TECHNICAL MEMORANDUM #5

EXISTING CONDITIONS SUMMARY

Date: September 24, 2024

To: Oregon Department of Transportation, Region 3

From: Angela Rogge, PE, Janet Jones, PE and Michael Bronsen, EIT, David Evans and Associates, Inc.

Subject: I-5 Exits 124/125 Interchange Area Management Plan & Garden Valley Corridor Plan

This memorandum describes current transportation system operations and safety conditions within the study area of the I-5 Exits 124 and 125 Interchange Area Management Plan (IAMP) and the Garden Valley Corridor Plan (GVCP). The information in this memorandum provides a basis for comparison with future growth projections, which will be discussed in a future memorandum, and will inform the identification of various opportunities and constraints for meeting the goals and objectives of the IAMP and GVCP.

CURRENT TRANSPORTATION SYSTEM OPERATIONS

The assessment of traffic conditions includes development of existing traffic volumes, assessment of traffic operations, and a review of historical crash patterns.

STUDY AREA

The IAMP study area delineates the vicinity in which transportation facilities, land uses, and approaches may affect operations at the interchange. The boundaries of the management area for the IAMP should extend a minimum half-mile in all directions and should be large enough to "address both direct and indirect transportation and land uses."

The scope identified 23 study intersections, as shown in Figure 1.

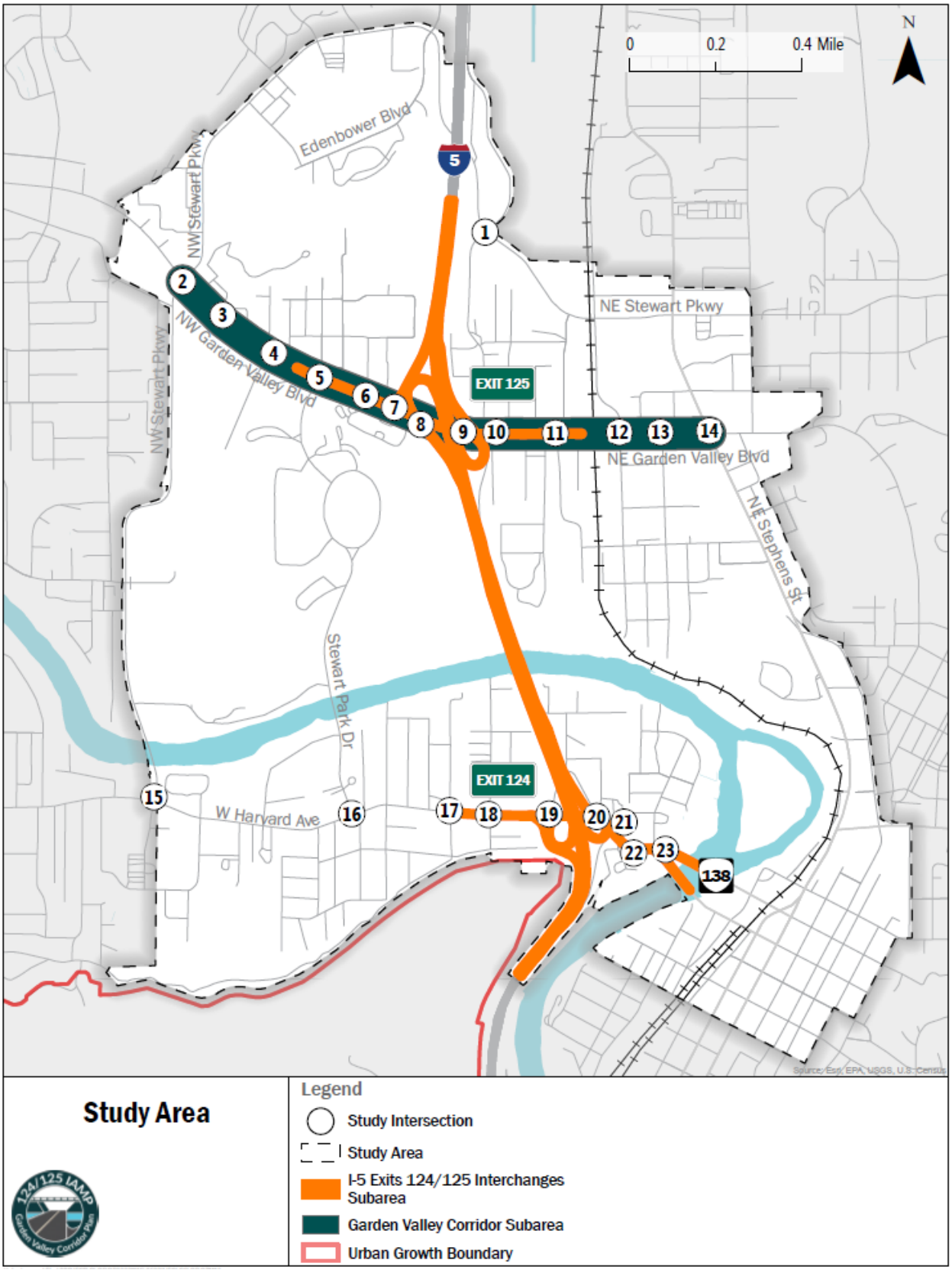
1. Stewart Pkwy at Mulholland Dr / Aviation Dr
2. Garden Valley Blvd at Stewart Pkwy
3. Garden Valley Blvd at Sizzler Entrance
4. Garden Valley Blvd at Goetz St / Duck Pond St
5. Garden Valley Blvd at Estelle St / Veterans Way
6. Garden Valley Blvd at Garden Valley Shopping Center / BLM
7. Garden Valley Blvd at Southbound Off-Ramp
8. Garden Valley Blvd at Southbound On-Ramps
9. Garden Valley Blvd at Northbound On-Ramps
10. Garden Valley Blvd at Northbound Off-Ramp/NW Mulholland Dr
11. Garden Valley Blvd at Highland St
12. Garden Valley Blvd at Airport Rd/Cedar St
13. Garden Valley Blvd at Walnut St

14. Garden Valley Blvd at Stephens St
15. Harvard Ave at Stewart Pkwy
16. Harvard Ave at Stewart Park Dr
17. Harvard Ave at Harrison St
18. Harvard Ave at Umpqua St
19. Harvard Ave at Southbound Ramps / Bellows St
20. Harvard Ave at Northbound On-Ramps
21. Harvard Ave at Northbound Off-Ramp / Roseburg High School
22. Harvard Ave at Corey Ct
23. Harvard Ave at Madrone St

Although not included in the study area boundary, the alternatives analysis will include an assessment of the interchanges to the north and south of the study area. This is to assess the impacts and ability of the proposed changes to safely and efficiently collect, distribute, and accommodate traffic on the Interstate facility, ramps, intersection of ramps with crossroad, and local street network.[1]

[1] Federal Highway Administration's (FHWA) Policy on Access to the Interstate System
https://www.fhwa.dot.gov/design/interstate/170522.cfm

FIGURE 1. STUDY AREA



TRAFFIC VOLUMES

Existing weekday counts were collected in April 2023 over several days for most intersections. On-Ramp counts were collected in April 2023, and two intersection counts were collected in April 2024. All counts summarize non-motorized transportation movements by volume, type, and direction for every location. All counts were grown and seasonally adjusted as documented in the *Methodology and Assumptions Technical Memorandum* (Technical Memorandum #4) dated May 21, 2024. Year 2022 Annual Average Daily Traffic (AADT) presented in ODOT's 2022 Transportation Volume Tables are also shown below for reference.

Annual Average Daily Traffic (AADT) Volumes

The most current average annual daily traffic (AADT) volumes for I-5 and Harvard Avenue (Highway No. 138) near the study area are currently available for the year 2022 via ODOT's Transportation Volumes Table. The most current AADT volumes for non-state facilities are provided via ODOT's TransGIS web application for year 2022. The volumes are summarized in Table 1.

TABLE 1. AVERAGE ANNUAL DAILY TRAFFIC (YEAR 2022)

ROADWAY SEGMENT	AADT
I-5, south of West Harvard Avenue Interchange	42,268
I-5, south of Garden Valley Road Interchange	46,894
I-5, south of North Roseburg Interchange	35,618
Highway No. 138, east of Madrone Street (WB)	10,587
Highway No. 138, east of Madrone Street (EB)	8,934
Highway No. 138, at I-5 overcrossing on Harvard Avenue	18,686
Highway No. 138, west of Madrone Street	20,580
NE Garden Valley Boulevard, west of Stewart Parkway	18,528
NE Garden Valley Boulevard, east of Stewart Parkway	22,629
NE Garden Valley Boulevard, west of I-5 Interchange	30,323
NE Garden Valley Boulevard, east of I-5 Interchange	19,611
W Harvard Avenue, west of Stewart Park Drive	20,495
Stewart Parkway, north of Garden Valley Boulevard	18,025
Stewart Parkway, north of Garden Valley Boulevard	15,996
Stewart Parkway, north of Harvard Avenue	14,213

Sources: Transportation Volume Tables for State Highways 2022, Oregon Department of Transportation and ODOT TransGIS web application: https://gis.odot.state.or.us/transgis/, Oregon Department of Transportation

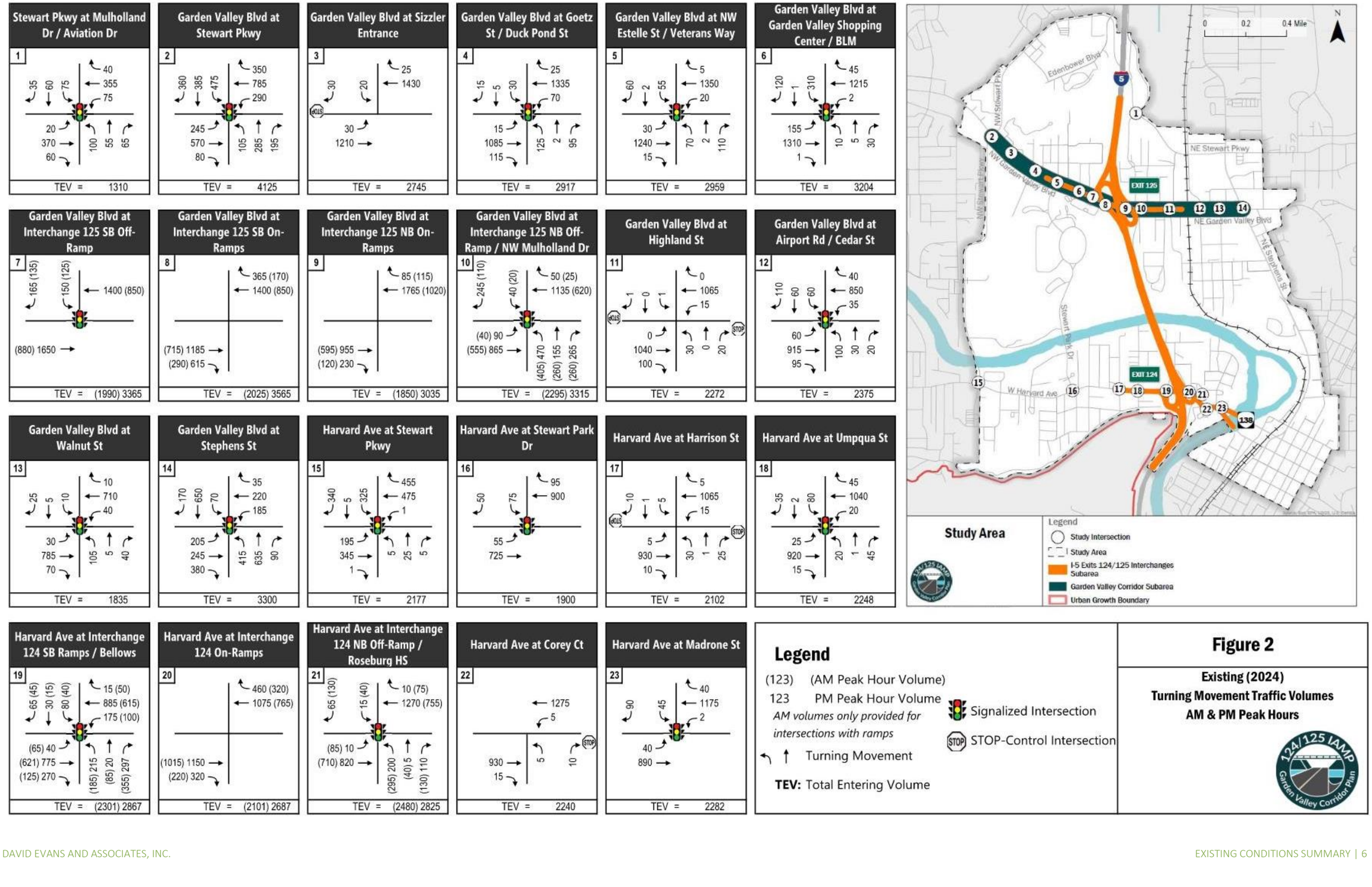
Historic Automatic Traffic Recorder (ATR) data per ODOT's Automatic Traffic Recorder Summary 2022 shows an average 1.5% annual growth along I-5 mainline north of the study interchange (ATR 10-005) in recent years. From the years of 2013 to 2019, volumes on I-5 north of the study area show a continuously growing trend as a yearly rate varies between 1.2% and 5.8%. However, there was a 22% decrease

between year 2019 and 2020, a 26% increase between year 2020 and year 2021, and a 3% decrease between year 2021 and year 2022 because of COVID-19. Due to these erratic growth changes per the ODOT Transportation Volumes Tables, the 2023 traffic counts were grown to 2024 using a growth factor developed using ODOT's Future Highway Volume Table, as discussed in the following section.

Design Hourly Volumes

The *Analysis Methodology and Assumptions Memorandum* includes detailed information related to the peak hour development, seasonal adjustment factors, and historical factors used to develop traffic volumes for the traffic operations analysis. A system-wide peak hour of 4:30 to 5:30 p.m. was selected as a basis for the analysis. While the midday volumes are high, the PM peak hour between 4:30 and 5:30 PM still reflects the highest system peak volumes. A seasonal adjustment factor of 1.08 was applied to counts collected on I-5 in April 2023. Seasonal adjustment factors of 1.05 and 1.04 were applied to counts collected on the local street network on April 5 and between April 10 and April 26, respectively. To have set of existing volumes representative of 2024, growth factors of 1.005 and 1.010 were applied to the counts collected on I-5 and the local street network, respectively. Figure 2 summarizes the traffic volumes developed at the study intersections for the 2024 existing traffic operations analysis. The *Analysis Methodology and Assumptions Memorandum* provides details on the various adjustment factors and how they were applied.

FIGURE 2. EXISTING 2024 PEAK HOUR TURNING MOVEMENT VOLUMES



Heavy Vehicle Percentages

Heavy vehicle volumes were also included in the data collection for all study area intersections. Heavy vehicle percentages were calculated based on the proportion of heavy vehicles to total traffic per movement at every study area intersection to inform the operational analysis.

The Exit 124 and Exit 125 interchanges see the highest volumes and percentage of heavy vehicles within the study area (8% - 12%). Along Garden Valley Boulevard, to the east and to the west of I-5, heavy vehicle traffic volumes gradually decline as distance from the freeway increases, down to 2% - 3% within the study area. Harvard Avenue has heavy vehicle percentages and trends comparable to Garden Valley Boulevard west of I-5 but with less volume. Harvard Avenue to the east of I-5 is Oregon Highway 138 and has both higher heavy vehicle volumes and percentages (6% - 8%); heavy vehicle traffic along this route remains constant within the study area.

Another trend is that heavy vehicles make up a higher percentage of the morning hours than the afternoon hours. A review of afternoon heavy vehicle volumes at the study intersections reveals peak truck traffic early in the afternoon, tapering off significantly by the PM peak hour (4:30 PM – 5:30 PM).

TRAFFIC OPERATIONS

Operational Criteria

The traffic operations analysis was performed in accordance with the methodologies outlined in the Highway Capacity Manual 6th Edition (HCM6), as well as guidelines provided in ODOT's Analysis Procedures Manual, Version 2 (APM). Intersection operations analysis was performed using Synchro 12 software and freeway operations analysis was performed using Highway Capacity Software (HCS) 7. ODOT uses volume-to-capacity (v/c) ratios to assess intersection operations. The overall v/c ratios for signalized intersections were calculated manually per APM guidelines.

Table 2 summarizes the v/c ratios that will be used to identify the existing and potential future operational issues at the study intersections.

TABLE 2. STUDY AREA MOBILITY TARGETS

JURISDICTION	FACILITY TYPE	MOBILITY TARGET[1,2]
Roseburg	Arterial, Collector, and Local roadways	0.95 v/c, LOS E
ODOT	Ramp Terminals	0.85 v/c
ODOT	Regional Highways, Non-MPO, ≤ 35 mph	0.90 v/c
ODOT	I-5, Non-MPO, ≥ 45 mph	0.80 v/c (inside UGB) 0.70 v/c (outside UGB)

1. City intersections shall be analyzed at a peak hour factor of 1.0, *Roseburg Transportation System Plan*, 2019, page 39.
2. *1999 Oregon Highway Plan (*Including amendments November 1999 through January 2023)*,* Table 6.

Table 2 presents the mobility standards for study intersections. The v/c target ratio of 0.80 will be used for merge, diverge, weaving, and mainline sections for Interstate Highways outside Metro and within an Urban Growth Boundary (UGB).

SimTraffic software was also utilized to evaluate 95th percentile queues and corridor delays during the peak hour. The simulation from the SimTraffic analysis aids in evaluating if queue spillbacks to adjacent street intersections are present under existing conditions. Under saturated conditions, SimTraffic queuing and delays present results that reflect how congested intersections impact each other, while Synchro represents intersection performance in isolation and may reflect better performance results.

Calibration

The Synchro and SimTraffic models were calibrated for local conditions based on data collected at a site visit on Thursday, June 6, 2024, during the period that represents the analysis time (4:30 – 5:30 PM).

For the calibration, traffic volumes, lane configurations, and lane utilization were input into the traffic models. SimTraffic was then run for the peak period. The simulations were conducted with a Peak Hour Factor (PHF) to replicate the peaking traffic patterns within the peak hour. Turning speeds and headway factors in the SimTraffic model were adjusted and the model was re-simulated and, once again, compared to the field observed queue lengths and delays. This process was repeated until the model was visually comparable to the actual field observations. Once this visual level of calibration was gained, volume throughputs were summarized from the SimTraffic simulations and compared to actual count data.

During model calibration, the intersection of Garden Valley Boulevard at Stephens Street could not be simulated to match field observations. The SimTraffic simulations suggest extensive northbound and southbound queuing; field observations indicated that intersection queue regularly clears throughout the peak hour.

Given the limited field data used for most traffic analyses, the manufacturers of SimTraffic consider the model to be calibrated when model results are within 20% of an observed goal. A 10% calibration is considered excellent but generally requires more detailed field data such as acceleration rates, reaction times, headways, and free flow speeds. Finally, 11 SimTraffic simulation seeds were run, and any outliers were omitted. The five most consistent runs were averaged to obtain an average model run.

Study Intersection Operations

All study area intersections were reviewed during the PM peak hour. summarizes the results of the PM peak hour intersection operations analysis. For the AM peak hour, Intersection operations were only reviewed for ramp terminal intersections. AM peak hour intersection operations results are presented in Table 4.

TABLE 3. EXISTING (YEAR 2024) PM PEAK HOUR TRAFFIC OPERATIONS ANALYSIS RESULTS

ID	INTERSECTION (CONTROL TYPE)	CRITICAL MOVEMENT[1]	V/C RATIO[2]	LOS[3]	JURISDICTION	MOBILITY TARGET[4,5]
1	Stewart Pkwy at Mulholland Dr / Aviation Dr (Signal)	Overall	0.29 (0.30)	B	Roseburg	0.95, LOS E
2	Garden Valley Blvd at Stewart Pkwy (Signal)	Overall	0.72 (0.74)	D	Roseburg	0.95, LOS E
3	Garden Valley Blvd at Sizzler entrance (TWSC)	SBL+R	0.23	C	Roseburg	0.95, LOS E
4	Garden Valley Blvd at Goetz St / Duck Pond St (Signal)	Overall	0.60 (0.63)	B	Roseburg	0.95, LOS E
5	Garden Valley Blvd at Estelle St / Veterans Way (Signal)	Overall	0.55 (0.57)	B	Roseburg	0.95, LOS E
6	Garden Valley Blvd at Garden Valley Shopping Center / BLM (Signal)	Overall	0.77 (0.87)	B	Roseburg	0.95, LOS E
7	Garden Valley Blvd at Southbound Off-Ramp (Signal)	Overall	0.67 (0.68)	A	ODOT	0.85
8	Garden Valley Blvd at Southbound On-Ramps (Uncontrolled)	N/A	N/A	N/A	ODOT	0.85
9	Garden Valley Blvd at Northbound On-Ramps (Uncontrolled)	N/A	N/A	N/A	ODOT	0.85
10	Garden Valley Blvd at Northbound Off-Ramp/NW Mulholland Dr (Signal)	Overall	**0.86 (0.87)**	C	ODOT	0.85
11	Garden Valley Blvd at Highland St (TWSC)	NBL+R	0.19	C	Roseburg	0.95, LOS E
12	Garden Valley Blvd at Airport Rd/Cedar St (Signal)	Overall	0.60 (0.56)	B	Roseburg	0.95, LOS E
13	Garden Valley Blvd at Walnut St (Signal)	Overall	0.55 (0.42)	C	Roseburg	0.95, LOS E
14	Garden Valley Blvd at Stephens St (Signal)	Overall	0.77 (0.79)	D	Roseburg	0.95, LOS E
15	Harvard Ave at Stewart Pkwy (Signal)	Overall	0.57 (0.60)	C	Roseburg	0.95, LOS E
16	Harvard Ave at Stewart Park Dr (Signal)	Overall	0.43 (0.52)	A	Roseburg	0.95, LOS E
17	Harvard Ave at Harrison St (TWSC)	NBLTR	0.44	**F**	Roseburg	0.95, LOS E
18	Harvard Ave at Umpqua St (Signal)	Overall	0.43 (0.45)	B	Roseburg	0.95, LOS E
19	Harvard Ave at Southbound Ramps / Bellows St (Signal)	Overall	0.69 (0.68)	C	ODOT	0.85

TABLE 3. EXISTING (YEAR 2024) PM PEAK HOUR TRAFFIC OPERATIONS ANALYSIS RESULTS

ID	INTERSECTION (CONTROL TYPE)	CRITICAL MOVEMENT[1]	V/C RATIO[2]	LOS[3]	JURISDICTION	MOBILITY TARGET[4,5]
20	Harvard Ave at Northbound On-Ramps (Uncontrolled)	N/A	N/A	N/A	ODOT	0.85
21	Harvard Ave at Northbound Off-Ramp / Roseburg High School (Signal)	Overall	0.66 (0.63)	A	ODOT	0.85
22	Harvard Ave at Corey Ct (TWSC)	NBL	0.03	C	ODOT	0.90
23	Harvard Ave at Madrone St (Signal)	Overall	0.48 (0.48)	A	ODOT	0.90

Acronyms: EB = eastbound; WB = westbound; NB = northbound; and SB = southbound. L = left; T = through; and R = right; TWSC = two-way stop control; Signal = signal control.
Intersections exceeding the applicable mobility target are bold and shaded.

Notes:
1. At signalized intersections, the overall results are reported; at all-way stop-controlled intersections, and at unsignalized intersections the results are reported for the worst major and minor movements that must stop or yield the right of travel to other traffic flows.
2. Overall v/c ratio calculated using methodology in ODOT's APM based on HCM6 and HCM2000 results, as appropriate; overall v/c reported using HCM6 hand calculations methodology and HCM 2000 v/c results reported in (parentheses) for comparison only.
3. Level of Service (LOS) reported using HCM6 methodology.
4. 1999 Oregon Highway Plan (OHP), Table 6, Policy 1F applies to existing conditions.
5. The City of Roseburg Land Use and Development Regulations (LUDR) code section 12.06.020.C.1.b designates the traffic operations standard on City facilities and defers to ODOT standards for intersections with state highways within the City.

Source: David Evans and Associates, Inc.

As shown in , two study intersections exceed applicable mobility targets under existing conditions during the PM peak hour: Intersection #10 (Garden Valley Boulevard at Northbound Off-Ramp/NW Mulholland Drive) and intersection #17 (Harvard Avenue at Harrison Street). The traffic operations at intersection #10 reflect traffic operations prior to the recent timing improvements and additional northbound right-turn lane.

TABLE 4. EXISTING (YEAR 2024) AM PEAK HOUR TRAFFIC OPERATIONS ANALYSIS RESULTS

ID	INTERSECTION (CONTROL TYPE)	CRITICAL MOVEMENT[1]	V/C RATIO[2]	LOS[3]	JURISDICTION	MOBILITY TARGET[4,5]
7	Garden Valley Blvd at Southbound Off-Ramp (Signal)	Overall	0.43 (0.44)	A	ODOT	0.85
8	Garden Valley Blvd at Southbound On-Ramps (Uncontrolled)	N/A	N/A	N/A	ODOT	0.85
9	Garden Valley Blvd at Northbound On-Ramps (Uncontrolled)	N/A	N/A	N/A	ODOT	0.85
10	Garden Valley Blvd at Northbound Off-Ramp/NW Mulholland Dr (Signal)	Overall	0.62 (0.62)	C	ODOT	0.85
19	Harvard Ave at Southbound Ramps / Bellows St (Signal)	Overall	0.58 (0.63)	D	ODOT	0.85
20	Harvard Ave at Northbound On-Ramps (Uncontrolled)	N/A	N/A	N/A	ODOT	0.85
21	Harvard Ave at Northbound Off-Ramp / Roseburg High School (Signal)	Overall	0.65 (0.63)	B	ODOT	0.85

Acronyms: EB = eastbound; WB = westbound; NB = northbound; and SB = southbound. L = left; T = through; and R = right; TWSC = two-way stop control; Signal = signal control.
Intersections exceeding the applicable mobility target are **bold and shaded.**

Notes:
1. At signalized intersections, the overall results are reported; at all-way stop-controlled intersections, and at unsignalized intersections the results are reported for the worst major and minor movements that must stop or yield the right of travel to other traffic flows.
2. Overall v/c ratio calculated using methodology in ODOT's APM based on HCM6 and HCM2000 results, as appropriate; overall v/c reported using HCM6 hand calculations methodology and HCM2000 methodology results reported in (parentheses) for comparison only.
3. 1999 Oregon Highway Plan (OHP), Table 6, Policy 1F applies to existing conditions.
4. The City of Roseburg Land Use and Development Regulations (LUDR) code section 12.06.020.C.1.b designates the traffic operations standard on City facilities and defers to ODOT standards for intersections with state highways within the City.

Source: David Evans and Associates, Inc

As presented in Table 4, all ramp terminals currently operate within ODOT's mobility target of 0.85 v/c during the AM peak hour. However, the northbound Off-Ramp on Harvard Avenue opposite Roseburg High School currently operates at ODOT's standard of 0.85 v/c.

95th Percentile Queues

summarizes the PM peak hour 95th percentile queues by movement at each study area intersection. The table also highlights locations where the 95th percentile queue either exceeds available storage/extends beyond the nearest driveway or extends beyond the nearest upstream public street intersection. presents the AM peak hour 95th percentile queues for ramp terminals only. We note the results for the AM peak hour queuing analysis may not reflect actual conditions due to lack of AM peak hour data for several intersections which may impact queue spillback at the ramp terminals.

TABLE 5. EXISTING (YEAR 2024) PM PEAK HOUR 95TH PERCENTILE QUEUES

ID	INTERSECTION	APPROACH/ MOVEMENT	95TH PERCENTILE QUEUE (FEET)	STORAGE (FEET)[1]
1	Stewart Pkwy at Mulholland Dr / Aviation Dr	EBL	50	105
		EBT	125	>1,000
		EBT+R	75	>1,000
		WBL	50	105/150
		WBT	100	>1,000
		WBT+R	75	>1,000
		NBL	100	60/90
		NBT+R	100	>1,000
		SBL	75	85
		SBT+R	75	>1,000
2	Garden Valley Blvd at Stewart Pkwy	EBL	275	155/>250
		EBT	550	235/>1,000
		EBT+R	475	235/>1,000
		WBL	250	125/>250
		WBT	700	210/>1,000
		WBT	750	210/>1,000
		WBR	350	110
		NBL	150	175/220
		NBT	200	220
		NBT	200	220
		NBR	125	190
		SBL	300	195/420
		SBL	325	150/200
		SBT	300	965
		SBT	250	965
		SBR	225	125
3	Garden Valley Blvd at Sizzler entrance	SBL+R	125	65
		EBL	75	225
4	Garden Valley Blvd at Goetz St / Duck Pond St	EBL	75	100/300
		EBT	350	300/>1,000
		EBT+R	350	300/>1,000
		WBL	125	110/215
		WBT	150	215
		WBT+R	175	215
		NBL+T	175	140/160
		NBR	100	280
		SBLTR	100	345
5	Garden Valley Blvd at Estelle St / Veterans Way	EBL	50	65/235
		EBT	200	355
		EBT+R	200	355
		WBL	50	75/210
		WBT	75	210
		WBT+R	75	210
		NBL+T	125	490
		NBR	125	125
		SBL+T	100	100
		SBR	100	440

TABLE 5. EXISTING (YEAR 2024) PM PEAK HOUR 95TH PERCENTILE QUEUES

ID	INTERSECTION	APPROACH/ MOVEMENT	95TH PERCENTILE QUEUE (FEET)	STORAGE (FEET)[1]
6	Garden Valley Blvd at Garden Valley Shopping Center / BLM	EBL	200	90/255
		EBT	**300**	150/255
		EBT+R	**300**	150/255
		WBL	50	100/140
		WBT	***475***	140/290
		WBT+R	***525***	140/290
		NBL	50	65
		NBT+R	75	160
		SBL	**250**	35
		SBT+R	**325**	35
7	Garden Valley Blvd at Southbound Off-Ramp	EBT	250	290
		EBT	***600***	290
		WBT	175	1,000
		WBT	200	1,000
		SBL	200	600
		SBR	125	>600
8	Garden Valley Blvd at Southbound On-Ramps	N/A	N/A	N/A
9	Garden Valley Blvd at Northbound On-Ramps	N/A	N/A	N/A
10	Garden Valley Blvd at Northbound Off-Ramp/NW Mulholland Dr	EBL	150	60/>1,000
		EBT	325	800/>1,000
		EBT	350	800/>1,000
		WBT	**>1,000**	100/220
		WBT+R	**>1,000**	100/220
		NBL	***>1,000***	195/770
		NBT+R	***>1,000***	>770
		SBL	100	80/130
		SBR	200	130/>1,000
11	Garden Valley Blvd at Highland St	WBL	50	55
		NBL+R	125	135/>1,000
12	Garden Valley Blvd at Airport Rd/Cedar St	EBL	**175**	140
		EBT	325	260/620
		EBT+R	350	260/620
		WBL	100	85
		WBT	**275**	185
		WBT+R	**300**	185
		NBL	150	80/140
		NBT+R	125	840
		SBL	**125**	85/105
		SBT+R	200	105/>1,000
13	Garden Valley Blvd at Walnut St	EBL	75	110
		EBT	200	180/430
		EBT+R	125	180/430
		WBL	75	75/125
		WBT	100	75/450
		WBT+R	125	75/450
		NBL+T	**150**	85
		NBR	100	830
		SBL+T	50	50
		SBR	**75**	50

TABLE 5. EXISTING (YEAR 2024) PM PEAK HOUR 95TH PERCENTILE QUEUES

ID	INTERSECTION	APPROACH/ MOVEMENT	95TH PERCENTILE QUEUE (FEET)	STORAGE (FEET)[1]
14	Garden Valley Blvd at Stephens St	EBL	**350**	235/260
		EBT	***675***	460
		EBR	325	240/470
		WBL	200	115/200
		WBT+R	**575**	200/295
		NBL	275	240/290
		NBL	***325***	240/290
		NBT	275	215/415
		NBT+R	300	215/415
		SBL	250	115/490
		SBT	**>1,000**	265/490
		SBT+R	**1,000**	265/490
15	Harvard Ave at Stewart Pkwy	EBL	200	105/220
		EBT	175	395
		EBT+R	125	395
		WBL	25	100/185
		WBT	250	185/520
		WBT	425	185/520
		WBR	**300**	100
		NBL	25	55/100
		NBT+R	75	260
		SBL	**375**	85/135
		SBT+R	250	>1,000
16	Harvard Ave at Stewart Park Dr	EBL	75	90/165
		EBT	100	165
		EBT	100	165
		WBT	150	175
		WBT+R	**200**	175
		SBL	100	260
		SBR	75	80/100
17	Harvard Ave at Harrison St	EBL	25	210
		WBL	50	175/410
		NBLTR	100	75/460
		SBLTR	50	765
18	Harvard Ave at Umpqua St	EBL	100	70/160
		EBT	225	70/415
		EBT+R	275	70/415
		WBL	75	80/115
		WBT	200	115/640
		WBT+R	225	115/640
		NBLTR	100	25/350
		SBLTR	175	90/965
19	Harvard Ave at Southbound Ramps / Bellows St	EBL	100	135/235
		EBT	300	370/655
		EBT	350	370/655
		EBR	**200**	90/135
		WBL	300	285/400
		WBT	350	760
		WBT+R	350	760
		NBL	**275**	205
		NBT	100	450
		NBR	75	>450
		SBL	150	110/205
		SBT+R	150	505

TABLE 5. EXISTING (YEAR 2024) PM PEAK HOUR 95TH PERCENTILE QUEUES

ID	INTERSECTION	APPROACH/ MOVEMENT	95TH PERCENTILE QUEUE (FEET)	STORAGE (FEET)[1]
20	Harvard Ave at Northbound On-Ramps	N/A	N/A	N/A
21	Harvard Ave at Northbound Off-Ramp / Roseburg High School	EBL	50	100/210
		EBT	175	755
		EBT+R	200	755
		WBT	**300**	85
		WBT+R	**350**	85
		NBL	**225**	80
		NBT+R	175	>1,000
		SBL	50	180/220
		SBR	75	180/220
22	Harvard Ave at Corey Ct	WBL	25	40/130
		NBL	25	40/340
		NBR	**50**	40
23	Harvard Ave at Madrone St	EBL	75	100/190
		EBT	75	150/470
		EBT	100	150/470
		WBU	25	30
		WBT	200	>1,000
		WBT+R	200	>1,000
		SBL	100	260/590
		SBR	100	205

Bold and highlighted indicates queue exceeds available storage; ***Italic and underlined*** indicates queue is excessive and/or may impact upstream traffic.
Notes: Storage distance is reported as either the length of the turn pocket for turn lanes or the distance to the nearest upstream driveway for through lanes, as applicable. Effective distance is reported as the distance to the nearest upstream driveway or public street intersection for turn lanes or the distance to the nearest upstream public street intersection for through lanes.

As presented in , there are 15 intersections with queues that extend past the effective storage. Of those 15 intersections, only four (4) intersections have queuing deficiencies that impact signalized intersections: Garden Valley Boulevard at Garden Valley Shopping Center, Garden Valley Boulevard at I-5 Northbound Off-Ramp, Garden Valley Boulevard at Stephens Street, and Garden Valley Boulevard at Southbound I-5 Southbound Off-Ramp.

Westbound through queues at the shopping center extend past the I-5 Southbound Off-Ramp. Similarly, westbound through queues at the I-5 Southbound Off-Ramp extend past the I-5 Southbound Entrance Loop Ramp, which blocks drivers from accessing the loop ramp. At the Stephens Street intersection with Garden Valley Boulevard eastbound through queues extend past the signal at Walnut Street and northbound left-turn queues extend past the striped storage and spillback to the northbound lane, but do not spillback to the signal at the shopping center on Stephens Street.

At the I-5 Northbound Off-Ramp on Garden Valley Boulevard the northbound approach extends past the existing storage and to the I-5 mainline. We note the recent improvement to include a dedicated northbound right-turn lane with 285 feet of storage at this intersection likely improves this condition. This was not modeled in the existing conditions analysis as the existing counts and traffic patterns did not reflect this recent change. However, this change will be incorporated into the future conditions analysis.

The AM peak hour queuing analysis does not indicate any significant queue spillback issues at the ramp terminals. The most significant queue in the northbound left-turning movement at the northbound Off-Ramp on Harvard Avenue. This queue does not spillback to any public street intersections and can be accommodated in the combined approach lane upstream of the signal.

TABLE 6. EXISTING (YEAR 2024) AM PEAK HOUR 95TH PERCENTILE QUEUES

ID	INTERSECTION	APPROACH/ MOVEMENT	95TH PERCENTILE QUEUE (FEET)	STORAGE (FEET)[1]
7	Garden Valley Blvd at Southbound Off-Ramp	EBT	125	290
		EBT	150	290
		WBT	150	1,000
		WBT	125	1,000
		SBL	175	600
		SBR	75	>600
8	Garden Valley Blvd at Southbound On-Ramps	N/A	N/A	N/A
9	Garden Valley Blvd at Northbound On-Ramps	N/A	N/A	N/A
10	Garden Valley Blvd at Northbound Off-Ramp/NW Mulholland Dr	EBL	100	60/>1,000
		EBT	175	800/>1,000
		EBT	200	800/>1,000
		WBT	**225**	100/220
		WBT+R	200	100/220
		NBL	750	195/770
		NBT+R	775	>770
		SBL	50	80/130
		SBR	100	130/>1,000
19	Harvard Ave at Southbound Ramps / Bellows St	EBL	150	135/235
		EBT	225	370/655
		EBT	225	370/655
		EBR	100	90/135
		WBL	150	285/400
		WBT	250	760
		WBT+R	325	760
		NBL	**250**	205
		NBT	150	450
		NBR	125	>450
		SBL	75	110/205
		SBT+R	100	505
20	Harvard Ave at Northbound On-Ramps	N/A	N/A	N/A
21	Harvard Ave at Northbound Off-Ramp / Roseburg High School	EBL	100	100/210
		EBT	200	755
		EBT+R	300	755
		WBT	**175**	85
		WBT+R	**175**	85
		NBL	**300**	80
		NBT+R	275	>1,000
		SBL	75	180/220
		SBR	100	180/220

Bold and highlighted indicates queue exceeds available storage; ***Italic and underlined*** indicates queue is excessive and/or may impact upstream traffic.

Notes: Storage distance is reported as either the length of the turn pocket for turn lanes or the distance to the nearest upstream driveway for through lanes, as applicable. Effective distance is reported as the distance to the nearest upstream driveway or public street intersection for turn lanes or the distance to the nearest upstream public street intersection for through lanes.

Railroad Operations

The Central Oregon & Pacific Railroad (CORP) runs parallel to I-5 and has at-grade railroad crossings with NE Garden Valley Boulevard (potential impacts to interchange 125 and the GVC) as well as with SE Washington Avenue and SE Oak Avenue (potential impacts to interchange 124). Current service includes one northbound and one southbound train five days a week with an approximate schedule of one northbound train between 11:00 AM and 1:00 PM and one southbound train between 5:00 and 7:00 PM. The average crossing gate down for a 100-car train is approximately seven minutes.[2]

The existing queues do not back up from the interchange to the railroad, however trains do result in long vehicular queues extending along the local street network that impede regular movement at adjacent intersections, particularly in downtown Roseburg.

Freeway Operations

It is also important to evaluate how the interchange ramps interact with the mainline highway traffic on I-5 through an analysis of the points where traffic enters or merges onto the highway and where it exits or diverges from the highway. These analyses were conducted in accordance with the methodology prescribed in ODOT's APM to determine v/c ratio performance. A select-link analysis was run to determine the approximate volume of traffic utilizing the Exit 124 on-ramp and the Exit 125 off-ramp for purposes of accurately performing the northbound weave analysis between the two exits. The results of the analysis are summarized in Table 7.

The merge, diverge, and weaving analyses for the design hour between 4:30 PM and 5:30 PM show that the freeway and the merge and diverge points associated with the Roseburg interchange ramps are currently operating below the mobility standard of 0.85. During this period, the northbound direction has the higher directional flow on the freeway.

[2] Schedule information per email communication with Central Oregon and Pacific Railroad, June 13, 2024.

TABLE 7. FREEWAY OPERATIONS – PM PEAK HOUR

Direction/Location	V/C Ratio[1]	
	Design Hour[2]	OHP Target[4]
I-5 Northbound		
Mainline South of Exit 124 (W Harvard Ave)	0.45	0.80
Diverge: Northbound Exit 124 Off-Ramp	0.30	0.85
Mainline North of Exit 124 Off-Ramp	0.38	0.80
Merge: Exit 124 Northbound Loop On-Ramp	0.30	0.85
Mainline North of Exit 124 Loop On-Ramp	0.47	0.80
Weave: Exit 124 to Exit 125	0.53	0.85
Mainline North of Exit 125 Off-Ramp (Garden Valley Blvd)	0.36	0.80
Merge: Exit 125 Northbound Loop On-Ramp	0.24	0.85
Mainline North of Exit 125 Loop On-Ramp (Garden Valley Blvd)	0.43	0.80
Merge: Exit 125 Northbound On-Ramp	0.44	0.85
Mainline North of Exit 125 (Garden Valley Blvd)	0.47	0.80
I-5 Southbound		
Mainline North of Exit 125 (Garden Valley Blvd)	0.41	0.80
Diverge: Southbound Exit 125 Off-Ramp	0.27	0.85
Mainline South of Exit 125 Off-Ramp	0.31	0.80
Merge: Exit 125 Southbound Loop On-Ramp	0.26	0.85
Mainline South of Exit 125 Loop On-Ramp (W Harvard Ave)	0.41	0.80
Merge: Exit 125 Southbound On-Ramp	0.36	0.85
Mainline South of Exit 125 On-Ramp	0.57	0.80
Diverge: Southbound Exit 124 Loop Off-Ramp	0.37	0.85
Mainline South of Exit 124 Loop Off-Ramp (W Harvard Ave)	0.43	0.80
Merge: Southbound Exit 124 On-Ramp	0.36	0.85
Mainline South of Exit 124 On-Ramp	0.56	0.80

MULTIMODAL CONSIDERATIONS

This section summarizes the existing conditions for bicycles, pedestrians and transit, as noted below.

BICYCLE AND PEDESTRIAN VOLUMES

The PM peak hour bicycle and pedestrian volumes are summarized in Figure 3 and Figure 4, respectively. The number of bicycles is low, likely due to the lack of east-west bicycle connectivity.

LEVEL OF TRAFFIC STRESS

This memorandum relies on the Roseburg Transportation System Plan (TSP) Level of Traffic Stress (LTS) for study area roads in conjunction with the methodology in the *ODOT Analysis Procedures Manual* (APM) Version 2 (last updated: 03/01/2024) to identify the pedestrian and bicycle level of traffic stress (PLTS and BLTS, respectively) for all roadways collector and above within the study area. The LTS methodology assigns a numeric stress level of 1, 2, 3 or 4 to roadway segments, with 1 representing the lowest level of traffic stress and 4 representing the highest. We note the Roseburg Bike Routes Plan (adopted 2023) relies on information from the currently adopted TSP.

Although there are many factors that can influence LTS (traffic volumes, buffer width, pavement conditions, etc.), the score is dictated by the "worst" score for a particular section. Figure 5 (page 22) and Figure 6 (page 23) summarize the bicycle and pedestrian LTS.

There are a number of bicycle, pedestrian, and multi-use path facilities located within the study area, as documented in *Technical Memorandum #2: Study Area Inventory*. The existing network has a strong foundation of multi-use paths through the city's park system. However, beyond these paths, physical barriers such as Interstate 5 (I-5), the South Umpqua River, and hilly terrain create challenges for establishing a connected and comfortable system.

Gaps in the bicycle network likely discourage those who may be interested in biking from doing so because existing facilities are not set up to serve users of all abilities. Many segments of the current system share the road with high volumes of fast-moving motor vehicles, which may feel uncomfortable and unsafe for people biking or driving. The lack of connectivity also makes it so people who are willing to bike often use routes that lack bike facilities.

Many existing bicycle and pedestrian facilities have a high LTS, indicating high levels of traffic-based stress and low levels of comfort for people biking, walking and rolling. On Garden Valley Boulevard, both the BLTS and PLTS scores are 3 for the segment between Stewart Parkway and the southbound ramp terminal with BLTS and PLTS 4 between the southbound ramp terminal and Stephens Street.

Harvard Avenue is slightly less stressful in comparison, but still is BLTS and PLTS 4 for most of the segment between Stewart Parkway and the southbound ramp terminal at the Exit 124 interchange. Between the southbound ramp terminal and Madrone Street (which travels through the RHS frontage), it is BLTS 2 and PLTS 3.

FIGURE 3. BICYCLE VOLUMES (PM PEAK HOUR)

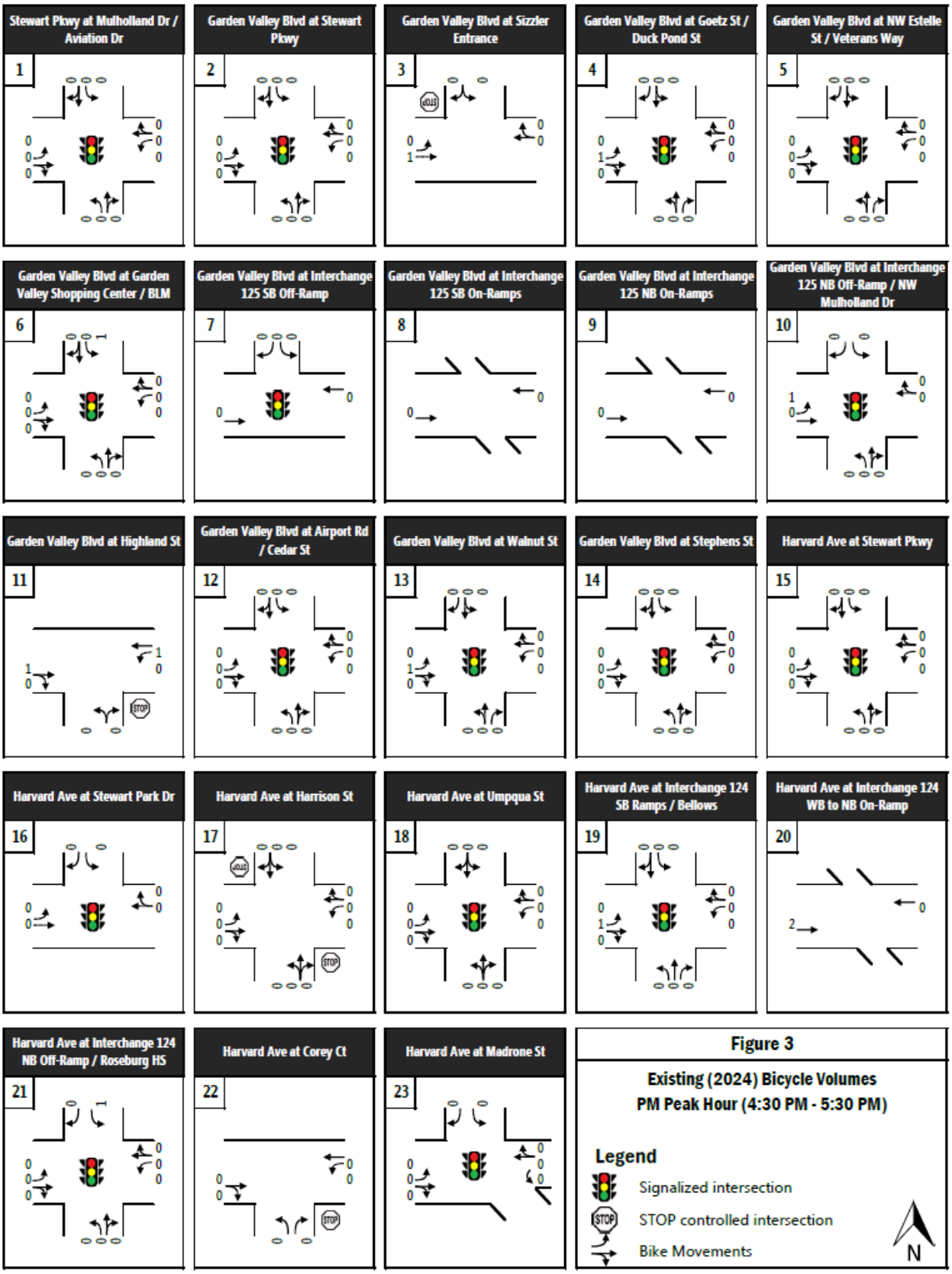


FIGURE 4. PEDESTRIAN VOLUMES (PM PEAK HOUR)

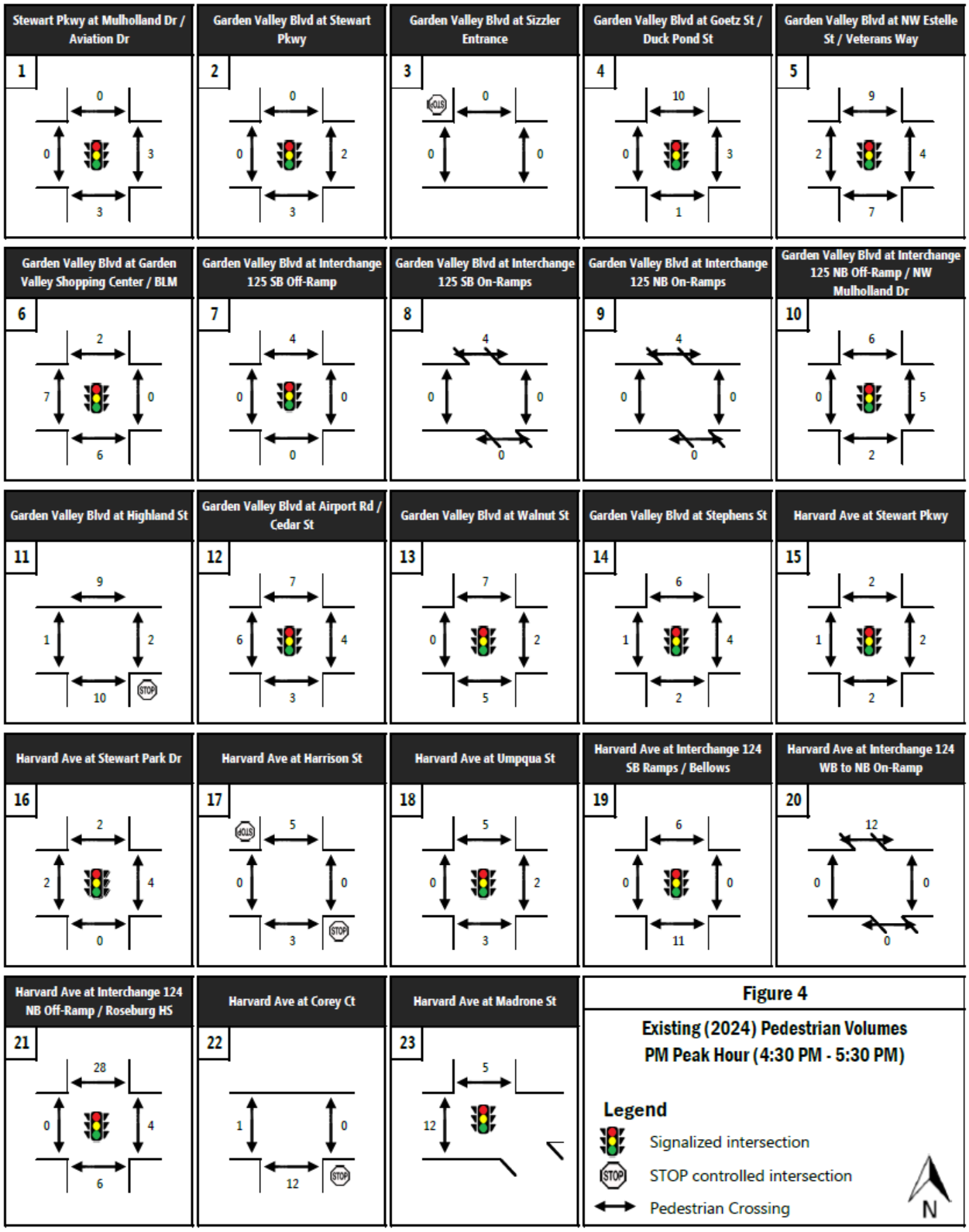


FIGURE 5. BICYCLE LEVEL OF TRAFFIC STRESS

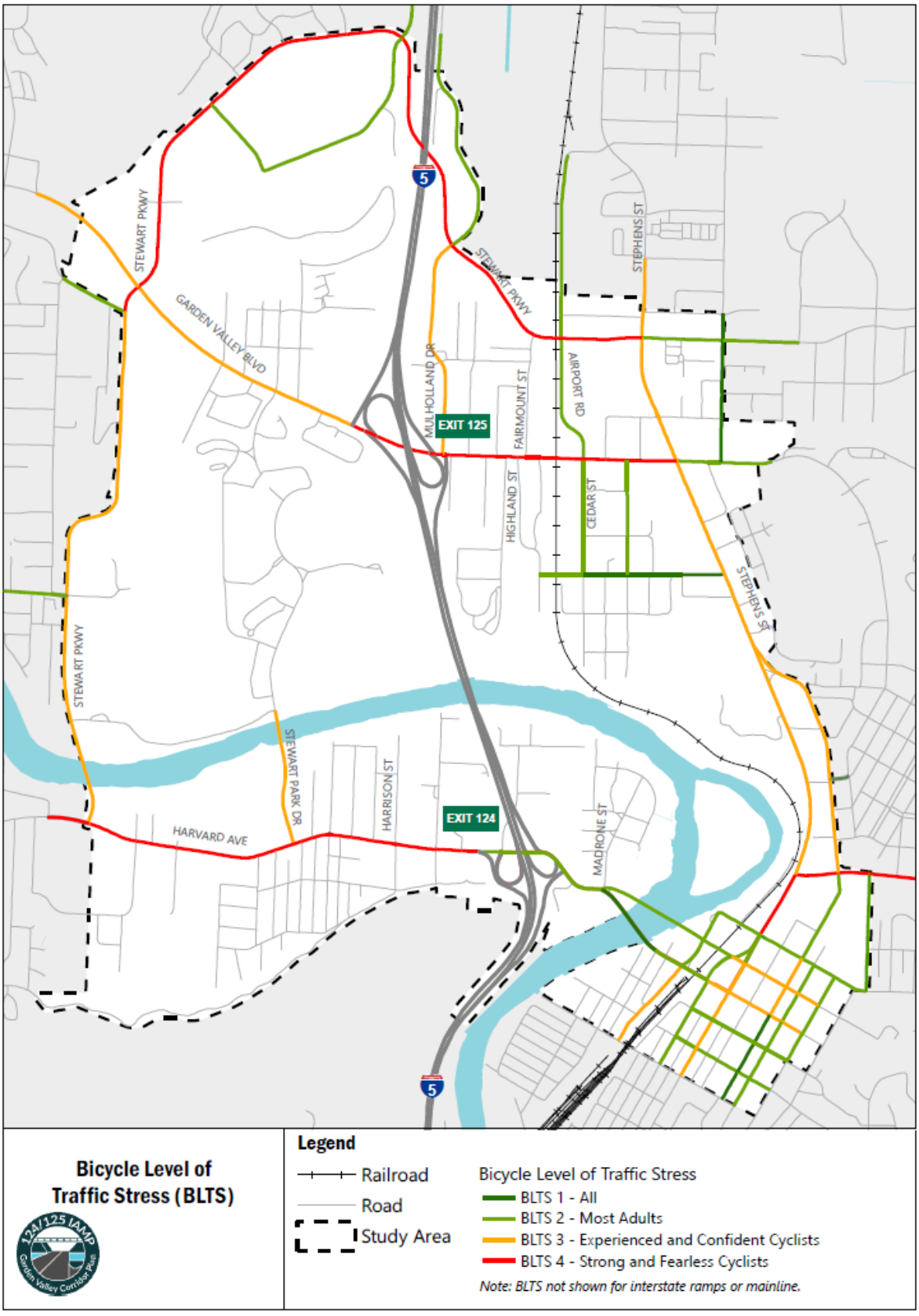
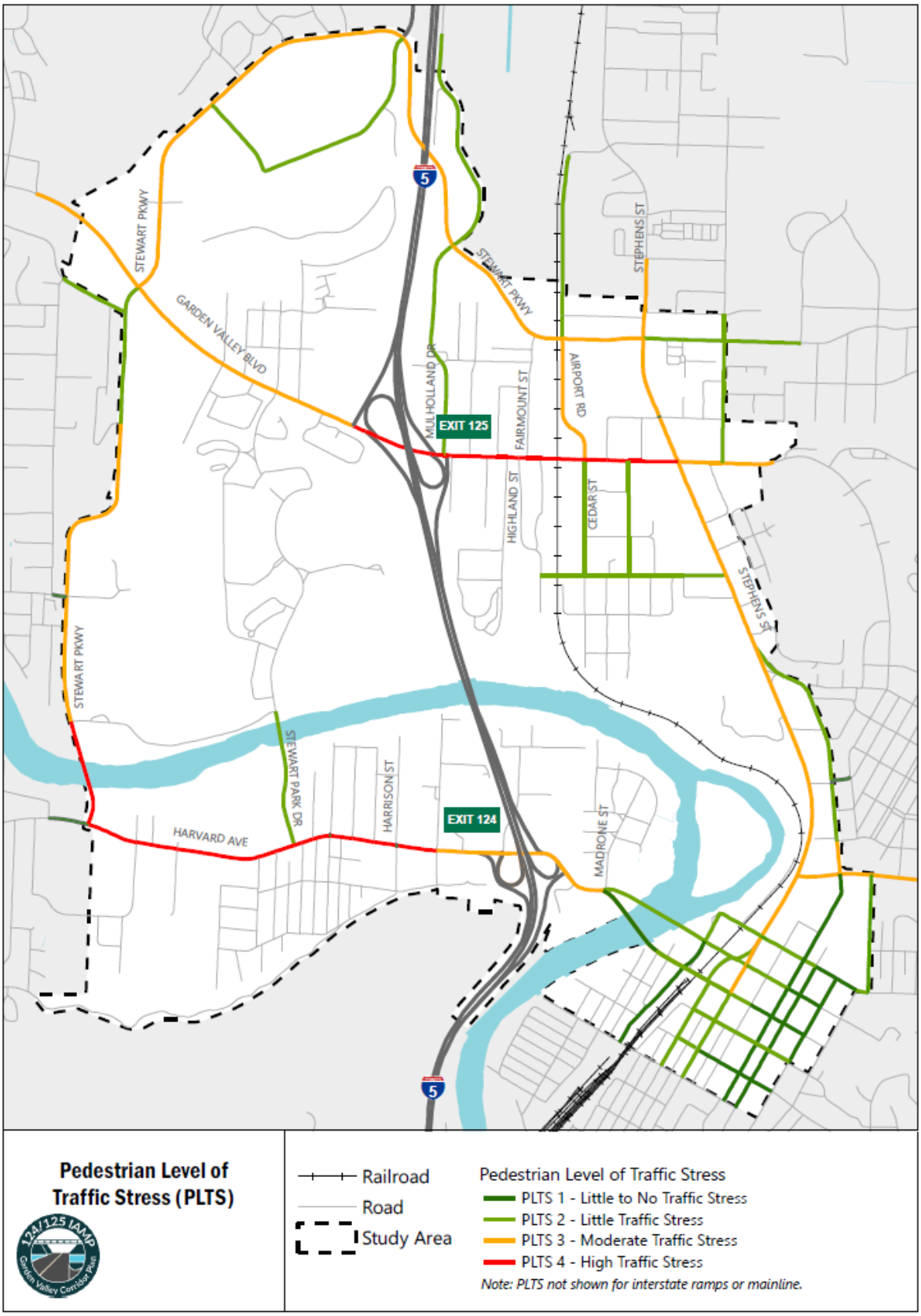


FIGURE 6. PEDESTRIAN LEVEL OF TRAFFIC STRESS



TRANSIT ASSESSMENT

Transit through the study area was evaluated on a context-based subjective "Excellent/Good/Fair/Poor" rating based on the following factors:

- Frequency and on-time reliability: More frequent service and higher on-time schedule reliability are better than less frequent service and less reliable schedules.
- Schedule speed/travel times: Faster average peak hour schedule speeds and travel times are rated better than slower speeds and longer travel times.
- Transit stop amenities: The presence of shelters, benches, and lighting is rated better than stops with limited or no amenities. High-rated stops should have adequate boarding and maneuvering areas and offer proximity to marked crosswalks with proper lighting.
- The project team note that without designated bus pullouts through traffic may be impacted by frequent transit stops.
- Some transit stops are located downstream of signals which may increase congestion along the corridors.
- Connecting pedestrian/bike network: Stops connected to a network of paths or sidewalk-equipped streets with improved crossings are better than those with no pedestrian facilities.

At best, transit frequency in Roseburg is hourly, which is considered "fair". Service every half hour would be considered "good". Increasing the frequency of transit service would also have the additional benefit of improving the pedestrian experience.

In Roseburg, less than half of the transit stops have covered seating, though most have some form of wayfinding signage.

SAFETY ANALYSIS

This section contains an evaluation of the existing safety conditions based on available crash data in the study area from the five most recent years of data (2018-2022). Crash data was obtained from the Oregon Department of Transportation (ODOT) Crash Analysis and Reporting Unit, and trends and crash rates are summarized below, including a review of crash records and ODOT Safety Priority Index System (SPIS) data.

BASIC CRASH STATISTICS

The crash analysis includes a review of crash history supplied by the ODOT Crash Analysis and Reporting Unit for the period between January 1, 2018, and December 31, 2022, which were the five most recent full years for which crash data were available at the time of the analysis. Basic crash data is summarized by study area, subarea and study intersections.

The crash analysis includes crashes on the local street system as well as on I-5 one mile north and south of the Harvard Avenue and Garden Valley Boulevard interchanges. Within the 5-year analysis period there were 1,188 crashes in the study area. Of those crashes, 327 crashes are within the I-5 Exits 124/125 Subarea, 302 crashes were within the GVCP subarea, and 310 crashes were documented at study area intersections.

Within the study area, an average of 238 crashes occurred per year as shown in Table 8. The I-5 Exits 124/125 subarea and GVCP subarea had comparable average annual crashes at 65 and 60 crashes per year, respectively. The COVID-19 pandemic in 2020 influenced the number of crashes throughout the entire study area and subareas but had returned or exceeded pre-pandemic levels by 2022.

TABLE 8. CRASHES PER YEAR (2018-2022)

AREA	2018	2019	2020	2021	2022	TOTAL	YEARLY AVERAGE
STUDY AREA	260	261	187	231	249	**1,188**	**238**
I-5 EXITS 124/125 SUBAREA	66	70	59	55	77	**327**	**65**
GVCP SUBAREA	59	72	49	53	69	**302**	**60**

The primary crash types recorded were rear-end and turning movement crashes. This was true for the study area and both subareas. A breakdown of all crash types per severity level are provided in Table 9.

TABLE 9. CRASH TYPE PER SEVERITY (2018-2022)

	FATAL	SERIOUS INJURY	MINOR INJURY	POSSIBLE INJURY	PDO	TOTAL
STUDY AREA						
PEDESTRIAN	2	10	9	7	-	28
ANGLE	-	8	45	52	52	157
HEAD-ON	-	1	2	3	1	7
REAR-END	-	5	60	160	175	400
SIDESWIPE - MEETING	-	-	2	2	2	6
SIDESWIPE - OVERTAKING	-	-	10	11	56	77
TURNING	2	21	77	108	187	395
PARKING	-	-	-	-	1	1
NON-COLLISION	-	-	5	-	2	7
FIXED OBJECT	1	4	16	17	50	88
BACKING	-	-	-	1	13	14
MISCELLANEOUS	-	-	1	1	6	8
STUDY AREA TOTAL	**5**	**49**	**227**	**362**	**545**	**1,188**
I-5 EXITS 124/125 SUBAREA						
PEDESTRIAN	1	3	3	-	-	7
ANGLE	-	-	2	4	3	9
HEAD-ON	-	1	-	1	-	2
REAR-END	-	2	22	59	60	143
SIDESWIPE - MEETING	-	-	1	1	0	2
SIDESWIPE - OVERTAKING	-	-	4	4	14	22
TURNING	-	4	16	22	36	78
PARKING	-	-	-	-	-	-
NON-COLLISION	-	-	2	0	1	3
FIXED OBJECT	-	1	7	14	32	54
BACKING	-	-	-	1	3	4
MISCELLANEOUS	-	-	-	-	3	3
SUBAREA TOTAL	**1**	**11**	**57**	**106**	**152**	**327**
GVCP SUBAREA						
PEDESTRIAN	-	2	2	-	-	4
ANGLE	-	1	1	7	7	16
HEAD-ON	-	-	-	0	1	1
REAR-END	-	2	18	64	65	149
SIDESWIPE - MEETING	-	-	-	-	-	-
SIDESWIPE - OVERTAKING	-	-	3	3	11	17
TURNING	1	6	18	28	51	104
PARKING	-	-	-	-	-	-
NON-COLLISION	-	-	1	-	-	1

	FATAL	SERIOUS INJURY	MINOR INJURY	POSSIBLE INJURY	PDO	TOTAL
FIXED OBJECT	-	2	-	1	1	4
BACKING	-	-	-	1	3	4
MISCELLANEOUS	-	-	1	-	1	2
SUBAREA TOTAL	**1**	**13**	**44**	**104**	**140**	**302**

Note: The I-5 Exits 124/125 Subarea and GVCP Subarea overlap for the segment of Garden Valley Boulevard between Crouch Street (west of I-5) and the railroad crossing (east of I-5); the same crash may be included in the summaries for both subareas.

The primary contributing factors that were attributed to recorded crashes are documented in Table 10. Vehicles not yielding, vehicles failing to avoid other vehicles and following too closely were attributed to the highest number of crashes in all of the areas.

TABLE 10. PRIMARY CONTRIBUTING FACTORS (2018-2022)

PRIMARY CONTRIBUTING FACTOR	TOTAL
STUDY AREA	
DID NOT YIELD	24%
FAILURE TO AVOID	17%
FOLLOWED TOO CLOSELY	13%
DISREGARDED TRAFFIC SIGNAL	11%
IMPROPER TURN	10%
I-5 EXITS 124/125 SUBAREA	
FAILURE TO AVOID	20%
FOLLOWED TOO CLOSELY	17%
DID NOT YIELD	15%
TRAVELING TOO FAST FOR CONDITIONS	10%
GVCP SUBAREA	
FAILURE TO AVOID	27%
DID NOT YIELD	20%
FOLLOWED TOO CLOSELY	18%
DISREGARDED TRAFFIC SIGNAL	10%

Note: Contributing factors are listed if they represent at least 10% of the study area or subarea's crashes.

Study Intersection Crashes

Of the 1,288 crashes in the study area, 310 occurred at study area intersections. The three intersections with the most crashes during the study area were:

- Garden Valley Blvd at Northbound Off-Ramp / NW Mulholland Dr (47 crashes)
- Garden Valley Blvd at Stewart Pkwy (43 crashes)
- Garden Valley Blvd at Southbound Off-Ramp (24 crashes)

The number of crashes, by crash type and severity, are summarized in Table 11.

TABLE 11. STUDY INTERSECTIONS CRASH TYPE AND CRASH RATE SUMMARY (2018-2022)

Intersection	Total	Crash Type							Severity		
		Pedestrian	Angle	Rear-End	Sideswipe - Overtaking	Turning	Fixed Object	Other	Property Damage Only	Minor Injury	Fatal & Serious Injury
1. Stewart Pkwy at Mulholland Dr / Aviation Dr	11	0	1	3	2	5	0	0	8	3	0
2. Garden Valley Blvd at Stewart Pkwy	43	1	2	21	4	15	0	0	22	20	1
3. Garden Valley Blvd at Sizzler entrance	10	0	0	1	0	9	0	0	3	6	1
4. Garden Valley Blvd at Goetz St / Duck Pond St	11	1	0	7	0	2	0	1	5	5	1
5. Garden Valley Blvd at Estelle St / Veterans Way	10	0	0	7	0	3	0	0	6	4	0
6. Garden Valley Blvd at Garden Valley Shopping Center / BLM	12	0	1	10	0	1	0	0	6	6	0
7. Garden Valley Blvd at Southbound Off-Ramp	24	0	0	16	1	6	0	1	12	12	0
8. Garden Valley Blvd at Southbound On-Ramps	4	0	0	3	0	1	0	0	1	3	0
9. Garden Valley Blvd at Northbound On-Ramps	7	0	0	5	1	1	0	0	1	6	0
10. Garden Valley Blvd at Northbound Off-Ramp/ NW Mulholland Dr	47	1	5	22	3	16	0	0	24	20	3
11. Garden Valley Blvd at Highland St	6	0	0	2	0	4	0	0	4	1	1
12. Garden Valley Blvd at Airport Rd/Cedar St	14	0	2	6	1	5	0	0	8	5	1
13. Garden Valley Blvd at Walnut St	11	0	0	7	0	4	0	0	3	7	1
14. Garden Valley Blvd at Stephens St	29	0	4	20	0	4	0	1	11	16	2
15. Harvard Ave at Stewart Pkwy	12	1	0	8	0	3	0	0	5	6	1
16. Harvard Ave at Stewart Park Dr	7	0	0	4	1	2	0	0	2	5	0
17. Harvard Ave at Harrison St	1	0	0	1	0	0	0	0	0	1	0
18. Harvard Ave at Umpqua St	10	0	0	5	0	5	0	0	3	7	0
19. Harvard Ave at Southbound Ramps / Bellows St	17	0	1	11	0	2	3	0	7	10	0
20. Harvard Ave at Northbound On-Ramps	4	0	1	2	0	0	1	0	2	2	0
21. Harvard Ave at Northbound Off-Ramp / Roseburg High School	12	0	0	5	0	5	1	1	6	6	0
22. Harvard Ave at Corey Ct	1	0	0	1	0	0	0	0	0	1	0
23. Harvard Ave at Madrone St	7	1	0	5	0	0	1	0	2	4	1
Totals	**310**	**5**	**17**	**172**	**13**	**93**	**6**	**4**	**141**	**156**	**13**

Source: ODOT Crash Analysis and Reporting Unit, 2018-2022.

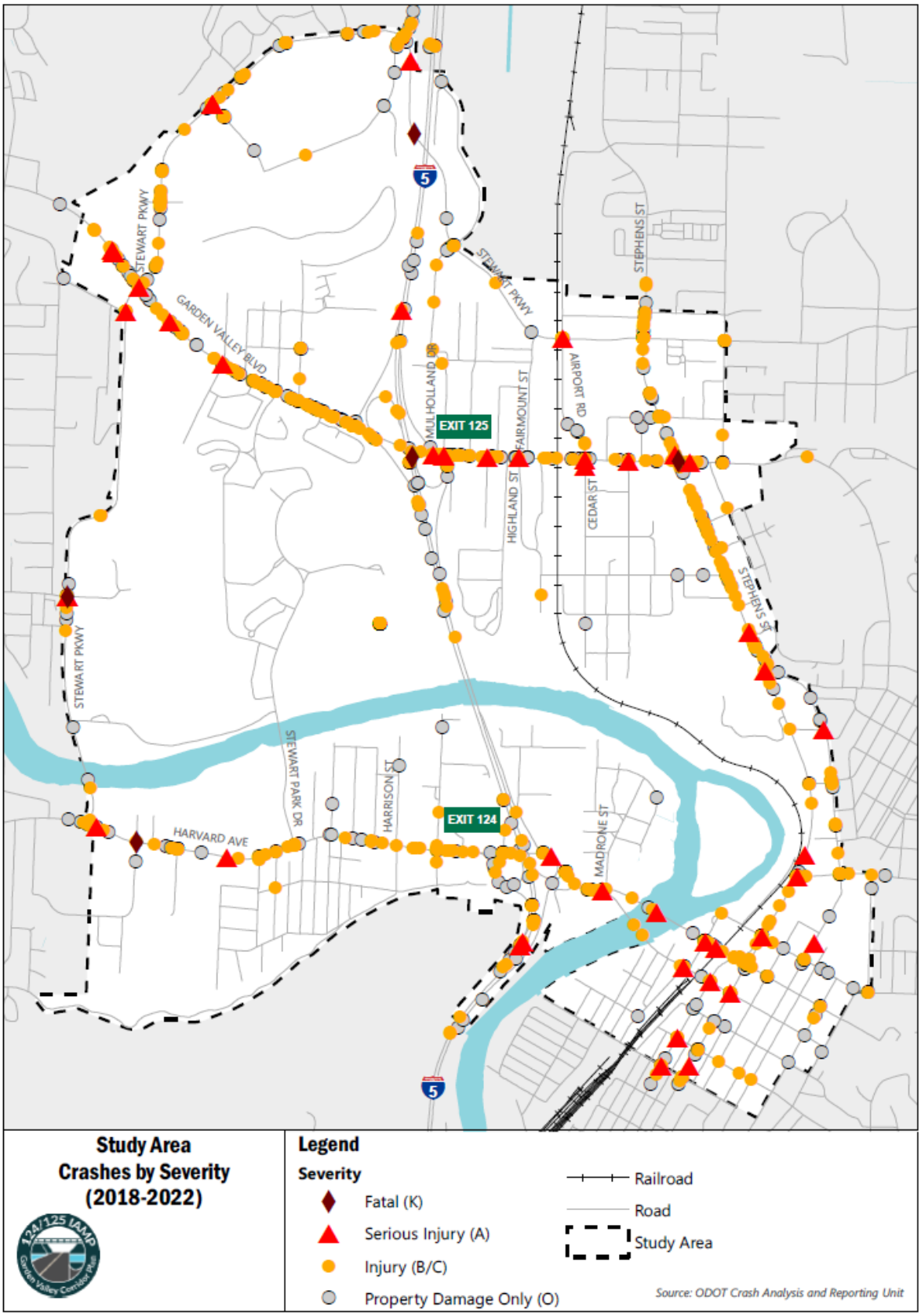
Fatal and Serious Injury Crashes

As shown in Table 9, 5 fatal crashes and 49 serious injury crashes were recorded in the study area during the study period. A map of the fatal and serious injury crashes is presented Figure 7.

- Fatal Crashes
    - Study Area: Harvard Avenue at Stanton Street in May 2021. A turning-related crash occurred when an eastbound motorcycle passed a vehicle in the outside lane and was struck by a vehicle turning south onto Stanton Street from Harvard Avenue.

  - Study Area: Stewart Parkway at Harvey Avenue in July 2018. A pedestrian was struck in the crosswalk while attempting to go east across Stewart Parkway when a vehicle failed to yield to the right-of-way.
  - Study Area: Stewart Parkway south of Edenbower Boulevard (I-5 overpass) in October 2018. A fixed object collision resulted in a fatality when a vehicle left the roadway and hit a retaining wall.
  - I-5 Exits 124/125 Subarea: I-5 mainline near the eastbound to northbound on-ramp of Exit 125 interchange in August 2021. A pedestrian was struck while illegally on the highway between 1:00 and 2:00 AM.
  - GVCP Subarea: Garden Valley Boulevard at Stephens Street in August 2021. A turning-related crash occurred when a motorcycle tried to turn west from Stephens Street onto Garden Valley Boulevard against a red light.
- Serious Injury Crashes:
  - Of the 49 serious injury crashes that occurred in the study area, 12 occurred at study area intersections (10 of which were intersections with Garden Valley Boulevard):
    - Garden Valley Boulevard at Stewart Parkway
    - Garden Valley Boulevard at Sizzler Entrance
    - Garden Valley Boulevard at Goetz Street / Duck Pond Street
    - Garden Valley Boulevard at Exit 125 Northbound Off-Ramp / Mulholland Drive (3)
    - Garden Valley Boulevard at Highland Street
    - Garden Valley Boulevard at Airport Road / Cedar Street
    - Garden Valley Boulevard at Walnut Street
    - Garden Valley Boulevard at Stephens Street
    - Harvard Avenue at Stewart Parkway
    - Harvard Avenue at Madrone Street
  - 35% (17 crashes) of the study area serious injury crashes were due to vehicles not yielding right-of-way and 16% (8 crashes) were due to vehicles disregarding the traffic signal.
  - 42% (21 crashes) of the study area serious injury crashes were turning-related collisions and 20% (10 crashes) were pedestrian collisions.
  - There were 13 serious injury crashes in the I-5 Exits 124/125 subarea and 11 in the GVCP subarea.
  - 29 of the crashes were intersection related, 4 were driveway/alley related and the remaining 16 were not attributed with an intersection.
  - The intersection of Garden Valley Boulevard at Exit 125 Northbound Off-Ramp / Mulholland Drive was the only intersection to record more than one serious injury crash within the study period; there were three reported serious injury crashes.

FIGURE 7. STUDY AREA CRASHES BY SEVERITY

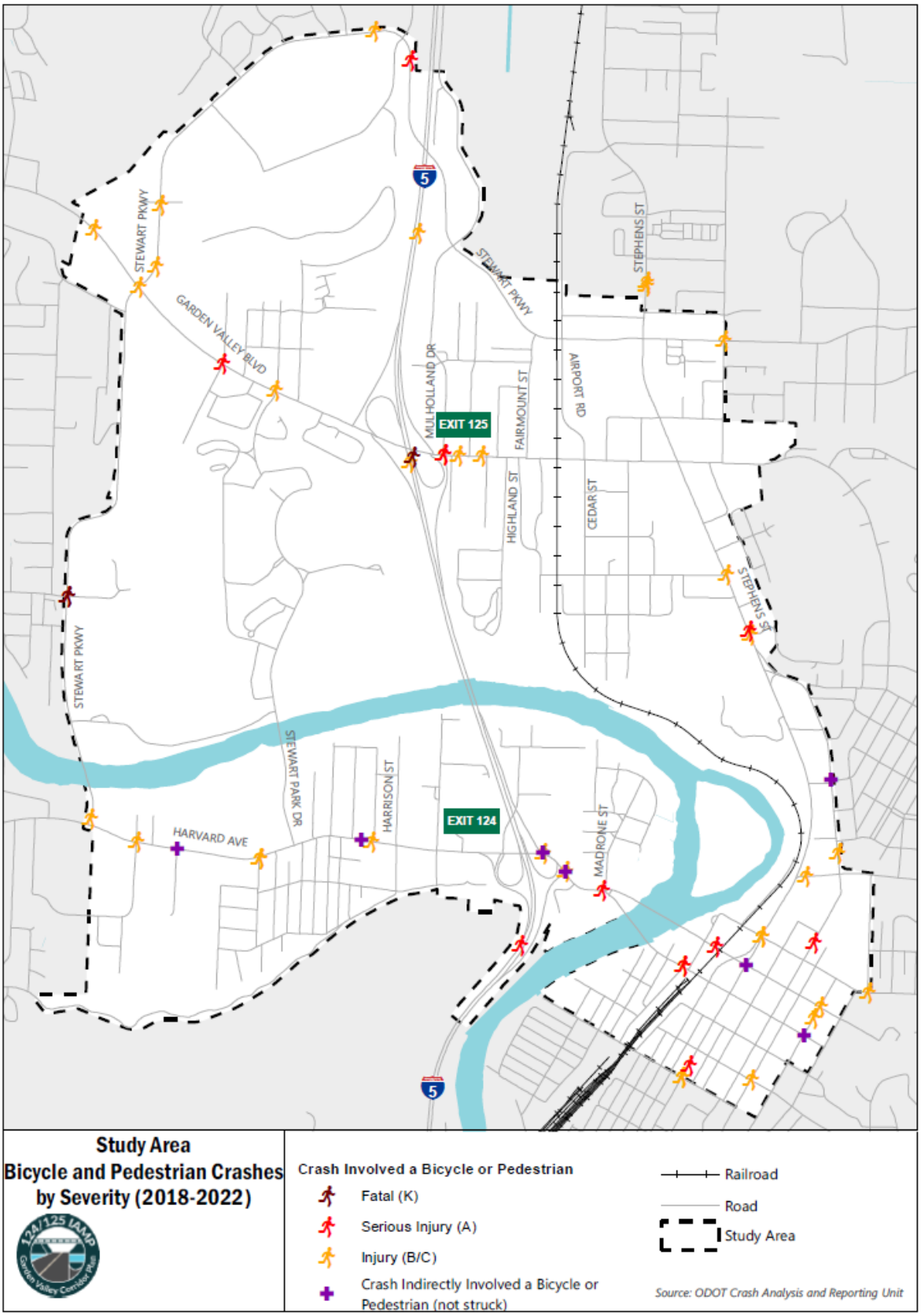


Bicycle and Pedestrian Crashes

There were 28 crashes in the study area recorded as pedestrian crashes and 19 bicycle-involved crashes. There were also crashes in the study area documented with a pedestrian being indirectly involved but not struck. All of the crashes involved or indirectly involving a bicycle or pedestrian are displayed in Figure 8. The figure shows that there are clusters of bicycle or pedestrian-related crashes downtown, near the I-5 Exit 125 interchange and on Harvard Avenue near Roseburg High School.

- Pedestrian
    - Of the pedestrian crashes, 2 resulted in fatalities, 10 resulted in serious injury and the remaining resulted in minor or possible injury; none of the pedestrian crashes were property damage only (PDO).
    - 4 of the pedestrian-involved crashes occurred in the GVCP subarea at or near the intersections of Garden Valley Boulevard at Ellan Street, Goetz Street, I-5 Exit 125 northbound off-ramp / Mulholland Drive and Stewart Parkway. The causes were non-motorists illegally in roadway, disregarded traffic signal, not yielding right-of-way and inattention, respectively.
    - 7 of the pedestrian-involved crashes occurred in the I-5 Exits 124/125 subarea; 4 on I-5, 2 on Garden Valley Boulevard and 1 on Harvard Avenue. The causes were not yielding right-of-way. For the I-5 crashes, the pedestrian was illegally in the roadway and for the other crashes, the motorist either did not yield right-of-way or disregarded a traffic signal.
- Bicycle
    - Of the bicycle-involved crashes, 2 resulted in serious injury and the remaining resulted in minor or possible injury; none of the bicycle-involved crashes were PDO.
    - 3 of the bicycle-involved crashes occurred in the GVCP subarea at or near the intersections of Garden Valley Boulevard at Estelle Street, I-5 Exit 125 northbound off-ramp / Mulholland Drive and Munson Court. The causes were inattention, not yielding right-of-way and following too closely, respectively.
    - 2 of the bicycle-involved crashes occurred in the I-5 Exits 124/125 subarea on Harvard Avenue at or near the intersections with the I-5 westbound to northbound on-ramp and Corey Court. The causes were not yielding right-of-way.

FIGURE 8. STUDY AREA BICYCLE AND PEDESTRIAN CRASHES BY SEVERITY



CRASH RATE AND CRITICAL CRASH RATE CALCULATIONS

ODOT guidance was followed to evaluate the crash rates and critical crash rates at the study intersections and segments. Table 12 show the results of the evaluation. The purpose of comparing calculated (actual) crash rates with critical crash rates is to identify any sites where crashes occur at a higher frequency than expected and should be flagged for further investigation.

Intersections

The intersection types were determined by their respective geometries and traffic control, while the segment types were determined by their road context and functional classification. The crash rate is then calculated based on crash frequency and vehicle volume, with crash rates at intersections given in units of crashes per million entering vehicles (crashes/MEV) and crash rates for segments given in units of crashes per million vehicle miles traveled (crashes/MVMT). The Calculated Crash Rates are then compared to a Critical Crash Rate (if a reference population is applicable) and the Statewide Comparison Crash Rates, which contain statewide average crash rates for each of the last five years and are published annually by the ODOT Crash Analysis and Reporting Unit. Statewide Comparison crash rates for intersections can be found in Exhibit 4-1 in the ODOT APM.

Segments

Segment crash rates and critical crash rates were not calculated for the streets on the local system (e.g. Garden Valley Boulevard and Harvard Avenue); the prevalence of closely spaced intersections along these corridors created short sections less than a half mile in length, which can skew crash rates and should be avoided. Crash trends were still summarized.

The crash rates for the I-5 segments within the study area are summarized in Table 13. Critical crash rates were not calculated because there were not enough segments in a reference population. For segments on I-5, both intersection and non-intersection crashes are included as this matches the methodology for what is included in the Table II based segment crash analysis. Statewide Comparison crash rates for segments can be found in Table II on the ODOT Crash Statistics and Reports website. The segment including the mainline through interchange 125 and just north and the segment including the mainline through interchange 124 and the segment to the south are exceeding the comparable Table II crash rate for urban interstate freeways.

Findings

Garden Valley Boulevard at Stewart Parkway and Garden Valley Boulevard at Exit 125 Northbound Off-Ramp / Mulholland Drive both exceed the critical crash rate for 4-legged signalized study intersections. The HSM predictive method will be applied to these intersections and expected crashes per year will be documented in the *Future Baseline Traffic Conditions Memorandum*.

TABLE 12. STUDY INTERSECTIONS CRASH TYPE AND CRASH RATE SUMMARY (2018-2022)

Intersection	Total	AADT Entering Intersection	Reference Population	Critical Crash Rate	90th Percentile Crash Rate	5-Year Crash Rate[1,2]
1. Stewart Pkwy at Mulholland Dr / Aviation Dr	11	16,301	4SG	0.49	0.860	0.37
2. Garden Valley Blvd at Stewart Pkwy	43	46,889	4SG	0.41	0.860	**0.50**
3. Garden Valley Blvd at Sizzler entrance	10	34,463	3ST	-	0.293	0.16
4. Garden Valley Blvd at Goetz St / Duck Pond St	11	34,988	4SG	0.42	0.860	0.17
5. Garden Valley Blvd at Estelle St / Veterans Way	10	35,322	4SG	0.42	0.860	0.16
6. Garden Valley Blvd at Garden Valley Shopping Center / BLM	12	37,057	4SG	0.42	0.860	0.18
7. Garden Valley Blvd at Southbound Off-Ramp	24	37,850	3SG	-	0.509	0.35
8. Garden Valley Blvd at Southbound On-Ramps	4	39,477	4ST	-	0.408	0.06
9. Garden Valley Blvd at Northbound On-Ramps	7	37,220	4ST	-	0.408	0.10
10. Garden Valley Blvd at Northbound Off-Ramp/NW Mulholland Dr	47	40,906	4SG	0.41	0.860	**0.63**
11. Garden Valley Blvd at Highland St	6	25,896	3ST	-	0.293	0.13
12. Garden Valley Blvd at Airport Rd/Cedar St	14	28,072	4SG	0.44	0.860	0.27
13. Garden Valley Blvd at Walnut St	11	23,319	4SG	0.45	0.860	0.26
14. Garden Valley Blvd at Stephens St	29	39,133	4SG	0.42	0.860	0.41
15. Harvard Ave at Stewart Pkwy	12	25,471	4SG	0.45	0.860	0.26
16. Harvard Ave at Stewart Park Dr	7	21,177	3SG	-	0.509	0.18
17. Harvard Ave at Harrison St	1	24,198	4ST	-	0.408	0.02
18. Harvard Ave at Umpqua St	10	25,777	4SG	0.45	0.860	0.21
19. Harvard Ave at Southbound Ramps / Bellows St	17	32,371	4SG	0.43	0.860	0.29
20. Harvard Ave at Northbound On-Ramps	4	30,419	3ST	-	0.293	0.07
21. Harvard Ave at Northbound Off-Ramp / Roseburg High School	12	33,846	4SG	0.43	0.860	0.19
22. Harvard Ave at Corey Ct	1	25,794	3ST	-	0.293	0.02
23. Harvard Ave at Madrone St	7	26,183	4SG	0.44	0.860	0.15
Total:	**310**					

Source: ODOT Crash Analysis and Reporting Unit, 2018-2022.

Notes:

1. Where the observed rate exceeds the Statewide 90th Percentile Crash Rate, the observed rate is *italic, and underlined.*
2. Where the observed rate exceeds the Critical Crash Rate, the observed rate is **bold and shaded**.

TABLE 13. SEGMENT CRASH TYPE AND CRASH RATE SUMMARY (2018-2022)

Segment	Total	AADT	Table II Crash Rate	5-Year Crash Rate[1,2]
Garden Valley Boulevard: Stewart Parkway to Stephens Street	**44**	22,629	2.51	N/A
Harvard Avenue: Stewart Parkway to Southbound Ramps / Bellows St	**48**	20,495	2.51	N/A
OR 138: Southbound Ramps / Bellows St to Stephens Street	**80**	29,325	2.51	***N/A***
I-5 MP 123.3 – MP 124.50	**88**	42,268	0.55	*0.95*
I-5 MP 124.51 – MP 124.80	**23**	46,894	0.55	N/A
1-5 MP 124.81 – MP 125.90	**160**	35,618	0.55	*2.26*

Source: ODOT Crash Analysis and Reporting Unit, 2018-2022.

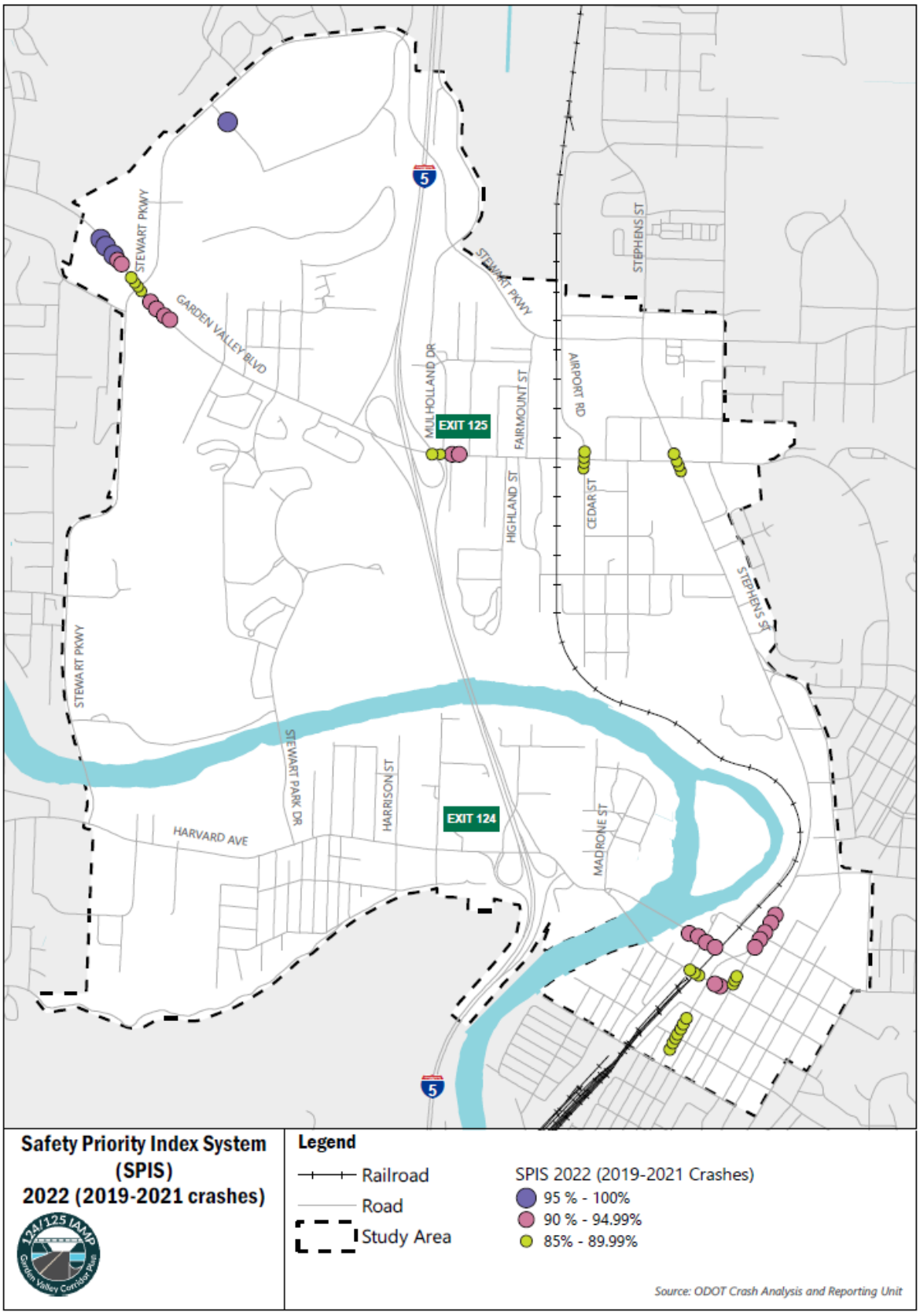
Notes:

1. Where the observed rate exceeds the Table II Five-Year Comparison of State Highway Crash Rates (2017 – 2021) for urban interstate freeways, the observed rate is *italic and underlined.*

Safety Priority Index System (SPIS)

SPIS is a method used in Oregon to identify safety problem areas. Roads are evaluated in approximately one-tenth mile increments (often grouped into larger segments). Each year these segments are ranked by assigning a SPIS score based on the frequency and severity of crashes observed, while taking traffic volumes into account. When a segment is ranked in the top 15% of the index, a crash analysis is typically warranted, and corrective actions are considered. There segments of roadway within the study area identified in the top 15% of the most recent (2022) SPIS rankings are shown in Figure 9.

FIGURE 9. SAFETY PRIORITY INDEX SYSTEM, 2022 (2019 - 2021 CRASHES)



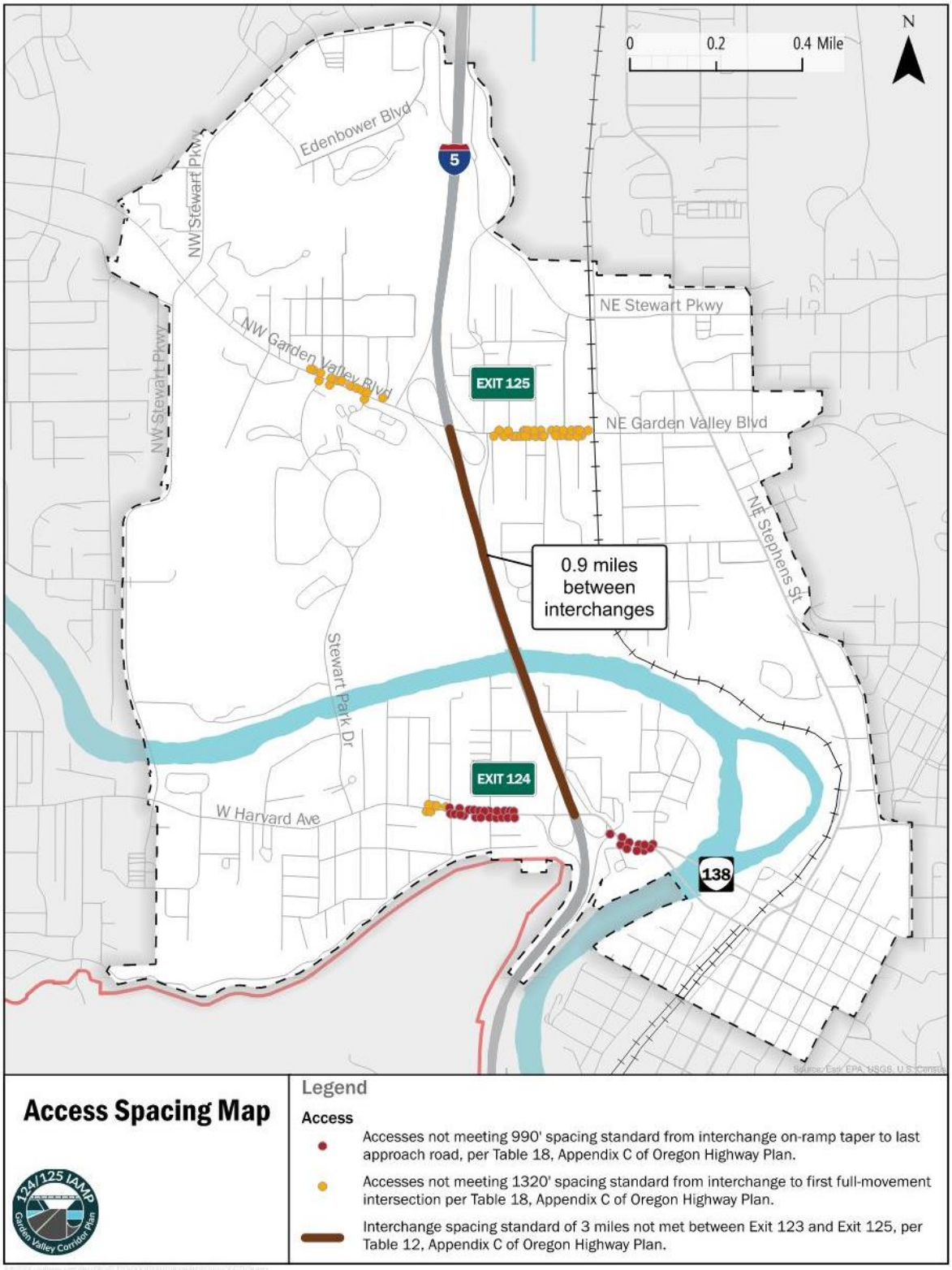
ACCESS, INTERSECTION, AND INTERCHANGE SPACING

The Oregon Highway Plan (OHP) and Oregon Administrative Rule (OAR) 734, Division 51 establish criteria for access, intersection, and interchange spacing with respect to state facilities. Specifically, access management standards, including those for interchanges and state highways, are presented in Appendix C of the OHP. Spacing requirements for interchanges are intended for the planning and design of new interchanges. The interchange spacing standards and existing interchange spacing for the study area is presented in Figure 10 for comparison.

The interchange spacing standard of 3 miles is not met between Exits 124 and 125 and between Exits 123 and 124 near Roseburg. However, this interchange spacing standard only applies to the planning and design of new interchanges and is only presented in this memo for informational purposes.

The access spacing standards for the I-5 interchange on Highway No. 138 (W Harvard Avenue) are presented in Table 18, Appendix C of the OHP. The I-5 interchange on Highway No. 138 (W Harvard Avenue) does not meet any of the spacing standards presented in the OHP.

FIGURE 10 - ACCESS AND INTERCHANGE SPACING



SUMMARY OF EXISTING DEFICIENCIES

The existing deficiencies are summarized in Table 14.

TABLE 14. SUMMARY OF EXISTING DEFICIENCIES

Deficiencies	
Multimodal	
Pedestrian	• Sidewalks along Garden Valley Boulevard are curb tight to traffic with no shoulder, creating a high-stress environment for pedestrians (PLTS 3 or PLTS 4). • Pedestrian volumes at study intersections were highest near Roseburg High School. On Garden Valley Boulevard, the highest pedestrian volumes were near Veterans Way on the west side of I-5, and near Airport Road / Cedar Street to the east.
Bicycle	• Bicycle volumes through study area intersections are low, particularly during the PM peak hour. • There are no formal bicycle facilities on Garden Valley Boulevard (east of the southbound on/off ramps) and W Harvard Avenue, resulting in BLTS 4. • Two-way bicycle and pedestrian traffic has been observed on the sidewalk along Garden Valley Boulevard between Duck Pond Street and the I-5 on-ramp due to lack of bicycle facility.
Transit	
Service	• At best, transit frequency in Roseburg is hourly, which is considered “fair”. • In Roseburg, less than half of the transit stops have covered seating, though most have some form of wayfinding signage.
Traffic	
Traffic Operations	• Two intersections currently exceed applicable mobility targets during the PM Peak Hour: Intersection #10 (Garden Valley Boulevard at Northbound Off-Ramp/NW Mulholland Drive) and intersection #17 (Harvard Avenue at Harrison Street). • None of the study intersections exceed applicable mobility targets during the AM Peak Hour. • The freeways operations operate below applicable mobility targets during the AM and PM Peak Hours.
Queuing	• Queuing during the design hour (PM peak hour) is most significant in the westbound direction of Garden Valley Boulevard approaching the Garden Valley Shopping Center access and the interchange 125 northbound ramp. • The outside (right) through lane on westbound Garden Valley Boulevard is more heavily utilized than the inside lane between the Garden Valley Shopping Center and Highland Street. • At signalized intersections, 95th percentile queues throughout the study area are usually able to clear the intersection without having to wait through multiple signal cycles. • Although not observed during the site visit, anecdotal information provided by the project team notes that when a train passes through the study area, it can limit mobility throughout Roseburg east of I-5, particularly downtown.

Deficiencies	
Safety	

Crash History	• Of the 1,288 crashes in the study area, 310 occurred at study area intersections. The three intersections with the most crashes during the study area were:
	  • Garden Valley Blvd at Northbound Off-Ramp / NW Mulholland Dr (47 crashes)
	  • Garden Valley Blvd at Stewart Pkwy (43 crashes)
	  • Garden Valley Blvd at Southbound Off-Ramp (24 crashes)
	• 5 fatal crashes and 49 serious injury crashes were recorded in the study area during the study period.
	• There were 28 crashes in the study area recorded as pedestrian crashes and 19 bicycle-involved crashes.
	• Garden Valley Boulevard at Stewart Parkway and Garden Valley Boulevard at Exit 125 Northbound Off-Ramp / Mulholland Drive both exceed the critical crash rate for 4-legged signalized study intersections.
	• The I-5 mainline segments traveling through interchange 125 and through interchange 124 exceed the comparable Table II crash rate for urban interstate freeways.