because 5,128 ADT exceeds 400 ADT.
- ODOT will work with the City of Medford through its development review process to ensure the applicant's TIA adequately mitigates the impact that an additional 5,128 ADT on the parcel(s) has on the South Medford Interchange Off-Ramps.
    - The applicant's TIA trip generation, trip distribution and modelling scenario must demonstrate that the increase of 5,128 ADT on the 5-acre parcel does not further degrade the safety/operations of the South Medford Interchange Off-Ramps.
    - The applicant's TIA must demonstrate that the IAMP's safety/operations improvements are adequate to mitigate the traffic increase impacting the South Medford Interchange Off-Ramps by complying with the AMT Maximum Ramp Queue Lengths.
    - The applicant's TIA must recommend additional traffic mitigation to mitigate the traffic increase impacting the South Medford Interchange Off-Ramps only if the IAMP's safety/operations projects are "Not" adequate to comply with the AMT Maximum Ramp Queue Lengths.

EXAMPLE 4 - Comprehensive Plan GLUP Map Amendment & No Zone Change

Scenario - An applicant proposes a Comprehensive Plan GLUP Map Amendment from Urban Residential (UR) to Commercial (CM) with no associated Zone Change on a 5-acre parcel.

ITE Factors Calculation for the 2020 Comprehensive Plan GLUP Map Background Traffic
The Urban Residential (UR) GLUP designation allows for a maximum of 10 dwelling units per acre.

- 10 Dwellings Per Acre x 5-acres = Maximum of 50 dwelling units
- 50 Dwelling Units x 9.44 ADT = Maximum 472 ADT (Parcel Trips)
- 472 ADT on the 5-acre parcel is considered "background traffic growth" in the Future Year 2045 Traffic Forecast.

Preliminary Traffic Assessment Comparison

The Commercial (CM) GLUP designation allows for a maximum of 1,500 trips per acre for the first acre, 1,250 trips per acre for the second acre, and 950 trips per acre for the third through fifth acres.

- 1,500 ADT + 1,250 ADT + 950 ADT * 3 acres = Maximum of 5,600 ADT (Parcel Trips)

New Traffic Growth = A total of 5,600 ADT will be generated on the 5-acreparcel by the proposed GLUP Map change to the Commercial (CM) designation.

Background Traffic Growth – A maximum of 472 ADT is allowed on the 5-acre parcel by the 2020 Comprehensive Plan GLUP Map Urban Residential (UR) designation.

- Net Site Traffic Increase: 5,600 ADT – 472 ADT = 5,128 ADT
- A TIA is required by the applicant because 5,128 ADT exceeds 400 ADT.
- ODOT Region 3 will work with the City of Medford through its development review process to ensure the applicant's TIA adequately mitigates the impact that an additional 5,128 ADT on the 5-acre parcel has on the South Medford Interchange Off-Ramps.
    - The applicant's TIA trip generation, trip distribution and modelling scenario must demonstrate that the increase of 5,128 ADT on the 5-acre parcel does not further degrade the safety/operations of the South Medford Interchange Off-Ramps.
    - The applicant's TIA must demonstrate that the IAMP's safety/operations improvements are adequate to mitigate the traffic increase impacting the South Medford Interchange Off-Ramps by complying with the AMT Maximum Ramp Queue Lengths.
    - The applicant's TIA must recommend additional traffic mitigation to mitigate the traffic increase impacting the South Medford Interchange Off-Ramps only if the IAMP's safety/operations projects are not adequate to comply with the AMT Maximum Ramp Queue Lengths.