I-5 Bottleneck Corridor Segment Plan

Exit 119 to Exit 129

Oregon Department of Transportation

OREGON DEPARTMENT OF TRANSPORTATION

July 2021

KITTELSON & ASSOCIATES

Image Source: Google Earth

I-5 BOTTLENECK CORRIDOR SEGMENT PLAN

Exit 119 to Exit 129

City of Roseburg/Douglas County, Oregon

Prepared for:

OREGON DEPARTMENTOF TRANSPORTATION REGION 3

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PROJECT PURPOSE

What improvements can enhance user experience on I-5 in the study area?

The I-5 mainline between Exit 129 and Exit 119 (graphically illustrated in Figures 1 and 2) has experienced increased traffic volumes, congestion, crashes, and delays over the past several years. Previous interchange area planning studies (IAMPs), the Roseburg Transportation System Plan (TSP), and other traffic volume forecasting studies have noted existing and forecast traffic operations deficiencies along the corridor. Given that this section of I-5 is the backbone of local and regional travel for the Roseburg/Douglas County study area, the Oregon Department of Transportation (ODOT) initiated this planning project to document the existing and future traffic conditions on the I-5 mainline and better understand the nuanced traffic patterns, existing/future circulation constraints (including the potential for future traffic bottlenecks), and the identification of potential improvement projects to address these constraints.

PROJECT PROCESS

The project included analysis, concept development, meetings with stakeholders, and a public review process. Key steps in the project process included:

- Existing inventory and conditions analysis
- Review of existing planning and traffic-related documents
- Crash analysis
- Future no-build conditions analysis for future year 2040
- Potential concept development and corridor operations evaluation, including high-level reviews of bridge, right-of-way, and geotechnical impacts
- Multiple project management and technical review team meetings, including representatives from ODOT, City of Roseburg, Douglas County, and community members at large
- Public comment period
- Three public body presentations, including representatives from the City of Roseburg City Council and Douglas County Commissioners

Figure 3 shows the project timeline for major meetings and technical memos. See Appendix A for meeting minutes and Appendix B for the supporting technical memos.

Figure 1: Study Corridor

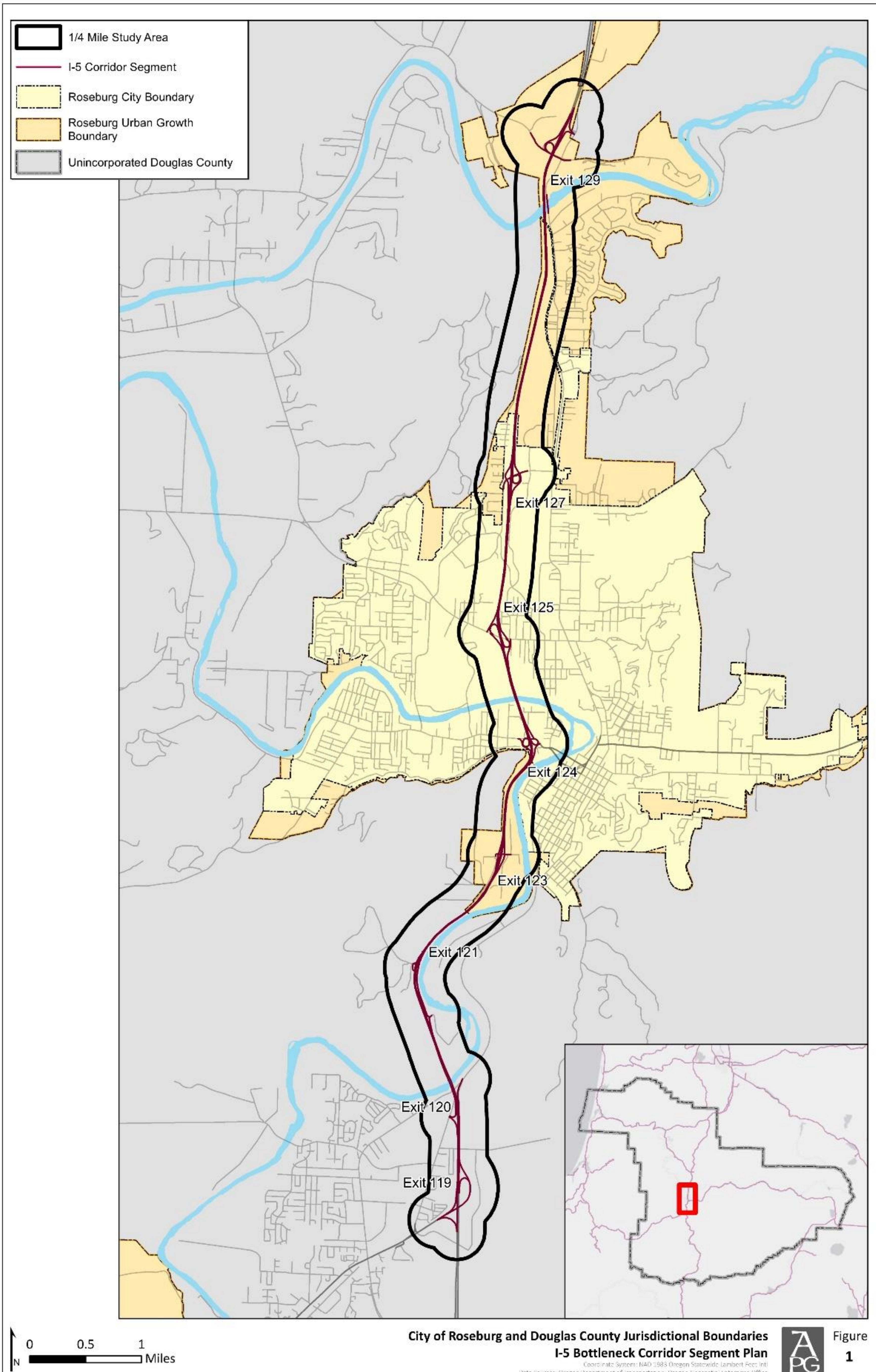


Figure 2 – Detailed I-5 Corridor Segment Map with Interchange Details

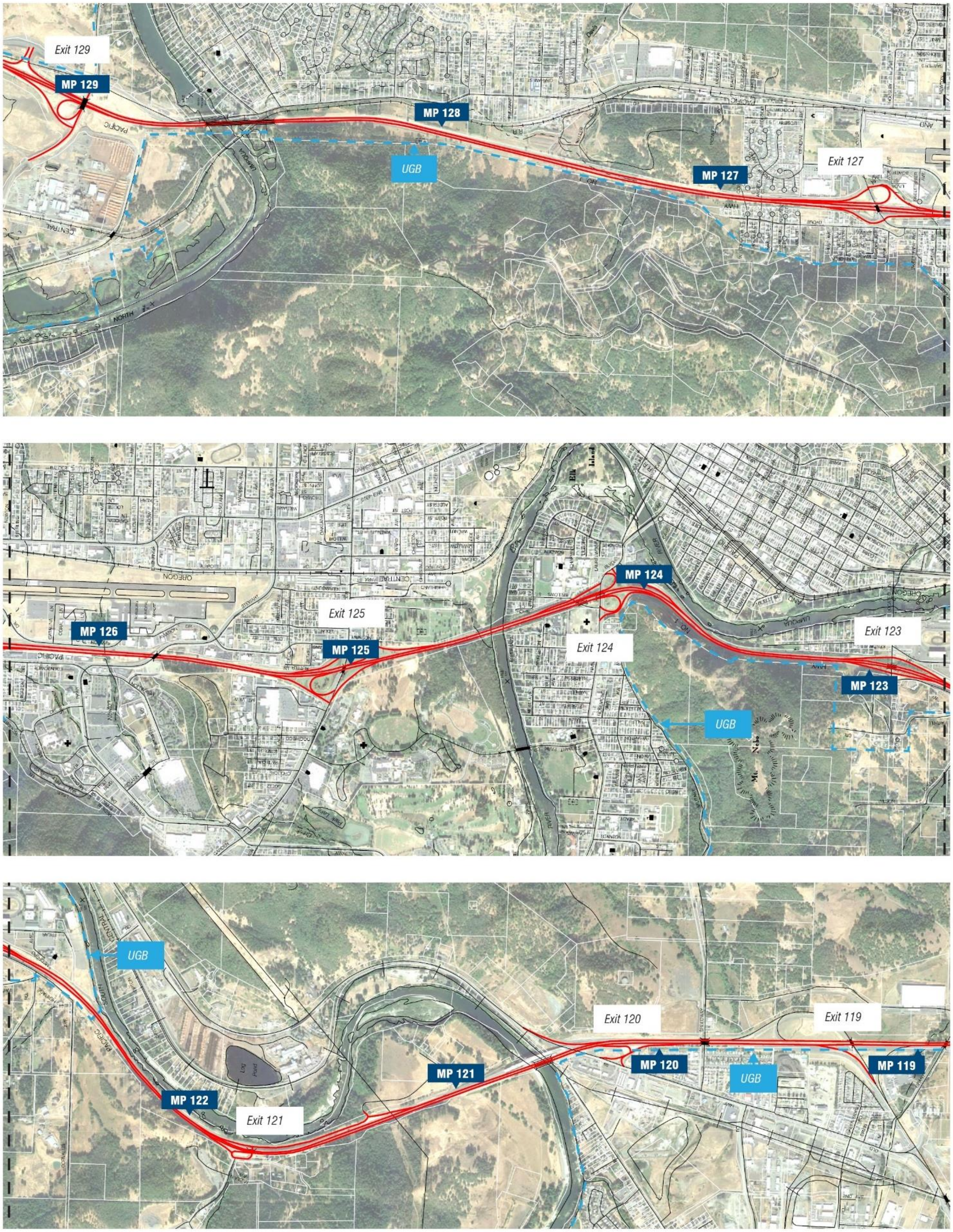
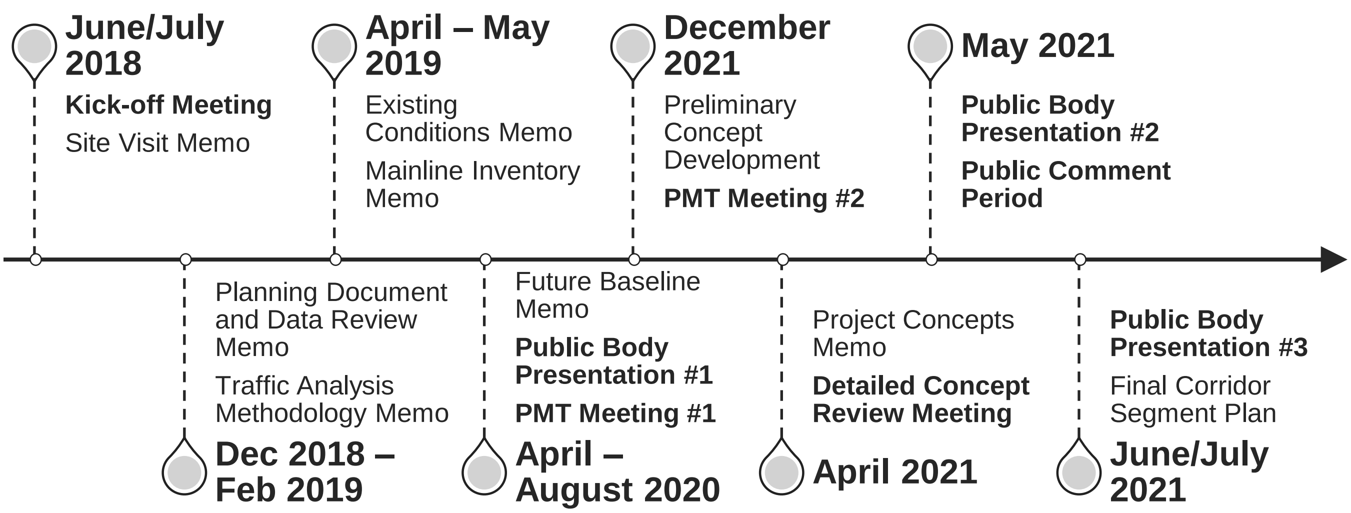


Figure 3: Project Timeline



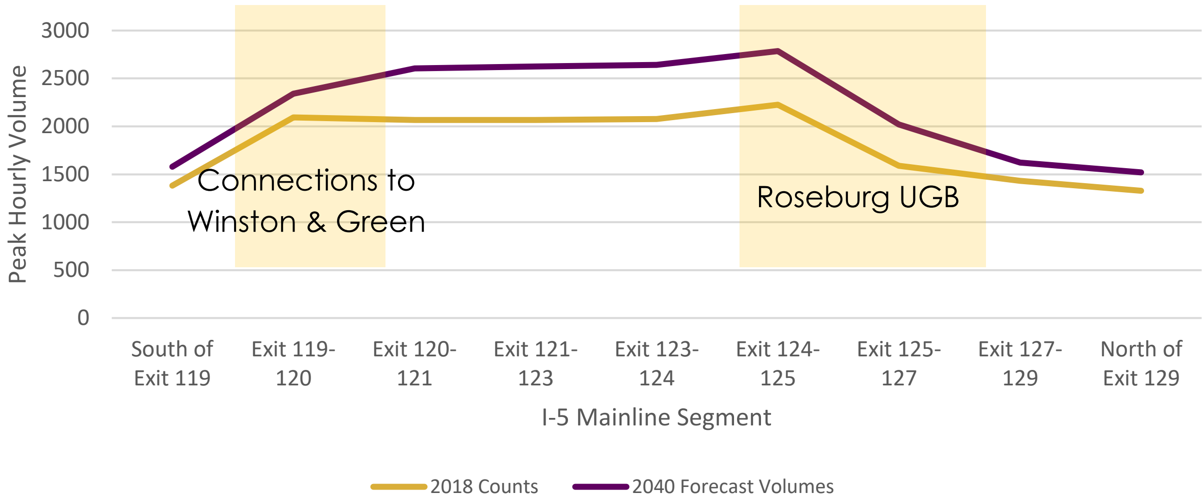
SUMMARY OF OPERATIONAL CHALLENGES

Through existing and future conditions analysis, it was found that there is not a recurring bottleneck issue on the I-5 mainline travel lanes. There are hotspots within the study area that exceed capacity during peak periods in the future year located at interchange ramp merge and diverge points. There is a lot of merge/diverge traffic causing friction and slowdowns, which can then become the beginning of temporary bottlenecks. Due to a lack of a traditional recurring bottleneck, the analysis process was adjusted during the project to consider peak traffic conditions for future year 2040 conditions during concept development.

The following describes key operational challenges identified along the study corridor:

- **Lack of Adequate Shoulders** – Due to the topographical constraints of the area, the majority of the study corridor has less than standard shoulder width, especially at certain bridges/overpasses and between Exits 125 and 119. The lack of room on the shoulder for vehicles to pull over in the event of an incident or crash can exacerbate congestion along the I-5 corridor. Additionally, the lack of shoulders also limits the ability to conduct speed enforcement along the study corridor. Through public engagement, it is known that speed, and specifically speed differentials between entering vehicles and through traffic at on-ramps, is a main safety concern of the community that would be supported with adequate shoulders.
- **Winston-Green Commuter Pattern** – Roseburg is a center of employment and retail in the study area. As such, approximately 25% of travel on I-5 represent commuter/shopping trips between Winston and Green (which is primarily residential) to Roseburg. These commuter patterns are expected to intensify as Winton and Green continue to grow.

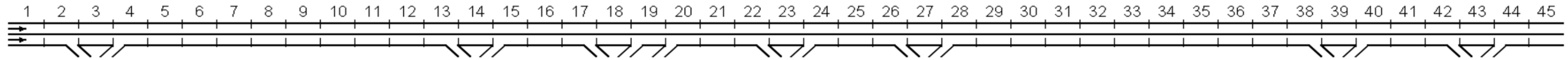
Figure 4: 2018 and 2040 Future Year PM Peak Hour Volumes in the Southbound Direction



- **Topographical Constraints Restricting Regional Connectivity** –Topographical and natural feature constraints abound in the larger Roseburg study area, including Mount Nebo, the Umpqua River, and steeply sloped hillsides. These constraints have inhibited the development of a continuous parallel arterial/collector grid pattern. As such, I-5 currently serves as an extension of the local arterial network, especially between Exits 125 and 124. These local trips along I-5 generate additional merge, diverge and weaving maneuvers, contributing to congestion and slowdowns along the I-5 mainline.
- **Southbound Congestion** – Compared to the northbound direction, I-5 in the southbound direction only has two travel lanes throughout the entire study segment. As such, I-5 southbound is generally more capacity constrained, particularly in the weekday PM peak period. Based on 2040 forecast volumes, corridor bottlenecks are expected to form at the Exit 124 southbound on-ramp on weekdays during the peak summer travel periods. Figure 5 illustrates changes in demand-over-capacity ratios by month of year.
- **Interchange Ramp Geometric Challenges** – Due to the topographical constraints of the area, there are existing interchanges (Exit 125, Exit 124, and Exit 121) with less than ideal offramp lengths, acceleration lanes, and diverge angles. These geometric challenges can lead to safety concerns and contribute to mainline congestion. Addressing some of these geometric issues is a focus of the improvement concepts.

Figure 5: I-5 Southbound PM Peak Period Reliability Results (2040 No-Build Analysis)

Max Demand-Capacity Ration During 5:15-5:30 PM Analysis Period



Month	Day of Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
				Winchester Exit 129											Edenbower Blvd Exit 127				Garden Valley Rd Exit 125					Harvard Ave Exit 124
January	Monday	0.37	0.43	0.33	0.46	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.46	0.32	0.57	0.49	0.57	0.41	0.58	0.81	0.69	0.81	0.54
	Tuesday	0.37	0.43	0.33	0.46	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.46	0.32	0.57	0.49	0.57	0.41	0.58	0.81	0.69	0.81	0.54
	Wednesday	0.36	0.42	0.33	0.45	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.45	0.32	0.56	0.48	0.56	0.40	0.57	0.79	0.67	0.79	0.53
	Thursday	0.35	0.41	0.32	0.43	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.43	0.31	0.55	0.46	0.55	0.39	0.56	0.77	0.65	0.77	0.52
	Friday	0.31	0.37	0.28	0.39	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.39	0.28	0.49	0.42	0.49	0.35	0.50	0.69	0.58	0.69	0.46
February	Monday	0.39	0.45	0.35	0.48	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.48	0.34	0.60	0.51	0.60	0.43	0.61	0.85	0.72	0.85	0.57
	Tuesday	0.39	0.45	0.35	0.48	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.48	0.34	0.60	0.51	0.60	0.43	0.61	0.85	0.72	0.85	0.57
	Wednesday	0.38	0.45	0.34	0.47	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.47	0.33	0.59	0.50	0.59	0.42	0.60	0.83	0.71	0.83	0.56
	Thursday	0.37	0.43	0.33	0.45	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.45	0.32	0.57	0.49	0.57	0.41	0.58	0.81	0.69	0.81	0.54
	Friday	0.33	0.39	0.30	0.41	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.41	0.29	0.51	0.44	0.51	0.37	0.52	0.72	0.61	0.72	0.49
March	Monday	0.42	0.49	0.38	0.52	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.52	0.37	0.65	0.55	0.65	0.47	0.66	0.92	0.78	0.92	0.62
	Tuesday	0.42	0.49	0.38	0.52	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.52	0.37	0.65	0.55	0.65	0.47	0.66	0.92	0.78	0.92	0.62
	Wednesday	0.41	0.48	0.37	0.51	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.51	0.36	0.64	0.54	0.64	0.46	0.65	0.90	0.76	0.90	0.60
	Thursday	0.40	0.47	0.36	0.49	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.49	0.35	0.62	0.53	0.62	0.44	0.63	0.87	0.74	0.87	0.59
	Friday	0.36	0.42	0.32	0.44	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.44	0.31	0.56	0.47	0.56	0.40	0.57	0.78	0.66	0.78	0.53
April	Monday	0.42	0.49	0.38	0.52	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.52	0.37	0.65	0.56	0.65	0.47	0.66	0.92	0.78	0.92	0.62
	Tuesday	0.42	0.49	0.38	0.52	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.52	0.37	0.65	0.56	0.65	0.47	0.66	0.92	0.78	0.92	0.62
	Wednesday	0.41	0.48	0.37	0.51	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.51	0.36	0.64	0.54	0.64	0.46	0.65	0.90	0.77	0.90	0.61
	Thursday	0.40	0.47	0.36	0.49	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.49	0.35	0.62	0.53	0.62	0.44	0.63	0.87	0.74	0.87	0.59
	Friday	0.36	0.42	0.32	0.44	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.44	0.31	0.56	0.47	0.56	0.40	0.57	0.78	0.67	0.78	0.53
May	Monday	0.44	0.51	0.39	0.54	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.54	0.38	0.68	0.58	0.68	0.48	0.69	0.95	0.81	0.95	0.64
	Tuesday	0.44	0.51	0.39	0.54	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.54	0.38	0.68	0.58	0.68	0.48	0.69	0.95	0.81	0.95	0.64
	Wednesday	0.43	0.50	0.38	0.53	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.53	0.38	0.66	0.57	0.66	0.47	0.68	0.93	0.80	0.93	0.63
	Thursday	0.41	0.49	0.37	0.51	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.51	0.36	0.65	0.55	0.65	0.46	0.66	0.91	0.77	0.91	0.61
	Friday	0.37	0.44	0.33	0.46	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.46	0.33	0.58	0.49	0.58	0.41	0.59	0.81	0.69	0.81	0.55
June	Monday	0.48	0.56	0.43	0.59	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.59	0.42	0.74	0.63	0.74	0.53	0.76	1.05	0.89	1.05	0.70
	Tuesday	0.48	0.56	0.43	0.59	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.59	0.42	0.74	0.63	0.74	0.53	0.76	1.05	0.89	1.05	0.70
	Wednesday	0.47	0.55	0.42	0.58	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.58	0.41	0.73	0.62	0.73	0.52	0.74	1.02	0.87	1.02	0.69
	Thursday	0.45	0.53	0.41	0.56	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.56	0.40	0.71	0.60	0.71	0.51	0.72	0.99	0.85	0.99	0.67
	Friday	0.41	0.48	0.37	0.50	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.50	0.36	0.63	0.54	0.63	0.45	0.65	0.89	0.76	0.89	0.60
July	Monday	0.49	0.57	0.44	0.60	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.60	0.43	0.76	0.64	0.76	0.54	0.77	1.06	0.91	1.06	0.72
	Tuesday	0.49	0.57	0.44	0.60	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.60	0.43	0.76	0.64	0.76	0.54	0.77	1.06	0.91	1.06	0.72
	Wednesday	0.48	0.56	0.43	0.59	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.59	0.42	0.74	0.63	0.74	0.53	0.75	1.04	0.89	1.04	0.70
	Thursday	0.46	0.54	0.42	0.57	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.57	0.41	0.72	0.61	0.72	0.51	0.73	1.01	0.86	1.01	0.68
	Friday	0.41	0.49	0.37	0.51	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.51	0.36	0.64	0.55	0.64	0.46	0.66	0.91	0.77	0.91	0.61
August	Monday	0.48	0.57	0.43	0.60	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.60	0.42	0.75	0.64	0.75	0.54	0.76	1.05	0.90	1.05	0.71
	Tuesday	0.48	0.57	0.43	0.60	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.60	0.42	0.75	0.64	0.75	0.54	0.76	1.05	0.90	1.05	0.71
	Wednesday	0.47	0.55	0.42	0.58	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.58	0.41	0.73	0.63	0.73	0.52	0.75	1.03	0.88	1.03	0.70
	Thursday	0.46	0.54	0.41	0.57	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.57	0.40	0.71	0.61	0.71	0.51	0.73	1.00	0.85	1.00	0.67
	Friday	0.41	0.48	0.37	0.51	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.51	0.36	0.64	0.54	0.64	0.46	0.65	0.90	0.76	0.90	0.60
September	Monday	0.45	0.53	0.40	0.55	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.55	0.39	0.70	0.59	0.70	0.50	0.71	0.98	0.83	0.98	0.66
	Tuesday	0.45	0.53	0.40	0.55	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.55	0.39	0.70	0.59	0.70	0.50	0.71	0.98	0.83	0.98	0.66
	Wednesday	0.44	0.51	0.39	0.54	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.54	0.38	0.68	0.58	0.68	0.49	0.69	0.96	0.82	0.96	0.65
	Thursday	0.43	0.50	0.38	0.53	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.53	0.37	0.66	0.56	0.66	0.47	0.67	0.93	0.79	0.93	0.63
	Friday	0.38	0.45	0.34	0.47	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.47	0.33	0.59	0.50	0.59	0.42	0.60	0.83	0.71	0.83	0.56
October	Monday	0.42	0.49	0.38	0.52	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.52	0.37	0.65	0.55	0.65	0.46	0.66	0.91	0.78	0.91	0.61
	Tuesday	0.42	0.49	0.38	0.52	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.52	0.37	0.65	0.55	0.65	0.46	0.66	0.91	0.78	0.91	0.61
	Wednesday	0.41	0.48	0.37	0.51	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.51	0.36	0.64	0.54	0.64	0.45	0.65	0.89	0.76	0.89	0.60
	Thursday	0.40	0.47	0.36	0.49	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.49	0.35	0.62	0.53	0.62	0.44	0.63	0.87	0.74	0.87	0.58
	Friday	0.36	0.42	0.32	0.44	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.44	0.31	0.55	0.47	0.55	0.40	0.56	0.78	0.66	0.78	0.52
November	Monday	0.43	0.50	0.39	0.53	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.53	0.38	0.67	0.57	0.67	0.48	0.68	0.94	0.80	0.94	0.63
	Tuesday	0.43	0.50	0.39	0.53	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.53	0.38	0.67	0.57	0.67	0.48	0.68	0.94	0.80	0.94	0.63
	Wednesday	0.42	0.49	0.38	0.52	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.52	0.37	0.65	0.56	0.65	0.47	0.67	0.92	0.78	0.92	0.62
	Thursday	0.41	0.48	0.37	0.50	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.50	0.36	0.63	0.54	0.63	0.45	0.65	0.89	0.76	0.89	0.60
	Friday	0.36	0.43	0.33	0.45	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.45	0.32	0.57	0.48	0.57	0.41	0.58	0.80	0.68	0.80	0.54
December	Monday	0.43	0.50	0.39	0.53	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.53	0.38	0.67	0.57	0.67	0.48	0.68	0.94	0.80	0.94	0.63
	Tuesday	0.43	0.50	0.39	0.53	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.53	0.38	0.67	0.57	0.67	0.48	0.68	0.94	0.80	0.94	0.63
	Wednesday	0.42	0.49	0.38	0.52	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.52	0.37	0.66	0.56	0.66	0.47	0.67	0.92	0.78	0.92	0.62
	Thursday	0.41	0.48	0.37	0.51	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.51	0.36	0.64	0.54	0.64	0.45	0.65	0.89	0.76	0.89	0.60
	Friday	0.37	0.43	0.33	0.45	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.45	0.32	0.57	0.48	0.57	0.41	0.58	0.80	0.68	0.80	0.54

Month	Day of Week	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
					Fairgrounds Ave Exit 123												North Shady Exit 120				Coos Bay - Winston Exit 119		
January	Monday	0.80	0.68	0.71	0.66	0.69	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.78	0.59	0.62	0.60	0.71	0.38	0.49	0.42
	Tuesday	0.80	0.68	0.71	0.66	0.69	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.78	0.59	0.62	0.60	0.71	0.38	0.49	0.42
	Wednesday	0.79	0.67	0.70	0.65	0.68	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.77	0.57	0.61	0.59	0.69	0.37	0.48	0.41
	Thursday	0.76	0.65	0.68	0.63	0.66	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.74	0.56	0.59	0.57	0.67	0.36	0.47	0.40
	Friday	0.68	0.58	0.61	0.56	0.59	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.67	0.50	0.53	0.51	0.60	0.32	0.42	0.36
February	Monday	0.84	0.72	0.75	0.69	0.73	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.82	0.62	0.66	0.63	0.74	0.40	0.52	0.44
	Tuesday	0.84	0.72	0.75	0.69	0.73	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.82	0.62	0.66	0.63	0.74	0.40	0.52	0.44
	Wednesday	0.83	0.70	0.73	0.68	0.71	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.80	0.60	0.64	0.62	0.73	0.39	0.51	0.43
	Thursday	0.80	0.68	0.71	0.66	0.69	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.78	0.59	0.62	0.60	0.71	0.38	0.49	0.42
	Friday	0.72	0.61	0.64	0.59	0.62	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.70	0.52	0.56	0.54	0.63	0.34	0.44	0.37
March	Monday	0.91	0.78	0.81	0.75	0.79	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.89	0.67	0.71	0.68	0.80	0.43	0.56	0.48
	Tuesday	0.91	0.78	0.81	0.75	0.79	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.89	0.67	0.71	0.68	0.80	0.43	0.56	0.48
	Wednesday	0.90	0.76	0.79	0.74	0.77	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.87	0.65	0.70	0.67	0.79	0.42	0.55	0.47
	Thursday	0.87	0.74	0.77	0.71	0.75	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.85	0.63	0.68	0.65	0.76	0.41	0.53	0.45
	Friday	0.78	0.66	0.69	0.64	0.67	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.76	0.57	0.61	0.58	0.68	0.37	0.48	0.41
April	Monday	0.91	0.78	0.81	0.75	0.79	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.89	0.67	0.71	0.68	0.80	0.43	0.56	0.48
	Tuesday	0.91	0.78	0.81	0.75	0.79	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.89	0.67	0.71	0.68	0.80	0.43	0.56	0.48
	Wednesday	0.90	0.76	0.79	0.74	0.77	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.87	0.65	0.70	0.67	0.79	0.42	0.55	0.47
	Thursday	0.87	0.74	0.77	0.72	0.75	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.85	0.63	0.68	0.65	0.76	0.41	0.53	0.45
	Friday	0.78	0.66	0.69	0.64	0.67	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.76	0.57	0.61	0.58	0.68	0.37	0.48	0.41
May	Monday	0.95	0.81	0.84	0.78	0.82	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.92	0.69	0.74	0.71	0.84	0.45	0.58	0.50
	Tuesday	0.95	0.81	0.84	0.78	0.82	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.92	0.69	0.74	0.71	0.84	0.45	0.58	0.50
	Wednesday	0.93	0.79	0.82	0.77	0.80	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.91	0.68	0.72	0.70	0.82	0.44	0.57	0.49
	Thursday	0.90	0.77	0.80	0.74	0.78	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.88	0.66	0.70	0.68	0.80	0.43	0.55	0.47
	Friday	0.81	0.69	0.72	0.67	0.70	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.79	0.59	0.63	0.61	0.71	0.38	0.50	0.42
June	Monday	1.04	0.89	0.92	0.86	0.90	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	1.01	0.76	0.81	0.78	0.92	0.49	0.64	0.54
	Tuesday	1.04	0.89	0.92	0.86	0.90	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	1.01	0.76	0.81	0.78	0.92	0.49	0.64	0.54
	Wednesday	1.02	0.87	0.90	0.84	0.88	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.99	0.74	0.79	0.76	0.90	0.48	0.63	0.53
	Thursday	0.99	0.84	0.88	0.82	0.85	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.96	0.72	0.77	0.74	0.87	0.47	0.61	0.52
	Friday	0.89	0.76	0.79	0.73	0.76	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.86	0.65	0.69	0.66	0.78	0.42	0.54	0.46
July	Monday	1.06	0.90	0.94	0.87	0.91	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	1.03	0.77	0.82	0.79	0.93	0.50	0.65	0.55
	Tuesday	1.06	0.90	0.94	0.87	0.91	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	1.03	0.77	0.82	0.79	0.93	0.50	0.65	0.55
	Wednesday	1.04	0.88	0.92	0.85	0.89	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	1.01	0.76	0.81	0.78	0.91	0.49	0.64	0.54
	Thursday	1.01	0.86	0.89	0.83	0.87	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.98	0.74	0.78	0.75	0.89	0.48	0.62	0.53
	Friday	0.90	0.77	0.80	0.74	0.78	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.88	0.66	0.70	0.68	0.79	0.43	0.55	0.47
August	Monday	1.05	0.89	0.93	0.86	0.90	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	1.02	0.77	0.82	0.79	0.92	0.49	0.64	0.55
	Tuesday	1.05	0.89	0.93	0.86	0.90	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	1.02	0.77	0.82	0.79	0.92	0.49	0.64	0.55
	Wednesday	1.03	0.88	0.91	0.85	0.89	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	1.00	0.75	0.80	0.77	0.90	0.48	0.63	0.54
	Thursday	1.00	0.85	0.88	0.82	0.86	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.97	0.73	0.78	0.75	0.88	0.47	0.61	0.52
	Friday	0.90	0.76	0.79	0.74	0.77	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.87	0.65	0.70	0.67	0.79	0.42	0.55	0.47
September	Monday	0.98	0.83	0.86	0.80	0.84	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.95	0.71	0.76	0.73	0.86	0.46	0.60	0.51
	Tuesday	0.98	0.83	0.86	0.80	0.84	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.95	0.71	0.76	0.73	0.86	0.46	0.60	0.51
	Wednesday	0.96	0.81	0.85	0.79	0.82	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.93	0.70	0.74	0.71	0.84	0.45	0.59	0.50
	Thursday	0.93	0.79	0.82	0.76	0.80	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.90	0.68	0.72	0.69	0.82	0.44	0.57	0.48
	Friday	0.83	0.71	0.74	0.68	0.72	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.81	0.61	0.65	0.62	0.73	0.39	0.51	0.43
October	Monday	0.91	0.77	0.81	0.75	0.78	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.88	0.66	0.71	0.68	0.80	0.43	0.56	0.47
	Tuesday	0.91	0.77	0.81	0.75	0.78	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.88	0.66	0.71	0.68	0.80	0.43	0.56	0.47
	Wednesday	0.89	0.76	0.79	0.73	0.77	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.87	0.65	0.69	0.67	0.78	0.42	0.55	0.47
	Thursday	0.87	0.74	0.77	0.71	0.75	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.84	0.63	0.67	0.65	0.76	0.41	0.53	0.45
	Friday	0.78	0.66	0.69	0.64	0.67	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.75	0.57	0.60	0.58	0.68	0.37	0.48	0.40
November	Monday	0.93	0.80	0.83	0.77	0.80	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.91	0.68	0.73	0.70	0.82	0.44	0.57	0.49
	Tuesday	0.93	0.80	0.83	0.77	0.80	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.91	0.68	0.73	0.70	0.82	0.44	0.57	0.49
	Wednesday	0.92	0.78	0.81	0.75	0.79	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.89	0.67	0.71	0.68	0.80	0.43	0.56	0.48
	Thursday	0.89	0.76	0.79	0.73	0.77	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.86	0.65	0.69	0.66	0.78	0.42	0.54	0.46
	Friday	0.80	0.68	0.70	0.65	0.69	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.77	0.58	0.62	0.60	0.70	0.38	0.49	0.42
December	Monday	0.94	0.80	0.83	0.77	0.81	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.91	0.68	0.73	0.70	0.82	0.44	0.57	0.49
	Tuesday	0.94	0.80	0.83	0.77	0.81	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.91	0.68	0.73	0.70	0.82	0.44	0.57	0.49
	Wednesday	0.92	0.78	0.81	0.75	0.79	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.89	0.67	0.71	0.69	0.81	0.43	0.56	0.48
	Thursday	0.89	0.76	0.79	0.73	0.77	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.87	0.65	0.69	0.67	0.78	0.42	0.55	0.47
	Friday	0.80	0.68	0.71	0.66	0.69	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.78	0.58	0.62	0.60	0.70	0.38	0.49	0.42

PROJECT CONCEPTS

This section describes each of the concept alternatives developed for the projects along I-5. These concepts were developed based on the noted operational challenges, existing infrastructure limitations, considerations toward the operational need, constructability, and cost feasibility of the concepts. Table 1 summarizes the concepts presented in this section:

Table 1: Project Concept Summary

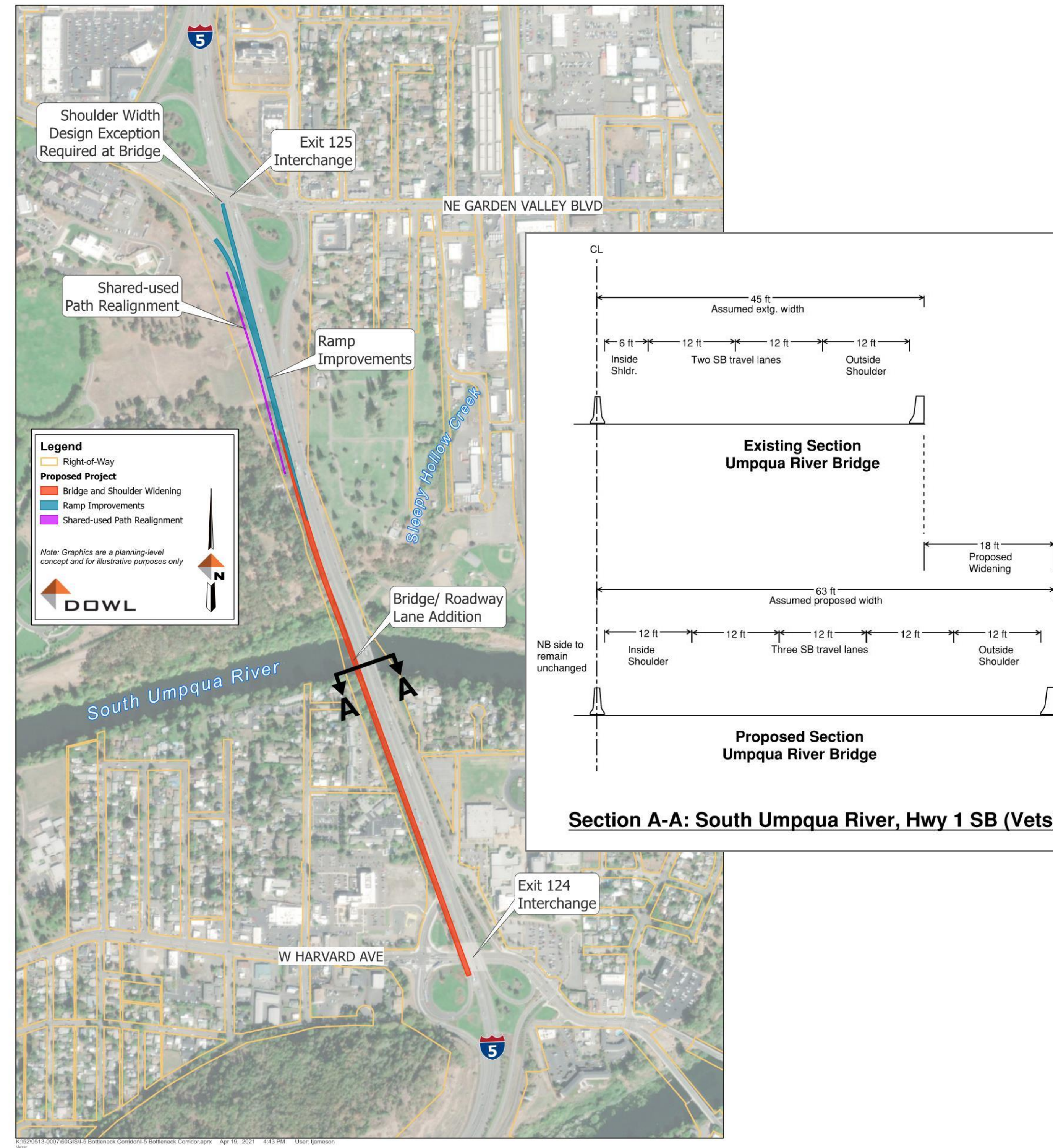
ID	Concept Name	Description
1	I-5 Southbound Auxiliary Lane (Exit 125 to 124)	Widen I-5 southbound to include an auxiliary lane between Exit 125 on-ramp and 124 off-ramp.
2	Shoulder Widening	Widen or restripe I-5 to add shoulders where feasible.
3	Exit 125 Southbound Ramp Meters	Install ramp meters for southbound on-ramps at Exit 125. The specific design/implementation details and impacts to the Garden Valley Boulevard corridor will be explored as part of a future IAMP at Exit 125.
4	Exit 124 Northbound & Southbound Ramp Meters	Install ramp meters for northbound and southbound on-ramps at Exit 124. The specific design/implementation details and impacts to the Harvard Avenue corridor will be explored as part of a future IAMP at Exit 124.
5	Exit 124 Southbound Geometric Modifications	Reconfigure southbound on-ramp at Exit 124 to reduce friction with mainline. The specific design/implementation details and impacts to the Harvard Avenue corridor will be explored as part of a future IAMP at Exit 124.
6	Exit 121 Southbound Geometric Modifications	Reconfigure southbound off-ramp at Exit 121 to reduce friction with mainline. The specific design/implementation details will be explored as part of a future IAMP at Exit 121.
7	Exit 119 Southbound Deceleration Lane Modification	Reconfigure southbound off-ramp deceleration lane length at Exit 119 to reduce friction with mainline. The specific design/implementation details will be explored as part of a future IAMP at Exit 119.

Concept #1: I-5 Southbound Auxiliary Lane (Exit 125 to Exit 124)

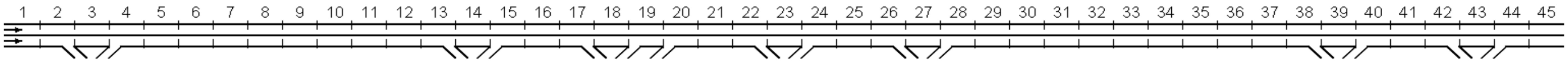
Project Details

Location	I-5 Mile Points: 124-125
Transportation Facility Characteristics	**Facility Type:** Interstate Highway **Jurisdiction:** ODOT **Functional Classification:** • Federal – Urban Interstate • OHP – Interstate • NHS • Seismic Program 2 **Travel Lanes:** • Two Southbound Lanes • Two Northbound Lanes **Freight Route Designation:** • National Highway Freight Route • OHP Freight Route • Reduction Review Route • High Clearance Route **Posted Speed:** • 65 mph **Mobility Target:** • OHP: 0.80 • HDM: 0.65 **Cross Section Elements:** • Inside Shoulder - 6 feet • Travel Lanes - 12 feet • Outside Shoulder - 12 feet **Mainline Hourly Volumes between Exits 125 and 124 during the Southbound Peak Hour (5:15-6:15 PM):** • Southbound ○ 2414 – Year 2017 ○ 3079 – Year 2040 • Northbound ○ 1704 – Year 2017 ○ 2193 – Year 2040
Project Description/Purpose	Construct a southbound auxiliary lane on I-5 between Exit 125 and Exit 124. In recognition that I-5 is used as an extension of the local transportation network between the two interchanges, the auxiliary lane would better accommodate existing and projected travel demand and increase capacity for southbound through traffic on I-5. This helps minimize friction at the ramps, by removing the need for local traffic to merge and/or diverge with mainline traffic In addition to the auxiliary lane, lengthen the southbound on-ramp to increase the acceleration distance. As part of the bridge widening, multi-modal impacts will be considered, including shared-use path realignment and improvements. A second alternative was considered for this location to modify operations to a part-time shoulder use application. Due to the lack of adequate existing shoulders at this location, part-time shoulder use would necessitate widening. Because both alternatives would require widening and part-time shoulder use would provide less additional capacity, the part-time shoulder use alternative was not explored.
Operational Considerations	An auxiliary lane would allow ramp-to-ramp maneuvers that reduces friction with I-5 mainline between Exit 125 and Exit 124. Although the auxiliary lane will allow more vehicles to be processed within the extents of the modification, the additional through traffic will interact with merging vehicles at the Exit 124 on-ramp just downstream of the auxiliary lane. As such, an existing bottleneck may be removed, but the bottleneck at Exit 124 on-ramp still occurs during the same time period. The auxiliary lane will reduce the intensity of congestion in the area. See the graphics after the project sheet. **2040 No-Build Conditions (no changes):** • Max D/C between Exit 125 on-ramp and Exit 124 off-ramp: 1.06 • Max Queue: 1.5 miles to the Garden Valley Road southbound off-ramp (for 30 minutes) **2040 Modified Conditions (with proposed auxiliary lane):** • Max D/C of new weaving segment: 0.67 (bottleneck downstream maintains max D/C = 1.06) • Max Queue: 1.0 miles to the Garden Valley Road southbound diagonal on-ramp (for 15 minutes)
Project Considerations	• There is insufficient width on I-5 to accommodate a southbound auxiliary lane. To accommodate the needed width, the existing bridge structure would need to be widened as shown in the project cross section. • There is an existing shared-use path along the west side of I-5 that would need to be relocated. As a major reconstruction project, improvements such as repaving/widening, lighting, and signage will be considered. • The existing looping on ramp acceleration lane under the NE Garden Valley Boulevard bridge would become the beginning of the southbound auxiliary lane. The shoulder width is insufficient under the bridge. A design exception for the shoulder width would be necessary to avoid extensive bridge work. • The existing Garden Valley diamond on ramp acceleration lane does not meet current standards. The ramp should be improved to extend the acceleration lane into the new auxiliary lane, which would require roadway widening. • The roadway would need to be widened at several locations between the ramps and bridges to accommodate the additional southbound auxiliary lane.
Land Use Considerations	• On the west side of I-5, the Veteran's Administration (VA) owns the property with ODOT having an easement to occupy the right of way. Coordination with the VA will be needed and the easement will likely need to be enlarged if the path is moved west. • No impacts are anticipated to Title VI and Environmental Justice populations.
Environmental/ Right of way Considerations	• Two waterways: South Umpqua River (major river) and Sleepy Hollow Creek (small stream) cross the proposed project area. Wetlands are likely to be associated with both streams within the project area based on review of the National Wetlands Inventory (NWI) and National Resources Conservation Services (NRCS) soil survey. • Hydric soils are mapped throughout approximately 15% of the anticipated project area along the S. Umpqua River and a small portion of the southernmost extent of the project area. A wetland delineation would need to be conducted and a Wetland Delineation Report would need to be prepared. • A Joint Permit Application (JPA) would need to be submitted for below-ordinary high water (OHW) elevation and wetland impacts. • Proposed roadway widening (adding impervious surface) and widening the bridge deck would trigger the Federal-Aid Highway Programmatic (FAHP) documentation for stormwater management and impacts on Endangered Species Act (ESA)-listed species under the jurisdiction of the National Marine Fisheries Service (NMFS) and Essential Fish Habitat (EFH). • The proposed project footprint is within the 100-year floodplain; hydraulic analysis and no-rise certification will be required as per the City of Roseburg Code (CRC) 12.04.090.
Planning Level Cost Estimate	$27M (Design Engineering, Construction, Construction Engineering, 32% Contingency – 2021 Dollars)
Implementation	A future IAMP should include additional analysis of this location, especially to understand impacts of the auxiliary lane on the ramp terminals and the supporting local network. The IAMP should also consider multimodal improvements as part of the recommendations.

Concept Illustration



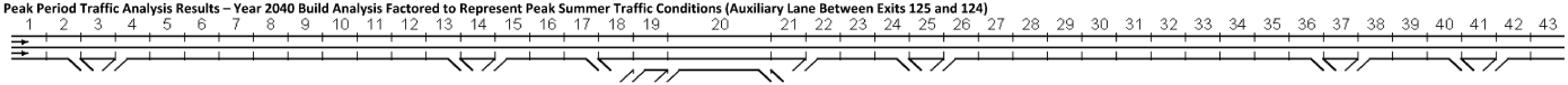
I-5 Southbound PM Peak Period Traffic Analysis Results – Year 2040 No-Build Analysis Factored to Represent Peak Summer Traffic Conditions



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
			Winchester Exit 129											Edenbower Blvd Exit 127				Garden Valley Rd Exit 125				
Measurement	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Number of Lanes	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Segment Type	B	OF	B	ON	B	B	B	B	B	B	B	B	OF	B	ON	B	OF	B	ON	ON	B	OF
Acceleration Lane	-	241	-	289	-	-	-	-	-	-	-	-	242	-	323	-	235	-	254	178	-	249
LEVEL OF SERVICE																						
Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
14:00 - 14:15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	C	D	C	D
14:15 - 14:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	C	B	C	D	C	D
14:30 - 14:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	C	B	C	C	C	D
14:45 - 15:00	B	B	B	C	B	B	B	B	B	B	B	B	C	B	C	C	C	B	C	D	D	D
15:00 - 15:15	B	C	B	C	B	B	B	B	B	B	B	B	C	B	C	C	C	C	C	D	D	D
15:15 - 15:30	B	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B	C	B	C	C	C	C
15:30 - 15:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	C	D	D	D
15:45 - 16:00	B	C	B	C	B	B	B	B	B	B	B	B	C	B	C	C	C	B	C	D	D	D
16:00 - 16:15	B	B	B	C	B	B	B	B	B	B	B	B	C	B	C	C	C	C	C	D	D	D
16:15 - 16:30	B	C	B	C	B	B	B	B	B	B	B	B	C	B	C	C	C	C	C	D	D	D
16:30 - 16:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	C	D	D	D
16:45 - 17:00	B	B	B	B	B	B	B	B	B	B	B	B	B	A	C	B	C	B	C	D	D	D
17:00 - 17:15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	C	D	E	F
17:15 - 17:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	F	F	F	F	F	F
17:30 - 17:45	B	B	A	B	B	B	B	B	B	B	B	B	B	A	C	C	F	F	F	E	F	F
17:45 - 18:00	A	B	A	B	A	A	A	A	A	A	A	A	B	A	B	B	B	B	C	F	F	F
DEMAND TO CAPACITY RATIO																						
Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
14:00 - 14:15	0.40	0.47	0.36	0.52	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.52	0.35	0.62	0.53	0.62	0.45	0.63	0.84	0.71	0.84
14:15 - 14:30	0.40	0.47	0.36	0.50	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.50	0.35	0.61	0.52	0.61	0.42	0.60	0.83	0.71	0.83
14:30 - 14:45	0.38	0.45	0.33	0.51	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.51	0.33	0.59	0.50	0.59	0.42	0.59	0.80	0.68	0.80
14:45 - 15:00	0.46	0.54	0.40	0.57	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.57	0.39	0.68	0.58	0.68	0.50	0.70	**0.95**	0.80	**0.95**
15:00 - 15:15	0.47	0.56	0.44	0.60	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.60	0.43	0.73	0.62	0.73	0.54	0.75	**0.99**	0.84	**0.99**
15:15 - 15:30	0.40	0.47	0.35	0.49	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.49	0.32	0.55	0.47	0.55	0.39	0.58	0.79	0.68	0.79
15:30 - 15:45	0.42	0.50	0.37	0.53	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.53	0.35	0.64	0.54	0.64	0.45	0.65	**0.91**	0.77	**0.91**
15:45 - 16:00	0.48	0.57	0.42	0.60	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.60	0.42	0.72	0.61	0.72	0.52	0.74	**0.99**	0.84	**0.99**
16:00 - 16:15	0.46	0.54	0.42	0.60	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.60	0.42	0.75	0.64	0.75	0.53	0.75	**0.98**	0.83	**0.98**
16:15 - 16:30	0.48	0.57	0.43	0.59	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.59	0.42	0.73	0.62	0.73	0.53	0.74	**0.99**	0.84	**0.99**
16:30 - 16:45	0.38	0.45	0.34	0.50	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.50	0.34	0.65	0.56	0.65	0.46	0.66	**0.93**	0.79	**0.93**
16:45 - 17:00	0.38	0.45	0.33	0.46	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.46	0.32	0.60	0.51	0.60	0.42	0.63	**0.89**	0.75	**0.89**
17:00 - 17:15	0.37	0.43	0.33	0.49	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.49	0.33	0.66	0.56	0.66	0.47	0.72	**1.02**	**0.87**	**1.02**
17:15 - 17:30	0.45	0.53	0.40	0.55	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.55	0.39	0.73	0.62	0.73	0.52	0.77	**1.06**	**0.90**	**1.06**
17:30 - 17:45	0.36	0.43	0.31	0.45	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.45	0.32	0.60	0.51	0.60	0.44	0.63	**0.89**	0.76	**0.89**
17:45 - 18:00	0.30	0.35	0.26	0.38	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.38	0.26	0.51	0.44	0.51	0.36	0.53	0.79	0.67	0.79
MAINLINE HOURLY VOLUMES																						
Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
14:00 - 14:15	1268	1268	1134	1134	1410	1410	1410	1410	1410	1410	1410	1410	1410	1109	1109	1746	1746	1477	1477	1760	2406	2406
14:15 - 14:30	1270	1270	1133	1133	1366	1366	1366	1366	1366	1366	1366	1366	1366	1085	1085	1709	1709	1372	1372	1686	2399	2399
14:30 - 14:45	1203	1203	1052	1052	1379	1379	1379	1379	1379	1379	1379	1379	1379	1040	1040	1657	1657	1361	1361	1675	2291	2291
14:45 - 15:00	1440	1440	1255	1255	1542	1542	1542	1542	1542	1542	1542	1542	1542	1235	1235	1889	1889	1613	1613	1972	2720	2720
15:00 - 15:15	1490	1490	1375	1375	1627	1627	1627	1627	1627	1627	1627	1627	1627	1332	1332	2031	2031	1749	1749	2108	2834	2834
15:15 - 15:30	1259	1259	1089	1089	1324	1324	1324	1324	1324	1324	1324	1324	1324	1003	1003	1540	1540	1260	1260	1625	2283	2283
15:30 - 15:45	1335	1335	1155	1155	1440	1440	1440	1440	1440	1440	1440	1440	1440	1079	1079	1783	1783	1470	1470	1827	2615	2615
15:45 - 16:00	1520	1520	1328	1328	1620	1620	1620	1620	1620	1620	1620	1620	1620	1307	1307	1998	1998	1678	1678	2072	2853	2853
16:00 - 16:15	1455	1455	1309	1309	1620	1620	1620	1620	1620	1620	1620	1620	1620	1327	1327	2116	2116	1744	1744	2125	2816	2816
16:15 - 16:30	1529	1529	1349	1349	1595	1595	1595	1595	1595	1595	1595	1595	1595	1298	1298	2042	2042	1720	1720	2079	2840	2840
16:30 - 16:45	1209	1209	1084	1084	1362	1362	1362	1362	1362	1362	1362	1362	1362	1065	1065	1841	1841	1519	1519	1888	2704	2704
16:45 - 17:00	1196	1196	1052	1052	1256	1256	1256	1256	1256	1256	1256	1256	1256	1009	1009	1671	1671	1362	1362	1782	2573	2573
17:00 - 17:15	1164	1164	1039	1039	1333	1333	1333	1333	1333	1333	1333	1333	1333	1044	1044	1860	1860	1534	1534	2081	2979	2979
17:15 - 17:30	1417	1417	1252	1252	1480	1480	1480	1480	1480	1480	1480	1480	1480	1237	1237	2041	2041	1704	1704	2186	3079	3079
17:30 - 17:45	1151	1151	990	990	1225	1225	1225	1225	1225	1225	1225	1225	1225	990	990	1694	1694	1429	1429	1810	2596	2596
17:45 - 18:00	946	946	833	833	1026	1026	1026	1026	1026	1026	1026	1026	1026	813	813	1452	1452	1187	1187	1519	2292	2292

	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
	Harvard Ave Exit 124				Fairgrounds Ave Exit 123												North Shady Exit 120				Coos Bay - Winston Exit 119		
Measurement	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Number of Lanes	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Segment Type	B	ON	B	OF	B	ON	B	B	B	B	B	B	B	B	B	OF	B	ON	OV	OF	B	ON	B
Acceleration Lane	-	197	-	252	-	297	-	-	-	-	-	-	-	-	-	207	-	219	-	297	-	199	-
LEVEL OF SERVICE																							
Analysis Period	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
14:00 - 14:15	C	D	C	D	C	C	C	C	C	C	C	C	C	C	C	D	C	C	D	C	B	B	B
14:15 - 14:30	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B
14:30 - 14:45	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B
14:45 - 15:00	C	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	C	C
15:00 - 15:15	C	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	B	C	C
15:15 - 15:30	C	C	C	D	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B
15:30 - 15:45	C	D	D	D	C	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	C	B
15:45 - 16:00	C	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	B	C	C
16:00 - 16:15	C	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	B	C	C
16:15 - 16:30	C	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	C	B
16:30 - 16:45	C	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	C	B
16:45 - 17:00	C	D	C	D	C	D	C	C	C	C	C	C	C	C	C	D	C	C	D	C	B	B	B
17:00 - 17:15	F	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	C	B
17:15 - 17:30	F	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	B	B
17:30 - 17:45	F	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	B	B
17:45 - 18:00	E	D	D	D	C	D	D	D	D	D	D	D	D	D	D	D	C	C	C	C	B	B	B
DEMAND TO CAPACITY RATIO																							
Analysis Period	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
14:00 - 14:15	0.57	0.81	0.69	0.72	0.67	0.71	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.80	0.63	0.66	0.64	0.75	0.42	0.54	0.46
14:15 - 14:30	0.55	0.78	0.66	0.69	0.65	0.68	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.77	0.60	0.64	0.62	0.73	0.39	0.51	0.43
14:30 - 14:45	0.50	0.74	0.63	0.66	0.61	0.65	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.74	0.57	0.61	0.59	0.69	0.35	0.47	0.40
14:45 - 15:00	0.62	**0.91**	0.77	0.80	0.75	0.80	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	**0.91**	0.71	0.76	0.73	**0.86**	0.50	0.65	0.55
15:00 - 15:15	0.67	**0.97**	0.83	**0.86**	0.80	**0.85**	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	**0.96**	0.75	0.80	0.77	**0.90**	0.49	0.62	0.53
15:15 - 15:30	0.53	0.80	0.68	0.71	0.65	0.69	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.77	0.60	0.64	0.61	0.72	0.37	0.49	0.42
15:30 - 15:45	0.61	**0.88**	0.75	0.78	0.73	0.77	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	**0.87**	0.67	0.72	0.69	0.81	0.45	0.58	0.49
15:45 - 16:00	0.68	**0.94**	0.80	0.84	0.78	0.83	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	**0.94**	0.74	0.78	0.75	**0.88**	0.49	0.63	0.53
16:00 - 16:15	0.68	**0.97**	0.82	**0.86**	0.80	**0.85**	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	**0.96**	0.74	0.80	0.76	**0.90**	0.48	0.62	0.53
16:15 - 16:30	0.66	**0.95**	0.81	0.84	0.79	0.83	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	**0.93**	0.73	0.77	0.74	**0.87**	0.45	0.59	0.50
16:30 - 16:45	0.63	**0.91**	0.77	0.80	0.76	0.79	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	**0.89**	0.69	0.74	0.71	0.83	0.43	0.58	0.49
16:45 - 17:00	0.58	**0.86**	0.73	0.76	0.70	0.74	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.83	0.63	0.68	0.65	0.77	0.39	0.52	0.44
17:00 - 17:15	0.67	**1.04**	**0.88**	**0.92**	**0.85**	**0.90**	**0.86**	**0.86**	**0.86**	**0.86**	**0.86**	**0.86**	**0.86**	**0.86**	**0.86**	**1.02**	0.77	0.82	0.79	**0.93**	0.48	0.63	0.54
17:15 - 17:30	0.71	**1.06**	**0.90**	**0.94**	**0.87**	**0.91**	**0.88**	**0.88**	**0.88**	**0.88**	**0.88**	**0.88**	**0.88**	**0.88**	**0.88**	**1.03**	0.77	0.82	0.79	**0.93**	0.44	0.57	0.49
17:30 - 17:45	0.60	**0.88**	0.75	0.78	0.72	0.76	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	**0.86**	0.64	0.69	0.66	0.78	0.38	0.50	0.42
17:45 - 18:00	0.50	0.73	0.62	0.64	0.60	0.64	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.72	0.50	0.54	0.52	0.61	0.28	0.38	0.32
MAINLINE HOURLY VOLUMES																							
Analysis Period	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
14:00 - 14:15	1914	1914	2336	2336	2275	2275	2306	2306	2306	2306	2306	2306	2306	2306	2306	2306	2127	2127	2163	2163	1405	1405	1525
14:15 - 14:30	1838	1838	2251	2251	2190	2190	2211	2211	2211	2211	2211	2211	2211	2211	2211	2211	2035	2035	2091	2091	1321	1321	1443
14:30 - 14:45	1679	1679	2147	2147	2082	2082	2123	2123	2123	2123	2123	2123	2123	2123	2123	2123	1927	1927	1996	1996	1176	1176	1314
14:45 - 15:00	2069	2069	2618	2618	2553	2553	2606	2606	2606	2606	2606	2606	2606	2606	2606	2606	2405	2405	2469	2469	1676	1676	1838
15:00 - 15:15	2243	2243	2798	2798	2709	2709	2748	2748	2748	2748	2748	2748	2748	2748	2748	2748	2550	2550	2604	2604	1648	1648	1772
15:15 - 15:30	1770	1770	2321	2321	2227	2227	2240	2240	2240	2240	2240	2240	2240	2240	2240	2240	2039	2039	2083	2083	1252	1252	1394
15:30 - 15:45	2052	2052	2550	2550	2480	2480	2509	2509	2509	2509	2509	2509	2509	2509	2509	2509	2300	2300	2358	2358	1523	1523	1652
15:45 - 16:00	2260	2260	2721	2721	2656	2656	2697	2697	2697	2697	2697	2697	2697	2697	2697	2697	2499	2499	2547	2547	1650	1650	1779
16:00 - 16:15	2260	2260	2793	2793	2732	2732	2763	2763	2763	2763	2763	2763	2763	2763	2763	2763	2518	2518	2595	2595	1625	1625	1780
16:15 - 16:30	2215	2215	2735	2735	2670	2670	2685	2685	2685	2685	2685	2685	2685	2685	2685	2685	2470	2470	2522	2522	1519	1519	1672
16:30 - 16:45	2124	2124	2640	2640	2584	2584	2603	2603	2603	2603	2603	2603	2603	2603	2603	2603	2355	2355	2424	2424	1473	1473	1666
16:45 - 17:00	1974	1974	2494	2494	2409	2409	2428	2428	2428	2428	2428	2428	2428	2428	2428	2428	2163	2163	2240	2240	1339	1339	1490
17:00 - 17:15	2285	2285	3046	3046	2947	2947	2982	2982	2982	2982	2982	2982	2982	2982	2982	2982	2662	2662	2739	2739	1665	1665	1845
17:15 - 17:30	2411	2411	3083	3083	2979	2979	2996	2996	2996	2996	2996	2996	2996	2996	2996	2996	2657	2657	2721	2721	1530	1530	1657
17:30 - 17:45	2023	2023	2567	2567	2487	2487	2508	2508	2508	2508	2508	2508	2508	2508	2508	2508	2216	2216	2276	2276	1312	1312	1447
17:45 - 18:00	1712	1712	2127	2127	2071	2071	2096	2096	2096	2096	2096	2096	2096	2096	2096	2096	1740	1740	1786	1786	964	964	1086

I-5 Southbound PM Peak Period Traffic Analysis Results – Year 2040 Build Analysis Factored to Represent Peak Summer Traffic Conditions (Auxiliary Lane Between Exits 125 and 124)



Measurement	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
			Winchester Exit 129											Edenbower Blvd Exit 127				Garden Valley Rd Exit 125		Harvard Ave Exit 124
Number of Lanes	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3
Segment Type	B	OF	B	ON	B	B	B	B	B	B	B	B	OF	B	ON	B	OF	B	ON	W
Acceleration Lane	-	241	-	289	-	-	-	-	-	-	-	-	242	-	323	-	235	-	254	0
LEVEL OF SERVICE																				
Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
14:00 - 14:15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	B	B
14:15 - 14:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	C	B	B	B
14:30 - 14:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	C	B	B	B
14:45 - 15:00	B	B	B	C	B	B	B	B	B	B	B	B	C	B	C	C	C	B	B	C
15:00 - 15:15	B	C	B	C	B	B	B	B	B	B	B	B	C	B	C	C	C	C	B	C
15:15 - 15:30	B	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B	C	B	A	B
15:30 - 15:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	B	C
15:45 - 16:00	B	C	B	C	B	B	B	B	B	B	B	B	C	B	C	C	C	B	B	C
16:00 - 16:15	B	B	B	C	B	B	B	B	B	B	B	B	C	B	C	C	C	C	B	C
16:15 - 16:30	B	C	B	C	B	B	B	B	B	B	B	B	C	B	C	C	C	C	B	C
16:30 - 16:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	B	C
16:45 - 17:00	B	B	B	B	B	B	B	B	B	B	B	B	B	A	C	B	C	B	B	C
17:00 - 17:15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	B	C
17:15 - 17:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	B	C
17:30 - 17:45	B	B	A	B	B	B	B	B	B	B	B	B	B	A	C	B	C	B	B	F
17:45 - 18:00	A	B	A	B	A	A	A	A	A	A	A	A	B	A	B	B	B	B	A	D
DEMAND TO CAPACITY RATIO																				
Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
14:00 - 14:15	0.40	0.47	0.36	0.52	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.52	0.35	0.62	0.53	0.62	0.45	0.40	0.51
14:15 - 14:30	0.40	0.47	0.36	0.50	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.50	0.35	0.61	0.52	0.61	0.42	0.38	0.54
14:30 - 14:45	0.38	0.45	0.33	0.51	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.51	0.33	0.59	0.50	0.59	0.42	0.38	0.52
14:45 - 15:00	0.46	0.54	0.40	0.57	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.57	0.39	0.68	0.58	0.68	0.50	0.44	0.60
15:00 - 15:15	0.47	0.56	0.44	0.60	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.60	0.43	0.73	0.62	0.73	0.54	0.48	0.60
15:15 - 15:30	0.40	0.47	0.35	0.49	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.49	0.32	0.55	0.47	0.55	0.39	0.37	0.51
15:30 - 15:45	0.42	0.50	0.37	0.53	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.53	0.35	0.64	0.54	0.64	0.45	0.41	0.58
15:45 - 16:00	0.48	0.57	0.42	0.60	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.60	0.42	0.72	0.61	0.72	0.52	0.47	0.61
16:00 - 16:15	0.46	0.54	0.42	0.60	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.60	0.42	0.75	0.64	0.75	0.53	0.48	0.59
16:15 - 16:30	0.48	0.57	0.43	0.59	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.59	0.42	0.73	0.62	0.73	0.53	0.47	0.61
16:30 - 16:45	0.38	0.45	0.34	0.50	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.50	0.34	0.65	0.56	0.65	0.46	0.42	0.60
16:45 - 17:00	0.38	0.45	0.33	0.46	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.46	0.32	0.60	0.51	0.60	0.42	0.40	0.59
17:00 - 17:15	0.37	0.43	0.33	0.49	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.49	0.33	0.66	0.56	0.66	0.47	0.46	0.67
17:15 - 17:30	0.45	0.53	0.40	0.55	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.55	0.39	0.73	0.62	0.73	0.52	0.49	0.67
17:30 - 17:45	0.36	0.43	0.31	0.45	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.45	0.32	0.60	0.51	0.60	0.44	0.40	0.58
17:45 - 18:00	0.30	0.35	0.26	0.38	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.38	0.26	0.51	0.44	0.51	0.36	0.34	0.55
MAINLINE HOURLY VOLUMES																				
Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
14:00 - 14:15	1268	1268	1134	1134	1410	1410	1410	1410	1410	1410	1410	1410	1410	1109	1109	1746	1746	1477	1477	1760
14:15 - 14:30	1270	1270	1133	1133	1366	1366	1366	1366	1366	1366	1366	1366	1366	1085	1085	1709	1709	1372	1372	1686
14:30 - 14:45	1203	1203	1052	1052	1379	1379	1379	1379	1379	1379	1379	1379	1379	1040	1040	1657	1657	1361	1361	1675
14:45 - 15:00	1440	1440	1255	1255	1542	1542	1542	1542	1542	1542	1542	1542	1542	1235	1235	1889	1889	1613	1613	1972
15:00 - 15:15	1490	1490	1375	1375	1627	1627	1627	1627	1627	1627	1627	1627	1627	1332	1332	2031	2031	1749	1749	2108
15:15 - 15:30	1259	1259	1089	1089	1324	1324	1324	1324	1324	1324	1324	1324	1324	1003	1003	1540	1540	1260	1260	1625
15:30 - 15:45	1335	1335	1155	1155	1440	1440	1440	1440	1440	1440	1440	1440	1440	1079	1079	1783	1783	1470	1470	1827
15:45 - 16:00	1520	1520	1328	1328	1620	1620	1620	1620	1620	1620	1620	1620	1620	1307	1307	1998	1998	1678	1678	2072
16:00 - 16:15	1455	1455	1309	1309	1620	1620	1620	1620	1620	1620	1620	1620	1620	1327	1327	2116	2116	1744	1744	2125
16:15 - 16:30	1529	1529	1349	1349	1595	1595	1595	1595	1595	1595	1595	1595	1595	1298	1298	2042	2042	1720	1720	2079
16:30 - 16:45	1209	1209	1084	1084	1362	1362	1362	1362	1362	1362	1362	1362	1362	1065	1065	1841	1841	1519	1519	1888
16:45 - 17:00	1196	1196	1052	1052	1256	1256	1256	1256	1256	1256	1256	1256	1256	1009	1009	1671	1671	1362	1362	1782
17:00 - 17:15	1164	1164	1039	1039	1333	1333	1333	1333	1333	1333	1333	1333	1333	1044	1044	1860	1860	1534	1534	2081
17:15 - 17:30	1417	1417	1252	1252	1480	1480	1480	1480	1480	1480	1480	1480	1480	1237	1237	2041	2041	1704	1704	2186
17:30 - 17:45	1151	1151	990	990	1225	1225	1225	1225	1225	1225	1225	1225	1225	990	990	1694	1694	1429	1429	1810
17:45 - 18:00	946	946	833	833	1026	1026	1026	1026	1026	1026	1026	1026	1026	813	813	1452	1452	1187	1187	1519

Measurement	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
					Fairgrounds Ave Exit 123												North Shady Exit 120				Coos Bay - Winston Exit 119		
Number of Lanes	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Segment Type	B	ON	B	OF	B	ON	B	B	B	B	B	B	B	B	B	OF	B	ON	OV	OF	B	ON	B
Acceleration Lane	-	197	-	252	-	297	-	-	-	-	-	-	-	-	-	207	-	219	-	297	-	199	-
LEVEL OF SERVICE																							
Analysis Period	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
14:00 - 14:15	C	D	C	D	C	C	C	C	C	C	C	C	C	C	C	D	C	C	D	C	B	B	B
14:15 - 14:30	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B
14:30 - 14:45	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B
14:45 - 15:00	C	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	C	C
15:00 - 15:15	C	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	B	C	C
15:15 - 15:30	C	C	C	D	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B
15:30 - 15:45	C	D	D	D	C	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	C	B
15:45 - 16:00	C	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	B	C	C
16:00 - 16:15	C	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	B	C	C
16:15 - 16:30	C	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	C	B
16:30 - 16:45	C	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	C	B
16:45 - 17:00	C	D	C	D	C	D	C	C	C	C	C	C	C	C	C	D	C	C	D	C	B	B	B
17:00 - 17:15	F	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	C	B
17:15 - 17:30	F	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	B	B
17:30 - 17:45	F	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	B	B
17:45 - 18:00	F	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	C	D	C	B	B	B
DEMAND TO CAPACITY RATIO																							
Analysis Period	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
14:00 - 14:15	0.57	0.81	0.69	0.72	0.67	0.71	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.80	0.63	0.66	0.64	0.75	0.42	0.54	0.46
14:15 - 14:30	0.55	0.78	0.66	0.69	0.65	0.68	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.77	0.60	0.64	0.62	0.72	0.39	0.51	0.43
14:30 - 14:45	0.50	0.74	0.63	0.66	0.61	0.65	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.74	0.57	0.61	0.59	0.69	0.35	0.46	0.39
14:45 - 15:00	0.62	0.91	0.77	0.80	0.75	0.80	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.91	0.71	0.76	0.73	0.86	0.50	0.65	0.55
15:00 - 15:15	0.67	0.97	0.83	0.86	0.80	0.85	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.96	0.75	0.80	0.77	0.90	0.49	0.62	0.53
15:15 - 15:30	0.53	0.80	0.68	0.71	0.65	0.68	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.77	0.60	0.63	0.61	0.72	0.37	0.49	0.41
15:30 - 15:45	0.61	0.88	0.75	0.78	0.73	0.77	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.87	0.67	0.72	0.69	0.81	0.45	0.58	0.49
15:45 - 16:00	0.67	0.94	0.80	0.83	0.78	0.83	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.94	0.74	0.78	0.75	0.88	0.49	0.62	0.53
16:00 - 16:15	0.67	0.97	0.82	0.85	0.80	0.85	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.96	0.74	0.79	0.76	0.90	0.48	0.62	0.53
16:15 - 16:30	0.66	0.95	0.81	0.84	0.79	0.82	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.93	0.73	0.77	0.74	0.87	0.45	0.59	0.50
16:30 - 16:45	0.63	0.91	0.77	0.80	0.75	0.79	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.89	0.68	0.73	0.71	0.83	0.43	0.58	0.49
16:45 - 17:00	0.58	0.85	0.73	0.76	0.70	0.74	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.83	0.63	0.68	0.65	0.77	0.39	0.51	0.44
17:00 - 17:15	0.67	1.03	0.88	0.92	0.85	0.90	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	1.01	0.77	0.82	0.79	0.93	0.47	0.63	0.53
17:15 - 17:30	0.71	1.06	0.90	0.93	0.87	0.91	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	1.03	0.77	0.82	0.79	0.93	0.44	0.57	0.48
17:30 - 17:45	0.60	0.88	0.75	0.78	0.72	0.76	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.86	0.64	0.69	0.66	0.77	0.38	0.50	0.42
17:45 - 18:00	0.50	0.73	0.62	0.64	0.60	0.64	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.72	0.50	0.54	0.52	0.61	0.28	0.38	0.32
MAINLINE HOURLY VOLUMES																							
Analysis Period	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
14:00 - 14:15	1914	1914	2336	2336	2275	2275	2306	2306	2306	2306	2306	2306	2306	2306	2306	2306	2127	2127	2163	2163	1405	1405	1525
14:15 - 14:30	1838	1838	2251	2251	2190	2190	2211	2211	2211	2211	2211	2211	2211	2211	2211	2211	2035	2035	2091	2091	1321	1321	1443
14:30 - 14:45	1679	1679	2147	2147	2082	2082	2123	2123	2123	2123	2123	2123	2123	2123	2123	2123	1927	1927	1996	1996	1176	1176	1314
14:45 - 15:00	2069	2069	2618	2618	2553	2553	2606	2606	2606	2606	2606	2606	2606	2606	2606	2606	2405	2405	2469	2469	1676	1676	1838
15:00 - 15:15	2243	2243	2798	2798	2709	2709	2748	2748	2748	2748	2748	2748	2748	2748	2748	2748	2550	2550	2604	2604	1648	1648	1772
15:15 - 15:30	1770	1770	2321	2321	2227	2227	2240	2240	2240	2240	2240	2240	2240	2240	2240	2240	2039	2039	2083	2083	1252	1252	1394
15:30 - 15:45	2052	2052	2550	2550	2480	2480	2509	2509	2509	2509	2509	2509	2509	2509	2509	2509	2300	2300	2358	2358	1523	1523	1652
15:45 - 16:00	2260	2260	2721	2721	2656	2656	2697	2697	2697	2697	2697	2697	2697	2697	2697	2697	2499	2499	2547	2547	1650	1650	1779
16:00 - 16:15	2260	2260	2793	2793	2732	2732	2763	2763	2763	2763	2763	2763	2763	2763	2763	2763	2518	2518	2595	2595	1625	1625	1780
16:15 - 16:30	2215	2215	2735	2735	2670	2670	2685	2685	2685	2685	2685	2685	2685	2685	2685	2685	2470	2470	2522	2522	1519	1519	1672
16:30 - 16:45	2124	2124	2640	2640	2584	2584	2603	2603	2603	2603	2603	2603	2603	2603	2603	2603	2355	2355	2424	2424	1473	1473	1666
16:45 - 17:00	1974	1974	2494	2494	2409	2409	2428	2428	2428	2428	2428	2428	2428	2428	2428	2428	2163	2163	2240	2240	1339	1339	1490
17:00 - 17:15	2285	2285	3046	3046	2947	2947	2982	2982	2982	2982	2982	2982	2982	2982	2982	2982	2662	2662	2739	2739	1665	1665	1845
17:15 - 17:30	2411	2411	3083	3083	2979	2979	2996	2996	2996	2996	2996	2996	2996	2996	2996	2996	2657	2657	2721	2721	1530	1530	1657
17:30 - 17:45	2023	2023	2567	2567	2487	2487	2508	2508	2508	2508	2508	2508	2508	2508	2508	2508	2216	2216	2276	2276	1312	1312	1447
17:45 - 18:00	1712	1712	2127	2127	2071	2071	2096	2096	2096	2096	2096	2096	2096	2096	2096	2096	1740	1740	1786	1786	964	964	1086

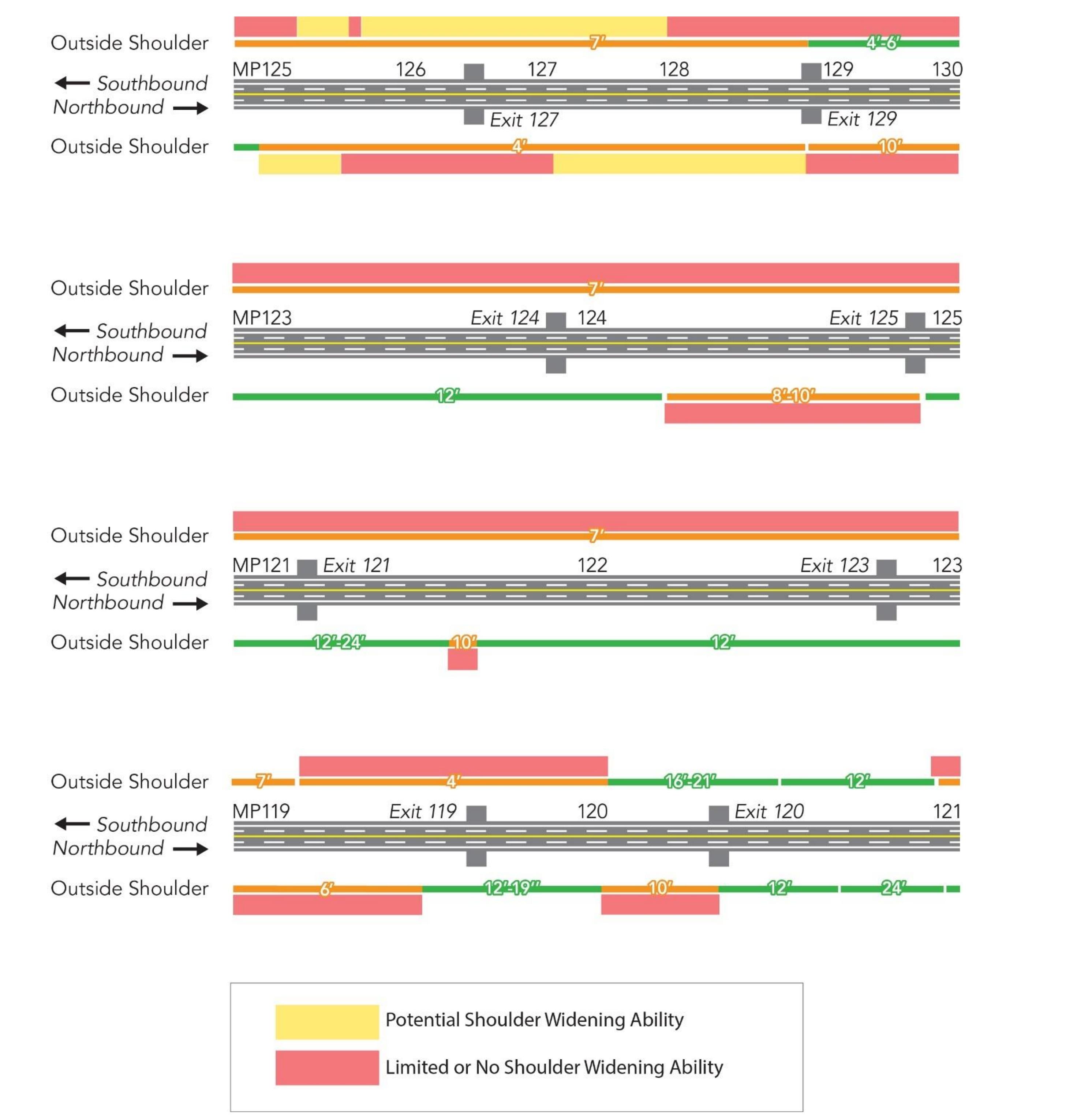
† B = Basic Segment, OFF = Off-Ramp, ON = On-Ramp, W = Weave, OV = Overlap

Concept #2: Shoulder Widening

Project Details

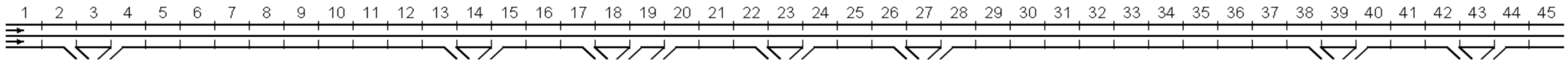
Location	I-5 Mile Point: 129 to 119
Transportation Facility Characteristics	**Facility Type:** Interstate Highway **Jurisdiction:** ODOT **Functional Classification:** • Federal – Urban Interstate • OHP – Interstate • NHS • Seismic Program 2 • OHP – Expressway (off ramp to OR 42 **Freight Route Designation:** • National Highway Freight Route • OHP Freight Route • Reduction Review Route • High Clearance Route **Posted Speed:** • 65 mph **Travel Lanes:** • Two Southbound Lanes • Two Northbound Lanes **Mobility Target:** • OHP: 0.80 • HDM: 0.65
Project Purpose/Description	There are long stretches of the corridor that lack adequate shoulder widths, especially between Exit 125 and Exit 121. Provide shoulder enhancements throughout the corridor for incident management, maintenance staff access, and speed enforcement activities.
Operational Considerations	When incidents occur at locations without shoulders, the impacted vehicles or wreckage could block one or more travel lanes, reducing the roadway capacity and/or causing bottlenecks. In congested segments, the reduced capacity can further increase the D/C ratios and cause shockwaves in the queue that lengthen the time to fully clear the incident-related bottleneck. The graphic provided below the project sheet shows an example incident, with and without a shoulder available. As shown, the scenario without shoulder available has a blocked lane for 45 minutes. The queue from that blockage near Exit 120 extends north, which interacts with high volume segments and extends the queue all the way to Exit 127. If the same incident with the same 45-minute duration had the impacted vehicles and wreckage moved to the shoulder instead of blocking a lane, no queue would be produced.
Project Considerations	• Existing shoulder grades vary widely along the corridor. Larger grading impacts would result in higher costs. • Considerations are needed to address stormwater impacts and connecting to existing drainage systems. • Review shoulder widening locations for potential speed enforcement observation points. • Based on each shoulder widening location, consider whether a sound wall is needed as part of the project. • ODOT Region 1 has used predictive methods when considering shoulder widening in constrained areas.
Land Use Considerations	• No land use impacts are anticipated as all widenings can occur within the existing I-5 right of way. • No impacts are anticipated to Title VI and Environmental Justice populations.
Environmental/ Right of way Considerations	• Likelihood of wetland presence is low, but a field visit would be needed to verify. • Proposed roadway widening (adding impervious surface) would potentially trigger FAHP documentation for stormwater management and impacts on ESA-listed species under the jurisdiction of the NMFS.
Planning Level Cost Estimate	$750K to $1M per mile (Design Engineering, Construction, Construction Engineering, Contingency – 2021 Dollars)
Implementation	As other capital projects occur, consider whether shoulder widening can be added to the project. Implementation may also be triggered when funding becomes available or when needed to address safety issues or long-term traffic growth. Higher priority should be given to implementing shoulder widening on high-volume segments or segments immediately downstream of high-volume segments.

Concept Illustration



I-5 Southbound PM Peak Period Reliability Results – Year 2040 No-Build Analysis

Example Level of Service Comparison for Incident when a Shoulder is or is not Available



Segments 1–23:

			Winchester Exit 129											Edenbower Blvd Exit 127				Garden Valley Rd Exit 125					Harvard Ave Exit 124
Measurement	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Number of Lanes	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Segment Type	B	OF	B	ON	B	B	B	B	B	B	B	B	OF	B	ON	B	OF	B	ON	ON	B	OF	B
Acceleration Lane	-	241	-	289	-	-	-	-	-	-	-	-	242	-	323	-	235	-	254	178	-	249	-
Incident Scenario #1: No shoulder available (wreckage blocks a travel lane) – LEVEL OF SERVICE																							
Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
14:00 - 14:15	B	B	A	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B	C	C	C	C	B
14:15 - 14:30	B	B	A	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B	B	C	C	C	B
14:30 - 14:45	B	B	A	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B	B	C	C	C	B
14:45 - 15:00	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	C	B	C	D	C	D	C
15:00 - 15:15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	C	D	D	D	C
15:15 - 15:30	B	B	A	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B	B	C	C	C	B
15:30 - 15:45	B	B	A	B	B	B	B	B	B	B	B	B	B	A	C	B	C	B	C	C	C	C	C
15:45 - 16:00	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	C	D	D	D	C
16:00 - 16:15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	C	D	C	D	C
16:15 - 16:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	C	D	D	D	C
16:30 - 16:45	B	B	A	B	B	B	B	B	B	B	B	B	B	A	C	B	C	B	C	D	C	D	C
16:45 - 17:00	B	B	A	B	B	B	B	B	B	B	B	B	B	A	B	B	B	C	F	F	F	F	F
17:00 - 17:15	A	B	A	B	B	B	B	B	B	B	B	B	B	A	C	F	F	F	F	F	F	F	F
17:15 - 17:30	B	B	B	B	B	B	B	B	B	B	B	B	E	F	F	F	F	F	F	F	F	F	F
17:30 - 17:45	A	B	A	B	B	B	B	B	B	B	B	B	F	F	F	F	F	F	F	F	F	F	F
17:45 - 18:00	A	B	A	B	A	A	A	A	A	A	A	A	C	F	F	F	F	F	F	F	F	F	F
Incident Scenario #2: Shoulder available (wreckage is pulled onto shoulder) – LEVEL OF SERVICE																							
Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
14:00 - 14:15	B	B	A	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B	C	C	C	C	B
14:15 - 14:30	B	B	A	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B	B	C	C	C	B
14:30 - 14:45	B	B	A	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B	B	C	C	C	B
14:45 - 15:00	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	C	B	C	D	C	D	C
15:00 - 15:15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	C	D	D	D	C
15:15 - 15:30	B	B	A	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B	B	C	C	C	B
15:30 - 15:45	B	B	A	B	B	B	B	B	B	B	B	B	B	A	C	B	C	B	C	C	C	C	C
15:45 - 16:00	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	C	D	D	D	C
16:00 - 16:15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	C	D	C	D	C
16:15 - 16:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	C	D	D	D	C
16:30 - 16:45	B	B	A	B	B	B	B	B	B	B	B	B	B	A	C	B	C	B	C	D	C	D	C
16:45 - 17:00	B	B	A	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B	C	C	C	C	B
17:00 - 17:15	A	B	A	B	B	B	B	B	B	B	B	B	B	A	C	B	C	B	C	D	D	D	C
17:15 - 17:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	C	D	D	D	C
17:30 - 17:45	A	B	A	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B	C	C	C	C	B
17:45 - 18:00	A	B	A	B	A	A	A	A	A	A	A	A	B	A	B	B	B	A	B	C	C	C	B

Segments 24–45:

				Fairgrounds Ave Exit 123												North Shady Exit 120				Coos Bay - Winston Exit 119		
Measurement	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Number of Lanes	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Segment Type	ON	B	OF	B	ON	B	B	B	B	B	B	B	B	B	OF	B	ON	OV	OF	B	ON	B
Acceleration Lane	197	-	252	-	297	-	-	-	-	-	-	-	-	-	207	-	219	-	297	-	199	-
Incident Scenario #1: No shoulder available (wreckage blocks a travel lane) – LEVEL OF SERVICE																						
Analysis Period	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
14:00 - 14:15	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B
14:15 - 14:30	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	C	C	C	B	B	B
14:30 - 14:45	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	C	C	C	A	B	B
14:45 - 15:00	C	C	D	C	C	C	C	C	C	C	C	C	C	C	D	C	C	D	C	B	C	B
15:00 - 15:15	D	C	D	C	D	C	C	C	C	C	C	C	C	C	D	C	C	D	C	B	C	B
15:15 - 15:30	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	C	C	C	A	B	B
15:30 - 15:45	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B
15:45 - 16:00	D	C	D	C	C	C	C	C	C	C	C	C	C	C	D	C	C	D	C	B	C	B
16:00 - 16:15	D	C	D	C	D	C	C	C	C	C	C	C	C	C	D	C	C	D	C	B	C	B
16:15 - 16:30	D	C	D	C	C	C	C	C	E	F	F	F	F	F	F	D	B	B	B	A	B	A
16:30 - 16:45	D	E	F	F	F	F	F	F	F	F	F	F	F	F	F	D	B	B	B	A	B	A
16:45 - 17:00	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	D	B	B	B	A	B	A
17:00 - 17:15	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	C	D	D	D	B	C	B
17:15 - 17:30	F	E	F	D	D	D	D	D	D	F	F	F	F	F	D	C	D	D	D	B	B	B
17:30 - 17:45	D	D	D	D	D	D	D	D	C	D	F	F	F	F	D	C	D	D	D	B	B	B
17:45 - 18:00	D	D	D	D	D	D	D	D	D	D	C	F	F	F	D	C	C	D	C	B	B	B
Incident Scenario #2: Shoulder available (wreckage is pulled onto shoulder) – LEVEL OF SERVICE																						
Analysis Period	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
14:00 - 14:15	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B
14:15 - 14:30	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	C	C	C	B	B	B
14:30 - 14:45	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	C	C	C	A	B	B
14:45 - 15:00	C	C	D	C	C	C	C	C	C	C	C	C	C	C	D	C	C	D	C	B	C	B
15:00 - 15:15	D	C	D	C	D	C	C	C	C	C	C	C	C	C	D	C	C	D	C	B	C	B
15:15 - 15:30	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	C	C	C	A	B	B
15:30 - 15:45	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B
15:45 - 16:00	D	C	D	C	C	C	C	C	C	C	C	C	C	C	D	C	C	D	C	B	C	B
16:00 - 16:15	D	C	D	C	D	C	C	C	C	C	C	C	C	C	D	C	C	D	C	B	C	B
16:15 - 16:30	D	C	D	C	C	C	C	C	C	C	C	C	C	C	D	D	C	D	C	B	B	B
16:30 - 16:45	C	C	C	C	C	C	C	C	C	C	C	C	C	C	D	D	C	C	C	B	B	B
16:45 - 17:00	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B
17:00 - 17:15	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	C	B
17:15 - 17:30	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	B	B
17:30 - 17:45	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B
17:45 - 18:00	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	C	B	A	B	A

† B = Basic Segment, OFF = Off-Ramp, ON = On-Ramp, W = Weave, OV = Overlap

= lane blocked

= capacity reduced by 30% due to incident

Concept #3: I-5 Exit 125 Southbound Ramp Meters (Exit 125 IAMP Update)

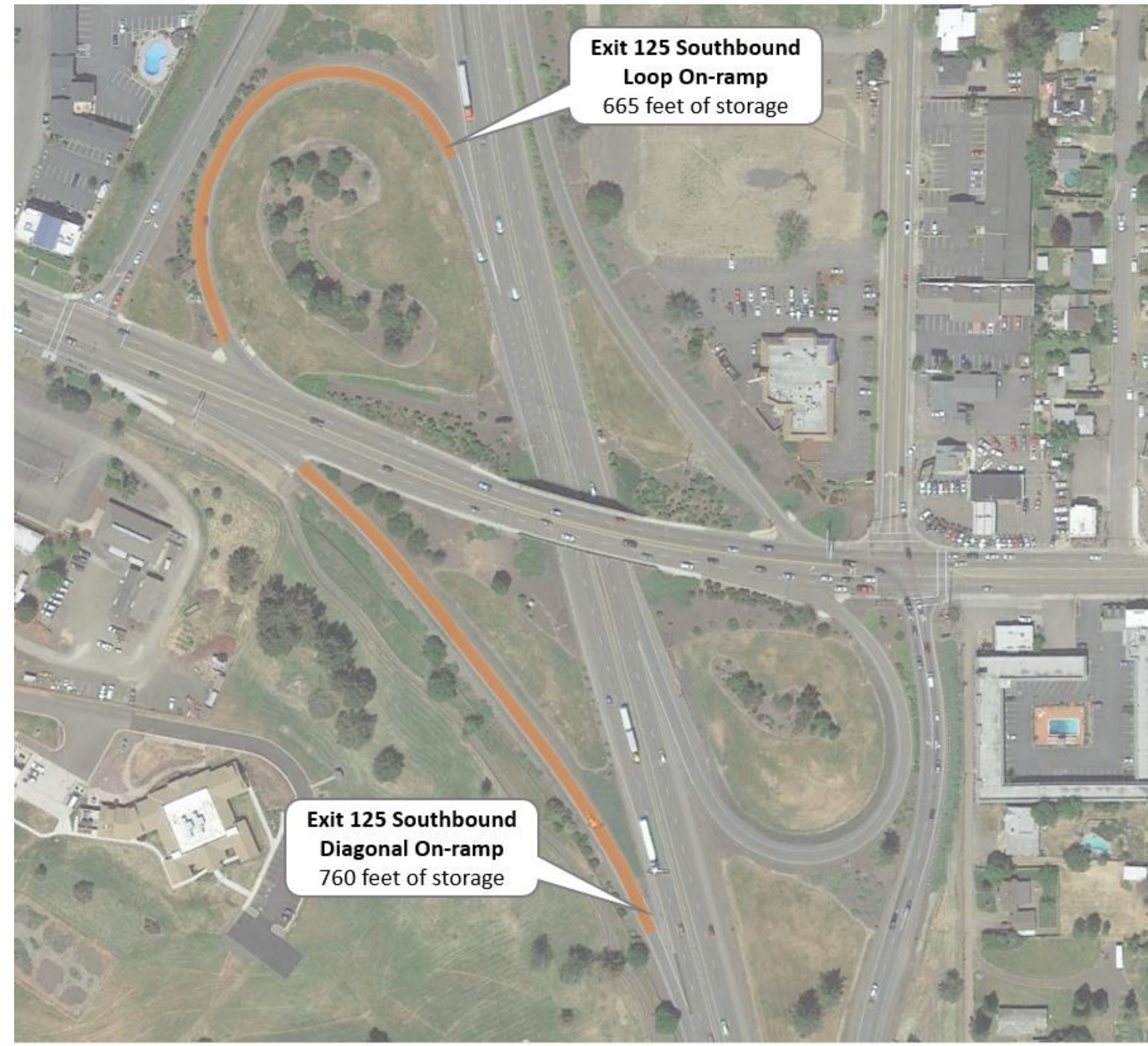
Project Details

Location	I-5 Mile Point: 125
Transportation Facility Characteristics	**Facility Type:** Interstate Highway **Jurisdiction:** ODOT **Functional Classification:** • Federal – Urban Interstate • OHP – Interstate • NHS • Seismic Program 2 **Freight Route Designation:** • National Highway Freight Route • OHP Freight Route • Reduction Review Route • High Clearance Route **Posted Speed:** • 65 mph **Travel Lanes:** • Two Southbound Lanes • Two Northbound Lanes **Exit 125 Southbound Loop On-Ramp Peak Hour Volumes (5:00-6:00 PM):** • 514 – Year 2017 • 547 – Year 2040 **Exit 125 Southbound Diagonal On-Ramp Peak Hour Volumes (5:00-6:00 PM):** • 636 – Year 2017 • 898 – Year 2040 **Mobility Target:** • OHP: 0.80 • HDM: 0.65 **Cross Section Elements:** • Inside Shoulder - 6 feet • Travel Lanes - 12 feet • Outside Shoulder - 6 feet
Project Purpose/Description	Install ramp meters on the two Exit 125 southbound on-ramps. Ramp metering is used to control the rate of entry for vehicles at on-ramps, creating a more consistent entry flow that helps minimize friction for the mainline.

Operational Considerations	For ramp meters to provide an operational benefit over non-metered entry traffic flow, a metering rate must be low enough to create gaps. For a single lane on-ramp that allows one vehicle per green, a metering rate less than 900 vehicles per hour is recommended. Minimum metering rates are provided below assuming a single storage lane.
	
	Exit 125 Southbound Loop On-Ramp Minimum Metering Rates (vehicles per hour):
	• Storage length: 665 feet
	• 2017
	  ○ 165 vph – AM Peak Period
	  ○ 435 vph – PM Peak Period
	• 2040
	  ○ 190 vph – AM Peak Period
	  ○ 470 vph – PM Peak Period
	
	Exit 125 Southbound Diagonal On-Ramp Minimum Metering Rates (vehicles per hour):
	• Storage length: 760 feet
	• 2017
	  ○ 265 vph – AM Peak Period
	  ○ 580 vph – PM Peak Period
	• 2040
	  ○ 445 vph – AM Peak Period
	  ○ 845 vph – PM Peak Period

Project Considerations	• As traffic volumes increase, ramp widening to provide two storage lanes may be needed to increase storage capacity of the ramp in the long-term and maintain lower metering rates. If widening is needed, there is sufficient right of way to accommodate widening. ODOT Region 1 has completed similar projects in the Portland area that could be used as examples if two lanes are needed. Based on the 2017 hourly volumes and forecasted 2040 volumes, the metering rates can be maintained below 900 vehicles per hour within the available storage length. • If implemented in combination with the auxiliary lane, the operations and design should consider the limited distance upstream to detect traffic. • Sufficient space for maintenance personnel and their vehicles also needs to be a design consideration if ramp widening is needed in the future. • Public education on the operations and use of ramp meters will be needed when implemented in the Roseburg area.
Land Use Considerations	• No impacts are anticipated to Title VI and Environmental Justice populations.
Environmental/ Right of way Considerations	• No land use impacts are anticipated as all ramp meter installation can occur within the existing I-5 right of way. • Likelihood of wetland presence is low, but a field visit would be needed to verify.
Planning Level Cost Estimate	$200K (Design Engineering, Construction, Construction Engineering, 32% Contingency – 2021 Dollars) per ramp.
Implementation	A future IAMP will include additional analysis of this location, including impacts of ramp metering to the local street network. Utilize ramp metering lessons learned from ODOT Region 1, including adjustments allowing for more adaptive operations.

Concept Illustration

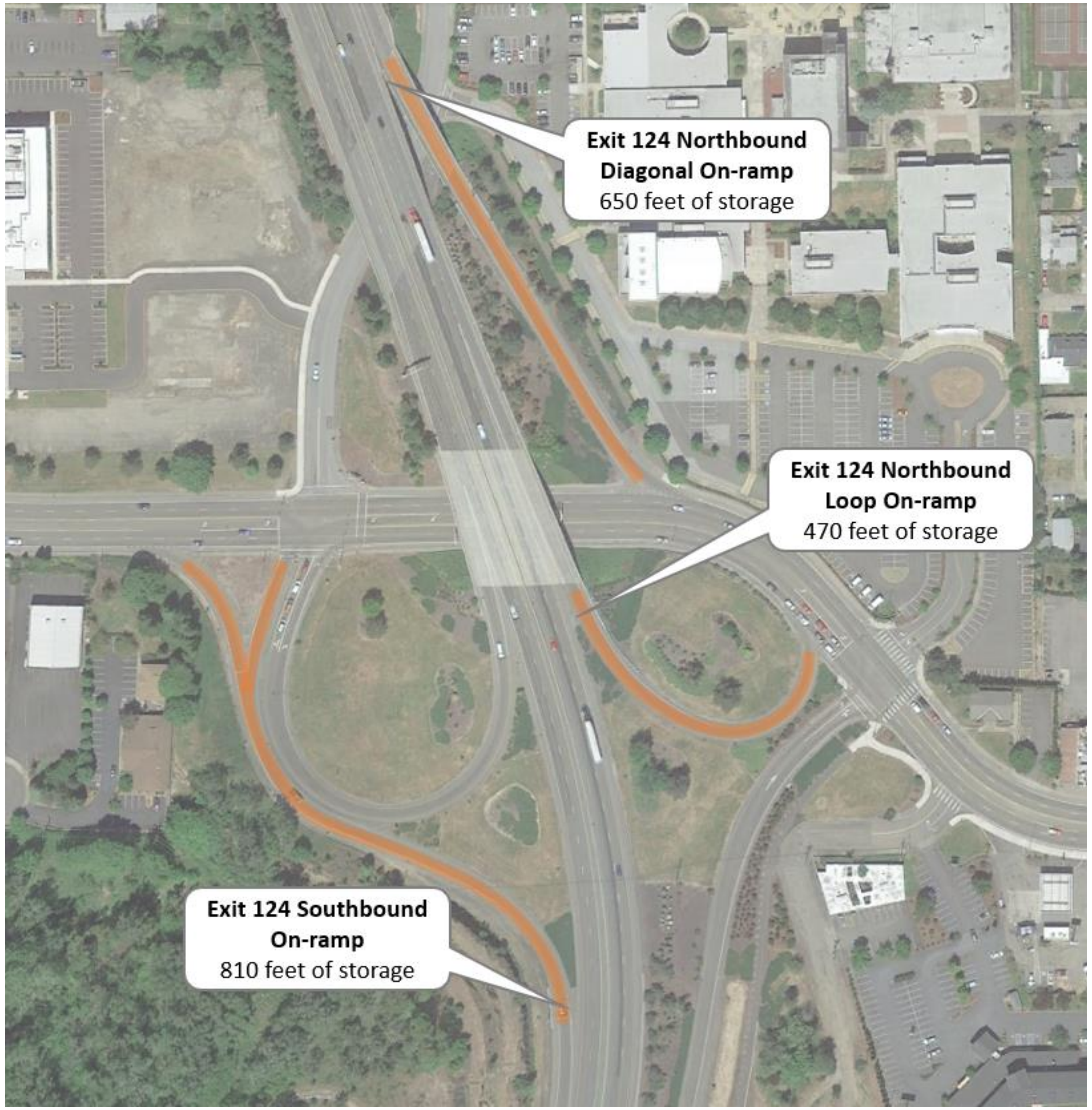


Concept #4: I-5 Exit 124 Northbound & Southbound Ramp Meters (Exit 124 IAMP Update)

Project Details

Location	I-5 Mile Point: 124
Transportation Facility Characteristics	**Facility Type:** Interstate Highway **Jurisdiction:** ODOT **Functional Classification:** • Federal – Urban Interstate • OHP – Interstate • NHS • Seismic Program 2 **Freight Route Designation:** • National Highway Freight Route • OHP Freight Route • Reduction Review Route • High Clearance Route **Posted Speed:** • 65 mph **Travel Lanes:** • Two Southbound Lanes • Two Northbound Lanes **Exit 124 Northbound On-Ramp Peak Hour Volumes (4:30-5:30 PM):** • 326 – Year 2017 • 514 – Year 2040 **Exit 124 Southbound On-Ramp Peak Hour Volumes (5:00-6:00 PM):** • 648 – Year 2017 • 761 – Year 2040 **Mobility Target:** • OHP: 0.80 • HDM: 0.65 **Cross Section Elements:** • Inside Shoulder - 6 feet • Travel Lanes - 12 feet • Outside Shoulder - 6 feet
Project Purpose/Description	Install ramp meters on the Exit 124 southern northbound on-ramp and southbound on-ramp. Ramp metering is used to control the rate of entry for vehicles at on-ramps, creating a more consistent entry flow that helps minimize friction for the mainline.
Operational Considerations	For ramp meters to provide an operational benefit over non-metered entry traffic flow, a metering rate must be low enough to create gaps. For a single lane on-ramp that allows one vehicle per green, a metering rate less than 900 vehicles per hour is recommended. Minimum metering rates are provided below assuming a single storage lane. **Exit 124 Northbound Loop On-Ramp Minimum Metering Rates (vehicles per hour):** • Storage length: 470 feet • 2017 ○ 220 vph – AM Peak Period ○ 270 vph – PM Peak Period • 2040 ○ 380 vph – AM Peak Period ○ 445 vph – PM Peak Period **Exit 124 Northbound Diagonal On-Ramp Minimum Metering Rates (vehicles per hour):** • Storage length: 650 feet • 2017 ○ 210 vph – AM Peak Period ○ 265 vph – PM Peak Period • 2040 ○ 370 vph – AM Peak Period ○ 435 vph – PM Peak Period **Exit 124 Southbound Loop On-Ramp Minimum Metering Rates (vehicles per hour):** • Storage length: 810 feet • 2017 ○ 225 vph – AM Peak Period ○ 550 vph – PM Peak Period • 2040 ○ 305 vph – AM Peak Period ○ 660 vph – PM Peak Period
Project Considerations	• As traffic volumes increase, ramp widening to provide two storage lanes may be needed to increase storage capacity of the ramp in the long-term and maintain lower metering rates. If widening is needed, there is sufficient right of way to accommodate widening. ODOT Region 1 has completed similar projects in the Portland area that could be used as examples if two lanes are needed. Based on the 2017 hourly volumes and forecasted 2040 volumes, the metering rates can be maintained below 900 vehicles per hour within the available storage length. • Sufficient space for maintenance personnel and their vehicles also needs to be a design consideration if ramp widening is needed in the future. • Public education on the operations and use of ramp meters will be needed when implemented in the Roseburg area.
Land Use Considerations	• No impacts are anticipated to Title VI and Environmental Justice populations.
Environmental/ Right of way Considerations	• No land use impacts are anticipated as all ramp meter installation can occur within the existing I-5 right of way. • Likelihood of wetland presence is low, but a field visit would be needed to verify.
Planning Level Cost Estimate	$300K (Design Engineering, Construction, Construction Engineering, 32% Contingency – 2021 Dollars) per ramp.
Implementation	A future IAMP should include additional analysis of this location including impacts of ramp metering to the local street network. Utilize ramp metering lessons learned from ODOT Region 1, including adjustments allowing for more adaptive operations.

Concept Illustration

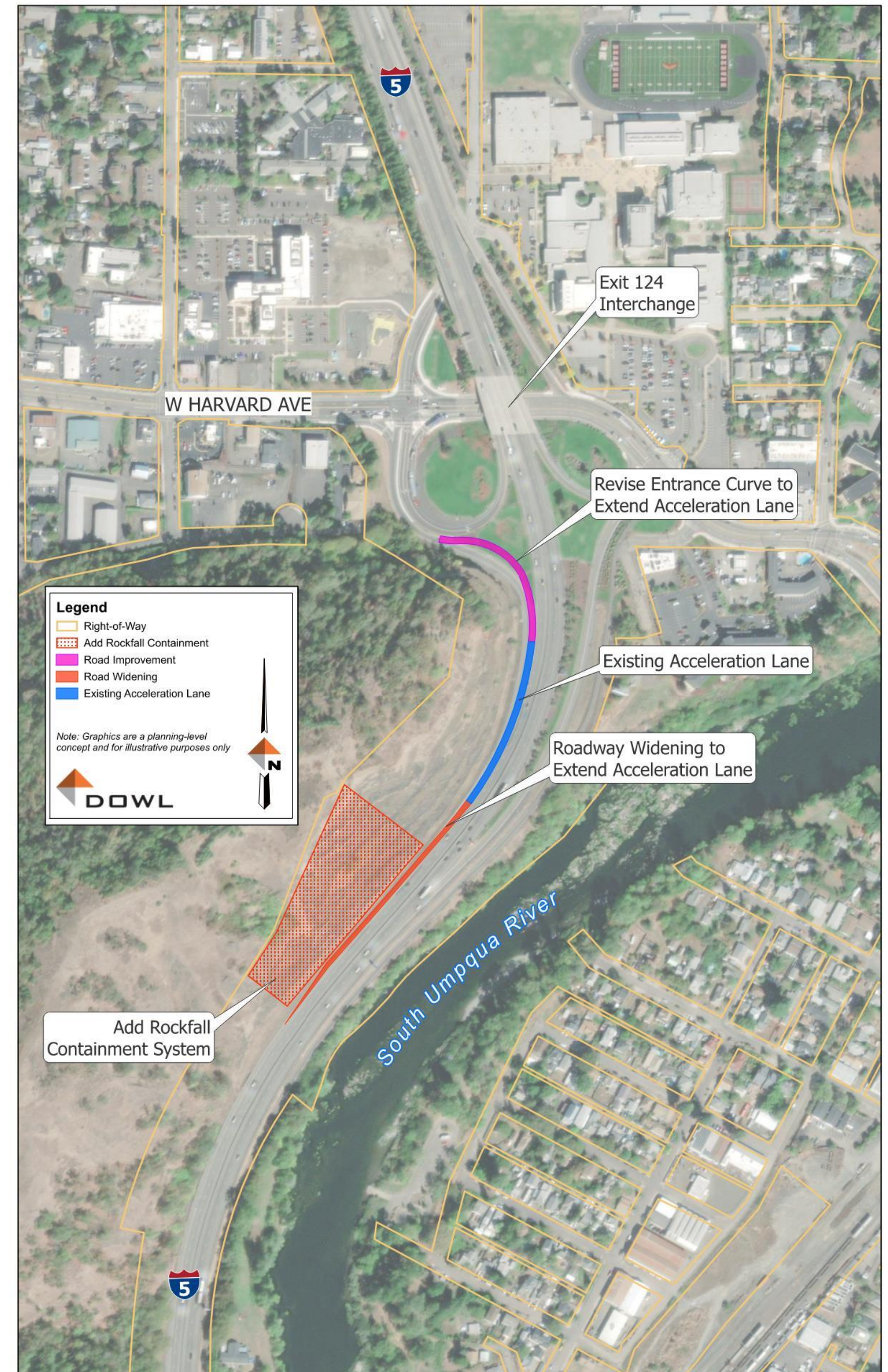


Concept #5: Exit 124 Southbound Geometric Modifications (Exit 124 IAMP Update)

Project Details

Location	I-5 Mile Point: 124
Transportation Facility Characteristics	**Facility Type:** Interstate Highway **Jurisdiction:** ODOT **Functional Classification:** • Federal – Urban Interstate • OHP – Interstate • NHS • Seismic Program 2 **Freight Route Designation:** • National Highway Freight Route • OHP Freight Route • Reduction Review Route • High Clearance Route **Posted Speed:** • 65 mph **Travel Lanes:** • Two Southbound Lanes • Two Northbound Lanes **Exit 124 Southbound On-Ramp Peak Hour Volumes (5:00-6:00 PM):** • 648 – Year 2017 • 761 – Year 2040 **Mobility Target:** • OHP: 0.80 • HDM: 0.65 **Cross Section Elements:** • Inside Shoulder - 6 feet • Travel Lanes - 12 feet • Outside Shoulder - 6 feet
Project Purpose/Description	The existing southbound on-ramp converge angle is aligned in a manner that could lead mainline drivers to think vehicles will enter earlier than the ramp entrance, resulting in slow-downs and friction north of the gore point. Reconstruct existing southbound on-ramp to align entering vehicles parallel to the mainline further west of the main line to reduce the existing geometric and safety concerns associated with the current on-ramp alignment.
Operational Considerations	Travel demand for I-5 within the vicinity of the southbound on-ramp is expected to be 6% over capacity during the peak 15-minute period with forecast 2040 volumes. Minor points of friction, such as the proximity of east-facing vehicles to the mainline, may cause slowdowns that can cause operational impacts and shockwaves through a congested segment. The reconstructed on-ramp may reduce the operational effects of the ramp geometrics and reduce the possibility of a bottleneck forming at this location.
Project Considerations	• The existing southbound entrance ramp acceleration lane could be lengthened to improve traffic flow. • The ramp entrance curve could be revised to extend the acceleration lane approximately 100 to 200 feet. • With the tighter on-ramp curvature, the acceleration lane could be extended south approximately 500 to 700 feet. This would reduce the clearance between the roadway and the adjacent rock slope and would require the installation of a rockfall protection system. • The design is should avoid the topographical constraints (Mount Nebo) as much as possible.
Land Use Considerations	• No impacts are anticipated to Title VI and Environmental Justice populations.
Environmental/ Right of way Considerations	• Likelihood of wetland presence is low, but a field visit would be needed to verify. • No right of way impacts are anticipated.
Planning Level Cost Estimate	$3.5M (Design Engineering, Construction, Construction Engineering, 32% Contingency – 2021 Dollars)
Implementation	A future IAMP should include additional analysis of this location. Other ramp configurations may be evaluated and impacts of ramp modifications to the local street network will be analyzed.

Concept Illustration



Concept #6: Exit 121 Southbound Geometric Modifications (Exit 121 IAMP Update)

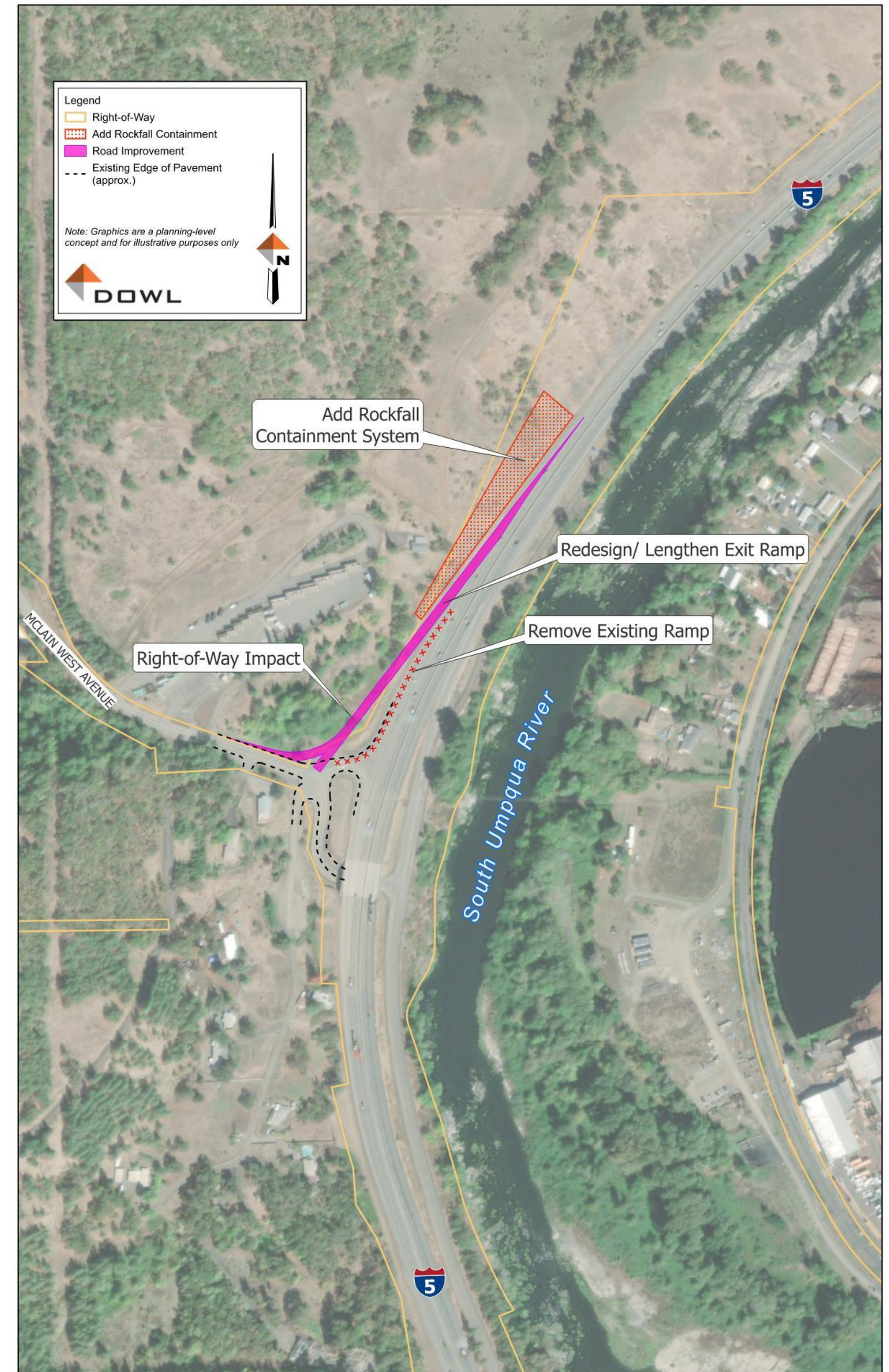
Project Details

Location	I-5 Mile Point: 121

Transportation Facility Characteristics	**Facility Type:** Interstate Highway
	Jurisdiction: ODOT
	Functional Classification:
	• Federal – Urban Interstate
	• OHP – Interstate
	• NHS
	• Seismic Program 2
	Freight Route Designation:
	• National Highway Freight Route
	• OHP Freight Route
	• Reduction Review Route
	• High Clearance Route
	Posted Speed:
	• 65 mph
	Travel Lanes:
	• Two Southbound Lanes
	• Two Northbound Lanes
	Mainline Hourly Volumes between Exits 123 and 120 during the Southbound Peak Hour (5:15-6:15 PM):
	• Southbound
	  ○ 2322 – Year 2017
	  ○ 2996 – Year 2040
	Mobility Target:
	• OHP: 0.80
	• HDM: 0.65
	Cross Section Elements:
	• Inside Shoulder - 6 feet
	• Travel Lanes - 12 feet
	• Outside Shoulder - 6 feet

Project Purpose/Description	The existing SB off-ramp has a deceleration lane with insufficient length to allow for ideal deceleration prior to the controlling curve on the off-ramp. In addition, the existing diverge angle to the off-ramp is aligned in a manner that could lead to drivers inadvertently leaving the mainline of the freeway through the wraparound design of I-5. Reconstruct existing SB off-ramp to provide a more traditional offramp geometry with an extended deceleration lane. This offramp would reduce the existing geometric and safety concerns associated with the current offramp alignment.
Operational Considerations	Exit 121 is located in the section of I-5 with some of the heaviest southbound volumes in the study corridor, including mainline segments that are expected to experience D/C ratios up to 0.88 under year 2040 no-build traffic conditions. Minor points of friction, such as driver confusion due to a non-tangential ramp alignment and the short deceleration lane, may cause slowdowns that can cause operational impacts and shockwaves through a congested segment. The reconstructed off-ramp will reduce those operational impacts of geometrics.
Project Considerations	• The existing southbound exit ramp geometry does not meet current standards. The entire ramp would need to be removed and replaced with a gore point extended approximately 300 feet north. • This would require extensive excavation into the rock hillside adjacent to the freeway. Rock cutting may be a viable excavation method. A rockfall protection system would likely need to be installed. This area is already a regular rock maintenance location for ODOT. • Through this project, ODOT should coordinate with the landfill property managers to understand the lifespan of the site and any on-site modifications that can be made to reduce occurrences of queue spillback onto the mainline with updated exit geometry.
Land Use Considerations	• Right of way would need to be acquired to flare the ramp away from the mainline.
Environmental/ Right of way Considerations	• Likelihood of wetland presence is low, but a field visit would be needed to verify. • Right of way would need to be acquired to flare the ramp away from the mainline.
Planning Level Cost Estimate	$5M (Design Engineering, Construction, Construction Engineering, 32% Contingency – 2021 Dollars)
Implementation	Implementation may occur when funding becomes available or when needed to address additional safety concerns. This is a future capital project separate from a future IAMP.

Concept Illustration



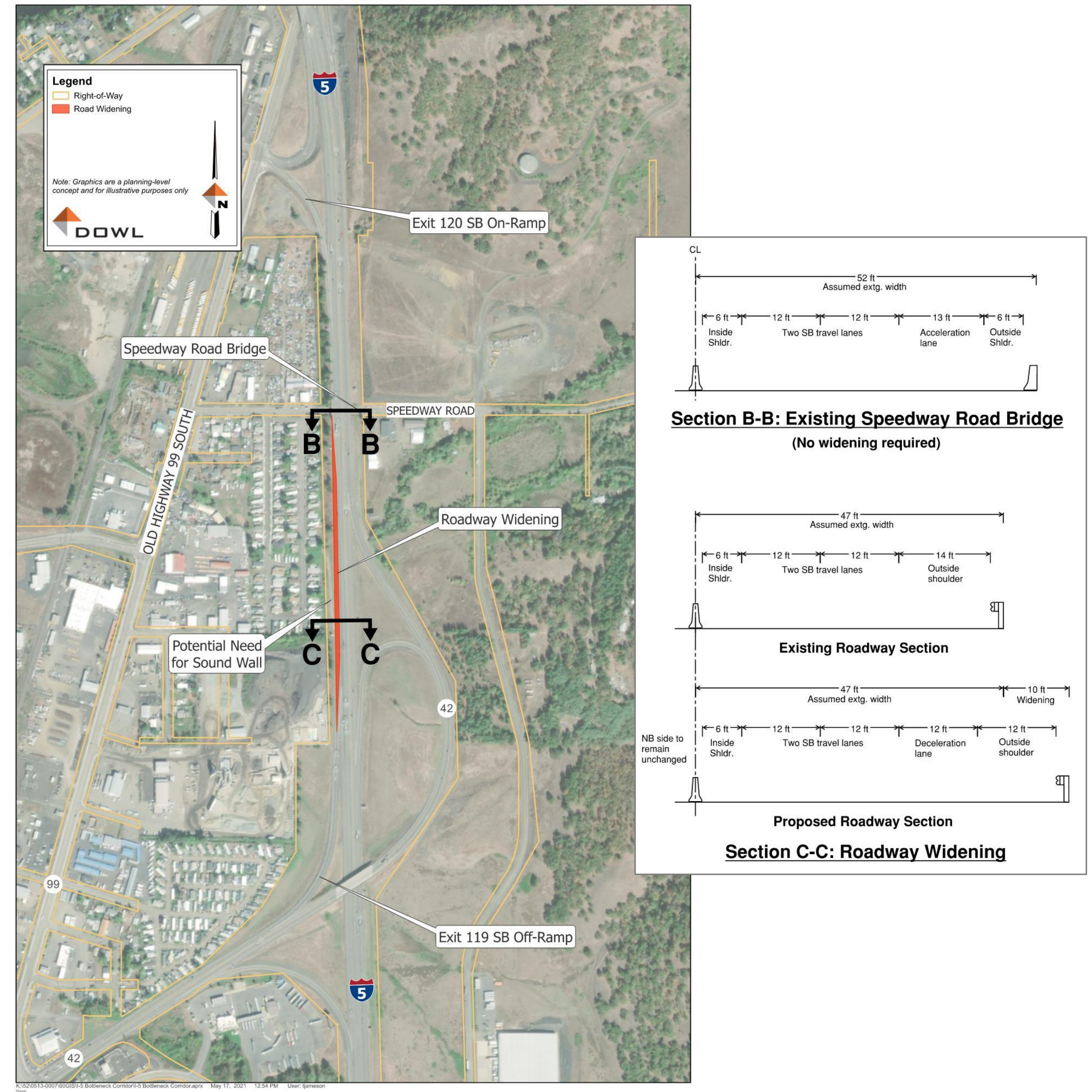
Concept #7: Exit 119 Southbound Deceleration Lane Modification (Exit 119 IAMP Update)

Project Details	
Location	I-5 Mile Point: 119

Transportation Facility Characteristics	**Facility Type:** Interstate Highway
	Jurisdiction: ODOT
	Functional Classification:
	• Federal – Urban Interstate
	• OHP – Interstate
	• NHS
	• Seismic Program 2
	• OHP – Expressway (off ramp to OR 42
	Freight Route Designation:
	• National Highway Freight Route
	• OHP Freight Route
	• Reduction Review Route
	• High Clearance Route
	Posted Speed:
	• 65 mph
	Travel Lanes:
	• Two Southbound Lanes
	• Two Northbound Lanes
	Mainline Hourly Volumes between Exits 120 and 119 during the Southbound Peak Hour (5:00-6:00 PM):
	• Southbound
	  ○ 2270 – Year 2017
	  ○ 2739 – Year 2040
	• Northbound
	  ○ 1668 – Year 2017
	  ○ 2000 – Year 2040
	Mobility Target:
	• OHP: 0.80
	• HDM: 0.65
	Cross Section Elements:
	• Inside Shoulder - 6 feet
	• Travel Lanes - 12 feet
	• Outside Shoulder - 6 feet

Project Purpose/Description	Projected travel demand along I-5 between Roseburg and the Winston/Green area is projected to measurably increase in the long-term. Southbound mainline volumes between Exit 120 and 119 are projected to approach capacity conditions. Lengthen the Exit 119 SB off-ramp.
Operational Considerations	Exit 119 is located at the end of the heavy southbound volume section of I-5. The southbound off-ramp is expected to experience D/C ratios up to 0.93 under year 2040 no-build traffic conditions. Minor points of friction, such as the short deceleration lane, may cause slowdowns that can cause operational impacts and shockwaves through a congested segment. The reconstructed off-ramp will reduce those operational impacts of geometrics.
Project Considerations	• The deceleration lane for the Exit 119 southbound off-ramp could be extended to improve traffic flow. This would involve roadway widening extending from the Speedway Road bridge to the existing off-ramp. • A soundwall may be needed for this project to address noise impacts to the adjacent residential areas.
Land Use Considerations	• No land use impacts are anticipated as all widenings can occur within the existing I-5 right of way. • No impacts are anticipated to Title VI and Environmental Justice populations.
Environmental/ Right of way Considerations	• Likelihood of wetlands and resources is high within the API based on review of aerial imagery and hydric soils mapped by the NRCS within the API. • Proposed roadway widening (adding impervious surface) would likely trigger FAHP documentation for stormwater management and impacts on ESA-listed species under the jurisdiction of the NMFS.
Planning Level Cost Estimate	$1.8M (Design Engineering, Construction, Construction Engineering, 32% Contingency – 2021 Dollars)
Implementation	Implementation may occur when funding becomes available or when needed to address long-term traffic growth. This a future capital project that is separate from a future IAMP.

Concept Illustration



CONSIDERATIONS FOR FUTURE INTERCHANGE AREA MANAGEMENT PLANS (IAMPS)

Throughout the I-5 Bottleneck Corridor Segment Plan process, ODOT and partner agencies have acknowledged the need for future Interchange Area Management Plans (IAMPs) to analyze the connections between I-5 and the local street network. The above concept sheets focus on the I-5 mainline, and future IAMPs will be in a better position to inform concepts that extend beyond the I-5 mainline and on/off ramps. The following describes IAMP considerations that have been discussed through development of I-5 mainline concepts:

- Analyze and/or model non-SOV modes, including potential mode shift when enhancements occur.
  - There are a lot of opportunities to improve or add transit within Roseburg and between Roseburg and Green.
  - Improvements to the regional/local bicycle and pedestrian systems should be considered, including connections between the west on Garden Valley Boulevard and Harvard Avenue and the east on Diamond Lake Boulevard. Those streets are currently barriers and would create key connections that could support more people choosing to walk or bike instead of driving.
- Utilize previous work, including alternatives for potential ramp and interchange closures and reconfigurations. It is important to note that removal of a ramp or interchange would distribute the demand to other access points. Future IAMPs may need to explore those shifts, especially if that shifted demand would intensify other potential bottlenecks. Although this project does not dive into the details for these types of concepts, it does not seem beneficial to fully close any of the interchanges in the study area.
- Conduct queuing analyses to understand impacts of potential ramp reconfigurations on the local system and verify queue storage on the ramp.
- Complete a high-level review of the region’s connectivity. Are there opportunities for parallel routes or enhancements to a parallel route?
- Explore a potential local street connection between Exit 123 and Exit 121 (such as a connection between McLane Avenue and the fairgrounds).
- Concepts 2 through 6 described above interact with the entrance and exit ramps and therefore the local system as well. Future IAMPs should analyze local system impacts of these concepts.
- Consider how drivers already may detour to the local system when I-5 is congested and limits their ability to load onto the mainline. Rerouting considerations will likely require a sophisticated modeling exercise, such as through a travel demand model.
- Explore travel demand management options for the region with agency and community partners, including determining mode shift potential.

IMPLEMENTATION

This plan is the first step for implementing enhancements on I-5 and the surrounding network in the Roseburg area. With the gained understanding of the I-5 mainline operations from this project, ODOT and regional stakeholders can begin reviewing the relationship of I-5 and the local system to verify concepts that are preferred from a regional perspective. For all the concepts describe above and concepts that come out of future IAMPS, further study and design work are needed to reach implementation.

Table 2 highlights the likely timeline for the I-5 mainline concepts and other studies that have been identified through the stakeholder and public input.

Table 2: Implementation Timeline

ID	Concept Name	Description	Planning Level Cost Estimate
Near-term (0 to 5 years)			
N/A	Interchange Area Management Plans (IAMPS)	Conduct IAMPs to understand impacts and interoperability of the identified I-5 improvement concepts and the local street system at Exits 125 and 124. Other interchanges for potential IAMPs include Exit 123 and Exit 121.	$300K per IAMP
2	Shoulder Widening	Widen or restripe I-5 to add shoulders where feasible. In addition to shoulder widening, coordinate with local agencies and speed enforcement agencies to review enforcement strategies	Varies by mileage ($750K to $1M per mile)
Mid-term (5 to 10 years)			
3	Exit 125 Southbound Ramp Meters	Install ramp meters for southbound on-ramps at Exit 125. The specific design/implementation details and impacts to the Garden Valley Boulevard corridor will be explored as part of a future IAMP at Exit 125.	$200K
4	Exit 124 Northbound & Southbound Ramp Meters	Install ramp meters for northbound and southbound on-ramps at Exit 124. The specific design/implementation details and impacts to the Harvard Avenue corridor will be explored as part of a future IAMP at Exit 124.	$300K
6	Exit 121 Southbound Geometric Modifications	Reconfigure southbound off-ramp at Exit 121 to reduce friction with mainline. The specific design/implementation details will be explored as part of a future IAMP at Exit 121.	$5M

ID	Concept Name	Description	Planning Level Cost Estimate
7	Exit 119 Southbound Deceleration Lane Modification	Reconfigure southbound off-ramp deceleration lane length at Exit 119 to reduce friction with mainline. The specific design/implementation details will be explored as part of a future IAMP at Exit 119.	$1.8M
2	Shoulder Widening – Continued As Needed	Widen or restripe I-5 to add shoulders where feasible.	Varies by mileage ($750K to $1M per mile)
Long-term (10 to 20 years)			
1	I-5 Southbound Auxiliary Lane (Exit 125 to 124)	Widen I-5 southbound to include an auxiliary lane between Exit 125 on-ramp and 124 off-ramp.	$27M
5	Exit 124 Southbound Geometric Modifications	Reconfigure southbound on-ramp at Exit 124 to reduce friction with mainline. The specific design/implementation details and impacts to the Harvard Avenue corridor will be explored as part of a future IAMP at Exit 124.	$3.5M
2	Shoulder Widening – Continued As Needed	Widen or restripe I-5 to add shoulders along other more challenging portions of the corridor.	Varies by mileage ($750K to $1M per mile)

Funding Considerations

As the projects move forward, funding will mostly likely come from the state and federal government. With this plan in place, ODOT can move forward with seeking funding to conduct the additional IAMP planning work and then begin design and construction phases for enhancements.

APPENDIX A: MEETING MINUTES

Meeting Minutes

I-5 Bottleneck Corridor Segment Plan (Roseburg)

Kick-Off Meeting

June 19, 2018 – 11:00 AM to 1:00 PM

Meeting Organizer: Matt Hughart, Consultant Project Manager & Tom Guevara, ODOT

Meeting Attendees: Melony Marsh; Stephanie Bentea, ODOT; Doug Sharp, ODOT; Logan Miles, ODOT; Peter Schuytema, ODOT; Jennifer Boardman, ODOT; Ron Hughes, ODOT; Mike Baker, ODOT; Stuart Cowie, City of Roseburg; Tracy Grauf, Roseburg Public Schools; Nikki Messenger, City of Roseburg; Jill Weber, Roseburg Public Schools; Glen Pederson, ODOT; Gary Garrisi, City of Roseburg; Joshua Shaklee, Douglas County; Darrin Neavoll, ODOT; Denny Austin, Roseburg Public Schools; Tom Guevara, ODOT; CJ Doxsee, Angelo Planning Group; Stan Petroff and Peter Pagter, OBEC Consulting; Matt Hughart and Bastian Schroeder, Kittelson & Associates, Inc.

Meeting Purpose: The purpose of the Kick-Off Meeting is to introduce the project, discuss the roles and responsibilities of the PMT, discuss the project goals and outcomes, and discuss a preliminary project schedule.

Project Introduction

Tom Guevara:

- Highest traffic volumes on I-5 in Roseburg; freight traffic congestion on the corridor; recurring bottlenecks between Exits 125 and 123
- This project will study corridor between Exit 129 to Exit 119
- High rate of fatal and injury crashes
- Limited parallel local circulation that is constrained by geography
- Congestion worsening under future forecast conditions
    - Reaching critical 60k volume that causes congestion on 4 lane road
    - Have reduced speed limit in last fall to address safety (127 – 123). Initial speed studies show little change in speed

Project Team Introductions/Roles

KAI

- Matt Hughart is the consultant team project manager

- Developing corridor analysis itself, including conducting analysis, examining alternatives, and preparing recommendations

ODOT, Tom Guevarra

- ODOT project manager
- Will be handling invoicing and verifying that the contract is met

OBEC

- Will be looking at physical improvements and analyze costs/impacts/mitigations

Angelo Planning Group

- Explain the policy and regulatory environment that the project is being developed in
- Identify policy/regulation red flags in the beginning of the project
- Existing conditions demographic portions, which helps the public involvement plan

Role of PMT

- Prepare for and participate in all PMT meetings.
- Begin discussing project concerns and formulate rough project goals/objectives.
- Provide technical assistance and guidance on the project.
- Will convene for at least three additional meetings to review and guide project.

Project Analysis Details

- ODOT has conducted traffic counts on the mainline. Team will be collecting safety data next.
- The 124/125 IAMPs couldn't fully address identified issues due to their limited scope. Hence, this project will look at broader corridor context
- Contingencies built in this project to look at streets beyond mainline if necessary and to integrate with TSP to the extent possible. TSP project outcomes will be "contingent on additional study and refinement."
- This project will use FREEVAL software for corridor analysis
- FREEVAL produces quick results that's easily modifiable
  - Consistent with HCM and ODOT analysis procedures
  - Analyzes aggregate cross sections (not lane by lane)
  - Improvements on getting on and off freeway will likely make it easier for people to get commercial destinations (issues beyond the terminals isn't within SOW)
  - Can take deeper dive into the modeling analysis using VISSIM tool

Goals and Outcomes Discussion

- This project will be looking primarily at the I-5 corridor. No plan to deviate analysis beyond I-5

- This project will coordinate and integrate with the TSP update (on-going) to the extent possible
- Seeking low cost improvements with minimal impact to adjacent land use but will also look at the potential for physical improvements to the freeway corridor, interchange ramps, bridges, etc.
- PMT Goals/Objectives Discussion:
    - Mike Baker, ODOT: opportunities for law enforcement improvements; shoulders for crash scene response
    - Ron Hughes, ODOT: same as Mike; minimize impacts to terminals and getting people to/from businesses
    - Jennifer Burnham: interested in looking at how transit can reduce car-demand
    - Peter Schuytema: concerns that Roseburg traffic is using I-5 as an extension of the local street network
    - Logan Miles: wants to be project resource when surveying is/may be needed
    - Doug Sharp: will be watching out for environmental issues (Note: planning level efforts may not get to that level of detail, but will acknowledge it)
    - Stephanie Bentea: wants to ensure projects have sufficient funding and project coordination is addressed amongst ODOT and partnering agencies
    - Tom Guevara: distinguishing between identifying projects that can be funded and constructed; identifying projects that are beyond funding but are needed/important; identifying projects that are entirely aspirational (if money is no object).
    - Gary Garrisi: interested in public safety and effects on service delivery models
    - Ray Lapke: the closeness of interchange ramps is a concern; access for law enforcement
    - Melony Marsh: economic development and impacts/access to businesses.
    - Tracey Grauf: ensure access to Roseburg High School is maintained/school can still function if improvements are considered
    - Stuart Cowie: concerns with gaps between this and TSP project and tying the projects together; recognize that this study relates to larger transportation network
    - Jill Weber: safety and efficiency at the high school between 7:00-7:30 because everyone converges at the same time (buses, parents, students); safety for getting people in/out if school shooting
    - Nikki Messenger: geometry problem (not just capacity) causing safety issues; not enough room for reader boards near fairgrounds; VA employees causing congestion (would like to get VA representatives involved);
    - Denny Austin: concerned about school buses and parent drop off coordination; politically challenging to replace/remove existing high school

- Darrin Neavoll: answers for economic development; able to maintain whatever gets built; safety for emergency response; look at ways to communicate to the public (reader boards, etc.)
- Joshua Shaklee: would like to see outcome of project feed into eventual Douglas County TSP update

Discuss Preliminary Project Schedule

The project schedule is preliminary and subject to refinement. Tom expressed interest in organizing separate meetings with the PMT, not shown in the schedule below, to review and discuss individual tech memos as they are released. Tom also expressed interest in tightening schedule between now and PMT Meeting #1 by approximately one month.

- Methodology memo: 7/16
- Plans/policy memo: 8/20
- Lands/pop/inventory: 9/16
- Existing system operations: 10/29
- Future baseline operations: mid-Dec
- PMT #1: mid-Dec
- Public open house: mid-Dec

Virtual PMT Meeting Minutes

I-5 Bottleneck Corridor Segment Plan

Meeting – Existing/Future Review, Concept Development

August 12, 2020 – 1:00 PM to 3:00 PM

Meeting Organizer: Matt Hughart, Consultant Project Manager & Tom Guevara, ODOT

Meeting Attendees: Brice Perkins - City of Roseburg, PW Director; Aaron Brooks - Interim R3 Traffic Manager; Gary Garrisi - City of Roseburg; Robert Grubbs - R3 Bridge Design; Tom Guevara - Senior Transportation Planner; Chris Hunter - Area Manager for SW Manager; John Lazur - City of Roseburg Planning; Josh Heacok - Douglas County PW; Raymond Lapke - R3 Traffic Engineer; Dan Latham - Public Information officer; Logan Miles - R3 Survey Manager; Nikki Messenger - City Manager Roseburg; Glen Pederson; Peter Schuytema – TPAU; Janell Stradtner - R3 Planner; David Warrick - Statewide Interchange Engineer; Troy Wilder - Planner for the VA; Cheryl Cheas - Transportation District; Melanie Marsh; Matt Hughart, Yi-Min Ha, and Bastian Schroeder, Kittelson & Associates, Inc.

Meeting Purpose: The purpose of the PMT Meeting #1 was to review the existing and future 2040 no-build analyses and discuss potential improvements to be tested and evaluated.

Project Re-Introduction

Matt Hughart:

- Gave an overview of the project. Rooted in earlier TPAU modeling analysis showing long-term capacity limitations along the I-5 corridor.
- Study area includes I-5 and immediately adjacent lands between Exits 119 and 129.
- This project will use FREEVAL software for corridor analysis
- FREEVAL produces quick results that’s easily modifiable
    - Consistent with HCM and ODOT analysis procedures
    - Analyzes aggregate cross sections (not lane by lane)
- This project will be looking primarily at the I-5 corridor. No plan to deviate analysis beyond I-5.
- Seeking low cost improvements with minimal impact to adjacent land use but will also look at the potential for physical improvements to the freeway corridor, interchange ramps, bridges, etc.

Project Analysis Details

- ODOT has conducted traffic counts on the mainline. Team will be collecting safety data next.
- The 124/125 IAMPs couldn’t fully address identified issues due to their limited scope. Hence, this project will look at broader corridor context

- Contingencies built in this project to look at streets beyond mainline if necessary and to integrate with TSP to the extent possible. TSP project outcomes will be "contingent on additional study and refinement."
- This project will use FREEVAL software for corridor analysis
- FREEVAL produces quick results that's easily modifiable
  - Consistent with HCM and ODOT analysis procedures
  - Analyzes aggregate cross sections (not lane by lane)
  - Improvements on getting on and off freeway will likely make it easier for people to get commercial destinations (issues beyond the terminals isn't within SOW)
  - Can take deeper dive into the modeling analysis using VISSIM tool

Existing and Future 2040 Findings

- Multiple geometric constraints along the I-5 study corridor. Deficient ramp acceleration length, narrow shoulders, tight curves.
  - Many of these deficiencies are a reflection of the tight geographical constraints and how design standards have changed over time. It is what the designers had to work with at the time.
- No existing bottlenecks per the pure definition.
- Model data shows a significant increase in traffic volumes through the study corridor over time. No bottlenecks per the pure definition, but there are segments of the study corridor that are forecast to reach capacity.
- Tom Guevara -
  - Traffic through Roseburg remains constant
  - But traffic within the Roseburg limits significantly climbs. Impact of jobs/housing imbalance.
  - While no bottlenecks, a slowing of speeds would creates the perception of queuing along the corridor. For Roseburg, this would be viewed or perceived as a bottleneck or the start of a bottleneck.
  - Want to come up with solutions to head off future bottlenecks.
  - On I-5 at Exits 125 to 123 - need opportunity to divert around incidents.
  - Need to explain to policy makers, if we don't do fixes for unique circumstance. It could become a daily occurrence.
  - Data may not show that, if that is a potential we need to explain it.
- Nikki Messenger –
  - Incidents or slowing on I-5 creates diversion to the local system, particularly at Garden Valley and Harvard.
  - Exit 125 - NB off-ramp has capacity issues. Queues can build back to mainline at times.

  - Police can't perform routine speed checks along the majority of the I-5 study corridor due to narrow shoulders.
- Tom:
  - Identify who our customers are: State and Federal Legislators vs City and County Elected Officials
  - Travel time - may probably focus on incidents
  - I-5 works 80% of the day. How does travel time compare to free-flow speed?

Future Improvement Discussion/Brainstorming

- Seems to be a lot of curves in the segment. Negotiating the curves at high speed, people tend to slowdown. Not sure if that leads to the slowdown/capacity issues.
- John Lazur:
  - Concerns with the limited I5 access between 124 and 119
- Robert Grubbs:
  - Regarding an additional SB travel lane between Exits 125 and 124, such a widening would have impacts to South Umpqua Bridge, Bellows Street, and Harvard overpass.
- Chris Hunter:
  - Any options looking at an additional local connection between Harvard and Garden Valley to off-load the local traffic from I-5? Currently only have Stewart Parkway and Stephens St.
- David Warrick
  - Corridor already very constrained, closely spaced interchange. Not many opportunities to add more ramps. Will have difficult time justifying adding additional lanes. "Freeway looks like the way it does for a reason. We are stuck with what we got".
  - From a design perspective - we are in a pretty tough corridor.
- Peter Schuytema
  - New local bridge crossing at the fairgrounds, but eliminate Exit 123. This idea has been tossed around.
  - Another possibility would be a longer SB ramp for Exit 121 to minimize queuing. Ideally, there would be a frontage road from there to 123, so you would not need 121, but there's not enough room.
- David Warrick
  - Shoulders for breakdown conditions (incident management)
  - Would a different interchange form better manage what we would expect?
- Melanie - 124 and 125 will see more traffic. Need to make it more user friendly for the business.
- Glen Pederson

    - Are you able to determine what percentages between the 'work commutes' vs. school traffic?
- Tom: Bottleneck Diagnosis on I-5
    - Roseburg has a jobs-housing balance that is not going to change.
    - Winston/Green is going to continue to grow over time and get worse.
    - Also seeing slight commute from the Sutherlin - probably going to get worse over time.
    - Over time that travel behavior is going to get worse.
    - Outside Roseburg stagnant, within Roseburg, its growing fast.
    - How much traffic is local traffic is adding to thru traffic. And how much are we trying to offset the impact?
    - Maybe the issue isn't traffic volume, maybe we need better distribution in the network so interchanges in the study area don't have significant traffic demand/congestion. Give local traffic other opportunities to commute.
        - Parallel frontage road?
        - Parallel road between Winston Green to Highway 99?
    - If we don't provide better trip distribution, traffic may divert to Highway 99 anyway.
    - If analysis can show that I-5 is efficient for local traffic - as I-5 becomes inefficient for local traffic, they will find other methods to get around I-5.
- Matt
    - What will be a good parallel facility for a new Highway 99?
    - X percentage reduction in trips along I-5
    - Could do reduction of volumes on I-5
- Tom - need to explain to the community why we are seeing the problems, and the problem is that local traffic have no good other options. We could look at parallel facilities.
- Janell
    - Living in the Melrose area. Growing, west Roseburg.
    - Typically take I-5 instead of Old Melrose Road to get to Roseburg High School. Saves several minutes. Suspects most others do the same.
- Melanie
    - Kids in highschool - they all take the freeway, it is the easiest and the fastest. His whole group use the freeway. Unless they wanted to stick on Harvard. They immediately jump onto the freeway.
- Ray Lapke
    - At one point there was idea to look at a Harvard and Garden Valley connection
    - Nikki
        - Concorde Connector - heads north. Concept been around for 50 years.

        - Most of that time the City wants to expand UGB, without that growth, there wasn't the need.
- Cheryl
    - 119 area - choice to take I-5 over 99. In order to take left-hand turn. You have to sit through three lights to get to turn lane.
    - Parallel route connecting Winston would be Lookingglass to West Harvard.

Next Steps

- Start into the alternatives concept evaluation
- Need to look into any and all concepts
- Wash those through the evaluation process
- Will look at the operational impacts
- Partnering firm will look into implications of some of the improvements to realize those improvements.
- We will put together summary evaluation sheets for all these ideas.
- Virtual open house with the public at large.
- All subsequent steps will include a public engagement process.
- Next meeting sometime in mid October.

Virtual PMT Meeting Minutes

I-5 Bottleneck Corridor Segment Plan

Meeting – Preliminary Concept Development and Review

December 17, 2020 – 1:00 PM to 3:00 PM

Meeting Organizer: Matt Hughart, Consultant Project Manager & Tom Guevara, ODOT

Meeting Attendees: Brice Perkins - City of Roseburg, PW Director; Aaron Brooks - Interim R3 Traffic Manager; Tom Guevara - Senior Transportation Planner; Chris Hunter - Area Manager for SW Manager; John Lazur - City of Roseburg Planning; Raymond Lapke - R3 Traffic Engineer; Dan Latham - Public Information officer; Nikki Messenger - City Manager Roseburg; Glen Pederson – ODOT D7; Peter Schuytema – TPAU; Janell Stradtner - R3 Planner; Matt Hughart, Yi-Min Ha, Bastian Schroeder, and Molly McCormick, Kittelson & Associates, Inc.; Stan Petroff, DOWL; Cheryl Cheas; Mike Baker – ODOT Planning Manager

Introductions

Tom G:

- Gave an overview of the project and tee-ed up the presentation.

Project Goals Review

Matt Hughart:

- Gave an overview of the meeting agenda. A main outcome of the meeting is to discuss a range of potential solutions and potentially focus in on the ones that have the most benefit.
- Reminder of study area: Exit 129 to Exit 119.
- It is important to remember that this project is focused on I-5 itself and does not look specifically at the local system. This is an important point since it is not the only travel way for accessing this area and modifications on I-5 will impact the local system.

Future No-Build Conditions Review

- Roseburg to Winston/Green commute patterns are major contributors to the mainline volumes and experienced
- The southbound weekday PM peak is the critical time period
- Although we previously shared results for the average day, this presentation focused on the peak period to better understand what bottlenecks look like when they form (June).

- Under summer 2040 no-build conditions, a southbound queue is expected to begin around 3PM and at the Garden Valley Road Exit 125 on-ramps

Envelope of Solutions

- There is a large range of solutions that could be included
  - Three general categories: capacity, demand, access modifications
- The analysis described is not specific to any individual solution but starts to show the envelope of impacts to I-5 bottlenecks if capacity, demand, or access modifications are made.
- The analyses shown are specific to understanding impacts to I-5. No environmental, ROW, local street network impacts have been analyzed. This is a focus of the next phase of the project.
- Capacity modifications
  - Various widening solutions including a third travel lane along the entire freeway corridor (both directions), strategic widening (where demand is highest), and auxiliary lanes between strategic interchanges.
  - Does not look at the potential of induced demand.
  - Keep in mind that if multiple areas have demand over capacity ratios near or over 1.0, building just a spot capacity improvement may only move the bottleneck further downstream
    - This is the case for this corridor, thus the "strategic modification"
- Demand modifications
  - Assumes the region can reduce I-5 travel demand between Roseburg and Winston/Green as a result of transit improvements, alternate travel routes, and TDM measures.
  - As shown, demand modifications will not solve the forecast bottlenecks alone.
- Access modifications
  - Show that there is some free capacity in the northern part of the corridor that could be used.

Key Takeaways

- No silver bullet – best solution is likely a combination of strategies
- Spot capacity improvements may intensify downstream bottlenecks
- Strive to maintain a consistent level of service
- Combination of improvements will be key:
  - Part time shoulder use
  - Traveler information systems

- Ramp metering
- Transit service
- Parallel/alternate travel corridors

Discussion

- Tom:
  - I-5 mainline north and south of the study area operate acceptably. A a combination of through traffic on I-5 and local traffic using I-5 creates the issues within the corridor.
    - Terrain, lack of a parallel route – these issues are not going to change
  - All the bottle necks are occurring at the interchanges. Or demand to capacity (d/c) is close at those interchanges, so they could
    - Ramp metering could help with those locations where d/c is just past 1.0
    - Part-time shoulder use
  - Want the PAC to help with whether to do a comprehensive corridor-wide project or more smaller spot improvements
- Janell
  - Was curious if the existing auxiliary lane in northbound is causing any issues? Seems like not
    - It wasn't showed in red because the speeds don't fall low enough for a bottleneck to form. With increased density (volumes) on the freeway, the vehicles speeds can reduce, even if it isn't forming a "bottleneck" (freeway not being able to accommodate volumes).
  - Ramp metering isn’t as simple as just a ramp meter. Would need to have storage space for queuing. Are there the needed geometrics to install?
    - Very true. This would need to be further explored.
- Bastian
  - Ramps have lower capacity
  - Strategies that lessen that friction
    - Auxiliary lanes and additional lanes
  - Important to note that this is not an average day, but more an outlier day
    - Could end up adding a lot of capacity during times when not needed. Could have unintended impacts – maybe safety if speeds get very high during the off-periods
    - Recommend some further exploration of the active demand management strategies since they can focus on time

        - Dynamic part-time shoulder use. Have been applied very successful
            - Colorado DOT uses them for weekend use near ski resorts

- Nikki
    - Understand that there are different strategies but don't think we can decouple them.
        - 124 and 125 exits are likely unable to do ramp metering as is
            - Can't get up to speed now with the constrained geometry
            - Would need to reconstruct the interchanges
    - Can't look at these things in a vacuum. Think of impacts
    - Politically, closing an interchange will be a major hurdle and not something to be considered lightly
    - Could variable speed limits be used
        - Bastian
            - Primarily a safety tool
            - Are being used for congestion mitigation, but largely back-of-queue/secondary crash reduction
            - Not normally a capacity enhancement
            - Would enhance the reliability by mitigating the safety issues that come from the congestion
- Brice Perkins
    - Won't work: getting douglas county folks to use transit/mass transit is likely not realistic.
    - Nikki: there is a place for transit and there is a demographic for it. But do not see it as a solution
- Tom
    - Keep in mind that we have two audiences: local agencies and FHWA
    - Want to have something in place from this plan so that if there are congestion and reliability issues that start to become more prevalent, ODOT will be able to pursue project and funding
- Cheryl
    - When looking at transit as a viable option for taking some traffic off the road (increased frequency/better coverage/better hours), end up getting riders of choice
        - 160,000 trips per year before 2016(?) cuts
        - 110,000 trips per year (pre-COVID)
        - 50,000 trip per year (COVID)
        - As long as have the COVID implications, end up having reduction of the forward progress that were being made

    - Mike Baker:
        - Southbound graphic – showed the hot spot moving to Exit 123, why? Light use
            - By clearing the upstream bottleneck, more demand is reaching Exit 123
        - Ramp metering – understand that some of the interchanges do not have the ability
            - Through this project, can more identify some of these locations where there will need to be future study/design work to understand ability to implement
            - Look at the interchanges themselves to better identify what can be done
    - Nikki:
        - VA is a big employer for Exit 124/125
            - Maybe FHWA has a relationship to help with some TDM strategies?
        - The high school is also a big generator
        - When look at closing interchanges, which I'm not in support of, need to think about the rerouting onto the local network
    - Troy:
        - VA representative
        - A lot of changes upcoming on the campus
        - When under normal conditions, use both 124 and 125
    - Peter:
        - Everything seems to make sense
        - A mixture of solutions does seem key
        - TSMO type projects are much cheaper to implement than a capacity project
- Janell:
    - Have we looked at what types of alternate travel routes could have an impact?
        - We simplified our demand reduction analysis to focus on any alternative route that reduces demand between Exit 119 and 125. But in terms of specific routes on the arterials, we have a list from our previous meeting, but not further refined under this study (we are focused on what we can do within the I-5 ROW).
- Tom:
    - The no-build is an option if the congestion during certain points
- Nikki:
    - Decoupling I-5 from the full network and impacts on the community is still an issue
        - Development is already hindered by the performance of the interchanges at the exits. Unless there is lessoning of standards at the exits
    - Was the Portland Bridge connection to 99 looked at?
        - Another option for 124. Might not impact 125. Might not have impact on the bottlenecks. Should look into this

        - It is difficult to talk about parallel routes and that is one option for a short segment
- Aaron:
    - Still don't understand the 123 bottleneck for the strategic widening. It is not a high-count location
- Chris H:
    - Doesn't look like any of these options really get to a reasonable alternative
        - No build doesn't seem like a good option
        - Would like to get to interim phases at least with maybe the full widening as the future goal
        - 123 doesn't make sense
- Mike B:
    - Don't think there would be enough mode shift to get 12%
        - Maybe park and rides, transit agency adjusting schedules, OD studies to determine what can be done
- Peter S:
    - Getting as much as 12% reduction would basically get to mandatory TDM compliance. Seems unlikely with the Roseburg size and context. Frequency is the most important key point. People want to be in charge of their schedules, not the transit agency
    - Maybe employers shifting schedules to shift demand
    - But 12% seems unrealistic
- Nikki:
    - Not sure what a temporary closure actually looks like, but seems like an equity issue. Shifts regional traffic onto the local system.
    - Would love to find a way to take the VA traffic directly to the VA. Would help with the local system.
    - Was part-time shoulder use specifically looked at?
        - Yi-Min - No but the capacity analyses help show what the impacts may be
        - Part-time shoulder per lane capacity is a bit different than adding a full lane (probably about 1600 vehicles/hour). Not quite the equivalent of a full lane

Next Steps

- Matt: Not hearing support for access modifications
    - Physical and demand responsive policies working in unison to help

- Tom: Combination of strategies/auxiliary lanes and something like ramp metering likely the best
- Tom: Recommend having a technical meeting between ODOT, Douglas County, city, consultant
  - Want to better understand mainline and interchange/ramp exit impacts
  - Is there a direct link between I-5 through volumes and the queuing and ramp issues
  - Maybe come up with some policy for future IAMP for moving forward
- Mike: When expect increased volumes, normally also expect increased crashes
  - Do have a reliability study to look at what happens when there are incidents on the corridor and when there is weather incidents
- Ray: have you guys worked with preferential lanes before? HOV, HOV during certain times of day. Keeping through traffic in the left lane during certain times of the day
  - Bastian: California ones are mostly price driven
  - Biggest issues are that it would take more ROW. Normally 2 +1 or more. This case would be 1 +1, which never seen before. So if go to 2 +1, would be so much added capacity where it then wouldn't need to be managed
  - Have not come across any signage suggesting through movements to stay to the left
- Please get any additional comments to Tom. Ask your coworkers to review as well if applicable.
  - Comments back before the end of next week.

Virtual Meeting Minutes

I-5 Bottleneck Corridor Segment Plan

Meeting – City and County Coordination Meeting

March 24, 2021 – 3:00 to 5:00 PM

Meeting Organizer: Matt Hughart, Consultant Project Manager & Tom Guevara, ODOT Agency Project Manager

Meeting Attendees: Tom Guevara – ODOT Senior Transportation Planner; Chris Hunter – ODOT SW Area Manager; Mike Baker – ODOT Region 3 Planning Manager; Glen Pederson – ODOT Interim District 8 Manager; Nikki Messenger - City Manager Roseburg; Joshua Shaklee – Douglas County; Matt Hughart, Yi-Min Ha, and Molly McCormick, Kittelson & Associates, Inc.; Stan Petroff, DOWL

Introductions

Tom provided an overview of the project:

- Refocused the group on the project purpose: diagnose bottlenecks or potential bottlenecks on the I-5 mainline between Exits 119 and 129 and identify projects to move forward.
- This project need was established because I-5 was reaching travel lane capacity, and ODOT wanted to understand why there was some congestion.
- Through analysis, it was found that there is not a bottleneck issue on the I-5 mainline travel lanes. There are hotspots within the study area that exceed capacity during peak periods in the future year located at interchanges. There is a lot of merge/diverge traffic causing frictions and slowdowns, which can then become the beginning of bottlenecks.
- Main question for consideration during the meeting: Do we try to create more mainline capacity or work on the root cause of friction at the interchanges?

Summary of Operational Challenges

- Significant commuter travel between Winston-Green and Roseburg.
- I-5 is supporting local connections due to geographic and other constraints of the area.
- Existing exit geometries cause friction, especially at locations constrained by topography.
    - Examples include the southbound Exit 120 deceleration lane located on a curve segment and the southbound Exit 124 where the acceleration lane is insufficient after the loop.
- High percentage of heavy vehicles, primarily on the mainline but also at select exits. This is not the main cause of slowdowns but does impact capacity.

Concepts for Review

Widening:

- The two widening options are a third southbound travel lane for the full corridor or between Exits 127 and 124.
- There was consensus among the meeting participants that this not likely the solution. There are physical constraints, funding constraints, and the potential to intensify downstream theoretical bottlenecks.

Auxiliary Lane/Part-time Shoulder Use:

- For any of the potential locations, there would need to be widening and bridge impacts for either an auxiliary lane or part-time shoulder use. Because there is not existing width to use for part-time shoulder use, it starts to minimize the benefits compared to auxiliary lanes.
- Comment: Agree that part-time shoulder use would not make sense if have to widen the three bridges. If widening wasn't necessary, it would be a better option. Part-time shoulder use would require public education on how it operates.
- Comment: If going to go through the effort of widening, seems like an auxiliary lane or part-time shoulder use don't make as much sense as a through lane. Can you define an auxiliary lane?
    - An auxiliary lane is an added lane between adjacent on-ramp and off-ramp exits. It provides more acceleration and deceleration distances and helps when there are significant volumes that travel between the two exits.
- Comment: The potential concept between Exits 120 and 119 may be unnecessary. It is unlikely that there would be many drivers traveling between the two.
    - The project team did hear that some of the traffic in the Green area is avoiding OR 99 because of the traffic control.
    - Consider a different concept where the Exit 119 deceleration lane is extended.

Ramp Metering:

- Based on the feedback received at the last meeting, the model capacities were adjusted. The previous assumptions were too conservative and assumed Roseburg drivers are more cautious, resulting in lower throughput. In addition to driver behavior capacity adjustments, exits with extremely low volumes were adjusted to assume a capacity closer to through segments due to the lack of merge/diverge friction.
- With the capacity adjustments, many of the interchanges show demand-capacity ratios that are just over 1.0. This points to the potential for effective ramp metering.
- Further analysis would be needed to understand impacts of ramp metering on the local system. This would be included in a future IAMP.
- Comment: placement of the ramp meter would need enough space to accelerate. The Exit 124 southbound ramp might not have acceleration lane length.

    - The project team will be reviewing this type of constraint as part of the project sheets. As an initial review, DOWL has been looking at acceleration length if meters are place at the physical gore point.
- Comment: The diagonal Exit 125 on-ramp is tricky. Garden Valley itself is highly congested and the ramp is located away from signal, making it difficult to form platoons that ramp meter would break up.
    - One option is to use a queue dump detector. If the queue reaches a certain point, then the meter stops metering and flushes the traffic onto the mainline. If a ramp is always reaching that point, then it wouldn't be an effective location for ramp metering.
- Comment: Ramp metering options cannot fully move forward until there is queuing analysis and understanding of local system impacts.
    - Agreed. This would be completed in the future IAMP.
    - The analysis shows that the mainline is ripe for using ramp metering but the local system needs to support it as well.
- Comment: Some of these improvements will not work on their own. Ramp metering will generally suggest geometric edits to be able to get up to provide acceleration distance.
    - If we don't address that speed differential, there will still be slowdown/friction issues.
- Comment: Did this process consider off-highway improvements?
    - This project is focused solely on the mainline. Non-mainline considerations will be covered by the future IAMP.
    - There is no easy parallel route to consider, but just a parallel route would not likely be enough to address the future peak period.
    - This project has validated that Roseburg is a unique portion of the I-5 network. With the river and topographic challenges, I-5 becomes part of the local system.

Geometric Edits:

- Identified locations where there may be operational impacts (i.e. friction, slow downs) due to geometric characteristics: exits on curve segments instead of tangents, room to adjust gore points, etc.
- In addition, the team will be identifying locations where there could be turnouts.
    - Comment: This is important for maintenance staff as well as for broken down vehicles and law enforcement. Staff have noted the area is difficult to access.

Future Work:

- Comment: The discussion around an Interchange Area Management Plan (IAMP) is not new. What is the timeline for completing that future plan?
    - It is budgeted for the next biennium. Now that there is better understanding of the mainline, ODOT can move forward with IAMPs in this area.

- Reviewing ramp and cross-road improvements outside of the mainline

General Discussion

- Comment: It is earmark season, and the southbound auxiliary lane between Exits 125 and 124 was requested.
- Comment: Should the project team be trying to create hybrid alternatives?
  - See the solution as a combination of all the types of projects discussed today except the third travel lane.
  - Do not recommend moving forward with the auxiliary lane between Exits 120 and 119. This should be addressed through a geometric edit.
- Comment: The two northbound on-ramps at Exit 124 create a lot of friction. The IAMP should review whether ramp consolidation would improve this.

Next Steps

- A round of meetings with stakeholders and city representatives will be completed in April/May to discuss the project sheets.

Virtual Meeting Minutes

I-5 Bottleneck Corridor Segment Plan

Meeting – Detailed Concept Review

April 26, 2021 – 3:00 to 5:00 PM

Meeting Organizer: Matt Hughart, Consultant Project Manager & Tom Guevara, ODOT Agency Project Manager

Meeting Attendees: Tom Guevara, ODOT; Mike Baker, ODOT; Glen Pederson, ODOT; Joshua Shaklee, Douglas County; Josh Heacock, Douglas County; Brice Perkins, City of Roseburg; Cheryl Cheas, Umpqua Public Transportation District; Raymond Lapke, ODOT; John McDonald, ODOT; Aaron Myton, ODOT; Janell Stradtner, ODOT; David Warrick, ODOT; Troy Wilder, Roseburg VA; Wei Wang, ODOT; John Lazur, City of Roseburg; Matt Hughart, Yi-Min Ha, and Molly McCormick, Kittelson & Associates, Inc.; Stan Petroff, DOWL

Introductions

Tom provided an overview of the project:

- This project need was established because I-5 was reaching travel lane capacity, and ODOT wanted to understand why there was congestion.
- Why does the Roseburg area have some of the highest volumes on I-5 in the state?
  - There is a lack of connectivity due to geographical/topographical constraints in the area. Local trips end up on I-5.
  - There is a heavy Winston-Green to Roseburg commute pattern with the nearby bedroom communities and the employment opportunities in Roseburg.
- Through analysis, it was found that there is not a recurring bottleneck issue on the I-5 mainline travel lanes. There are hotspots within the study area that exceed capacity during peak periods in the future year located at interchange ramp merge and diverge points. There is a lot of merge/diverge traffic causing friction and slowdowns, which can then become the beginning of temporary bottlenecks.

Summary of Operational Challenges

- Significant commuter travel between Winston-Green and Roseburg.
- I-5 is supporting local connections due to geographic and land use constraints in the area. I-5 is used as an extension of the local street system, particularly between Exit 125 and Exit 124.

- Existing exit geometries cause friction, especially at locations constrained by topography.
    - Examples include the Exit 120 southbound deceleration lane located on a curve segment and the Exit 124 southbound on-ramp where the acceleration lane is insufficient after the loop.
- There are long segments of this corridor that do not have adequate shoulders to support maintenance staff, incident management, and speed enforcement.
- Travel demand reliability analysis results are shown in the memo. It highlights what time of year and what part of the corridor sees the most congestion. When discussing bottlenecks in the future 2040 year, Exits 125 and Exit 124 during the summer months are the forecast hot spots.

Concepts for Review

Concept #1: Southbound Auxiliary Lane Between Exit 125 and Exit 124

- With the auxiliary lane, a temporary bottleneck is forecast starting at the Exit 124 on-ramp.
    - Keep in mind that the analysis represents the summer peak traffic conditions.
    - During the non-peak traffic conditions, the auxiliary lane provides the additional capacity to reduce bottlenecks instances when there is an incident or adverse weather that impacts freeway capacity.
- The project team already received a comment about additional considerations for the adjacent multi-use path.
- Comment: This area has two interchanges with dual on-ramp configurations. Was there any work done to look at the option to element a ramp where there are two? Assuming it would need to be reviewed by a future IAMP.
    - This project will not explore those kinds of concepts. The previous high level work included explorations of ramp and interchange closures, but these will need to be fully reviewed and addressed in the future IAMP.
    - It is important to note that removal of a ramp or interchange would distribute the demand to other access points. Future IAMPs may need to explore those shifts, especially if that shifted demand would intensify other potential bottlenecks. Although this project does not dive into the details for these types of concepts, it does not seem beneficial to fully close any of the interchanges in the study area.
- Comment: Will this project include recommended next steps for the IAMP?
    - Yes, especially the ramp modifications that are shown in the project sheets.
    - Would also recommend a high-level review of the region's connectivity. Is there potential for a parallel route that could be enhanced?
- Comment: On the project sheet, add the benefit of local traffic not needing to merge/diverge with mainline traffic.

Concept #2: Exit 125 Southbound Ramp Meters

- Ramp meters create gaps between the on-ramp vehicles so that there is a smoother flow that causes less friction as it merges onto the mainline.
- The project team already received a comment that the cost estimates are too low and should be reviewed in greater detail.
- Comment: ODOT has implemented ramp meters as retrofits in places like Portland. They are more of a band aid/near-term fix when unable to reconstruct an interchange or implements a bigger project immediately. They are an effective tool but not a catchall. ODOT also has experience with the different adjustments that can be made at ramp meters to allowing for more adaptive operations.
- Comment: There is definitely an element of public education that will be needed if these are implemented in the Roseburg area.
- Comment: When looking at the D/C ratios, generally about three to six percent over capacity. Those are the types of levels where better management of the facility can go a long way.
  - Element that could be explored further in the IAMP would be reconfiguration of the diagonal on-ramp and interactions with the local street system. Do not want to have queues backing up onto the local street system.
  - The faster you meter traffic (higher metering rate), the less effective the ramp metering is. To maintain an effective metering rate, options to increase storage may be needed.
  - Comment: That is very common in the Portland area. Squeezing in two lanes that only are used during the peak traffic condition. There are details for ramp widths in the HDM. If less than 26’, would need to look at some widening.
- Comment: With the auxiliary lane, how will the ramp meter work with the limited distance upstream to detect traffic? Seems like detection would be key. Want to understand auxiliary lane traffic versus weaving traffic. Is this a small consideration or an issue?
  - Believe there should be a lot of operational knowledge of these kinds of issues from Region 1 that could be shared.

Concept #3: Exit 124 Ramp Meters

- No comments.

Concept #4: Exit 124 Southbound Geometric Modifications

- The magenta line shows a small incremental improvement at the curve entrance. The orange line shows a more significant acceleration lane extension.
- Comment: The curve adjustment looks very sharp, but it makes sense as a whole with the extended acceleration lane. The HDM will provide additional guidance for updating the on-ramp. In addition, need to proceed with caution for any physical improvements impacting Mount Nebo.

    - Comment: Agree with incremental improvements and trying to avoid the topographical constraints as much as possible.

Concept #5: Exit 121 Southbound Geometric Modifications

- The existing geometry is not the modern angled exit. The geometry allows for fast diverge speeds and then there is a sharp curve at the end of the ramp.
- The concept would extend the off-ramp back to allow for an angled exit and a longer deceleration lane. This would have some topographical constraints.
- Comment: Encourage the incremental improvement at this location. Maybe rock cutting will make this more viable.
- Comment: This area is already a regular rock maintenance location for ODOT.
- Comment: The landfill sometimes causes traffic to queue back onto the freeway, but the property managers have been working on their operations and it has gotten better.
    - Maybe there is a fix off the freeway in terms of additional storage or modified configuration of the site.
    - Based on memory, the landfill site is meant to continue use for the next 20 to 25 years. Add consideration of the life span to the project sheet.
- Comment: Is there an opportunity for a local street connection between Exit 123 and Exit 121 (such as McLane Avenue to the fairgrounds)?
    - That type of concept was not further explored for this mainline-focused project. There are topographical issues that do not support a high-level review. This could be part of a future IAMP.
- Comment: This is a very isolated location. It is unlikely to be impacted by the same regional growth as the rest of the study area.

Concept #6: Exit 119 Southbound Deceleration Lane Modification

- Comment: This area has been previously considered for an auxiliary lane, which would impact the bridge or necessitate widening. This is generally consistent with previous concepts.
- Comment: May be substantially more costly due to the likelihood of a sound wall.
    - Agreed. Include as a consideration on the project sheet.

Concept #7: Shoulder Widening

- Comment: Portland area has some experience on considering shoulder widening in constrained areas. Have used predictive methods to think through where to include shoulders and to consider crash hot spots near merges/diverges where there are the most significant operational impacts. Region 1 also has knowledge to share around considerations of auxiliary lanes versus widening shoulders.
- Comment: Maintenance folks appreciate full-width shoulders. Safer and able to not take a lane.

  - Agree with comment regarding the need for shoulders that help maintenance and law enforcement to minimize lane closures.

General Discussion

- Comment: The only concepts that affect the study area are Concept #1 and #7. Being that the project doesn't study the local impacts to Garden Valley and Harvard, I don't feel that we have sufficient data to support the other concepts. I would defer to the 124/125 IAMP to propose these concepts. (#2, 3, & 4)
  - Would like more data on how ramp metering would impact Garden Valley and Harvard. Should be deferred until the IAMP, which is likely to start by fall of 2021.
  - Comment: Agreed. The scope and data for this project did not cover the immediately adjacent local system.
  - Comment: Even without ramp metering, drivers may detour to the local system when it is congested and can't load onto I-5.
    - The project modal does not account for these types of considerations. Thinking through rerouting would require a much larger and more sophisticated modeling exercise (travel demand model or mesoscopic).
    - Keep in mind that alternative routes are very limited in this area.
    - Brought this up because it is an important factor that the IAMP needs to consider.
- Comment: In the project sheets, add some of the observations from this meeting about near-term and long-term considerations.

Next Steps

- Please review the project sheets in more detail and provide comments by May 5th.
- Will be holding meetings with local officials to collect their comments as well.
- Final document by end of June.

Virtual Meeting Minutes

I-5 Bottleneck Corridor Segment Plan

Meeting – Joint City/County Officials Meeting

May 24, 2021 – 6:00 to 7:00 PM

Meeting Attendees: Amy Sowa, Larry Rich, Alison Eggers, Andrea Zielinski, Bev Cole, Bob Cotterell, Brian Prawitz, Brice Perkins, Chris Boice, Gary Klopfenstein, Nikki Messenger, Patrice Sipos, Sheri Moohart, Stuart Cowie, Tom Kress, Mike Baker, Tom Guevara, Matt Hughart, Yi-Min Ha, Molly McCormick, Stan Petroff

Meeting Purpose

ODOT and the consultant team have been studying I-5 between Exits 129 (near Umpqua Community College) and 119 (Winston-Green area) and are looking to the City and County officials to provide input before the planning project is finalized in June 2021. Tom Guevara (ODOT) and Matt Hughart (Kittelson) provided an overview of the project, summary of operational challenges, and description of the concepts for review.

Summary of Operational Challenges

- This project need was established because ODOT wanted to understand operations on I-5 and why the Roseburg area has some of the highest volumes on I-5 in the state.
- There is significant travel between Winston-Green and Roseburg as an urban area.
- There is also seasonal variability seen on the corridor, with the highest traffic volumes seen during the summer months.
- I-5 is supporting local connections due to geographic and land use constraints in the area. I-5 is used as an extension of the local street system, particularly between Exit 125 and Exit 124.
- Existing exit geometries cause friction, especially at locations constrained by topography.
    - Examples include the Exit 120 southbound deceleration lane located on a curve segment and the Exit 124 southbound on-ramp where the acceleration lane is insufficient after the loop.
- There are long segments of this corridor that do not have adequate shoulders to support maintenance staff, incident management, and speed enforcement.
- For traffic considerations, it is worth noting that the congestion we illustrated in the presentation slide is expected to only regularly occur (based on forecast volumes) on weekdays in June through August, assuming normal weather and incident-free conditions. This is illustrated by the graphic on Page 3 of the document.

- Through analysis, it was found that there is not a recurring bottleneck issue on the I-5 mainline travel lanes. There are hotspots within the study area that exceed capacity during peak periods in the future year located at interchange ramp merge and diverge points. There is a lot of merge/diverge traffic causing friction and slowdowns, which can then become the beginning of potential bottlenecks.

General Discussion

- Comment: Who would be funding the replacement of the bridge?
    - Funding would most likely come from the state and federal government, assuming the project is approved.
- Comment: There is not width for the auxiliary lane concept, so it does become a more expensive improvement.
- Comment: When would construction begin?
    - Public feedback is being collected over the next month and then a final plan document will be completed.
    - But these concepts need to be taken forward into further detail and design in the future. Formally documenting this study is the first step to start the process, but none of the concepts are ready for construction in the near-term.
- Comment: Which concepts are higher priority?
    - Ramp metering is low cost and achievable.
    - The auxiliary lane between Exit 124 and 125 is a high priority but will take much more time to design.
    - The completion of this study will reinitiate the Exit 125 and Exit 124 interchange area management plan (IAMP) now that there is understanding of the I-5 mainline.
        - The IAMP will include a corridor plan for Garden Valley Boulevard to think through the interoperability of the local system and I-5.

Next Steps

- Final document will be complete by the end of June.
- Public comments may be shared with ODOT via Tom. Attachment A shows the comments that were received. Any revisions related to the comments will be reflected in the plan document. Key themes from the comments include:
    - Speed is an issue and needs further enforcement.
    - Interest in moving forward with the auxiliary lane concept, although there is some opposition to any widening.
    - Mixed opinions on ramp metering.
    - Interest in exploring local street system options in addition to I-5 enhancements.

ATTACHMENT A: PUBLIC COMMENTS RECEIVED

Hi. I live on Fairhill Dr, Roseburg and drive from exit 123 to 125 and back daily, some days multiple times a day. I have seen more near accidents since the speed limit was changed from 65 to 60 and trucks from 60 to 55. Trucks rarely go 55, usually doing 65 to 70+. Most other vehicles still doing 65/70 then come up too fast on those that are actually doing the correct limit. Those slower vehicles doing the lower speed limit cause a bottle neck during the busy time of day and create more close calls. Changing the speed limit back to out of town limits may help the slowing down bottle neck.

I appreciate the review of the traffic issues between 119 and 129. All listed fixes are an admirable goal to help the accident rate.

I live in Myrtle Creek and travel to Roseburg about 3-5 times a week. I utilize the VA medical center services and conduct other commerce there. I am a retired mechanical engineer, which gives me no license to know about highway design.

I note the vast number of potential and actual accidents I witness are caused by 1. Excessive speed (especially trucks) 2. Inattentive drivers: eating, cell phone usage, apparent impairment and last-minute exit maneuvers.

I have contacted my elected officials about the excessive speed issue. Their responses range from "I always drive 10 mph over the posted limit" to keep up, I presume. When asked about automatic ticketing cameras, "the public will not stand for that." Another official referred me to OSP local commander. I had the opinion that I was irritating everyone. So…. here we are.

Until the ACTUAL speed is reduced in these areas (including exit 108) I predict that short of a very expensive elevated limited-access straight 3 lane each direction freeway, not much improvement in accident rates will be realized.

If folks would realize that the 10 miles in question traveled at 70 mph vs 60 mph nets them 1.4 minutes at the higher velocity. But math is not most folks' idea of entertainment, huh?

I feel that the auxiliary lane from exit 125 to exit 124 in the southbound lanes will make the biggest difference of the proposed changes. The biggest change that needs to happen that in my opinion is of higher importance than improving any off ramps is extending the 124 Southbound on ramp is a very short on ramp with low visibility of the oncoming traffic.

Why couldn't you add a lane of travel in both directions? And dedicating one lane as through traffic only.

Stop spending our money on un needed crap. Traffic is not that bad.

And NO ONRAMP METERS! What do you think this is? California?

How about changing the speed limit BACK to 65 mph(what it should be, should have never changed) and adding another lane. That would pretty much solve the problem. It's been worse since the speed limit turned to 60mph

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I have reviewed your memo related to addressing the current and future bottleneck issues from MP 125 to MP 119.

The highest priority that I see is addressing the safety and congestion at Exit 125 southbound and Exit 124 northbound. Exit 125, with (2) merges within a short distance and the overpass creates the most significant safety issue. While I believe the ramp meter could assist and be a lower cost interim solution, I believe that an extension of a third lane from under the overpass and at least to the South Umpqua River bridge is needed.

Exit 124 northbound has a significant loading issue and congestion at the exit with the high school and Harvard traffic. However, I feel this is a lower priority than southbound Exit 125.

I have used ramp meters a lot in the Portland Metro area. They are effective, but do require storage on the ramp. In addition, I have only seen them when congestion on the highway is already present. That generally is not the case on this portion of I-5 and have concerns that motorist behaviors and norms locally will not embrace said solution.

I concur that the traffic load from 119 to 125 will steadily increase and work is needed.

Thanks for the opportunity to comment.

Hello: Just this morning I saw the notice for the proposed I-5 improvements in the Exits 119-129 area, so my comment is a little tardy. I realize that there is limited funding available at this time for the proposed items. If the Roseburg district could come up with some additional funding in the future, there is one area that really could use improvement. It is the northbound ramp leaving the Fairgrounds that needs to be lengthened 500 feet or so. Yes, it will require an expensive retaining wall, but it sure would help reduce the extreme excitement every day for both the ramp and the northbound lanes motorists during a merge. As it is now, there is very limited sight distance and available ramp.

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1. I-5 Southbound Auxiliary lane, As a resident who goes between these exits frequently, a proposed auxiliary lane seems like a big win for transportation, one issue I see frequently is the variance in speeds along this area and can get dangerous at time, primarily due to having some of the traffic going 60 miles an hour, as directed, but a large number of vehicles maintain an 80 mile an hour speed throughout the roseburg interstate section. When vehicles going the speed limit merge into the left lane to let on

merging vehicles the high speed travelers in the left lane will hard break or swerve, and it's just generally a mess. It seems as though an Auxiliary lane would alleviate this regular issue in a very streamlined way.

2. 125 southbound ramp meters, no input

3. 124 ramp meters, This is a bit concerning as a resident of this area. the traffic that exists on harvard has been getting more dense by the year and in higher times of traffic, such as when RHS is let out, the lineup of cars can make it difficult if not impossible to exit from the businesses that are in that area of harvard, such as duch brothers, or dennys. I worry that if there is a hard limit on how many vehicles can be let on the freeway through meters that the backup of vehicles waiting to be let on will spill over into harvard and create an even bigger mess for those living and working there. Trying to make a left turn during rush hour out of any of the businesses located there is already very difficult and can leave you waiting for quite a while for a gap in traffic.

4. Geometric modifications to on/off ramps, Definitely needs to be done but no input on the proposed descriptions. The number of rollovers we see on onramps with trucks seems very high considering, also the northbound ramp on 124 leading to the northbound auxiliary lane presents consistent issues, as the angle of attack on that turn is so steep that nearly every day I see someone swing into the other lane of harvard to enter that onramp, Observe that onramp for 20 minutes and you'll see what I'm talking about.

5. Southbound deceleration lane, No input, great idea.

6. Shoulder Widening, No input, great idea.

I have 2 other notes of comment related to this but not mentioned in the project memo,

The section of 99 between Downtown and Green is a fantastic drive, though for some reason seems to have more accidents than would be expected, if that road was better signed, and any safety issues were addressed (I'm aware a lot of trucks enter that road) it could be an ease of use on the interstate for folks who live in winston and work downtown or vise versa.

The speed limit reduction in Roseburg seems to have little to no enforcement, since it was implemented I can only think of 2 times I've ever seen any law enforcement on that section of road. Every day driving through I will get passed by cars and semi's who are not reducing their speed at all. I think more traffic issues are being caused by some people wanting to observe the speed limit, while many are going well over 20 miles an hour over the speed limit. Is there a reason for this lack of enforcement? Is this something that can be addressed? It's a daily issue.

Thanks for the time and consideration

I have been a resident of Roseburg since 2013. I am against widening the I5 in any way, especially if it means encroaching on private property. I really just don't think it is necessary. I've driven on I5 all the way up to Seattle and all the way down to San Diego, and the stretch through Roseburg is really not all that bad in my opinion. I can understand how some reconfiguring would be helpful in some cases though. The on ramp to southbound I5 at exits 124 and 125 are short, and with all the heavy semi traffic through Roseburg, sometimes it's a little tight when they cannot get over to make room for incoming traffic. Expanding the shoulders or adding meters (I assume meters are when there is a green light to let people go?) would be helpful in those instances (however, I can guarantee that locals will HATE meters and might not follow them). I do have one other concern with meters as well, as far as backed up traffic. There isn't a lot of room if traffic backed up on to the feeder roads to the onramps, so those would have to be considered for reconfiguring if meters were installed.

What would happen to my property since I am so close to i5 now? Exit 121 on mclain Ave. when the overpass was reconstructed, the on-ramp south was widened a bit. Really a few feet and I 5 will be directly running through my property

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I have lived in the area for ten years and regularly drive north and south between exit 119 and 124.

Yes, there are increased accidents but traffic speed has been noted as a cause in many of these. The speed limit is now 60 but the majority of cars and trucks are doing 65 or higher, including commercial truck traffic. There is little to no enforcement and if you do 60, cars back up then zoom around you like you are the problem.

OSP does what it can but manpower for traffic enforcement is limited. What about solar power "speed limit - your speed" signs in several places?

Widening the freeway won't address the root causes which are "in a rush attitude, inattention to driving and lack of enforcement." Give OSP funds for enforcement before you dump millions into widening.

I believe the problem is hardly anyone including trucks drive 55/60 in the area around Roseburg. People drive way to fast & do not know basic rules of the road. Its not there is to much traffic. They don't get over when drivers are trying to get on the freeway or drive the speed limit ever. You never hardly ever see police through there patrolling. The money they make in tickets there could probably fund the project

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Hello. I read an article on this project. What is called a bottleneck is just not so. I have never had to go through that stretch of interstate at a pace that was below the speed limit, which is 60 mph there. I've lived here for over two years. I've never seen a bottleneck. There are other, better ways to spend your money, I think.

Not sure if you're the right person but reading the article on it improvements in roseburg I would like to give some input. After several years driving to roseburg from so county I find a lot of problems with the onramp north exit 124. The northern most onramp forces cars on to i5 then merge on to its 2 lanes then merge back if they are getting off at 125. Other that moving the cement barriers, some restriping would make it 3 lanes from Harvard's north on ramp and 125 off ramp there by eliminating the need to merge twice with traffic and card going through not needing to deal with that group of commuters.

Good day,

My thought is to move forward with the project. Would be a great improvement to traffic flow.

Traffic has greatly increased in the past five years, and so has the number of 'speeders'. When we drive the I-5 freeway to Roseburg from Sutherlin nearly every single car passes us going much faster than us (and we are usually going the speed limit, or slightly under the speed limit). The majority of the traffic is going 70, 75 or even 80 from Sutherlin to Roseburg. I'm sure you have studies that prove this.

The 65 zone change to 60 hasn't done anything to slow people down, as far as I can see. Maybe it needs to be changed to 55, with flashing lights. Maybe the '55' will get people's attention.

IMO, widening the freeway through Roseburg will only encourage people to keep speeding through the congested area.

The increase in accidents is a direct result of 1) increased users, and 2) most everyone exceeding the speed limit. (If you try to obey the speed limit, you are a distinct minority.)

I see no way to change people's speeding habits. It has to come from their hearts and respect for the laws of the land.

How about teaching people how to drive more respectful for starters. I live here and drive truck through Roseburg quite often. A big part of the problem here is truck traffic and the lack of respect for the speed limit by(truck drivers mostly) and the general population. More patrols by OSP would be helpful as well as a third lane and longer merging lanes. I see traffic control lights on the freeways in CA and they do help some but there's no substitute adequate schooling on how to drive more respectful. Its everybody's responsibility to make sure traffic flows smoothly for everyone's safety.

I have read the list of possible projects for the I-5 corridor in Roseburg, Oregon. It seems to me, that with all the traffic in Roseburg all the proposed projects at this time are essential. Roseburg is quite a hub area from all around Douglas County and can become very crowded. It appears to be very dangerous in my opinion to have cars backed up on off ramps trying to exit. It also can be very dangerous with no shoulders. Roseburg is much busier than it appears with out of the area travelers as well, since I-5 is a major route from north to south. It does not make sense to me to wait until the situation is out of control. I vote yes on all the projections and my opinion is to do all of them at this time so as to make the freeway even safer. I think the budget is reasonable.

I only recently saw the newspaper article regarding the study and planning of this project. I can appreciate that the primary goal is to enhance I5 and make it safer and handle more traffic. The bottleneck problems noted of the southbound entrance ramps at exits 124 and 125 are problems I have hated since I retired to Oregon in 2015. There have been a couple of times I have headed south at 125 only to find myself next to a tractor/trailer triple with a very short ramp left to speed up or stomp on the brakes. Ugh. That ramp is too short by at least 100 yards or more. The 124 south bound entry is too curvy and the shrubbery makes it difficult to see what is coming from the north but it is not as bad as 125. Trucks tower above the greenery but cars are too low to be seen easily. The shrubs are pretty but not practical.

Do I have anything to add to the possibilities already listed? For I5 itself, the answer is no but there are some projects that would add to the ability to handle more traffic through the general area. Of course, I5 gets the federal dollars. But what I saw in the planning appeared to be mostly bandaid solutions. What I am considering would require state or county dollars but maybe Federal dollars. That being said, here are a couple of thoughts.

1. State 99 from I5, exit 120 to downtown Roseburg is old, narrow and slow. It has one blind curve just south of the Swanson Mill that needs some dynamite on the rocks on either side. It is a blind curve. More traffic could use this route if it was improved with some straightening, widening where possible, passing lanes, etc. Logging trucks from east of Roseburg could use this for through traffic to the Roseburg Forest Products mill in Dillard. The logging trucks entering and exiting the Swanson Mill need turn lanes – wide ones! I use this route when I5 is a little too crazy for me to deal with but it is slow and has safety issues. The route needs serious help not just bandaids.

2. A major contributor to the traffic is a result of Hwy 42 being the main feeder to the coast with Coquille, Myrtle Point, Bandon, Coos Bay, and North Bend traffic. What if they had an alternate way to bypass or enter Roseburg? Hwy 42, 38 and 126 carry a lot of traffic over mostly old and small highways. The recent improvements on Hwy 42 due to landslides a few years back and the new Scottsburg bridge on Hwy 38 help but much more is needed to support those growing communities. How about a full 4 lane freeway from Coos Bay/North Bend which intercepts I5 somewhere around Yoncalla? Yeah, I like to dream.

3. What if there was a through road to take the loggers and mill workers from Dillard at RFP to the west side of Roseburg and on up to Wilbur on I5? Some of our friends who live in Ten Mile and Camas Valley take Lookingglass Road to get to west Roseburg. Of course, that is a county road. It is curvy and slow and no long-haul trucks take it. It suggests a portion of a possible route though.

What if you start a bypass I5 (Federal dollars now) at about exit 112 or exit 113 and route it to the west of Dillard and then north on the west side of Roseburg before curving back to reconnect to I5 at approximately MP130 around Wilbur? The route would follow old 99 from exit 112 to the west side of the river at Brockway Road. (Or whatever is the easiest route and cheapest for right of way.) At Dillard take Brockway Road north, cross State 42, continue up Brockway Rd. to Lookingglass Rd. Turn right at Happy Valley Road and go over to Powder House Canyon on N. Buell Rd. (Totally new road going north now.) Now parallel Lookingglass and continue toward W. Roseburg. At about 2100 Lookingglass Rd. veer left and make a new road toward the west side of the Roseburg Water Treatment facility on Old

Melrose Rd. Build a nice 4 lane bridge across the S. Umpqua River. New road continues north to connect to Garden Valley Blvd at Melrose Rd. Continue north on GV Blvd to Del Rio Rd. A new or additional bridge will be needed across the North Umpqua River. From Del Rio there are a couple of route possibilities to connect to I5 at Wilbur. Probably need a new interchange there to make it work. No, it isn't cheap but it would reroute trucks from the RFP mill and coast traffic on State 42 west around Roseburg. Make it I305? Maybe 99W in this area or something similar. Hwy 242 or Hwy 342? Whatever. Anyway, start now and it might be done by 2030 or 2035 – or never. For the most part it is through areas that are far more open and easily built than the very tight corridor through Roseburg first laid out back in the 1960's. There will still be a lot of people screaming "Not in my back yard!" Oh well.

I'm not sure where you are located but let me know if you are in the Roseburg area and want to discuss this. I might add that I am a retired cost estimator for aerospace engineering contract manufacturers. I understand somebody has to pay for all that. But you have to have ideas before you can proceed to reality.

APPENDIX B: TECHNICAL MEMOS

LAND USE PLANNING
TRANSPORTATION PLANNING
PROJECT MANAGEMENT

MEMORANDUM

Technical Memorandum #1: Planning Document and Data Review
I-5 Bottleneck Corridor Segment Plan

DATE	August 27th, 2018 (Updated December 10, 2018)
TO	I-5 Bottleneck Corridor Project Management Team
FROM	Darci Rudzinski, Clinton "CJ" Doxsee, & Courtney Simms, APG Matt Hughart, KAI
CC	

Overview

This memorandum presents a review of existing plans, regulations, and policies that affect transportation planning for the I-5 Bottleneck Corridor Segment Plan (Corridor Segment Plan). The following documents have been reviewed:

- Oregon Highway Plan (adopted 1999, last updated 2018)
- Oregon Freight Plan (2016)
- Oregon Bicycle and Pedestrian Plan (2011)
- Oregon Public Transportation Plan (2018)
- Oregon Transportation Options Plan (2015)
- Oregon Transportation Safety Action Plan (2016)
- Oregon Highway Design Manual (2012)
- Roseburg Transportation System Plan (2006)
- Douglas County Transportation System Plan and Green Transportation System Plan (2010)
- Interchange Area Management Plan Interchanges 119 and 120 (2009)
- Interchange Area Management Plan – I-5 Interchange 123 (Fairgrounds) (2005)
- Interchange Area Management Plan 124/125 Technical Memoranda (2013-2015)
- Interchange Area Management Plan I-5 Exit 127 (North Roseburg) (2014)
- Interchange Area Management Plan Interstate 5/Interchange 129 (2011)

The review summarizes key issues that will guide the planning effort, including decisions regarding selection of preferred transportation solutions and necessary amendments to related plan documents and regulations.

Some documents in this review establish transportation-related standards, targets, and guidelines with which the project must be consistent with; others contain transportation improvements that

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will need to be factored into the demand modeling. Local policy and regulatory requirements may be the subject of recommended amendments in order to implement the recommendations of the study.

Oregon Transportation Plan (2006)

The Oregon Transportation Plan (OTP) is a comprehensive plan that addresses the future transportation needs of the State of Oregon through the year 2030. The primary function of the OTP is to establish goals, policies, strategies, and initiatives that are translated into a series of modal plans, such as the Oregon Highway Plan and the Oregon Bike and Pedestrian Plan.

The OTP emphasizes:

- Maintaining and maximizing the assets in place.
- Optimizing the performance of the existing system through technology.
- Integrating transportation, land use, economic development, and the environment.
- Integrating the transportation system across jurisdictions, ownerships, and modes.
- Creating sustainable funding.
- Investing in strategic capacity enhancements.

The Implementation Framework section of the OTP describes the implementation process and how state multimodal, modal/topic plans, regional and local transportation system plans and master plans will further refine the OTP's broad policies and investment levels. Local transportation system plans can further OTP implementation by defining standards, instituting performance measures, and requiring that operational strategies be developed.

Oregon Highway Plan

The Oregon Highway Plan (OHP) is a modal plan of the Oregon Transportation Plan (OTP) that guides ODOT's Highway Division in planning, operations, and financing. The Corridor Segment Plan planning process will be guided by the policies and standards in the OHP. The resulting plan may be reviewed by the Oregon Transportation Commission (OTC) for adoption as a refinement to the OHP.

Policies in the OHP emphasize the efficient management of the highway system to increase safety and to extend highway capacity; partnerships with other agencies and local governments; and the use of new techniques to improve road safety and capacity. These policies also link land use and transportation, set standards for highway performance and access management, and emphasize the relationship between state highways and local road, bicycle, pedestrian, transit, rail, and air systems. The following policies, in particular, are relevant to the Corridor Segment Plan.

Policy 1A: State Highway Classification System

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

Interstate 5 (I-5), OR 138 (Harvard Avenue/North Umpqua Highway), and OR 42 (Coos Bay/Roseburg) have classifications in the OHP. The purpose and management objectives of these highways are provided in Policy 1A, as summarized below.

- **Interstate highways** (I-5) provide connections between major cities in a state, regions of the state, and other states. A secondary function in urban areas is to serve regional trips within the urban area. Their primary objective is to provide mobility and, therefore, the management objective is to provide for safe and efficient high-speed continuous-flow operation in urban and rural areas.
- **Regional highways** (OR 138) typically provide connections and links to regional centers, Statewide or Interstate highways, or economic or activity centers of regional significance. The management objective for these facilities is to provide safe and efficient, high-speed, continuous-flow operation in rural areas and moderate to high-speed operations in urban and urbanizing areas. A secondary function is to serve land uses in the vicinity of these highways.
- **Statewide highways** (OR 42) typically provide inter-urban and inter-regional mobility and provide connections to larger urban areas, ports, and major recreation areas that are not directly served by Interstate Highways. A secondary function is to provide connections for intra-urban and intra-regional trips. The management objective is to provide safe and efficient, high-speed, continuous-flow operation. In constrained and urban areas, interruptions to flow should be minimal.

Policy 1B: Land Use and Transportation

Policy 1B applies to all state highways. It is designed to clarify how ODOT will work with local governments and others to link land use and transportation in transportation plans, facility and corridor plans, plan amendments, access permitting and project development. Policy 1B recognizes that state highways serve as the main streets of many communities – as OR 138 and OR 42 do in Roseburg and Winston – and strives to maintain a balance between serving local communities (accessibility) and the through traveler (mobility). This policy recognizes the role of both the state and local governments related to the state highway system and calls for a coordinated approach to land use and transportation planning.

Policy 1C: State Highway Freight System

The primary purpose of the State Highway Freight System is to facilitate efficient and reliable interstate, intrastate, and regional truck movement through a designated freight system. This freight system, made up of the Interstate Highways and select Statewide, Regional, and District Highways, includes routes that carry significant tonnage of freight by truck and serve as the primary interstate and intrastate highway freight connection to ports, intermodal terminals, and urban areas. Highways included in this designation have higher highway mobility standards than other statewide highways. Both I-5 and OR 42 are designated in the OHP as freight routes.

Policy 1F: Highway Mobility Policy

Policy 1F sets mobility standards for ensuring a reliable and acceptable level of mobility on the state highway system. The standards are used to assess system needs as part of long range, comprehensive transportation planning projects, during development review, and to demonstrate compliance with the Transportation Planning Rule (TPR).

V/c ratios established in Policy 1F are “targets” that are to be used to determine significant effect pursuant to TPR Section -0060.

Table 1 includes the mobility targets for the state facilities in the area.

Table 1: State Facility Mobility Targets in Area

Highway	V/C Target
I-5	0.80 v/c target for segments within the Roseburg Urban Growth Boundary 0.70 v/c target for segments outside the Roseburg Urban Growth Boundary
OR 138	0.85 v/c
OR 42	0.80 v/c

Policy 1G: Major Improvements

This policy requires maintaining performance and improving safety on the highway system by improving efficiency and management on the existing roadway network before adding capacity. The state’s highest priority is to preserve the functionality of the existing highway system. Tools that could be employed to improve the function of the existing interchanges include access management, transportation demand management, traffic operations modifications, and changes to local land use designations or development regulations.

After existing system preservation, the second priority is to make minor improvements to existing highway facilities, such as adding ramp signals, or making improvements to the local street network to minimize local trips on the state facility.

The third priority is to make major roadway improvements such as adding lanes to increase capacity on existing roadways.

Policy 2E: Intelligent Transportation Systems

This policy prompts the State to consider a broad range of Intelligent Transportation System (ITS) services to provide cost-effective improvements to efficiency and safety. It specifically identifies the use of the following to implement the policy: incident management, en-route driver information; traffic control; route guidance; commercial vehicle electronic clearance; pre-trip travel information; public transportation management; emergency notification and personal security; emergency vehicle management; and commercial fleet management.

Action 2E.2 calls for expanded traffic management capabilities in metropolitan areas through the use of ramp meters, variable message signs, and closed circuit television to address recurrent congestion and enhance incident management.

Policy 2F: Traffic Safety

This policy emphasizes the state's efforts to improve safety of all users of the highway system. Action 2F.4 addresses the development and implementation of the Safety Management System to target resources to sites with the most significant safety issues.

Policy 3A: Classification and Spacing Standards

This policy defines the state's intent to manage the location, spacing, and type of road intersections on state highways to ensure the safe and efficient operation of state highways consistent with the classification of the highways.

Action 3A.2 calls for spacing standards to be established for state highways based on highway classification, type of area, and posted speed. Tables in OHP Appendix C present access spacing standards which consider urban and rural highway classification, traffic volumes, speed, safety, and operational needs and have been reproduced in the following graphics. In particular, standards dealing with the spacing between interchanges on the I-5 corridor are most applicable. In general, the minimum distance between the start and end of tapers between interchanges is 1 mile in Fully Developed Urban and Urban areas and 2 miles in Rural areas. The access management spacing standards established in the OHP are implemented by access management rules in OAR 734, Division 51, addressed later in this report.

Access Management Spacing Standards for Interchange Area

The following tables show the access spacing standards for interchanges as discussed in Goal 3, Policy 3C: Interchange Access Management Areas.

Table 17: Minimum Spacing Standards Applicable To Freeway Interchanges with Two-Lane Crossroads

Category of Mainline	Type of Area	Spacing Dimensions			
		A	X	Y	Z
FREEWAY	Fully Developed Urban	1 mi. (1.6 km)	750 ft. (230 m)	1320 ft. (400 m)	750 ft. (230 m)
	Urban	1 mi. (1.6 km)	1320 ft. (400 m)	1320 ft. (400 m)	990 ft. (300 m)
	Rural	2 mi. (3.2 km)	1320 ft. (400 m)	1320 ft. (400 m)	1320 ft. (400 m)

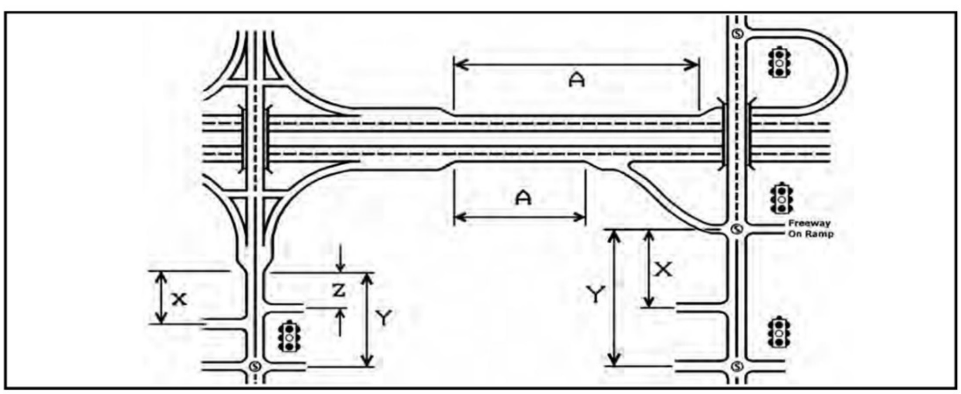
Notes for Table 17:

1) If the crossroad is a state highway, these distances may be superseded by the Access Management Spacing Standards, providing the distances are greater than the distances listed in the above table.
2) No four-legged intersections may be placed between ramp terminals and the first major intersection.
3) No application will be accepted where an approach would be aligned opposite a freeway or expressway ramp terminal.
4) Four-lane crossroad standards apply for urban and suburban locations that are documented to be widened in a Transportation System Plan or corridor plan.

Notes for Figure 18:

A = Distance between the start and end of tapers of adjacent interchanges.
X = Distance to the first approach on the right, right in/right out only.
Y = Distance to first intersections where left turns are allowed.
Z = Distance between the last right in/right out approach road and the start of the taper for the on-ramp.

Figure 18: Measurement of Spacing Standards for Table 17



Appendices

Table 18: Minimum Spacing Standards Applicable to Freeway Interchanges with Multi-Lane Crossroads

Category of Mainline	Type of Area	Spacing Dimensions			
		A	X	Y	Z
FREEWAY	Fully Developed Urban	1 mi. (1.6 km)	750 ft. (230 m)	1320 ft. (400 m)	990 ft. (300 m)
	Urban	1 mi. (1.6 km)	1320 ft. (400 m)	1320 ft. (400 m)	1320 ft. (400 m)
	Rural	2 mi. (3.2 km)	1320 ft. (400 m)	1320 ft. (400 m)	1320 ft. (400 m)

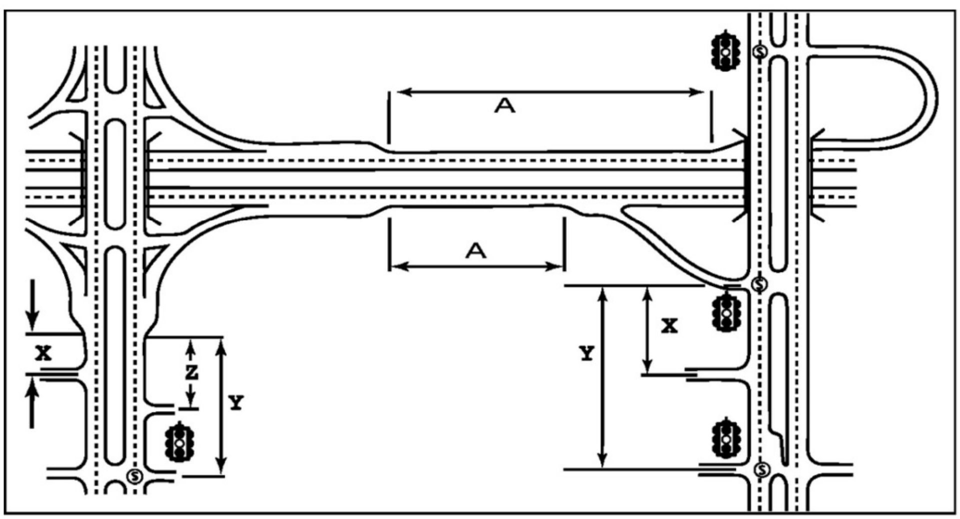
Notes for Table 18:

1) If the crossroad is a state highway, these distances may be superseded by the Access Management Spacing Standards, providing the distances are greater than the distances listed in the above table.
2) No four-legged intersections may be placed between ramp terminals and the first major intersection.
3) No application will be accepted where an approach would be aligned opposite a freeway or expressway ramp terminal.

Notes for Figure 19:

A = Distance between the start and end of adjacent interchanges.
X = Distance to first approach on the right, right in/right out only.
Y = Distance to first intersections where left turns are allowed.
Z = Distance between the last approach road and the start of the taper for the on-ramp.

Figure 19: Measurement of Spacing Standards for Table 18



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Policy 3C: Interchange Access Management Areas

This policy addresses management of grade-separated interchange areas to ensure safe and efficient operation between connecting roadways. Action items include developing interchange area management plans to protect the function of existing interchanges, provide safe and efficient operations between connecting roadways, and minimize the need for major improvements.

Policy 4A: Efficiency of Freight Movement

This policy emphasizes the need to maintain and improve the efficiency of freight movement on the state highway system. I-5 and OR 42 are state freight routes; I-5 is a federally designated truck route.

Policy 4B: Alternative Passenger Modes

This policy promotes and supports the use of alternative passenger transportation systems when supported by travel demand, land use, and other factors. Alternative passenger services has the potential to relieve highway traffic congestion and reduce the rate of vehicle miles of travel per capita. It encourages the development of alternative passenger services and systems as part of broader corridor strategies and the development of alternative passenger transportation services located off the highway system to help preserve the performance and function of the state highway system.

Policy 4C: High-Occupancy Vehicle (HOV) Facilities

Policy 4C supports the use of high-occupancy vehicle (HOV) facilities in locations where travel demand, land use, transit, and other factors contribute to the facilities' effectiveness. HOV facilities have been identified as an improvement used to address increasing traffic congestion, declining mobility levels, air quality and environmental concerns, and limited resources.

Policy 4D: Transportation Demand Management

Policy 4D seeks to use transportation demand strategies to increase efficiency on the state transportation system. Transportation demand strategies include a variety of techniques, including rideshare programs, alternative transportation incentives, road pricing strategies, or other techniques that seek to flatten peak demand or improve vehicular flow.

Oregon Freight Plan (2016)

The Oregon Freight Plan (OFP) is a modal plan of the Oregon Transportation Plan and implements the State's goals and policies related to the movement of goods and commodities. Its purpose statement identifies the State's intent "to improve freight connections to local, Native America, state, regional, national and global markets in order to increase trade-related jobs and income for workers and business." The objectives of the plan include prioritizing and facilitating investments in freight facilities and adopting strategies to maintain and improve the freight transportation system.

The plan defines a statewide strategic freight network. I-5 is designated as a strategic corridor in the OFP. The I-5 corridor connects the three largest population centers of Portland, Eugene, and Salem and are the state's primary arteries for truck shipments.

The following policy and strategic direction provided in the OFP prioritizes preservation of strategic corridors as well as improvements to the supply chain achieved through coordination of freight and system management planning.

> *Strategy 1.2: Strive to support freight access to the Strategic Freight System. This includes proactively protecting and preserving corridors designated as strategic.*
>
> > *Action 1.2.1. Preserve freight facilities included as part of the Strategic Freight System from changes that would significantly reduce the ability of these facilities to operate as efficient components of the freight system unless alternate facilities are identified or a safety-related need arises.*
>
> *Strategy 2.3: Identify and rank freight bottlenecks, corridor constraints or chokepoints, in particular those located on the strategic system. Update the ranked list periodically.*
>
> *Strategy 2.4: Coordinate freight improvements and system management plans on corridors comprising the Strategic Freight System with the intent to improve supply chain performance.*
>
> *Strategy 2.5: Enhance Intelligent Transportation Systems (ITS) applications (such as traveler information programs and transportation demand management systems) that are effective and useful to freight. Prioritize strategic locations for ITS applications.*

The OFP also provides an inventory of highway needs in Appendix I. The inventories include high-priority pinch points, top-priority bridge locations, regional highway system needs related to freight impacts (see Tables 4-6 below).

Table 2: High-Priority Over-Dimensional Load Pinch Points (Source: Table 9-8, Appendix I, Oregon Freight Plan)

Route	Beg MP	End MP	Needs
I-5	119.18	119.18	Vertical Clearance
I-5	124.17	124.17	Wide/Long
I-5	125.08	125.08	Vertical Clearance

Table 3: Phase 1 and 2 Seismic Bridges (Source: Table 9-9, Appendix I, Oregon Freight Plan)

Bridge No.	Bridge Name	Mile Point	Needs
07804N	Hwy 1 over Speedway Rd	120.03	Retrofit
07670A	Hwy 1 over Portland Ave (Fairgrounds Intchg)	123.01	Rehab+
07669A	Hwy 1 & Conn over Harvard Ave	124.15	Retrofit

07668A	Hwy 1 over Bellows St.	124.22	Rehab+
07668B	Hwy 1 Conn over Bellows St	124.24	Retrofit
07404	South Umpqua River, Hwy 1 SB (Vets)	124.54	Retrofit
07404A	South Umpqua River, Hwy 1 NB (Vets)	124.54	Retrofit
07663A	N Umpqua R & CORP & Co Rd, Hwy 1 SB (Winchester)	128.92	Retrofit
07663C	N Umpqua R & CORP & Co Rd, Hwy 1 NB (Winchester)	128.92	Rehab+

Table 4: Freight Impacts on Highway (Source: Table 9-11, Appendix I, Oregon Freight Plan)

Route	Beg MP	End MP	Needs
I-5	119	125	Congestion partially due to high truck % and weaving from closely spaced interchanges.

Oregon Bicycle and Pedestrian Plan (2016)

Most popularly referred to as the “Bike Bill,” ORS 366.514 was passed by the Oregon

Legislature in 1971, and applies to ODOT, cities and counties. Pursuant to State law,[1] facilities for pedestrians and bicyclists must be included whenever a road, street or highway is built, rebuilt, or relocated, and directs at least one percent of the State Highway Fund dollars be invested in projects that support biking and walking within the right-of-way of public roads, streets, or highways open to motor vehicle traffic. The Oregon Bicycle and Pedestrian Plan highlighting approaches for filling system gaps and building out the system and supports decision-making for walking and biking investments, strategies, and programs to encourage increased levels of bicycling and walking. The existence and condition of bicycle and pedestrian facilities within the I-5 right-of-way/study corridor will be inventoried as part of this project. Consistent with Strategy 2.1b from the plan, cited below, opportunities for enhanced non-motorized travel within the I-5 corridor right-of-way will also be explored as appropriate.

> *Stategy 2.1B: When local planning processes have, in consultation with ODOT, identified a local parallel bike route, and a bikeway on the state highway is determined to be contrary to public safety, is disproportionate in cost to the project cost or need, or is not needed as shown by relevant factors and therefore justified to be exempt from ORS 366.514 based on one of those statutory exemptions, ODOT will work with the jurisdictions to support the development of the parallel route and assure reasonable access to destinations along the state highway. ODOT and the local jurisdiction may enter into an agreement in which ODOT helps to fund, in negotiation and partnership with the local jurisdiction, construction of the bikeway in the vicinity of the state highway project that serves as an alternative or parallel route to the highway project.*

[1] ORS 366.514, passed by the Oregon Legislature in 1971, applies to ODOT, cities and counties. See the Oregon Bicycle and Pedestrian Plan, *The Plan in the Context of State and Federal Laws*, p. 13.

Oregon Public Transportation Plan (2018)

Oregon Public Transportation Plan (OPTP) establishes statewide policies and strategies relating to public transportation modes. It addresses transportation services provided throughout Oregon by public agencies (including cities, counties, tribal governments, and transit or transportation districts) and private sector entities such as intercity bus contractors. The OPTP supports decision making by the state, tribes, regional and local agencies, as well as public transportation providers; it is intended to be used by all these agencies as they develop local policies, plans, and investment programs.

I-5 through Roseburg is categorized as an Intercity Bus Route. It is a facility that supports intercity public transportation linking towns, cities, metropolitan regions, and rural areas. Intercity bus providers include a mix of public and private entities working separately or in partnership to deliver transit services. Large, private national providers, including Greyhound, serve the larger communities along I-5. Umpqua Transit (UTrans) routes also use I-5. Project outcomes will need to consider the needs of transit within the study area, along the I-5 corridor, consistent with the following OPTP policy.

> *Policy 10.5: Collaborate among agencies, jurisdictions, and providers to ensure the public transportation system is integrated as a component of the broader multimodal transportation system in Oregon. Provide leadership for public transportation activities and build upon efforts to coordinate public transportation services, especially statewide services.*

Oregon Transportation Options Plan (2015)

The Oregon Transportation Options Plan (OTOP) is a topic plan that establishes policies, strategies, and programs that promote efficient use of existing transportation system investments, thereby reducing reliance on the single-occupancy vehicle and facilitating use of walking, biking, transit, and rideshare. The OTOP sets a statewide vision for transportation options in Oregon: to provide travelers of all ages and abilities with options to access goods, services, and opportunities across the State. The OTOP recognizes that transportation options (also referred to as transportation demand management) programs and strategies are not limited to those focused on reducing reliance on single occupant vehicle travel during the busiest times of day. The plan describes many transportation options programs, including the State's online rideshare matching and trip logging service, *Drive less. Connect.* (DLC). For Douglas County, the Rogue Valley Transit District is the DLC Regional Network Administrator. The components of the Rogue Valley Transportation District Transportation Options Program are detailed on p. 31 of the plan. Providing travel options through the study area should be consistent with and compliment proposed solutions that result from this planning process. Strategies to reduce reliance on single occupant vehicle travel during the busiest times of day through the corridor will be explored through this project, including strategies such as carpooling, high-occupancy vehicle (HOV) lanes, and other congestion mitigation strategies such as tolling and congestion pricing.

Oregon Transportation Safety Action Plan (2016)

The Oregon Transportation Safety Action Plan (TSAP) is a plan that shows a set of actions that Oregonians have identified as steps to a safer travel environment. The TSAP is implemented by multiple state, local, and regional agencies in addition to ODOT. It is a multi-purpose plan that includes both a 20- year policy plan and a 5-year, federally compliant, Strategic Highway Safety Plan. It envisions no deaths or life-changing injuries on Oregon's transportation system by 2035. The long-term goals of the TSAP are to foster a safety culture, develop infrastructure for safety, support healthy communities, leverage technology, and coordinate agencies and stakeholders to work together, and guide strategic safety investments.

Consistent with the Oregon TSAP, this planning project will identify sites with high occurrences of safety problems and will consider safety in the selection and prioritization of transportation projects to meet future system needs for all modes of transportation.

Oregon Highway Design Manual (2012)

The 2012 Highway Design Manual provides ODOT with uniform standards and procedures for planning studies and project development for the state's roadways. It is intended to provide guidance for the design of new construction; major reconstruction (4R); resurfacing, restoration, and rehabilitation (3R); or resurfacing (1R) projects. It is generally in agreement with the American Association of State Highway and Transportation Officials (AASHTO) document *A Policy on Geometric Design of Highways and Streets - 2011*. However, sound engineering judgment must continue to be a vital part in the process of applying the design criteria to individual projects. The flexibility contained in the 2012 Highway Design Manual supports the use of Practical Design concepts and Context Sensitive Design practices.

The Highway Design Manual is to be used for all projects that are located on state highways. National Highway System or Federal-aid projects on roadways that are under local jurisdiction will typically use the 2011 AASHTO design standards or ODOT 3R design standards. Table 2 shows which design standards are applicable for certain projects based on project type. State and local planners will also use the manual in determining design requirements as they relate to the state highways in this Corridor Plan. Some projects under ODOT roadway jurisdiction traverse across local agency boundaries. Some local agencies have adopted design standards and guidelines that may differ from the various ODOT design standards. Although the appropriate ODOT design standards are to be applied on ODOT roadway jurisdiction facilities, local agency publications and design practices can also provide additional guidance, concepts, and strategies related to roadway design.

Table 5 – Design Standards Selection Matrix, ODOT Highway Design Manual

Project Type	Interstate (I-5)	Urban State Highways	Rural State Highways
Modernization/ Bridge New/ Replacement	ODOT 4R/ New Freeway	ODOT 4R/ New Urban	ODOT 4R/ New Rural
Preservation/ Bridge Rehabilitation	ODOT 3R Freeway	ODOT 3R Urban	ODOT 3R Rural
Preventative Maintenance	1R	1R	1R

Safety Operations Miscellaneous/ Special Programs	ODOT Freeway	ODOT Urban	ODOT Rural

The Highway Design Manual includes mobility standards related to project development and design that are applicable to all modernization projects, except for development review projects (see Table 3). The v/c ratios in the Highway Design Manual are different than those shown in the Oregon Highway Plan (OHP). The v/c ratio values in the OHP are used to assist in the planning phase to identify future system deficiencies; the Highway Design Manual v/c ratio values provide a mobility solution that corrects those previously identified deficiencies and provides the best investment for the State over a 20-year design life.

Table 6: 20 Year Design Mobility Standards (Volume/Capacity [V/C]) Ratio

Highway Category	**Inside Urban Growth Boundary**		**Outside Urban Growth Boundary**	
	Non-MPO outside of STAs where non-freeway speed limit <45	**Non-MPO where non-freeway speed limit >=45**	**Unincorporated Communities**	**Rural Lands**
Interstate Highways and Statewide (NHS) Expressways	0.70	0.65	0.60	0.60
Statewide (NHS) Freight Routes	0.70	0.70	0.60	0.60
Statewide (NHS) Non-freight Routes and Regional or District Expressways	0.75	0.70	0.60	0.60
Regional Highway	0.75	0.75	0.70	0.65
District/Local Interest Roads	0.80	0.75	0.75	0.70

Roseburg Transportation System Plan (2006)

The Roseburg Transportation System Plan (TSP) provides guidance so that the City can develop its transportation system through coordinated policies, regulatory tools, and planned improvements over the long-range (20 year) time horizon. It also identifies planned transportation facilities and services needed to support planned land uses identified in the Comprehensive Plan in a manner consistent with the Transportation Planning Rule (OAR 660-012) and the OTP.

Relevant goals and objectives to the Corridor Segment Plan include:

> *Goal 1. Overall Transportation System: Provide a transportation system for the Roseburg planning area that is safe, efficient, and accessible.*
>
> > *Objective A. Manage projected travel demand consistent with community, land use, environmental, economic, and livability goals.*

Objective B. Use the Transportation System Plan as the legal basis and policy foundation for decisions involving transportation issues.

Objective H. Maintain access management standards for streets consistent with city, county, and state requirements to reduce conflicts among vehicles, trucks, bicycles, and pedestrians.

Goal 3. Transportation and land Use: maximize the efficiency of Roseburg's transportation system through effective land use planning.

Objective D. Integrate transportation and land use into development ordinances.

Goal 5. Balanced Transportation System: Facilitate the development of bus stops, bike lanes, sidewalks, and multi-use paths in the Roseburg UGB to provide more transportation options for Roseburg residents and visitors.

Objective L. City plans and the Land Use and Development Ordinance need to address the need to maximize the comfort level of driving (such as fewer distractions and driveway, increase sight distances, etc.) consistent with the needs for access.

Goal 6. Transportation that Supports Economic Development. Facilitate the provision of a multimodal transport system for the efficient, safe, and competitive movement of goods and services, to from, and within the Roseburg UGB.

Objective D. Designate arterial routes and freeway access are essential for efficient movement of goods. Design these facilities and adjacent land uses to reflect the needs of goods movement.

Objective E. Encourage and support the operation, maintenance, and expansion of facilities and services provided at or near the Roseburg Regional Airport that accommodate passenger air travel, air cargo, and charter services.

Goal 7. Funding Transportation System Improvements: Implement the transportation plan by working cooperatively with federal, state, regional, and local governments, the private sector, and residents. Create a stable, flexible financial system for funding transportation improvements.

Objective C. Coordinate transportation projects, policy issues, and development actions with all affected governmental units in the area. Key agencies for coordination include Douglas County, Oregon Department of Transportation, URCOG,[2] and Umpqua Transit.

Objective G. Working in partnership with Oregon Department of Transportation, Douglas County, and other jurisdictions and agencies, develop long-range financial

[2] The Umpqua Regional Council of Governments (URCOG) is no longer active.

strategy to make needed improvements to the transportation system and support operational and maintenance requirements.

The roadways in the study area are identified and classified in the TSP as follows:

- W Harvard Avenue (Exit 124): Arterial
- Proposed Road (Exit 123): Arterial
- NW Garden Valley Boulevard (Exit 125): Arterial
- NW Edenbower Boulevard (Exit 127): Arterial
- Del Rio Road (Exit 129): Collector
- OR-99 (Exit 129): Arterial

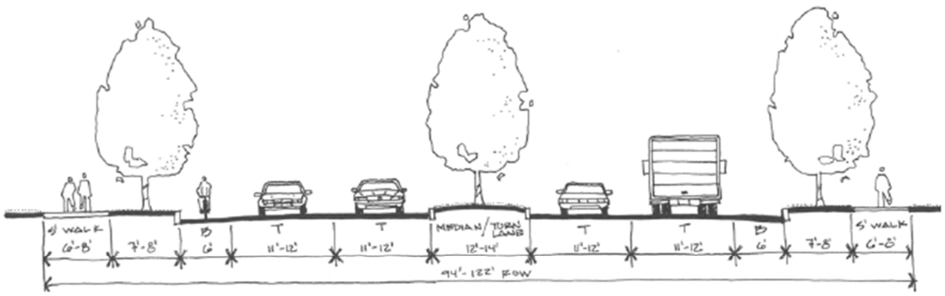
Figure 7-2 in the TSP provides typical street cross-sections for arterials, collectors, and local streets.[3] Roseburg cross-sections are shown in Figure 1.[4]

[3] Only cross sections for arterials and collectors are shown here. Local street cross sections are not shown.

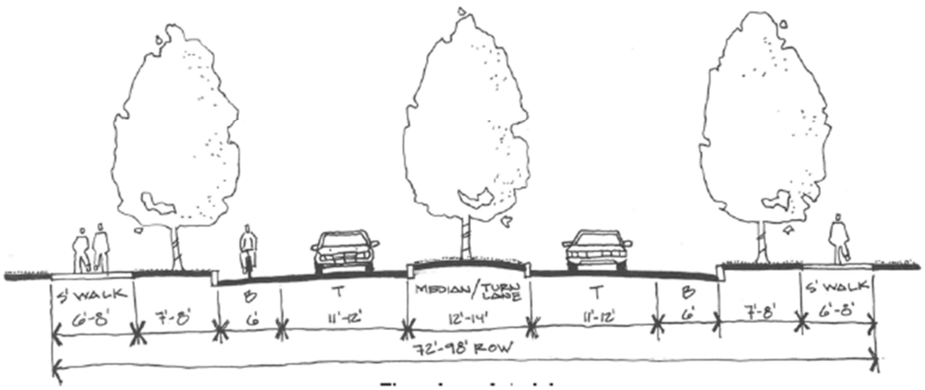
[4] The 2006 TSP cross-section standards are not achievable in most circumstances due to geographical or right-of-way constraints.

Figure 1: Roseburg TSP Cross-sections

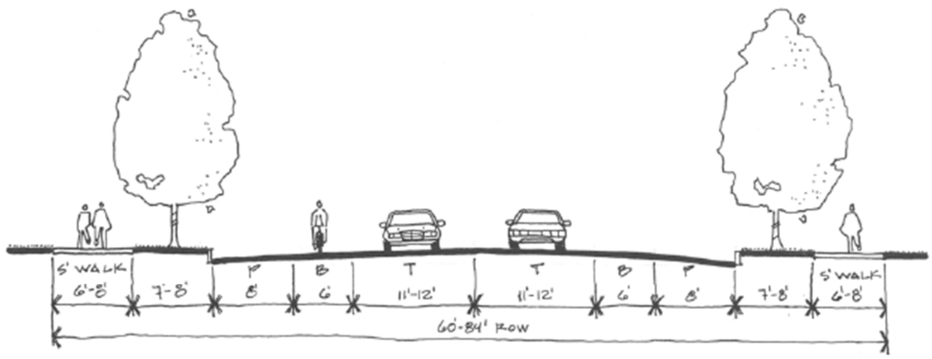
Five-Lane Arterial



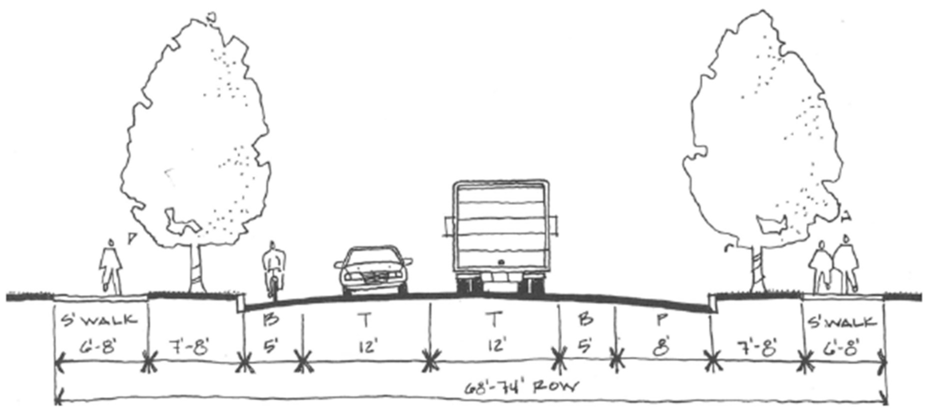
Three-Lane Arterial



Two-Lane Collector – Parking Both Sides



Two-Lane Collector – Parking One Side (Commercial / Industrial)



The following improvements located in or near the Corridor Segment Plan study area are identified in the TSP.[5]

- *Edenbower Boulevard between the I-5 ramps: add two through lanes in each direction through the I-5 ramp terminal intersections.*
- *Edenbower Boulevard and I-5 northbound off-ramp: widen off-ramp to two lanes and add northbound double lefts and a channelized westbound right-turn lane. A new northbound on-ramp in partial cloverleaf configuration is recommended as identified in the Environmental Impacts Statement (EIS).*
- *Edenbower Boulevard and I-5 southbound off-ramp: widen off-ramp to two lanes.*

[5] Note, The I-5 Exit 127 IAMP 127 – adopted in 2014 – recommends amending the 2006 TSP to replace the its list of Edenbower improvement projects with new improvement projects. Descriptions of the new improvement projects are provided in the IAMP 127 summary in this document. At the time of this memorandum, the recommended TSP amendments are not shown in the TSP or listed as an amendment to the City's Comprehensive Plan on the City's website. However, Advisory Committee members have indicated IAMP 127 has been adopted.

- *Stephens Street (OR-99) and Edenbower Boulevard: add northbound double left-turn lanes and an eastbound right-turn lane.*
- *Broad Street to Edenbower Boulevard (16-20 years): to improve safety and mobility, this project proposed to reconstruct Broad Street to collector street design standards, construct drainage facilities, and construct pedestrian facilities. This project is part of the Roseburg CIP.*
- *Portland Avenue Bridge and Interchange Improvements: This project proposed interchange improvements and a new bridge to connect to the Portland Avenue interchange at Interstate 5 to Old Highway 99. This will create a new connection to the downtown area from the south.*
- *Portland Avenue Bicycle and Multi-use Path: Construct a bicycle/multi-use path along the east side of the South Umpqua River from Douglas Avenue to Portland Avenue (new crossing). Bike lanes on Portland Avenue between Interstate 5 and Pine Street.*[6]

Roseburg TSP Update

The City of Roseburg is currently in the process to adopt an updated TSP. Adoption of the updated TSP is anticipated to occur in 2019. The TSP update is proposing to revise the 2006 TSP goals and objectives to align with existing Roseburg policies and the changing economic climate and priorities. The revised goals are intended to provide a clearer them which will allow for more targeted objectives.

> *Goal 1 – Mobility and Accessibility: Provide a comfortable, reliable and accessible transportation system that ensures safety and mobility for all members of the community.*
>
> > *Policies:*
> >
> > *Provide mobility and accessibility for all transportation modes where feasible while continuing to preserve the intended function of existing transportation assets.*
> >
> > *Coordinate with law enforcement and emergency response agencies in the planning and design of transportation facilities and emergency response operations.*
> >
> > > *Objectives:*
> > >
> > > *Continue to modernize existing streets and transportation facilities within the Roseburg UGB to current design standards.*
> > >
> > > *Maintain and improve emergency vehicle access.*
>
> *Goal 2 – Vibrant Community: Create an integrated multimodal transportation system that enhances community livability.*
>
> > *Policies:*

[6] Note, the TSP identifies and ranks bicycle lanes and multi-use paths with a "new crossing" as high priority projects. It is not clear if the projects are intended to be stand-alone facilities or included with a new crossing for automobiles.

Improve access to education facilities for all student within the UGB.

Objectives:

Consider a priorate traffic calming measures in school zones.

Improve quality of existing infrastructure to be in alignment with current design standards.

Goal 4 – Economic Vitality: Advance regional sustainability by providing a transportation system that improves economic vitality and facilitates the local and regional movement of people, goods and services.

Policies:

Facilities access to local businesses and business districts by all modes of transportation.

Facilitate efficient freight movement.

Facilitate the through-movement of goods and services along city arterial streets and state highways.

Objectives:

Focus potential capacity improvements on routes accessing major employment areas.

Proactively identify and correct roadway design, safety and operations deficiencies on designated freight routes.

Goal 5 – Implementation: Provide a sustainable transportation system through responsible stewardship of financial and environmental resources.

Policies:

Encourage preservation of the existing transportation system.

Plan for an economically viable and cost-effective transportation system.

Objectives:

Prioritize funding of projects that are most effective at meeting the goals and policies of the Transportation System Plan.

Douglas County Transportation System Plan and Green Transportation System Plan (adopted 1997, amended 2010)[7]

The Douglas County Transportation System Plan (TSP), adopted in 1997 and most recently amended in 2010, serves as the transportation element of the County's Comprehensive Plan. The Green TSP is included in Chapter 5 within the Douglas County TSP and provides additional guidance for the transportation system in this community in the County.

The most recent series of TSP amendments include the adoption by reference of IAMPs for Exit 119/120 (2009) and Exit 129 (2010).. The TSP document itself includes the IAMP goals for Exists 119/120

Although the IAMPs are included by reference, the TSP itself contains selected sections of the adopted documents, including the cover page of the IAMP, executive summaries, and maps of the IAMP management areas. In the case of the Exit 129 IAMP, a draft of supplemental standards from the Roseburg Growth Management Agreement is also included.

The TSP identifies several projects that are considered desirable in the future but are conceptual in nature with no funding identified. Among the list is a project that proposes to extend Portland Avenue east of Exit 123. The proposed extension would provide another river crossing and more effectively utilize the interchange. The plan also lists a preferred alternative to reconfigure the I-5 Interchange at OR 42 and the I-5 Interchange at Highway 99.

Green TSP

Green is an Urban Unincorporated Area (UUA) under the jurisdiction of Douglas County. Both I-5 and OR 42 are classified in the Green TSP as Principal Highways. Highway 99 is classified as an Arterial.

UUA General Circulation Planning Policy 3 states "Direct property access onto principal highways and arterial streets shall be restricted."

The Douglas County TSP includes multiple UUA Green Circulation Plan policies related to IAMP 119/120.[8] They are:

- *Policy 5. "The County should continue to monitor intersection in the Green UUA to assure volume to capacity ratios for each road classification maintained. Specifically, Old Highway 99/Speedway Road intersection is anticipated to require signalization with an interconnect to the Happy Valley signal and the addition of a left turn lane onto Old Highway 99.*
- *Policy 6. "The Exist 119/120 Interchange Area Management Plan is a part of Douglas County's TSP and by reference adopted as a support document to the Comprehensive Plan."*

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[7] Note, most of the maps and figures in the TSP document provided by Douglas County are incomplete, missing, or illegible, which is likely the result of document's age, multiple amendments, and that most of it is printed pages that were scanned to create a digital document.

[8] Note, these policies apply to the Green UUA, but are not specifically found in the Green TSP (Chapter 5).

- *Policy 7. "Douglas County will coordinate with ODOT in evaluating land use actions that could affect the function of Interchanges 119 and 120."*
- *Policy 8. "Douglas County will coordinate with ODOT prior to amending its transportation system plan or proposing transportation improvements that could affect the function of Interchanges 119 and 120."*
- *Policy 9. "Consistent with County policies that seek to ensure the balance between land use and transportation, the IAMP contains policies that outline the steps that define ODOT's role in protecting the function of the interchanges."*
- *Policy 10 "The IAMP Access Management language notes ODOT concern regarding coordination on an Access Management Plan. If ODOT has identified a safety issue, that improvement should be completed regardless of other perceived planning deficiencies."*
- *Policy 11 "ODOT has an access management plan for the routes within their jurisdiction. The County has an access permitting process to obtain rights of access onto County roadways. For those areas under the jurisdiction of Douglas County, the access permitting process will remain unchanged."*
- *Policy 12 "Douglas County, subject to applicable law, the standards of the Dolan Decision and the limitation of Measure 37 and Measure 49, will assist ODOT in achieving the following access management objectives of the IAMP;*
    - *Encourage redevelopment opportunities that consolidate access points,*
    - *Encourage sharing of access points between adjacent properties,*
    - *Use access management spacing standards to the extent possible to offset driveways at proper distances to minimize the number of conflict points between traffic using the driveways and through traffic,*
    - *Minimize driveway widths and driveway access via local roads where possible;*
    - *Interconnect traffic signals with adjacent signal to create a coordinated timing system."*
- *Policy 13 "The IAMP for Exits 119 and 120 is a part of Douglas County's TSP and by reference adopted as a support document to the Comprehensive Plan."*

The Green TSP has been amended to adopt by reference the IAMP for Exits 119/120 and for Exit 129; these documents are considered part of the TSP. The appendix (also in Chapter 5) includes the list projects and access management program identified in the IAMP 119/120 study.

The Green TSP provides design standards for urban roadways within the UUA. They are based on streets functional classification and are summarized in Table 1.

Table 7: Design Standards for Urban Roadways (source: Green TSP, Chapter 5 of Douglas County TSP)

DESIGN FEATURES	PRINCIPAL HIGHWAY (I-5 & OR 42)	ARTERIAL (HWY 99)
Minimum right-of-way width*	102'	102'
Travel land width	12'	12'
Shoulder width	10'	10'
Left turn lane width**	14'	14'

Recommended number of travel lanes	4	4
Sidewalk width***	6'	6'
Median width	14'	2'-14'

* Minimum right-of-way may be increased by the Public Works Director in all instances where necessary to obtain one half the required right-of-way from the centerline of an existing road.

** Where turn lanes are required, right-of-way and roadbed width must be increased.

*** Sidewalks are required where determined necessary by the Approving Authority for pedestrian safety.

The Green TSP in Chapter 5 includes a list of projects that are unfunded and unbuilt at the time the TSP was developed. Among the projects is a traffic signal at Old Highway 99/Speedway Road

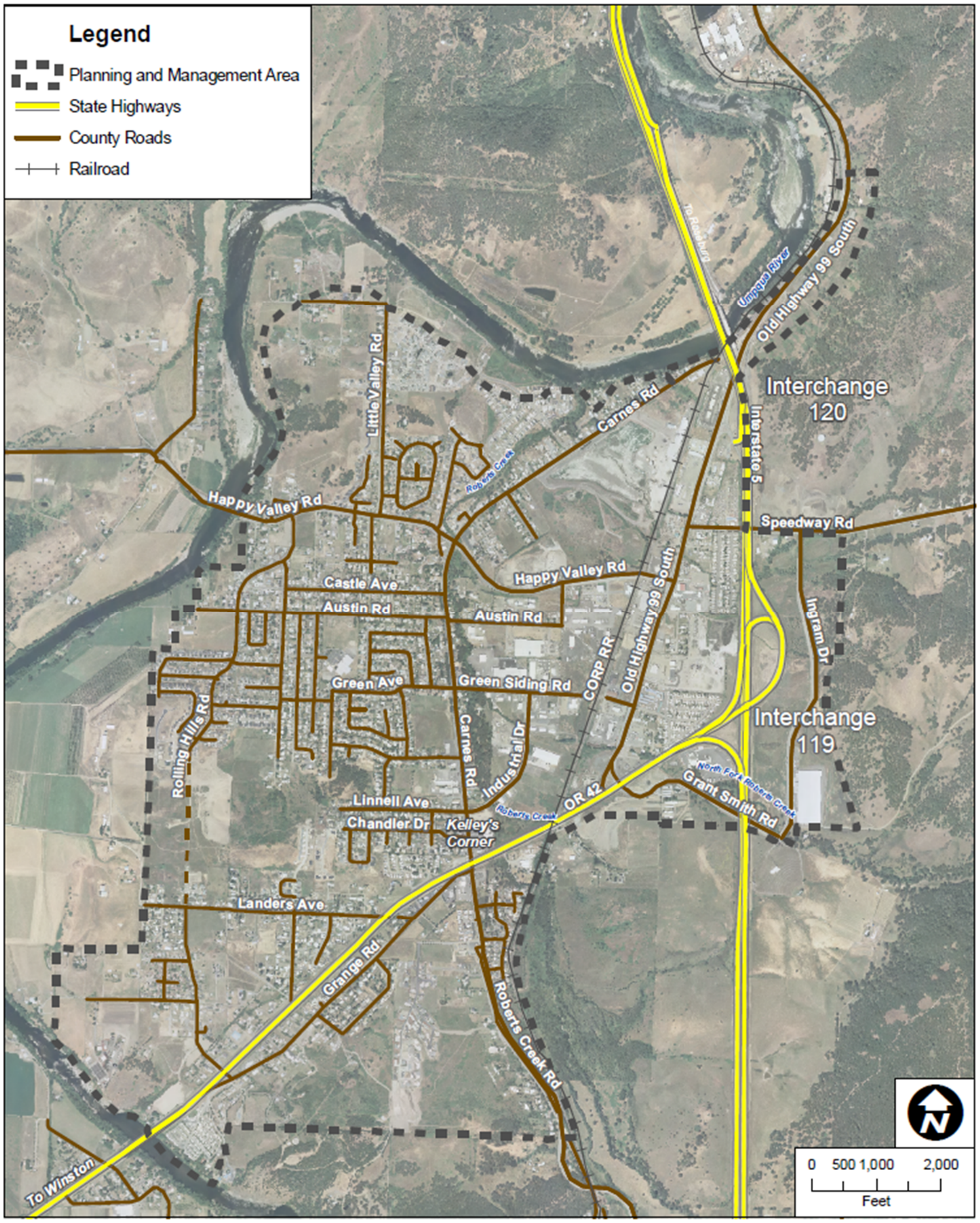
Interchange Area Management Plan Interchanges 119 and 120 (2009)

The Interchange Area Management Plan (IAMP) 119/120 planning area (Figure 2) largely coincides with the boundaries of the Green UUA and encompasses key roadways in the vicinity that relate to traffic operations at the interchanges.

As summarized in the IAMP, the Coos Bay-Roseburg Interchange 119 (Exit 119) serves as a "system" interchange and provides access to OR-42, a statewide freight expressway and part of the National Highway System (NHS). OR-42 provides access to the Port of Coos Bay and coastal communities. Exit 119 also provides access to surrounding limited industrial and low-density residential development west of the interchange in the Green UUA, and a mostly undeveloped industrial area east of the interchange. The surrounding terrain is relatively rolling. The Coos Bay-Roseburg interchange provides access to I-5 from the rural community of Green located at the southern outskirts of the City of Roseburg. Built in the mid-1950s, the interchange has a configuration of a trumpet. The crossroad (OR-42) is a five-lane state facility with a center left-turn lane.

The Oakland-Shady Interchange 120 (Exit 120) serves as a "local" interchange providing access to surrounding limited industrial and low-density residential development west of the interchange, and a mostly undeveloped industrial area east of the interchange. The surrounding terrain is relatively rolling. The Oakland-Shady Interchange provides access to I-5 from the rural community of Green. Built in the mid-1950s, the interchange has a configuration of a half-folded diamond on the west and a directional northbound leg on the east..

Figure 2: I-5 Interchanges 119 and 120, IAMP Planning and Management Area (source: Figure 1-1, Interchange Area Management Plan, Interchanges 119 and 120)



Preferred Alternative

The IAMP Preferred Alternative consists of projects to improve capacity, balance lane use, improve geometry, and maximize the use of the local street network. The individual projects could be implemented concurrently or in phases. The improvements are described in Table 2.

Table 8: IAMP 119/120 Preferred Alternative Projects (source: Table ES-1, Interchange Area Management Plan, Interchanges 119 and 120)

	Project	New Project	Estimated Cost (1000 Dollars)	Roadway Jurisdiction	Funding Partners
1	Interchange 120: Signalize ramp terminal intersection; widen ramp to accommodate a two-lane approach consisting of one left-turn lane and one shared left/right-turn lane from the exit ramp.	1	$445	ODOT	ODOT, Developers
2	Old Highway 99: Widen from the Interchange 120 ramp terminal to Happy Valley Road to two southbound lanes to accommodate the dual left-turn lanes from the ramp terminal.	1	$2,165	County	ODOT, County, Developers
3	OR 42 at Interchange 119: Provide two eastbound lanes on the new OR 42 bridge over I-5.	2	$1,345	ODOT	ODOT
4	I-5 Mainline: When warranted by traffic volumes, provide an additional northbound through lane on I-5 beginning at Interchange119.	2	Varies	ODOT	ODOT
5	Kelly's Corner (OR 42 at Carnes Road): Construct dual left-turn lanes on the southbound, eastbound and west-bound approaches.	2	$2,900	ODOT, County	ODOT, County, Developers
6	OR 42 Expressway Upgrade (2008-2011 STIP, KN 15006): Construct a signal on OR 42 at Rolling Hills Road; Construct a Necessary Local street; Close two street connections and eliminate private access.	2	$1,200	ODOT, County	County, ODOT
7	Complete collector/arterial street network as specified in the Green TSP.	2	Varies	County	County, Developers
8	Speedway Road: Widen to accommodate a three-lane section between Old Highway 99 and Ingram Road; construct southbound left- turn lane on Old Highway 99	2	$900	County	County, Developers
9	Speedway Road at Old Highway 99: Install traffic signal as warranted by future traffic volumes	2	$445	County	County, Developers

Access Management

The IAMP considered several management actions to preserve the interchange capacity and improve safety. The access management plan addresses the segment of Old Highway 99 in the vicinity of the Interchange 120 ramp terminals. General actions in the planning area include:

- *Development of frontage roads to remove access to Old Highway 99 in the vicinity of Interchange 120.*
- *Encourage redevelopment opportunities that consolidate access points.*
- *Encourage sharing of access points between adjacent properties.*
- *Offset driveways at proper distances to minimize the number of conflict points between traffic using the driveways and through-traffic.*
- *Provide driveway access via local roads where possible.*
- *Enforce access management spacing standards to the extent possible.*
- *Minimize driveway widths.*

- *When traffic signals are installed, interconnect them with adjacent signals to create a coordinated timing system.*

The specific access management actions largely consist of consolidating existing approaches in connection with future redevelopment. A long-term objective entails developing a frontage road system to provide alternate access to parcels that currently obtain direct access to Old Highway 99.

Implementation

The Implementation section documents the location of the interchanges (approximately 3 mile south of Roseburg in Douglas County) and the fact that the project was coordinated with the city and Douglas County to improve the existing interchange and surroundings. It describes the purpose of the IAMP as a tool to plan for and manage the investments put into the interchange and that it was originally intended to support a bridge replacement project of I-5 crossing over the South Umpqua River and Old Highway 99 and corresponding local improvements. Since development of the plan, the bridge replacement project has been changed to a repair project only.

The final section of this IAMP describes the responsibilities of Douglas County and ODOT and modifications to state and local plans and policies that are required for implementation of the IAMP. Implementation requirements include adoption of the IAMP as a facility plan in the OHP; adoption of the Access Management Plan by Douglas County; and amendments to the Douglas County TSP project list and Goals and Objectives.

ODOT Actions

- Develop the 119 and 120 IAMP for OTC adoption.
- Identify improvements to the interchange to allow it to operate within Oregon Highway Plan (OHP) standards within the planning horizon (2025).
- Adopt and implement access management actions.
- Continue to coordinate with Douglas County.
- Amend the Investment Policies Scenarios section of the OHP to direct priority for 120 toward critical safety improvements and maintaining existing infrastructure.

County Actions[9]

- Adopt project list including local street network projects.
- Adopt the access management plan
- Amend Capital Improvement List and Funding Partners
- Amend the Douglas County TSP Goals and Objectives to support access management

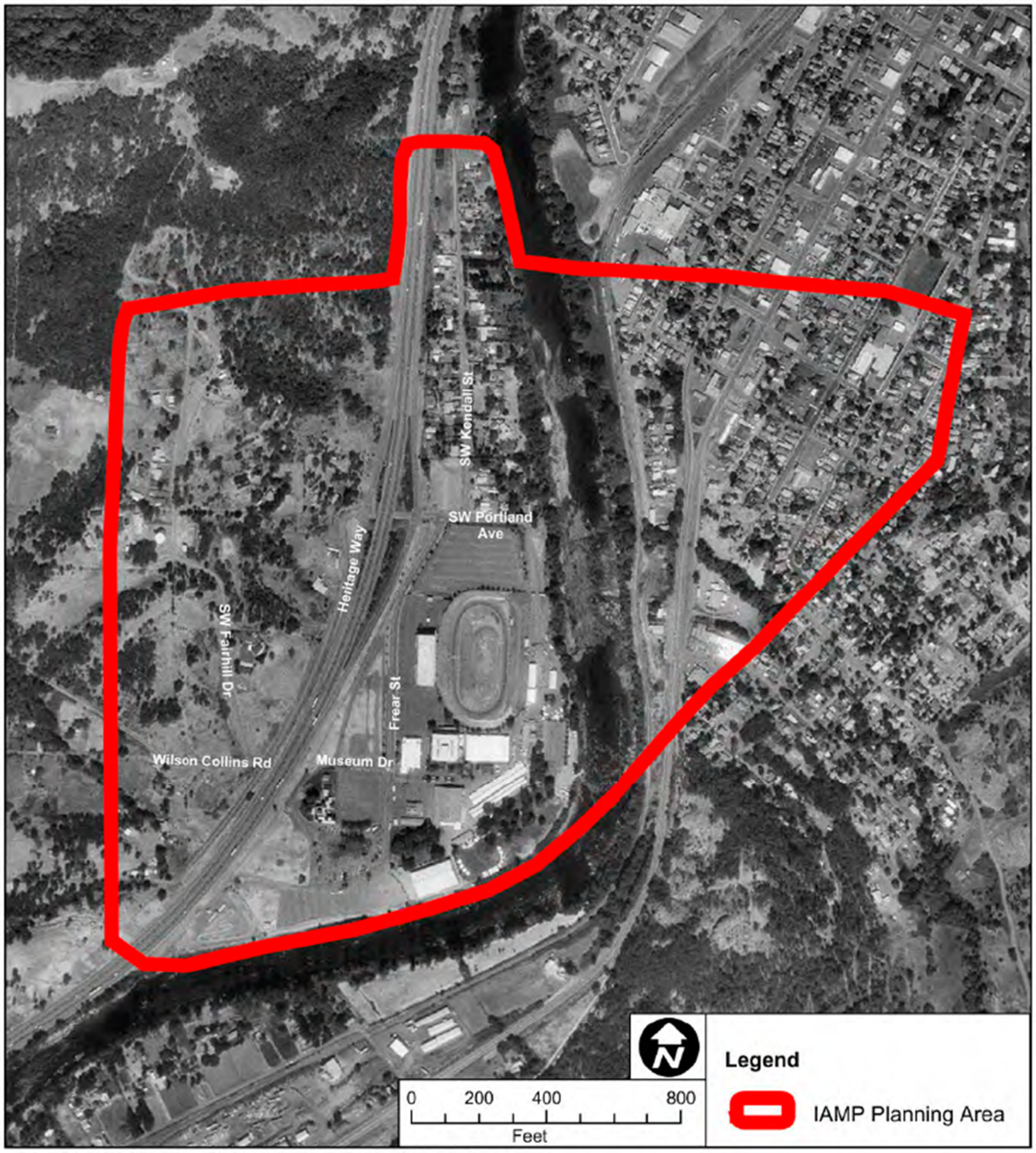
[9] The Douglas County TSP was amended in 2010 to adopt the IAMP by reference. It also included excerpts of the IAMP.

Interchange Area Management Plan – I-5 Interchange 123 (Fairgrounds) (2005)

Interchange 123 is located to the west of the South Umpqua River, at the southern edge of the Roseburg Urban Growth Boundary (UGB). The interchange currently serves as the sole access to several areas, including the Douglas County Fairgrounds, areas of commercial development, and several residences.

The IAMP planning area is generally bounded by the South Umpqua River to the south and encompasses the extent of isolated residential development to the north and west. The planning area also includes a section of Roseburg across the river that is not currently accessible from the interchange. Should a bridge be constructed between Interchange 123 and this section of Roseburg, additional vehicle trips at the interchange from this area of Roseburg would be expected. This area is roughly bounded by Main Street to the east, and Waite and Burke avenues to the north. Figure 3 shows the planning area.

Figure 3: I-5 Interchange 123 IAMP Planning Area Map (source: Figure 2, Interchange Area Management Plan, I-5 Interchange 123 (Fairgrounds))



n:/gis/odot0436/arcmap/i123_PlanningArea_8x11_042805.mxd

Preferred Alternative

The IAMP's preferred alternative recommends a tight diamond interchange, similar to what currently exists. The preferred alternative would replace the structurally deficient I-5 overcrossing and improve the safety and operational efficiency of the interchange. Portland Avenue, the interchange crossroad, would be widened to four lanes with bike lanes and sidewalks on both sides. This width is intended to accommodate traffic associated with large events at the Fairgrounds, not daily traffic. The ramp terminals would be made to intersect Portland Avenue at more perpendicular angles. Acceleration and deceleration lengths on the on- and off-ramps would be increased to meet current ODOT design standards. A sight distance deficiency caused by bridge columns at the southbound ramp terminals would also be corrected. The plan anticipates that funding for this project would be provided through the 2003 Oregon Transportation Investment Act (OTIA) legislation.[10]

The IAMP found that traffic operations at Interchange 123 function well except during large events at the Fairgrounds, such as the County Fair. During these events the interchange experiences significant congestion, and manual traffic control is used to direct traffic through the interchange. This type of control reportedly works well. Even so, substantial queues frequently form on Portland Avenue, which interferes with mainline I-5 operations. Year 2030 traffic operations were analyzed, and the interchange is expected to accommodate expected traffic volumes, even if a bridge is constructed that connects the interchange to Roseburg via Portland Avenue.

Access Management

The IAMP's access management strategy consists of short-term and long-term strategies. The IAMP's primary access management recommendation is to relocate Frear Street to line up with Kendall Street. However, due to site constraints, the primary recommendation is considered a long-term strategy for when major development occurs in the area; such as the construction of a new bridge connecting Portland Avenue with Roseburg or if the Fairgrounds proposes an expansion that would result in an increase in peak period traffic volumes.

Short-term Access Management Actions

The IAMP documents that, concurrent with the Interchange 123 improvements, ODOT will acquire access control along the interchange crossroads. Roadway closures are not anticipated; reservations of access will be given to property owners to access the state highway or interchange crossroad at specific locations. The IAMP notes that it is not practical to relocate Frear Street to a location further away from the interchange ramp terminals, due to the impact on parking for the fairgrounds.

Other approach-specific recommendations for the IAMP study area include:

- Consolidate and reduce the number of access points on Heritage Way serving the Garden Valley Church of Christ (tax lot 27-06W-25BA-01700) (20 in Figure 13) and the James properties (tax lot 27-06W-25BA-01600) (19 and 21).
- Develop alternative access and circulation for the fairgrounds complex, such as enhanced access using the northeast driveway to SW Portland Avenue.
- Access for the pump station may remain in place if used strictly for maintenance purposes on an infrequent basis. However, should the property redevelop, access should not be allowed to Portland Avenue.

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[10] The preferred alternative improvements identified in the I-5 Exit 127 IAMP have not been completed at the time of this memorandum.

- Access for the undeveloped properties north of Portland Avenue and East of Kendall Street (tax lots 27-06W-25BA-600 and 601) should be taken exclusively from Kendall Street. Under no circumstances should an approach to Portland Avenue be allowed.

Medium-term and Long-term Access Actions

Frear Street is too close to the northbound interchange ramp terminals; during major events at the Fairgrounds vehicles stack up on Portland Avenue and onto the interchange off-ramps, which disrupts I-5 mainline traffic operations. The primary long-term recommendation of the access management plan is the relocation of the northernmost section of Frear Street so that it aligns with Kendall Street.

The plan recommends the following additional medium-term to long-range actions to be implemented as land use changes and redevelopment occurs, in connection with future roadway improvement projects, or as needed to rectify safety problems.

- Encourage redevelopment opportunities that consolidate access points.
- Encourage sharing of access points between adjacent properties.
- Offset driveways at proper distances to minimize the number of conflict points between traffic using the driveways and through-traffic.
- Provide driveway access via local roads where possible.
- Enforce access management spacing standards to the extent possible.
- Minimize driveway widths.

Implementation Process

The plan recommends that the City of Roseburg and Douglas County adopt changes to their transportation policy and implementation ordinances to ensure that land uses and planned improvements to the interchange are in balance. The Roseburg TSP has incorporated the IAMP by reference. Douglas County will need to amend the Douglas County TSP, an element of the adopted Comprehensive Plan, to include by reference the I-5 Interchange 123 IAMP.

Interchange Area Management Plan 124/125 Technical Memoranda (2013-2015)

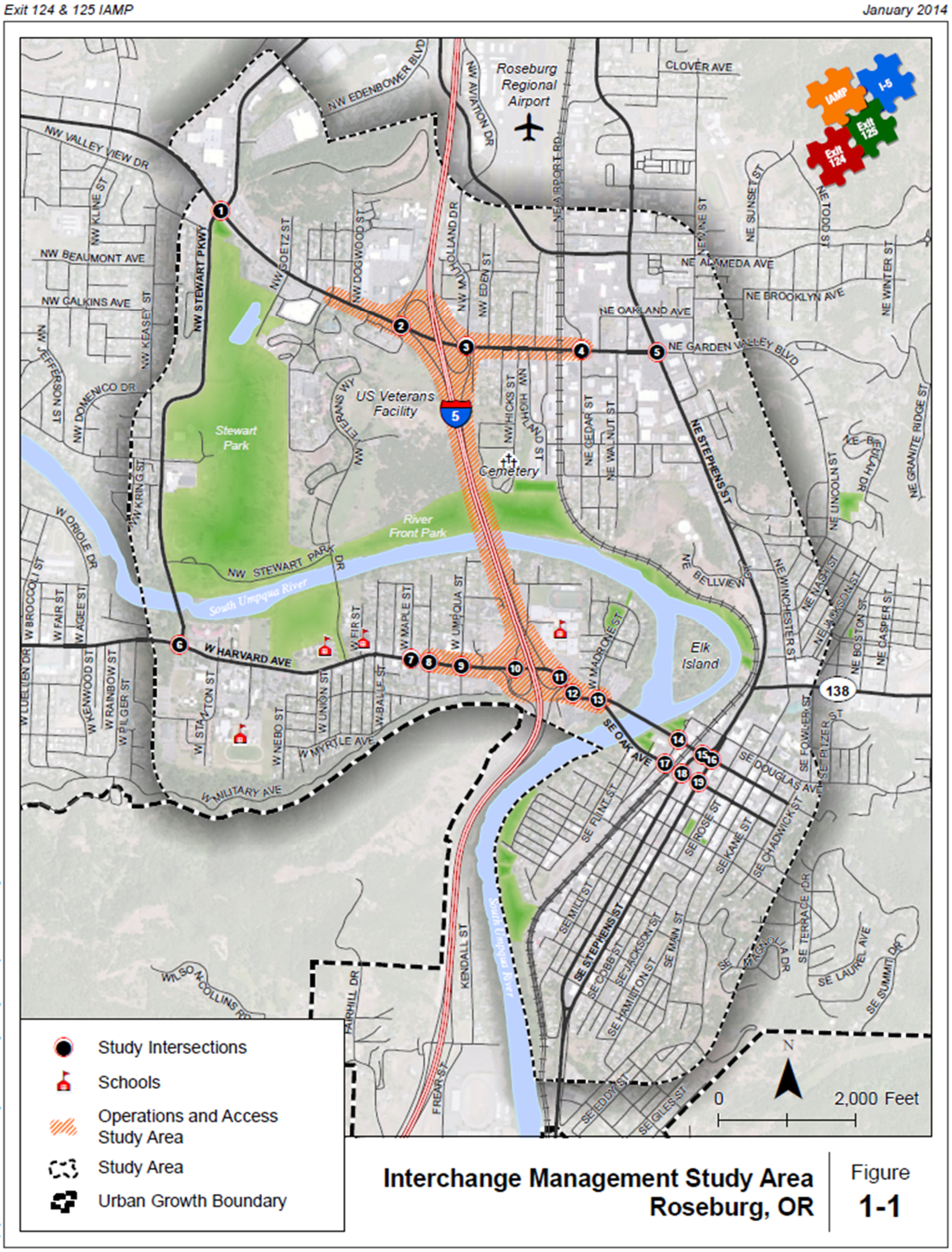
I-5 Exits 124 and 125 are two of four interchanges that serve the City of Roseburg. Exit 124 connects I-5 to the W Harvard Avenue and OR 138 corridors. Combined, these corridors serve a number of major land uses in Roseburg including Roseburg High School, Downtown Roseburg, and the majority of residential and commercial uses located south of the South Umpqua River.

Exit 125 connects I-5 to NW Garden Valley Boulevard. NW Garden Valley Boulevard is a major east-west corridor in Roseburg and provides access to a significant number of retail and professional businesses located near the interchange.

Several technical memoranda have been prepared for the I-5 exits 124 and 125 IAMP study area (see Figure 4) but a preferred alternative, access management strategy, or implementation measures have not been developed at this time. The technical memoranda that have been completed to date include:

- **Technical Memorandum #1: Project Background, Definition, Goals, and Objectives.** This memorandum provides an overview of Exists 124 and 125 Interchange Area Management Plan including project, purpose and intent, goals, objectives, evaluation criteria, and proposed study area (see Figure 3).
- **Technical Memorandum #2 & #3: Existing Conditions.** This memorandum provides a review of existing land uses, transportation facilities, traffic operations, safety, access, and environmental issues within the vicinity of Exits 125 and 125 interchanges. The information provides a basis for informing and identifying opportunities and constraints.
- **Technical Memorandum #4: Future Baseline Conditions.** This memorandum provides a review of future land uses, transportation facilities, and traffic operations. The information identifies future deficiencies, opportunities, and constraints that need to be addressed.
- **Technical Memorandum #5: Concept Evaluation.** This memorandum documents initial concepts submitted to the TAC, CAC, and the general public for review. It documents future (2035) traffic operations and provides an overview of the process used to develop initial concepts, a qualitative assessment of initial concepts, and a preliminary recommendation for refinement of these concepts.

Figure 4: Exit 124 & 125 IAMP Study Area (source: Figure 1-1, Technical Memorandum #1, Project Background, Definition, Goals, and Objectives)



IAMP project work resulted in several preliminary concepts, reviewed in a detailed quantitative evaluation. At this point in the planning effort, it was determined that many of the operational issues being addressed by the IAMP needed to be done in coordination with or following a planned update to the City of Roseburg's Transportation System Plan. As such, continued work on the IAMP

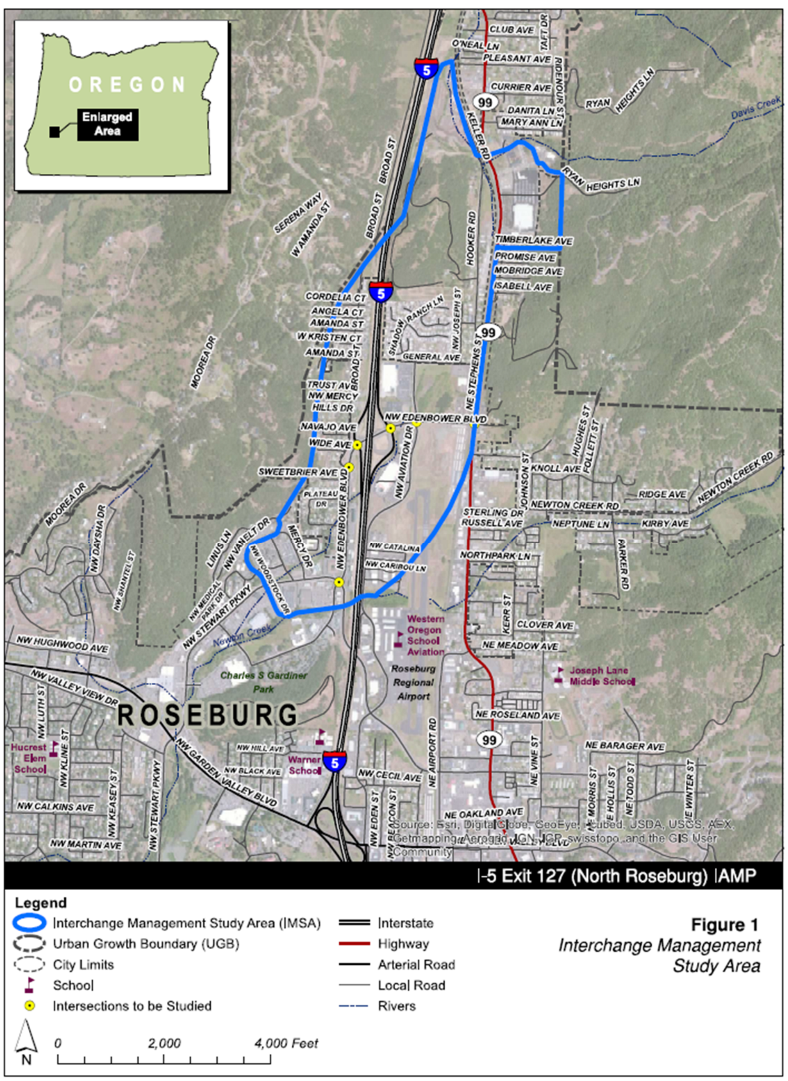
124/125 was placed on indefinite hold. It is ODOT's intention to resume work on the 124/125 IAMPs following completion of the City of Roseburg's TSP and completion of this plan.

Interchange Area Management Plan I-5 Exit 127 (North Roseburg) (2014)

I-5 Exit 127 is an urban interchange that serves north Roseburg in Douglas County. The interchange ramps connect with Edenbower Boulevard, which is one of four east-west local arterial routes that provide access over I-5 in Roseburg. Edenbower Boulevard connects with Stephens Street (Old Highway 99) east of the interchange and Stewart Parkway southwest of the interchange. Stephens Street is a north-south arterial that runs the entire length of Roseburg parallel to the freeway. Stewart Parkway is a Roseburg arterial that, with Edenbower Boulevard, provides a north-south arterial serving areas of Roseburg west of the freeway.

Edenbower Boulevard provides access to the Roseburg Regional Airport and Mercy Medical Center from I-5. It also connects to the community of Winchester and a Costco to the north via Stephens Street (Old Highway 99) and provides access to residential and commercial lands. The IAMP 127 study area is shown in Figure 5.

Figure 5: I-5 Exit 127 Interchange Management Study Area (source: Figure 1, Interchange Area Management Plan I-5 Exit 127 (North Roseburg))



Preferred Alternative

The I-5 Exit 127 IAMP preferred alternative addresses identified deficiencies, improves multimodal functionality, and accommodates traffic, including freight, safely and efficiently into the future. Figure 6 (Figure ES-1 in the IAMP) indicates the location of improvements and includes a brief description of the projects along with a general priority. The following provides a summary from detailed project sheets prepared for each improvement.

Transportation System Management Improvements include:

- Project 1: Edenbower Boulevard Signal Timing Coordination. Maintain signal coordination from the I-5 southbound ramp terminal through Stephens St (Ongoing).
- Project 2: Edenbower Boulevard/Stewart Parkway Sight Distance Improvements. Mitigate the existing sight distance limitations that restrict visibility for drivers traveling through the intersection on the eastbound (Stewart Pkwy) and northbound (Edenbower Blvd) approaches (Medium priority).
- Project 3: Edenbower Boulevard/Stephens Street Intersection Improvements. Extend eastbound and northbound left-turn bays (Medium priority).
- Project 4: Edenbower Boulevard/I-5 Northbound Ramp Terminal Intersection Improvement. Install traffic signal (Low priority)

Infrastructure improvements include:

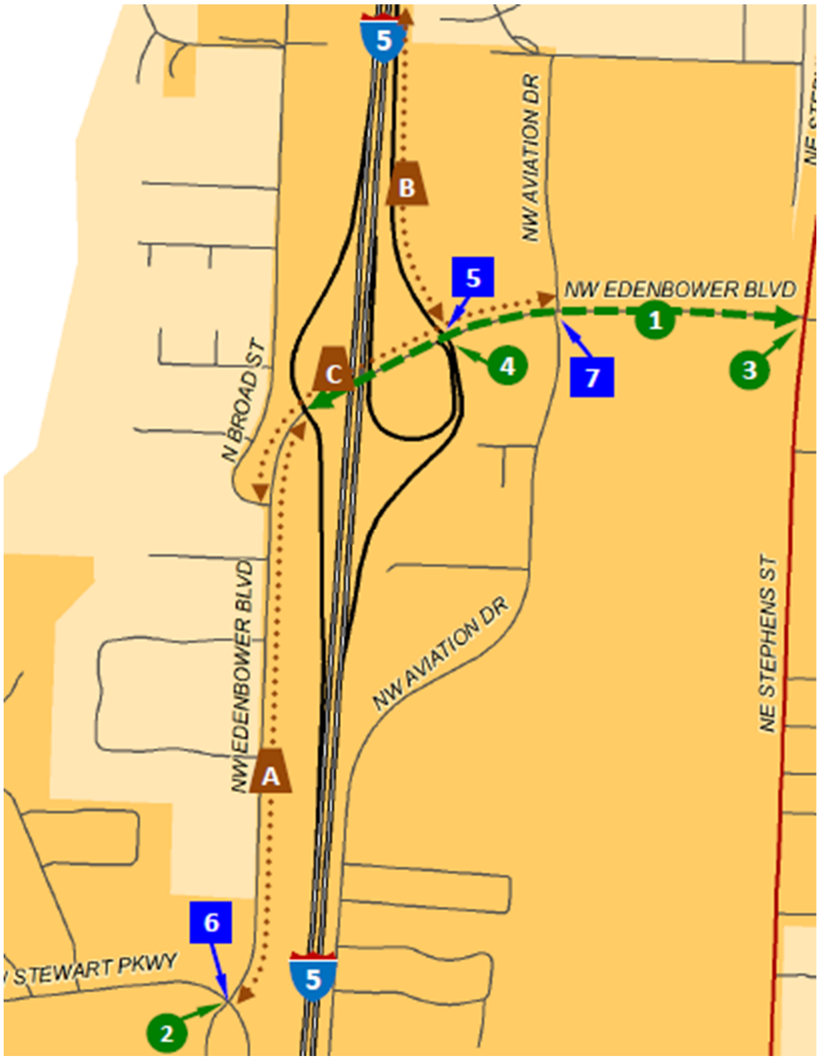
- Project 5: Edenbower Boulevard/I-5 Northbound Ramp Terminal Pedestrian Improvement. Improve pedestrian crossing on north side (High to Medium Priority)
- Project 6: Edenbower Boulevard/Stewart Parkway Intersection Improvements. Add a second left turn lane on the eastbound approach of Stewart Pkwy and add a second northbound receiving lane by widening Edenbower Blvd (Medium Priority). This project could be constructed in phases.
- Project 7: Edenbower Boulevard/Aviation Drive Intersection Improvements. Modify the northeast corner of the intersection to extend the existing westbound right-turn bay (Low Priority)

IAMP monitoring actions include:

A. Edenbower Boulevard: Reassess travel and posted speeds between Stewart Parkway and the I-5 southbound ramp terminal following the implementation of Project 6
B. Northbound On Ramp: Monitor crashes on the WB-to-NB ramp for patterns that may be mitigated with treatments that improve channelization and merging behavior
C. Edenbower Boulevard: Conduct a traffic analysis to identify the preferred location for transit stops for any future fixed-route bus service along Edenbower Boulevard

The identified improvements are shown in Figure 6.

Figure 6: Locations of Recommended IAMP Improvements (Source: Figure 7, Interchange Area Management Plan I-5 Exit 127 (North Roseburg))



Access Management

IAMP access management strategies include an access management plan, transportation demand and system management measures, and land use management measures.

Both ODOT and the City of Roseburg have access management standards that apply within the I-5 Exit 127 study area. The access management standards applicable to this project are summarized in Table 3. These standards are based on the OHP and the City of Roseburg Land Use and Development Ordinance.

Table 9: Exit 127 Access Spacing Standards (source: Table 13, I-5 Exit 127 (North Roseburg) Interchange Area Management Plan)

Segment Characteristic	Access Spacing Standard
ODOT – Interchange Ramp Terminals - Fully Developed Urban[1]	
Distance from off-ramp to first approach on the right, right-turn movements only	750 feet[2]
Distance from off-ramp to first intersection where left turns are allowed	1320 feet[2]
Distance from last approach road to the start of the taper for the on-ramp	1320 feet[2]
Distance from last right in/right out approach road to the start of the taper for the on-ramp	990 feet[2]
Other Public/Private Access Points	
Roseburg - Arterial (Edenbower Blvd.)	500 feet[3]

Notes:
1. Fully Developed Urban Interchange Management Area: Occurs when 85% or more of the parcels along the developable frontage area are developed at urban densities and many have driveways connecting to the crossroad. See definition in the Oregon Highway Plan.
2. Table 18 in the revised OHP-Effective January 1, 2012 Amended May 3, 2012 : Access Management Spacing Standards for Freeway Interchanges with Multi-Lane Crossroads
3. City of Roseburg Land Use and Development Ordinance, March 11, 2013.

Currently, the existing public street network does not meet the interchange standards and this IAMP does not include projects that will relocate any roadways. The IAMP notes that opportunities to reduce access frequency and/or conflicts on Edenbower Boulevard should be pursued by the City of Roseburg whenever a public infrastructure or private development project is constructed. ODOT will not permit any new access points on Edenbower Boulevard between Broad Street and Aviation Drive.

The Access Management Plan for I-5 Exit 127 and Edenbower Boulevard from Stewart Parkway to Stephens Street includes a variety of measures identified that may be triggered as land use changes occur (new development or redevelopment), future improvement projects are implemented, or as safety and operational issues arise.

> ***Policy 1***: *Access management techniques shall be applied with a desire to move towards achieving applicable access spacing standards over time.*
>
> ***Policy 2***: *Consolidation, closure, or modification of driveways shall be considered when any of the following conditions are met:*
>
> - *Properties develop or redevelop and when reasonable access can be provided with a single access point or via a local street.*
> - *Future roadway improvements move into design and construction.*
> - *The annual accident rate is 20 percent greater than the statewide rate for similar roadways or a highway segment has an ODOT SPIS rating in the worst 10 percent.*
>
> ***Policy 3***: *Turn limitations shall be considered when any of the following conditions are met:*
>
> - *Future roadway improvements move into design and construction.*
> - *The annual accident rate is 20 percent greater than the statewide rate for similar roadways or a highway segment has an ODOT SPIS rating in the worst 10 percent.*

Specific access management actions include:

***Action 1**: Access management measures will be evaluated when design begins for the Edenbower Boulevard/Stewart Parkway improvements. The evaluation of potential measures should include:*

- *Consolidation or closure of driveways on Edenbower Boulevard to reduce turning and merging conflicts along the east side of the roadway, extending 500 feet north of Stewart Parkway.*
- *Turn limitations on Edenbower Boulevard to reduce turning and merging conflicts along the east side of the roadway, extending 500 feet north of Stewart Parkway.*
- *Turn limitations on Edenbower Boulevard in the vicinity of standing queues.*

***Action 2**: Access management measures will be evaluated when design begins for the Edenbower Boulevard/Stephens Street turn lane extensions. The evaluation of potential measures should include:*

- *Turn limitations on Edenbower Boulevard and Stephens Street in the vicinity of standing queues.*

The IAMP supports transportation demand management (TDM) efforts through maintenance of existing bicycle and sidewalk facilities and a specific pedestrian improvement (Project 5. NB Ramp Terminal: Improve North Side Pedestrian Crossing). The IAMP also supports a future transit route along the Edenbower Boulevard but states that transit stops must not be located where they could impact the safe and efficient operations of the interchange ramp terminals.

The Transportation System Management (TSM) measures included in the preferred alternative are:

- Project 1. Edenbower Blvd: Maintain Signal Coordination
- Project 2. Edenbower Blvd/Stewart Pkwy: Provide Adequate Sight Distance
- Project 3. Edenbower Blvd/Stephens St: Extend Left-Turn Bays
- Project 4. NB Ramp Terminal: Signalize Intersection

In addition to these four projects and three infrastructure improvements (listed under Preferred Alternative), three additional monitoring actions are recommended for the long-term management of the transportation system:

- Action A. Edenbower Boulevard: Reassess travel and posted speeds between Stewart Parkway and the I-5 southbound ramp terminal following the implementation of Project 6
- Action B. Northbound On Ramp: Monitor crashes on the WB-to-NB ramp for patterns that may be mitigated with treatments that improve channelization and merging behavior
- Action C. Edenbower Boulevard: Conduct a traffic analysis to identify the preferred location for transit stops for any future fixed-route bus service along Edenbower Boulevard

The IAMP notes that changes to the land use zoning could dramatically impact the transportation system in the area. Vehicle trip generation associated with potential future growth in the region could cause traffic operations at I-5 Exit 127 to exceed ODOT mobility standards within the 20-year planning horizon. The intensity, timing and location of actual development may result in more congestion than is estimated by the model.

ODOT is relying on the currently adopted plans, policies, designations and codes to ensure that the land uses remain supportive of the function of the interchange. This management strategy is essentially a reaffirmation by the City of Roseburg that their Comprehensive Plan and TSP remains valid or, if changes are needed, the Transportation Planning Rule (TPR) requirements will be met and the City will notify ODOT and jointly undertake an evaluation of impacts to the interchange.

Implementation[11]

Implementation of the I-5 Exit 127 IAMP will need to occur at the local and state level. The plan will be adopted as an amendment to the Oregon Highway Plan by the OTC. It will also be adopted as part of the City of Roseburg Transportation System Plan. The elements recommended for formal adoption as part of this IAMP include the following actions:

State Actions:

ODOT will continue to coordinate with the City of Roseburg as planning documents get updated and amended and during the development review process to ensure the interchange is protected.

City of Roseburg Actions:

- Adopt the IAMP as a refinement plan to its TSP (City of Roseburg Urban Area Comprehensive Plan amendment).
- Retain, through adoption of the IAMP, current adopted Comprehensive Plan and Land Development Ordinance designations and regulations to ensure that the land uses within the IAMP study area remain supportive of the function of the interchange.
- When future land use actions are proposed, continue to coordinate with ODOT to ensure that actions and improvements are consistent with the defined function of the IAMP.
- Adoption of provisions of the City of Roseburg Urban Area Comprehensive Plan and LUDO by reference into this IAMP ensures that there would be no violation of the mobility performance standards for the interchange and related facilities. No amendments to the City of Roseburg Urban Area Comprehensive Plan, TSP, or LUDO are recommended, including overlay zones.

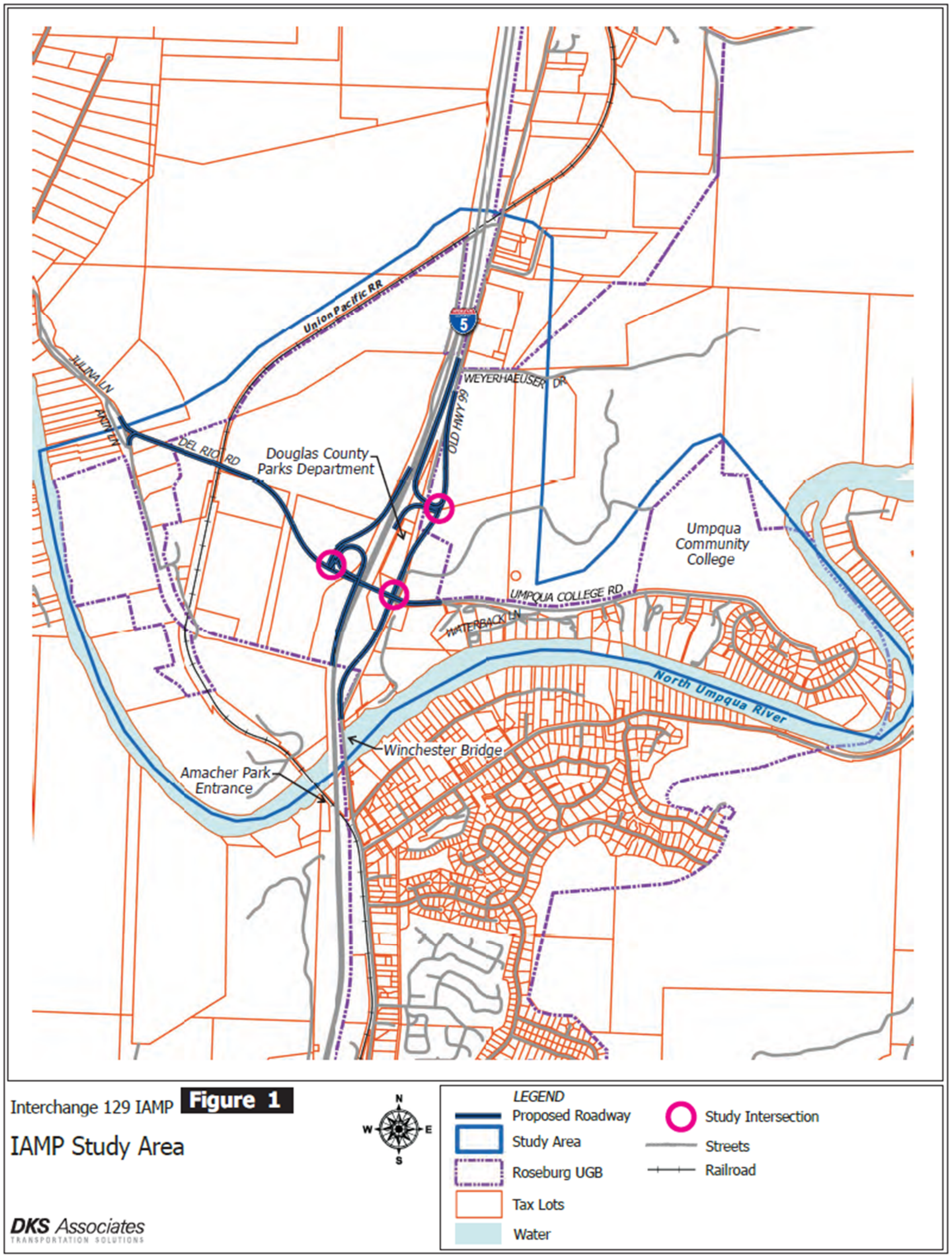
Interstate Area Management Plan Interstate 5/Interchange 129 (2011)

Interchange 129 is located on I-5, approximately 2.5 miles north of the Roseburg city limits. It provides access to Old Highway 99 (Old Oakland-Shady Highway), Del Rio Road (County Road 115) and to Umpqua Community College (UCC) via Umpqua College Road. It was constructed in 1978 as a

[11] Note, the 2014 I-5 Exit 127 IAMP recommends amending the 2006 TSP to replace the TSP's list of Edenbower improvement projects with new improvement projects. At the time of this memorandum, the recommended TSP amendments are not shown in the TSP or listed as an amendment to the City's Comprehensive Plan on the City's website. However, advisory committee members have indicated IAMP 127 has been adopted.

folded diamond configuration in the southbound direction and as a gull wing in the northbound direction. During the development of the IAMP, improvements to modernize the interchange as part of the bridgework were being planned by ODOT. These improvements have been completed since the IAMP adoption. The proposed interchange improvements and study area are shown in the study area map (Figure 7).

Figure 7: I-5 Exit 129 IAMP Study Area (source: Figure 1, Interchange Area Management Plan Interstate 5/Interchange 129)



Ultimate Build (Preferred Alternative)

The IAMP developed an "Ultimate Build" improvement scenario that represents the transportation system that will be necessary to accommodate future traffic demands in the year 2027, such that mobility standards can be met at all study intersections. The Ultimate Build scenario factors in the completion of ODOT's modernization improvements. The additional improvement projects identified in the plan that will be needed following the completion of the Interchange 129 project (Immediate Build) include:

- Del Rio Road & I-5 Southbound Ramp Terminal. Signalize intersection. Add second westbound through lane.
- Old Highway 99 & I-5 Northbound Ramp Terminal. Add second eastbound right turn lane.
- Del Rio Road / Umpqua College Road & Old Highway 99. Add second northbound turn lane. Add southbound shared through/right turn lane.

The preferred alternative did not factor the surplus property south of the interchange between I-5 and Old Highway 99 due to the lack of a zoning designation. However, in anticipation of the property developing as a commercial use in the future, the IAMP indicates additional improvements may be necessary, including:

- Del Rio Road/ Umpqua College Road & Old Highway 99: Modify northbound right turn lane to a shared through/right turn lane and accompanying receiving lane.
- Old Highway 99 & I-5 NB Ramp Terminal: Add a southbound right turn lane and a northbound through lane with accompanying receiving lane
- Old Highway 99 & I-5 SB Ramp Terminal: Add an eastbound through lane and accompanying receiving lane

Management Strategies

The IAMP's access management recommendations are categorized into short-range, medium-range, and long-range actions. Short-range actions are associated with ODOT's modernization project, which was completed shortly after the IAMP's adoption. The plan specifies that medium and long-range actions will be implemented as part of land development or future public construction projects by ODOT, the City of Roseburg, or Douglas County. No medium-range actions are identified in the IAMP. A single long-range action is identified; it states where access should be placed for the vacant property bounded by I-5, Del Rio Road, and Old Highway 99 should it be needed.

The IAMP does not recommend any signals in the IAMP area that are incompatible with the signals at the intersections of Old Highway 99 at Del Rio Road/Umpqua College Road and Old Highway 99 at the I-5 northbound ramp terminal, or the future signal on Del Rio Road at the I-5 southbound ramp terminal through the year 2031.

The IAMP plan recommends Old Highway 99 from the I-5 northbound ramp terminal to the Del Rio Road/Umpqua College Road intersection be designed to accommodate a type of positive separation in the median, whether it be a raised median or smaller traffic separator.

Implementation and Adoption

Roles and responsibilities related to the adoption and implementation of the IAMP are outlined for ODOT, Douglas County, and City of Roseburg. The IAMP makes recommendations for amendments to City and County plans and implementation measures necessary to successfully adopt and implement the IAMP are also included as appendices. In addition, adoption and implementation of the IAMP includes an Urban Growth Management Agreement between the Roseburg and Douglas County that provides supplemental standards to conserve the industrial site west if I-5 at Exist 129, consistent with OAR 660-009-005(3) and (8).

Greater Roseburg Area Study (GRATS) (1996)

The Greater Roseburg Area Transportation Study was completed in 1996 as a precursor to the TSP. This study provided a long-term analysis of multimodal transportation system needs in the area extending from south of the Green-Winston area to Winchester on the north, a larger area than the Roseburg UGB. This document summarizes the results of the public participation process, analyses of existing and future transportation conditions, evaluations of Transportation Demand Management strategies, and identifies alternatives that address regional transportation needs. The preferred alternative was integrated into the 2006 Roseburg TSP.

I-5 State of the Interstate Report (2000)

ODOT completed the I-5 State of the Interstate Report in June 2000. The report provides an assessment of the existing and forecasted safety, geometric, and operating conditions along the entire length of Interstate 5 from California to Washington. The document covers a wide range of issues, including:

- Overview of related plans, policies, and studies
- Trends in population, employment, land use, and transportation
- Existing and forecasted conditions for each I-5 interchange and mainline freeway segment
- Environmental conditions and potential development impact areas
- Opportunities for short-term improvements

Within ODOT's Region 3 – which encompasses southern Oregon, including Roseburg – the report states that travelers will experience significant congestion on I-5 by 2020. Many interchanges in this region are expected to have intersections at ramp terminals operating at an unacceptable level of congestion if no improvements are made. The problems associated with interchanges are expected to occur in the more populated portions of the corridor.

OR 42 Expressway Management Plan (2013)

The Oregon Route (OR) 42 Expressway Management Plan (EMP) focuses on the section of OR 42 that extends from I-5, through the Green Urban Unincorporated Area (UUA), to Lookingglass Road. The plan examines how the expressway operates both now and over the next 20 years. It identifies strategies to preserve and improve safety and capacity consistent with an expressway route designation. The EMP also establishes mobility and access management standards based on OHP policies for a statewide expressway designation.

Figure 8 indicates the location of EMP improvements and includes a brief description of the project along with a general priority. Detailed project sheets are provided for each expressway improvement in the EMP.

Figure 8: I-5 Exit 129 IAMP Study Area (source: Figure ES-1, Oregon Route (OR) 42 Expressway Management Plan)

ODOT Analysis Procedures Manual

The ODOT Analysis Procedures Manual (APM) provides the current procedures, practices, and methodologies for assessing near- and long-term operations analyses on all state highways under ODOT jurisdiction. Chapters from the APM which are applicable to the I-5 Bottleneck Corridor Segment Plan include the following:

Chapter 11 – Segment and Facility Analysis outlines the methods to be used when evaluating the operations of freeways and the uninterrupted-flow portions of multilane highways. Key inputs that will require guidance from Chapter 11 include:

- Software package (in this case, using FREEVAL which implements the Highway Capacity Manual 6th Edition procedures for freeway analysis)
- Analysis Time Periods
- Volume-related inputs (mainline and ramp volumes, % heavy vehicles, terrain type, area type, section or segment length, ramp acceleration/deceleration lane length, distances to adjacent ramps, weaving volumes (from APM, Chapter 2)
- Capacity-Related Inputs (mainline free-flow speeds, driver population Capacity Adjustment Factor), ramp free-flow speed, jam density, queue discharge capacity drop).
- Calibration following the 5-step procedure
- Performance measures (v/C ratio of freeway segments, LOS for segments, maximum queue length, travel time profiles, speed contours, vehicle hours of delay, total user cost)

Chapter 15 – Traffic Simulation Models outlines the protocols for preparing VISSIM simulations. The most current published protocols are outlined in the June 2011 Addendum 15A. Key inputs that will require guidance from Chapter 15 include:

- Software package (in this case, VISSIM 10.00-07 or greater)
- Analysis Time Periods
- Model Development (model geometry, driver behavior, speed control, desired speed decisions, vehicle inputs, vehicle routing, vehicle composition, conflict areas, signal control for ramp terminals)
- Simulation Parameters (simulation resolution, network warm-up period, simulation run time)

- Calibration (GEH statistics for output/input, speed, travel time, vehicle inspection, number of simulation runs)
- Performance Measures (hours of congestion, vehicle hours of delay, travel time, speed)

Data and Data Sources to be Used for Traffic Analysis

The traffic analysis will be prepared using ODOT provided 24-hour detector count data for all freeway mainline, on-ramp and off-ramp detectors along the I-5 study corridor. The detector data includes vehicles classification counts, and counts aggregated into 15-minute intervals for the 4-hour peak periods between 6:00 AM – 10:00 AM and 2:00 PM – 6:00 PM. Traffic count data were provided in hourly intervals for all other times of day. Data collection dates varied depending on the specific detector, but the traffic counts were generally collected between April and May 2017. Table 10 and Table 11 summarizes the detector location and data collection dates that will be used in the traffic analysis models.

The following describes the volume development process of converting the detector counts into volume inputs for the traffic analysis models:

- In the northbound direction, the freeway mainline volumes used in the traffic analysis was based on ODOT Site #10015, which is the southern-most mainline detector on the study corridor located just south of the Coos Bay – Winston Interchange (Exit 119).

- In the southbound direction, the northern-most freeway mainline detector is located just north of the Winchester Interchange (Exit 129). However, the detector counts at this location was only available in hourly intervals. To capture peak period volume profiles in 15-minute intervals, detector counts from ODOT Site #47, which is located just south of the Winchester Interchange, was used instead.

- Average heavy vehicle percentages were calculated for single unit trucks and tractor trailer trucks for each mainline and ramp segment. Individual percentages were calculated for the AM and PM peak period. Table 12 and Table 13 summarizes the truck percentages for all entering vehicles into the I-5 study segment.

In addition, 24-hour field travel time data was downloaded using ODOT iPeMS for the study corridor. Field travel time data for Monday through Thursday from April 3, 2018 through April 13, 2018 was used for calibration of traffic analysis models.

Previously Documented Operational Issues

Table 10: Summary of Freeway Detector Counts Provided by ODOT

ODOT Site #	Location Name	Data Collection Date
47	On I-5, 0.10 mile south of Winchester Interchange (Exit 129)	5/2/2017 – 5/3/2017
10015	On I-5, south of Coos Bay-Winston Interchange (Exit 119)	5/2/2017 – 5/3/2017

Table 11: Summary of Ramp Detector Counts Provided by ODOT

ODOT Site #	Location Name	Data Collection Date
99915677	Winchester Interchange (Exit 129) SB Diagonal Off-Ramp	4/3/2017 – 4/5/2017
99916068	Winchester Interchange (Exit 129) NB Diagonal On-Ramp	4/10/2017 – 4/12/2017
99916025	Winchester Interchange (Exit 129) NB Diagonal Off-Ramp	4/10/2017 – 4/12/2017
99916026	Winchester Interchange (Exit 129) SB Loop On-Ramp	4/3/2017 – 4/5/2017
99916061	North Roseburg / Edenbower Boulevard Interchange (Exit 127) SB Diagonal Off-Ramp	4/3/2017 – 4/5/2017
99916060	North Roseburg / Edenbower Boulevard Interchange (Exit 127) NB Diagonal On-Ramp	4/10/2017 – 4/12/2017
99917929	North Roseburg / Edenbower Boulevard Interchange (Exit 127) NB Loop On-Ramp	4/10/2017 – 4/12/2017
99916056	North Roseburg / Edenbower Boulevard Interchange (Exit 127) NB Diagonal Off-Ramp	4/10/2017 – 4/12/2017
99916062	North Roseburg / Edenbower Boulevard Interchange (Exit 127) SB Diagonal On-Ramp	4/3/2017 – 4/5/2017
99915673	Garden Valley Interchange (Exit 125) SB Diagonal Off-Ramp	4/3/2017 – 4/5/2017
20928	Garden Valley Interchange (Exit 125) NB Diagonal On-Ramp	4/10/2017 – 4/12/2017
20927	Garden Valley Interchange (Exit 125) NB Loop On-Ramp	4/10/2017 – 4/12/2017
20929	Garden Valley Interchange (Exit 125) SB Loop On-Ramp	4/3/2017 – 4/5/2017
99915670	Garden Valley Interchange (Exit 125) NB Diagonal Off-Ramp	4/10/2017 – 4/12/2017
20926	Garden Valley Interchange (Exit 125) SB Diagonal On-Ramp	4/3/2017 – 4/5/2017
99915668	Harvard Avenue Interchange (Exit 124) NB Diagonal Off-Ramp	4/10/2017 – 4/12/2017
99917466	Harvard Avenue Interchange (Exit 124) NB Loop On-Ramp	4/10/2017 – 4/12/2017
99917459	Harvard Avenue Interchange (Exit 124) SB Loop Off-Ramp	4/3/2017 – 4/5/2017
99915669	Harvard Avenue Interchange (Exit 124) SB Diagonal On-Ramp	4/3/2017 – 4/5/2017
99917462	Harvard Avenue Interchange (Exit 124) NB Diagonal On-Ramp	4/10/2017 – 4/12/2017
99915666	Fairgrounds Interchange (Exit 123) SB Diagonal Off-Ramp	4/3/2017 – 4/5/2017
99915665	Fairgrounds Interchange (Exit 123) NB Diagonal On-Ramp	4/10/2017 – 4/12/2017
99915663	Fairgrounds Interchange (Exit 123) NB Diagonal Off-Ramp	4/10/2017 – 4/12/2017
99915667	Fairgrounds Interchange (Exit 123) SB Diagonal On-Ramp	4/3/2017 – 4/5/2017
99916053	North Shady Interchange (Exit 120) SB Diagonal Off-Ramp	4/3/2017 – 4/5/2017
99915657	North Shady Interchange (Exit 120) NB Diagonal Off-Ramp	4/10/2017 – 4/12/2017
99916069	North Shady Interchange (Exit 120) SB Loop On-Ramp	4/3/2017 – 4/5/2017
99915656	Coos Bay-Winston Interchange (Exit 119) NB Loop Off-Ramp	4/10/2017 – 4/12/2017
99916944	Coos Bay-Winston Interchange (Exit 119) NB Diagonal On-Ramp	4/10/2017 – 4/12/2017
99916945	Coos Bay-Winston Interchange (Exit 119) SB Diagonal Off-Ramp	4/3/2017 – 4/5/2017
99916950	Coos Bay-Winston Interchange (Exit 119) SB Diagonal On-Ramp	4/3/2017 – 4/5/2017

Table 12: Truck Percentages for I-5 Northbound

Location	AM Peak Hour		PM Peak Hour	
	Single Unit	Tractor Trailer	Single Unit	Tractor Trailer
Mainline, South of Coos Bay-Winston Interchange (Exit 119)	27%	17%	24%	25%
Coos Bay-Winston Interchange (Exit 119) Diagonal On-Ramp	28%	16%	29%	18%
Coos Bay- Winston Interchange (Exit 119) Loop Off-Ramp	26%	4%	27%	4%
North Shady Interchange (Exit 120) Diagonal Off-Ramp	30%	5%	34%	5%
Fairgrounds Interchange (Exit 123) Diagonal Off-Ramp	40%	4%	42%	5%
Fairgrounds Interchange (Exit 123) Diagonal On-Ramp	42%	1%	38%	2%
Harvard Avenue Interchange (Exit 124) Diagonal On-Ramp	25%	1%	26%	1%
Harvard Avenue Interchange (Exit 124) Loop On-Ramp	32%	1%	29%	1%
Harvard Avenue Interchange (Exit 124) Diagonal Off-Ramp	34%	2%	27%	2%
Garden Valley Interchange (Exit 125) Diagonal Off-Ramp	25%	2%	24%	2%
Garden Valley Interchange (Exit 125) Loop On-Ramp	29%	3%	24%	1%
Garden Valley Interchange (Exit 125) Diagonal On-Ramp	43%	2%	37%	1%
North Roseburg / Edenbower Boulevard Interchange (Exit 127) Diagonal Off-Ramp	29%	2%	28%	1%
North Roseburg / Edenbower Boulevard Interchange (Exit 127) Loop On-Ramp	26%	2%	20%	1%
North Roseburg / Edenbower Boulevard Interchange (Exit 127) On-Ramp	35%	6%	31%	2%
Winchester Interchange (Exit 129) Diagonal Off-Ramp	25%	4%	30%	2%
Winchester Interchange (Exit 129) Diagonal On-Ramp	40%	9%	35%	3%

Table 13: Truck Percentage for I-5 Southbound

Location	AM Peak Hour		PM Peak Hour	
	Single Unit	Tractor Trailer	Single Unit	Tractor Trailer
Mainline, North of Winchester Interchange (Exit 129)	20%	17%	28%	19%
Winchester Interchange (Exit 129) SB Diagonal Off-Ramp	24%	18%	28%	11%
Winchester Interchange (Exit 129) SB Loop On-Ramp	34%	3%	35%	2%
North Roseburg / Edenbower Boulevard Interchange (Exit 127) SB Diagonal Off-Ramp	24%	2%	27%	2%
North Roseburg / Edenbower Boulevard Interchange (Exit 127) SB Diagonal On-Ramp	32%	3%	28%	1%
Garden Valley Interchange (Exit 125) SB Diagonal Off-Ramp	27%	3%	27%	2%
Garden Valley Interchange (Exit 125) SB Loop On-Ramp	25%	2%	20%	0%
Garden Valley Interchange (Exit 125) SB Diagonal On-Ramp	43%	2%	33%	1%
Harvard Avenue Interchange (Exit 124) SB Loop Off-Ramp	31%	4%	31%	2%
Harvard Avenue Interchange (Exit 124) SB Diagonal On-Ramp	27%	3%	16%	1%
Fairgrounds Interchange (Exit 123) SB Diagonal Off-Ramp	44%	6%	33%	3%
Fairgrounds Interchange (Exit 123) SB Diagonal On-Ramp	48%	24%	48%	11%
North Shady Interchange (Exit 120) SB Diagonal Off-Ramp	15%	1%	42%	2%
North Shady Interchange (Exit 120) SB Loop On-Ramp	44%	15%	41%	5%
Coos Bay-Winston Interchange (Exit 119) SB Diagonal Off-Ramp	29%	9%	23%	6%
Coos Bay-Winston Interchange (Exit 119) SB Diagonal On-Ramp	32%	22%	24%	19%

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I-5: BOTTLENECK CORRIDOR SEGMENT PLAN (ROSEBURG)
MAINLINE INVENTORY SUMMARY

The following inventory summary highlights existing features along I-5 through the project area beginning at milepoint 119 and ending at milepoint 129. See Figure 1 for overall project aerial and Figure 2 for a detailed image of the major study interchanges.

Classification/Design Speed
I-5 is classified as an Urban Interstate with a posted speed of 65 mph. The curve between M.P. 123.8 & M.P. 124.2, at the base of Mt. Nebo, is posted with an advisory speed of 55 mph. I-5 carries two lanes of traffic in each direction, northbound and southbound, through the project limits.

Roadway Composition
The two travels lanes have 12' lane widths and the shoulder widths vary from 4' to 24'. The facility requires 12' shoulder widths for both the inside and outside shoulders. The majority of the project has less than standard shoulder width, especially at the bridges. The southern section of the project, between milepoints 119 and 121, meet standards for shoulder width except at some of the bridges. See table below and Figure 3 for a summary of the average shoulder widths by milepoint:

Northbound	Median Shoulder Width	Outside Shoulder Width
M.P. 119.00	*10'	*6'
M.P. 119.18	14'	*6'
M.P. 119.52	12'-24'	12'-19'
M.P. 119.67 Exit #112		
M.P. 120.08	17'	*10'
M.P. 120.34 Exit #120	*11'	12'
M.P. 120.88	24'	24'
M.P. 120.96	*7'-8'	12'-24'
M.P. 121.09 Exit #121		
M.P. 121.60	*4'	*10'
M.P. 121.70	*4'-6'	12'
M.P. 122.76 Exit #123		
M.P. 123.80 Exit #124		
M.P. 124.22	*6'	*8'-10'
M.P. 124.80 Exit#125	*4'	12'-16'
M.P. 125.00	*4'	*4'
M.P. 126.30 Exit #127		
M.P. 129.00	*6'	*10'

Southbound	Median Shoulder Width	Outside Shoulder Width
M.P. 119.00	*11'	*7'
M.P. 119.18	12'	*4'
M.P. 119.75 Exit #112		
M.P. 119.94	*6'	*4'
M.P. 120.13	12-24'	16-21'
M.P. 120.48 Exit #120	24'	12'
M.P. 120.87	12'	*7'
M.P. 121.87 Exit #122		
M.P. 123.20 Exit #123		
M.P. 121.50	12'	*7'
M.P. 125.36 Exit #125		
M.P. 125.50	12'	*7'
M.P. 126.73 Exit #127		
M.P. 129.00	*10	*4-6

* Shoulder width is below standard

Horizontal/Vertical Alignments and Sight Distance

Generally, the freeway provides a fairly straight and flat alignment within the corridor. A review of 73 as-built project drawings, spanning over 60 years, indicates the freeway has been designed for 70 mph. Nearly all of the horizontal curves meet 70 mph design however the curves between M.P. 128 and M.P. 129 and between M.P. 120 and M.P. 121 have superelevations which meet 65 mph design speed. All of the spiral transitions within the corridor are longer than required. Several locations have limited stopping sight distance due to sharp curvature and tall median barrier blocking sight lines as summarized in Figure 3.

There are a few relatively sharp curves near Mt. Nebo. While the superelevations and spirals meet standards, the stopping sight distance is below standard. Stopping sight distance for this facility should be at least 730'. In these curves the horizontal sight distance is as low as 300' in the northbound direction and slightly more in the southbound direction.

Horizontal sight distance is also limited at Exit #122 and just north of Exit #125. The sight distance at Exit #122 is in the 400' to 500' range depending on direction of travel. At Exit #125 sight distance is limited to 530' in the southbound direction. Sight distance is limited due to vertical curvature between M.P. 120.33 and M.P. 121.72 in both directions, between M.P. 125.10 and M.P. 127.50 northbound, at M.P. 127.24 southbound and between 128.31 and 129.00 northbound and southbound.

The grade varies from 0.5% to 3.5% and is generally very flat.

Vertical Clearance

Vertical clearance is less than required at M.P. 119.18 southbound, 125.08 northbound and 125.72 northbound.

Figure 1

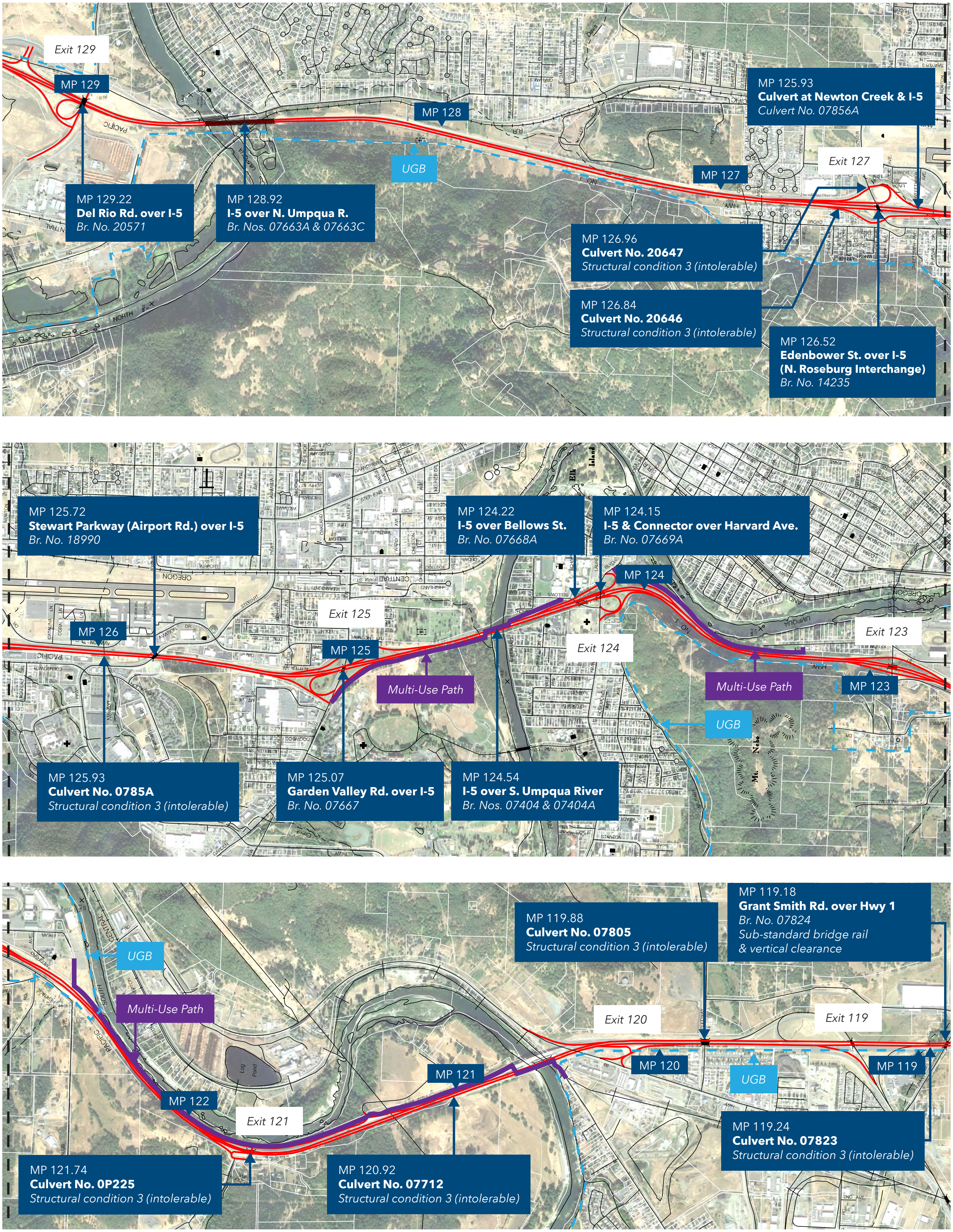
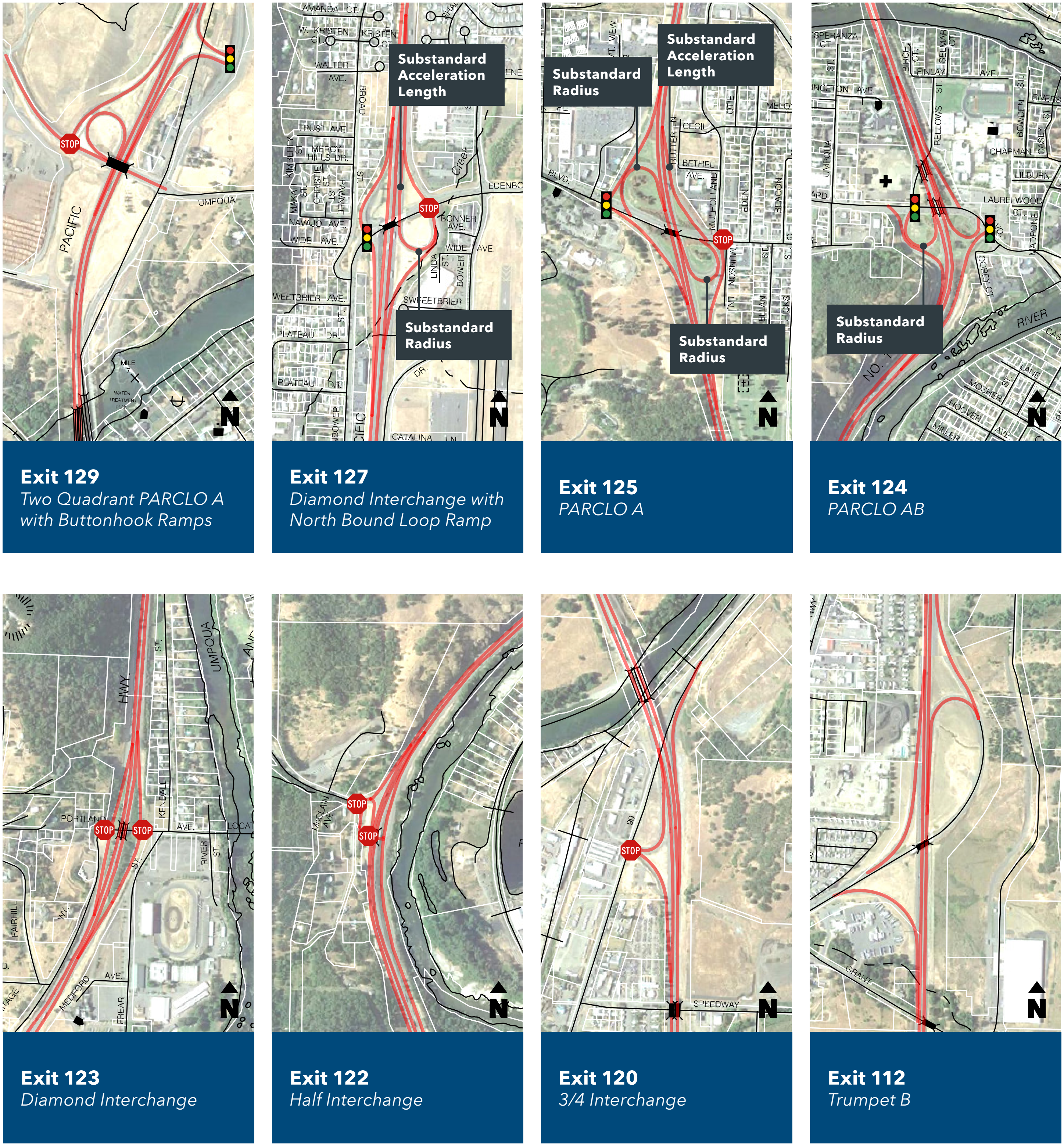

Exit 129
MP 129
MP 128
UGB
MP 127
Exit 127
MP 125.93
Culvert at Newton Creek & I-5
Culvert No. 07856A
MP 129.22
Del Rio Rd. over I-5
Br. No. 20571
MP 128.92
I-5 over N. Umpqua R.
Br. Nos. 07663A & 07663C
MP 126.96
Culvert No. 20647
Structural condition 3 (intolerable)
MP 126.84
Culvert No. 20646
Structural condition 3 (intolerable)
MP 126.52
Edenbower St. over I-5
(N. Roseburg Interchange)
Br. No. 14235
MP 125.72
Stewart Parkway (Airport Rd.) over I-5
Br. No. 18990
MP 124.22
I-5 over Bellows St.
Br. No. 07668A
MP 124.15
I-5 & Connector over Harvard Ave.
Br. No. 07669A
MP 124
Exit 125
MP 126
MP 125
Multi-Use Path
Exit 124
Exit 123
Multi-Use Path
MP 123
UGB
MP 125.93
Culvert No. 0785A
Structural condition 3 (intolerable)
MP 125.07
Garden Valley Rd. over I-5
Br. No. 07667
MP 124.54
I-5 over S. Umpqua River
Br. Nos. 07404 & 07404A
MP 119.18
Grant Smith Rd. over Hwy 1
Br. No. 07824
Sub-standard bridge rail
& vertical clearance
MP 119.88
Culvert No. 07805
Structural condition 3 (intolerable)
UGB
Multi-Use Path
Exit 120
Exit 119
MP 120
UGB
MP 119
MP 121
MP 122
Exit 121
MP 119.24
Culvert No. 07823
Structural condition 3 (intolerable)
MP 121.74
Culvert No. 0P225
Structural condition 3 (intolerable)
MP 120.92
Culvert No. 07712
Structural condition 3 (intolerable)

Figure 2



Exit 129
Two Quadrant PARCLO A with Buttonhook Ramps

Exit 127
Diamond Interchange with North Bound Loop Ramp

Exit 125
PARCLO A

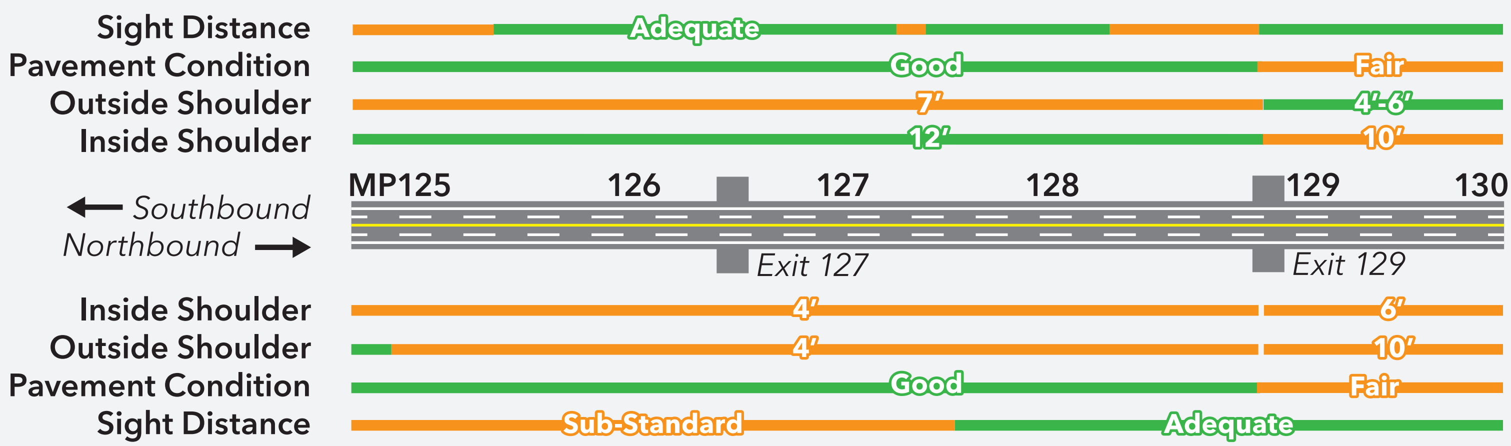
Exit 124
PARCLO AB

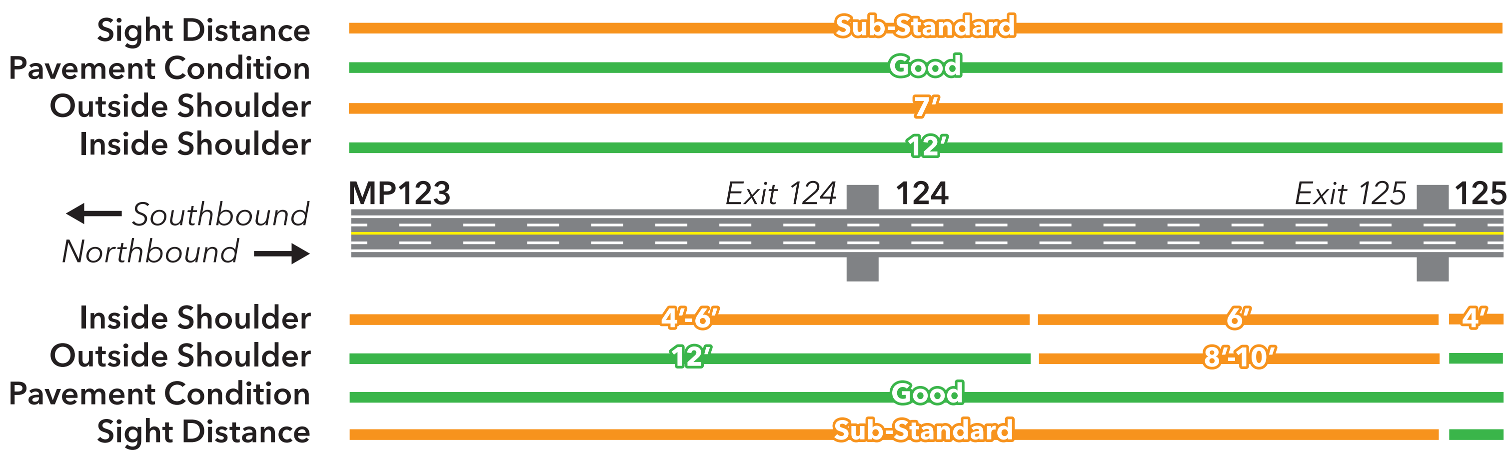
Exit 123
Diamond Interchange

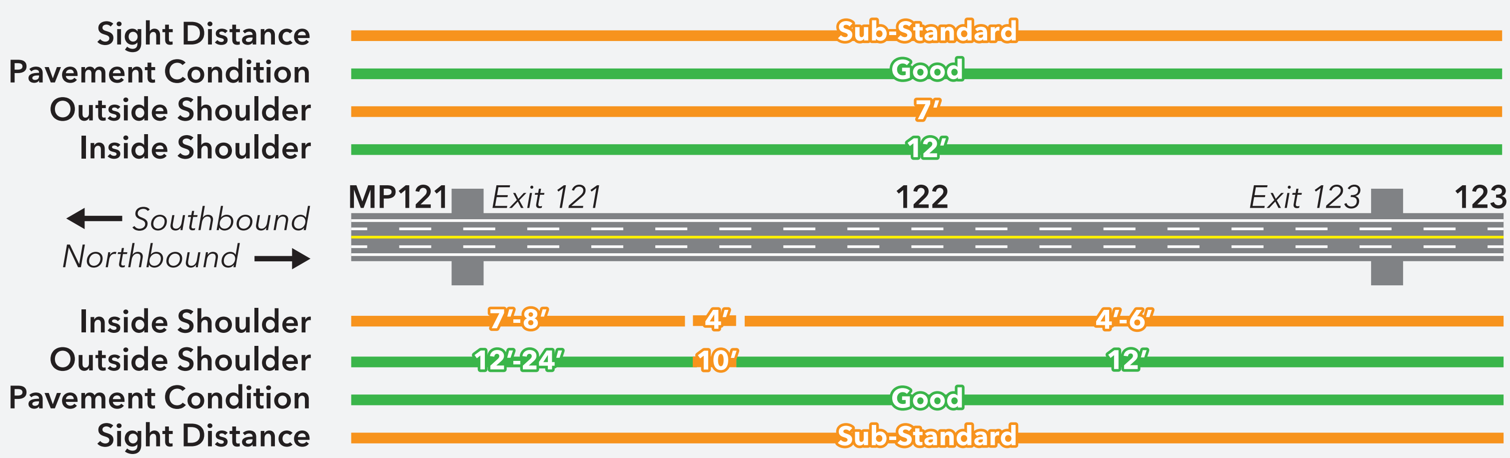
Exit 122
Half Interchange

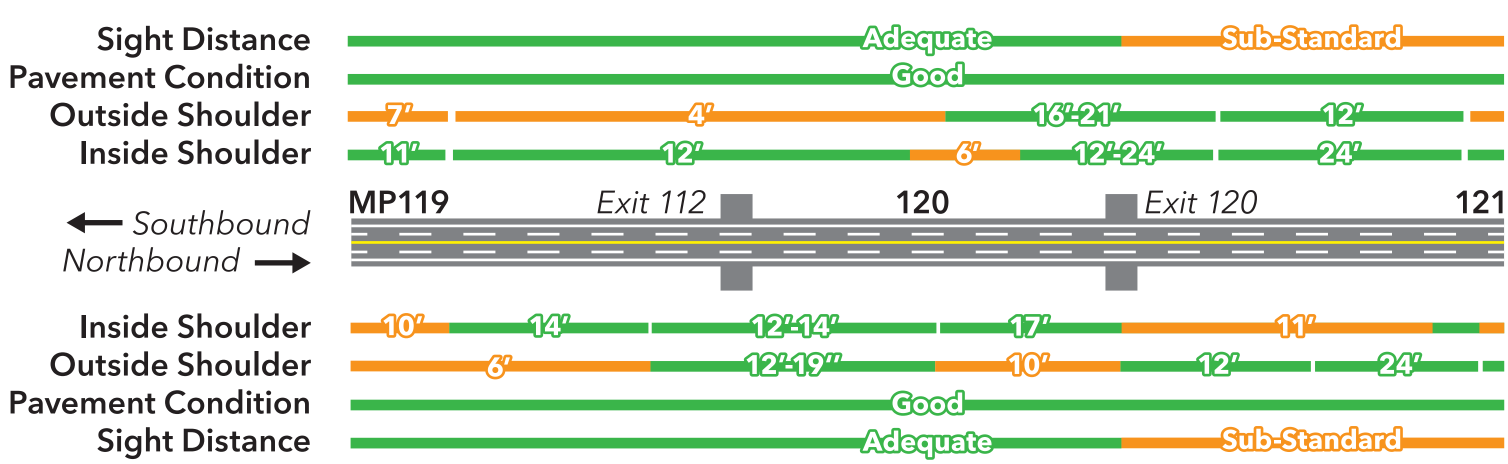
Exit 120
3/4 Interchange

Exit 112
Trumpet B


Sight Distance
Adequate
Pavement Condition
Good
Fair
Outside Shoulder
7′
4′-6′
Inside Shoulder
12′
10′
MP125
126
127
128
129
130
Southbound
Northbound
Exit 127
Exit 129
Inside Shoulder
4′
6′
Outside Shoulder
4′
10′
Pavement Condition
Good
Fair
Sight Distance
Sub-Standard
Adequate


Sight Distance
Sub-Standard
Pavement Condition
Good
Outside Shoulder
7′
Inside Shoulder
12′
MP123
Exit 124
124
Exit 125
125
Southbound
Northbound
Inside Shoulder
4′-6′
6′
4′
Outside Shoulder
12′
8′-10′
Pavement Condition
Good
Sight Distance
Sub-Standard


Sight Distance
Sub-Standard
Pavement Condition
Good
Outside Shoulder
7′
Inside Shoulder
12′
MP121
Exit 121
122
Exit 123
123
Southbound
Northbound
Inside Shoulder
7′-8′
4′
4′-6′
Outside Shoulder
12′-24′
10′
12′
Pavement Condition
Good
Sight Distance
Sub-Standard


Sight Distance
Adequate
Sub-Standard
Pavement Condition
Good
Outside Shoulder
7′
4′
16′-21′
12′
Inside Shoulder
11′
12′
6′
12′-24′
24′
MP119
Exit 112
120
Exit 120
121
Southbound
Northbound
Inside Shoulder
10′
14′
12′-14′
17′
11′
Outside Shoulder
6′
12′-19″
10′
12′
24′
Pavement Condition
Good
Sight Distance
Adequate
Sub-Standard

Interchanges

There are eight interchanges within the project limits. This stretch of I-5 contains several different styles of interchanges including partial cloverleaf, tight diamond, a directional Y and several combinations and variations of these styles. See Figure 2 for interchange layouts.

Generally the interchange ramps meet geometric standards with the exception of the partial cloverleaf interchanges at Exit #124, Exit #125 and Exit #127. Exit #129 received an overhaul within the last 10 years which moved the northbound entrance and exit ramps to the north side of the interchange away from the bridge over the N. Umpqua River and into the tangent section of the freeway.

Exit #127 contains two entrance ramps in the northbound direction. The northbound loop ramp has a very tight radius which is designed for 25 mph. Because of this the acceleration distance for the entrance ramp should be very long to allow for vehicles to get up to freeway speed. The acceleration distance provided is roughly 550' shorter than standard.

Similar to Exit #127, Exit #125 has two entrance ramps in the northbound direction. There are also two entrance ramps in the southbound direction. The first southbound entrance ramp has sub-standard acceleration length. Because the entrance ramp has a very tight curve and therefore low design speed, the acceleration length needs be very long for vehicles to get up to freeway speed. The provided acceleration length is roughly 500' shorter than require for the differential in speeds between the ramp and mainline.

Exit #124 contains loop ramps which are much tighter than standard. For a mainline design speed of 70 mph the ramps should be designed for a min of 35 mph which would require a 16 degree curve. These loop ramps contain 36 degree curves which are roughly twice as tight as they should be.

Pavement Type & Condition

According to the as-built drawings the pavement type consists of Level 4, ¾" and Level 4, ½" asphalt concrete pavement with PG 70-22 asphalt binder. No concrete pavement exists on the mainline and the bridges have exposed concrete decks with no asphalt overlays. Many of the entrance and exit ramps were constructed with Level 3, ½" dense asphalt concrete pavement.

The pavement is generally in good condition with some sections in fair condition. The pavement condition was determined using ODOT's TransGIS database. Figure 3 and the following table summarizes by milepoint of the pavement condition based off of the GIS database.

Northbound

M.P. 119.0 to M.P. 125.4	Good
M.P. 125.4 to M.P. 128.8	Fair
M.P. 128.8 to M.P. 129.1	Good

Southbound

M.P. 119.0 to M.P. 122.3	Good
M.P. 122.3 to M.P. 128.8	Fair
M.P. 128.8 to M.P. 129.1	Good

Median

The median is separated by concrete barrier for the majority of the length of the corridor. Between M.P. 119.0 and M.P. 119.4 the northbound and southbound lanes are separated by a large 80' wide grassy median which tapers down to the section separated by median barrier. The median barrier within the corridor appears to have been upgraded to new "tall" barrier meeting ODOT standards.

Multi-use paths

There are no pedestrian facilities directly along I-5 other than the existing shoulders however there are three multi-use paths which run parallel to I-5 on the east side of the freeway.

The first path begins at the end of SW Carnes Rd. near M.P. 120.6 and continues north on the east side of I-5 following the frontage road to M.P. 122.5 where it terminates at Frear St.

The second multi-use path begins at SW Kendall Ave. near M.P. 123.5 and continues north on the east side of I-5 to the Exit #124 intersection.

The third path begins at W. Bellows St. near Roseburg high school at M.P. 124.3. It runs north along the east side of I-5 and then crosses the South Umpqua River via a path suspended under the Northbound bridge structure. Once on the north side of the river it connects to the path system which runs east and west along the north bank of the river and also continues north along the west side of I-5 to the intersection at Exit #125.

Right of Way

The right of way throughout the corridor varies in width but is typically 250' wide. Approximate right of way lines have been acquired from Douglas County Survey and are shown on Figure 1.

BRIDGE INVENTORY SUMMARY

The following is an inventory of the existing bridge and culvert features and condition ratings. See Figure 1 for structure locations.

Grant Smith Road over Hwy 1
Bridge No. 07824
M.P. 119.18

The Grant Smith Road Bridge, located at M.P. 119.18, is a four span 216 long reinforced concrete continuous T-beam structure that carries two lanes of Grant Smith Road traffic over four lanes of Interstate 5 (I-5). This structure was constructed in 1956. The roadway width of the bridge is 26 feet, with substandard parapet-style bridge rails and protective fencing. The vertical clearance under the bridge is 16 feet 9 inches.

The deck condition has been rated 6 (satisfactory) and the overall superstructure has been rated 5 (fair). The substructure is also in satisfactory condition. The bridge sufficiency rating, according to the 2017 Bridge Inspection Report, is 70.9.

North Fork Roberts Creek, Hwy 1
Culvert No. 07823
M.P. 119.24

The structure at M.P. 119.24 is a 177 foot long, 7 foot x 7 foot reinforced concrete box culvert, constructed in 1955 under four lanes of I-5. The structural condition of the culvert has been rated 3 (intolerable), and the sufficiency rating is 24.0.

Hwy 35 over Hwy 1
Bridge No. 20333
M.P. 119.51

Bridge No. 20333 is a two span 42 inch prestressed concrete box beam bridge, located at M.P. 119.51. This structure carries two lanes of Highway 35 over I-5, although this structure was constructed to accommodate four lanes of traffic in the future. This bridge was constructed in 2006. The bridge rails are the standard 42-inch Type "F" rails with protective fencing. The roadway width is 61 feet although the deck is currently striped for only two lanes.

The deck, overall superstructure, and substructure are all rated 6 (satisfactory), and the sufficiency rating is 85.0.

Culvert, Hwy 1 at MP 119.88
Culvert No. 07805
M.P. 119.88

The structure at M.P. 119.88 is a 246 foot long 7 foot x 7 foot reinforced concrete box culvert, constructed in 1955 under 5 lanes of I-5. The structural condition of the culvert has been rated 3 (intolerable), and the sufficiency rating is 24.0, similar to the box culvert previously mentioned.

Hwy 1 over Speedway Rd
Bridge No. 07804N
M.P. 120.03

The Hwy 1 over Speedway Rd bridge, located at M.P. 120.03, is a three span 110 foot long reinforced concrete continuous slab bridge carrying 5 lanes of I-5 traffic over two lanes of Speedway Road traffic. This structure, constructed in 1955, has a roadway width of 49 feet 8 inches (southbound) and 48 feet 6 inches (northbound). The bridges rails are the old parapet-style bridge rails retrofitted with a new Type "F" facing, meeting current standards.

The deck condition has been rated 7 (good) and the overall superstructure and substructure has been rated 6 (satisfactory). The bridge sufficiency rating is currently 82.7.

Hwy 1 NB over Hwy 234 (Shady)
Bridge No. 19740
M.P. 120.49

This structure carries two northbound lanes of I-5 over two lanes of the Oakland-Shady Highway No. 234 (OR99). This structure is a 102 foot 8 inch single span bridge composed of 63 inch prestressed concrete Bulb-I girders. The structure was constructed in 2007 at M.P. 120.49. The bridge rails are the standard Type "F" rails and the roadway width is 59 feet.

The bridge deck is rated 6 (satisfactory), while the overall superstructure is rated 8 (very good). The substructure is rated 7 (good), and the sufficiency rating is 75.3.

Hwy 1 SB over Hwy 234 (Shady)
Bridge No. 19741
M.P. 120.49

This bridge is the twin structure to Bridge 19740 previously mentioned, with the same geometry and bridge rails. The bridge deck is rated 6 (satisfactory), the overall superstructure is rated 8 (very good), and the substructure is rated 7 (good). The sufficiency rating is 85.1.

South Umpqua River & CBRL, Hwy 1 SB (Shady)
Bridge No. 19739
M.P. 120.57

This South Umpqua River bridge is a four span, 951 foot long post-tensioned concrete box girder bridge, located at M.P. 120.57. This structure carries two lanes of I-5 southbound traffic. This structure also carries a reinforced concrete slab pedestrian/bicycle bridge underneath the superstructure. This bridge was constructed in 2007. The roadway width is 59 feet with standard Type "F" bridge rails.

The deck condition has been rated 7 (good) and the overall superstructure and substructure are rated 6 (satisfactory). The bridge sufficiency rating is 90.5.

South Umpqua River & CBRL, Hwy 1 NB (Shady)
Bridge No. 19738
M.P. 120.57

This bridge is the twin structure to Bridge 19739 previously mentioned, with the same geometry and bridge rails. The bridge deck, overall superstructure, and substructure are rated 6 (satisfactory). The sufficiency rating is 94.7.

Equipment Pass, Hwy 1 at MP 120.92
Culvert No. 07712
M.P. 120.92

This structure at M.P. 120.92 is a 130 foot long reinforced concrete box culvert, measuring 13 feet wide x 12 feet tall. The box culvert was originally constructed in 1955 and was extended 26 feet in 2007. The bridge plans show that the culvert extension will accommodate a 14 foot future bicycle path. This box culvert carries four lanes of I-5 traffic.

The structural condition of the culvert has been rated 3 (intolerable), and the sufficiency rating is 24.0, similar to the box culverts previously mentioned.

Hwy 1 over McLain Ave Frontage
Bridge No. 21087
M.P. 121.69

The McLain Avenue bridge, located at M.P. 121.69, is a three span, 110 foot long structure. The variable deck width carries two lanes of northbound traffic and three lanes of southbound traffic, including the on-ramp lane, over two lanes of McLain Avenue. The vertical clearance for McLain Avenue is 15 feet 2 inches.

The structure is composed of 12 inch prestressed concrete slabs with a five inch cast-in-place concrete deck. The bridge rails are the standard 42-inch Type "F" rails. The structure was constructed in 2009.

The bridge deck was rated 6 (satisfactory), while the overall superstructure and substructure are rated 7 (good). The sufficiency rating is 96.4.

Culvert, Hwy 1 at MP 121.74
Culvert No. OP225
M.P. 121.74

This culvert is a 484 foot long six foot diameter corrugated metal pipe, located at M.P. 121.74. The culvert was constructed in 1954. The culvert carries five lanes of I-5, including the southbound exit-ramp, and two frontage roads.

The structural condition of the culvert has been rated 3 (intolerable), and the sufficiency rating is 24.0, similar to the culverts previously mentioned.

Hwy 1 over Portland Ave (Fairgrounds Intchg)
Bridge No. 07670A
M.P. 123.01

The Hwy 1 over Portland Avenue bridge is a five span structure, consisting of three main spans of reinforced concrete continuous T-beam spans with two 15-foot reinforced concrete slab approach spans on both ends of the bridge. The total length of the structure is 130 feet and was constructed in 1954. This bridge is located at M.P. 123.01, and carries four lanes of I-5 traffic, overcrossing two lanes of Portland Avenue and an eight foot sidewalk on the south side. The bridges rails are the original Type "G" rails, similar to the standard Type "F" rails, meeting current standards. The roadway width is 43 feet for both the northbound and southbound lanes, and the vertical clearance under the bridge is 16 feet 11 inches.

The sufficiency rating is 89.7, with the bridge deck, overall superstructure, and substructure rated 6 (satisfactory).

Hwy 1 & Conn over W Harvard Ave
Bridge No. 07669A
M.P. 124.15

This bridge is a three span, 188 foot long reinforced concrete box girder structure, located at M.P. 124.15. This structure carries six lanes of I-5 traffic and five lanes of Harvard Avenue traffic. The southbound roadway width is 48 feet 6 inches, and the northbound roadway width is 59 feet 6 inches.
The bridge rails are the original Type "G" rails, similar to the standard Type "F" rails, meeting current standards. This bridge was constructed in 1976.

The bridge deck, overall superstructure, and substructure are rated 6 (satisfactory), and the sufficiency rating is 92.8.

Hwy 1 over Bellows St
Bridge No. 07668A
M.P. 124.22

The bridge over Bellows Street is a three span reinforced concrete box girder bridge, measuring 178 feet long. This structure was constructed in 1976, and is located at M.P. 124.22. This structure carries five lanes of I-5 traffic over two lanes of Bellows Street traffic. The southbound roadway width is 43 feet and the northbound roadway width is 49 feet. The unusual bridge rails are a combination of Type "F" rail on one side and a single slope barrier on the other side, but the bridge rails do meet current standards.

The bridge deck, overall superstructure, and substructure are rated 6 (satisfactory), and the sufficiency rating is 95.8.

Hwy 1 Conn over Bellows St
Bridge No. 07668B
M.P. 124.24

This structure is similar to the previous bridge (Bridge No. 07668A), although this structure is only 171 feet long and only carries one lane of northbound traffic over two lanes of Bellows Street traffic. This bridge was also constructed in 1976, and is located at M.P. 124.24. The unusual bridge rails are identical to the bridge rails on Bridge No. 07668A.

The sufficiency rating is 86.8, with the bridge deck, overall superstructure, and substructure are rated 6 (satisfactory).

South Umpqua River, Hwy 1 SB (Vets)
Bridge No. 07404
M.P. 124.54

The southbound South Umpqua River bridge, located at M.P. 124.54, is a seven span structure, including four steel deck truss spans, one reinforced concrete T-beam approach span at the south end, and two reinforced concrete T-beam approach spans at the north end. The total bridge length is 714 feet. This bridge carries two lanes of I-5 southbound traffic, and was constructed in 1955. The roadway width is 43 feet. The bridge rails have been replaced, and appear to be the standard Type "F" bridge rails, meeting current standards.

The bridge deck, overall superstructure, and substructure are rated 6 (satisfactory), and the sufficiency rating is 81.0.

South Umpqua River, Hwy 1 NB (Vets)
Bridge No. 07404A
M.P. 124.54

The northbound South Umpqua River bridge, also located at M.P. 124.54, also is a six span 714 foot long bridge. The four main steel deck truss spans are similar to Bridge No. 07404 previously mentioned, but the south approach span is composed of AASHTO Type II prestressed concrete girders, and the north approach span is composed of AASHTO Type IV prestressed girders. The northbound bridge carries three lanes of I-5 traffic. The roadway width is approximately 46 feet, and the bridge rails appear to have been replaced with standard Type "F" bridge rails. This structure was constructed in 1976.

The bridge deck, overall superstructure, and substructure are rated 6 (satisfactory), and the sufficiency rating is 78.8.

Garden Valley Road over Hwy 1
Bridge No. 07667
M.P. 125.07

The Garden Valley Road Bridge is a four span, 186 foot long reinforced concrete continuous T-beam bridge. This bridge four lanes of Garden Valley Road traffic over six lanes of I-5 traffic. The vertical clearance under the bridge is 16 feet 5 inches. The structure was constructed in 1955. The roadway width is 56 feet with 3 foot 6 inch sidewalks on both sides. The bridge rails are the original steel handrail bridge rails, retrofitted with horizontal structural tubing and protective fencing, meeting current standards.

The sufficiency rating is 70.5, with the bridge deck, overall superstructure, and substructure rated 6 (satisfactory).

Stewart Parkway (Airport Rd) over Hwy 1
Bridge No. 18990
M.P. 125.72

This structure, located at M.P. 125.72, is a two span 63 inch prestressed concrete Bulb-I girder bridge. The overall bridge length is approximately 225 feet. This structure carries four lanes of Stewart Parkway traffic over four lanes of I-5 traffic. The vertical clearance under the bridge is 16 feet 11 inches. The bridge was constructed in 2002. The roadway width is 58 feet with standard two-tube curb mounted bridge rails and protective fencing.

The bridge deck is rated 6 (satisfactory), with the overall superstructure being rated 8 (very good). The substructure is rated 6 (satisfactory), and the sufficiency rating is 87.8.

Newton Creek & Hwy 1 Frtg Rd Rt, Hwy 1
Culvert No. 07856A
M.P. 125.93

The culvert at M.P. 125.93 is a 179 foot long reinforced concrete box culvert, measuring 8 feet wide x 6 feet tall. The box culvert was originally constructed in 1955 and extended 45 feet in 1964. This box culvert carries six lanes of I-5 traffic.

The structural condition of the culvert has been rated 3 (intolerable), and the sufficiency rating is 24.0, similar to the box culverts previously mentioned.

Edenbower St over Hwy 1 (North Roseburg Intchg)
Bridge No. 17235
M.P. 126.52

The Edenbower Street bridge, located at M.P. 126.52, is a 262 foot two span 75 inch prestressed concrete Bulb-I girder bridge. This structure carries two lanes of Edenbower Street traffic over four lanes of I-5 traffic. The roadway width is 50 feet, with seven foot sidewalks on both sides. The bridge rails are standard two tube curb mount rails with protective fencing.

The bridge deck and substructure are rated 6 (satisfactory), and the overall superstructure is rated 7 (good). The sufficiency rating is 94.0.

Culvert at Hwy 1 Conn at MP 126.84
Culvert No. 20646
M.P. 126.84

The culvert at M.P. 126.84, located under the southbound off-ramp, is a 165 foot long 8 foot x 4 foot reinforced concrete box culvert, constructed in 1996. The structural condition of the culvert has been rated 3 (intolerable), and the sufficiency rating is 39.0.

Culvert at Hwy 1 Conn at MP 126.96
Culvert No. 20647
M.P. 126.96

The culvert under Edenbower Road, M.P. 126.96, is a 350 foot long reinforced concrete box culvert, measuring 8 feet wide x 4 feet tall. The structural condition of the culvert has been rated 3 (intolerable), and the sufficiency rating is 24.0, similar to most of the previously mentioned box culverts.

N Umpqua R & CBRL & Co Rd, Hwy 1 SB (Winchester)
Bridge No. 07663A
M.P. 128.92

The southbound crossing of the North Umpqua River, located at M.P. 128.92, is a 17 span bridge, with one reinforced concrete T-beam span, three prestressed concrete AASHTO Type IV girder spans, five steel deck truss spans, and eight prestressed concrete AASHTO Type IV girder spans. The total bridge length is 1,622 feet. This structure carries two southbound lanes of I-5 over one city street and the Coos Bay Rail Line (CBRL). This bridge was constructed in 1964. The roadway width is 30 feet 10 inches. The original bridge rails were the pipe parapet handrail rails, but in 1996 the bridge rails were retrofitted with a Type "F" facing, meeting current standards.

The bridge deck, overall superstructure, and substructure are rated 6 (satisfactory), and the sufficiency rating is 51.7.

N Umpqua R & CBRL & Co Rd, Hwy 1 NB (Winchester)
Bridge No. 07663C
M.P. 128.92

The northbound crossing of the North Umpqua River, also located at M.P. 128.92, is a 18 span bridge similar to the southbound crossing of the North Umpqua River bridge. The south approach consists of four reinforced concrete T-beam spans, with five steel deck truss spans, and nine reinforced concrete T-beam north approach spans. The total bridge length is 1,637 feet. This structure was constructed in 1955, and carries two northbound lanes of I-5 over one city street and the Coos Bay Rail Line (CBRL). The original bridge rails were the older steel handrail rails, but in 1980 the bridge rails were retrofitted with a modified Type "F" facing, meeting current standards. The roadway with is 29 feet 8 inches.

The bridge deck is rated 5 (fair), and the overall superstructure and substructure are rated 6 (satisfactory). The sufficiency rating is 62.0.

Del Rio Rd over Hwy 1 (Winchester)
Bridge No. 20571
M.P. 129.22

The Del Rio Road bridge is a 175 foot single span 90 inch prestressed concrete Bulb-T girder bridge. Located at M.P. 129.22, this structure was constructed in 2008. The roadway width is 90 feet. The Del Rio Road bridge carries four lanes of Del Rio Road traffic over 2 lanes of northbound I-5 traffic and three lanes of southbound I-5 traffic, including one on-ramp lane. The vertical clearance under the bridge is 17 feet 11 inches. The bridge rails are the newer standard sidewalk mounted combination rail, with protective fencing.

The bridge deck, overall superstructure, and substructure are rated 7 (good), and the sufficiency rating is 97.4.

Sincerely,

XXX:xxx
Enclosure

cc:

KITTELSON & ASSOCIATES
851 SW 6th AVENUE, SUITE 600
PORTLAND, OR 97204
P 503.228.5230 F 503.273.8169

TECHNICAL MEMORANDUM #3

Date:	July 5, 2021	Project #: 21339
To:	Thomas Guevara Oregon Department of Transportation 3500 NW Stewart Parkway Roseburg, OR 97470	
From:	Yi-Min Ha, Matt Hughart, Bastian Schroeder	
Project:	I-5 Bottleneck Segment Plan	
Subject:	Existing Conditions	

This memorandum provides a summary of the current traffic operations along the 11-mile segment of I-5 from Exit 129 to Exit 119. The existing conditions analysis includes a freeway traffic operations analysis, a review of historical crash data, and a summary of freight usage along the corridor. Figure 1 and Figure 2 shows the study limits for the existing conditions analysis.

MOBILITY TARGETS

Existing and future baseline analysis will use mobility targets as shown in Table 6 of the Oregon Highway Plan. As an Interstate Highway with speeds greater than 45 mph, a v/c ratio mobility target of 0.80 applies to all I-5 segments within the Roseburg Urban Growth Boundary (Exit 123, 124, 125, 127 & 129). A v/c ratio mobility target of 0.70 applies for I-5 segments located outside formally defined Urban Growth Boundaries in unincorporated communities or rural lands (Exit 119 and 120).

Future concept alternatives will use the design-mobility standards shown in Table 10-2 of the *Oregon Highway Design Manual* (HDM). The HDM v/c ratio applies to project development work and refinement studies. As an Interstate Highway with speeds greater than 45 mph, a v/c ratio design-mobility target of 0.65 will apply for I-5 segments within the Roseburg Urban Growth Boundary (UGB). A v/c ratio design-mobility target of 0.60 will apply for I-5 segments when located outside the Roseburg UGB.

Although the traffic analysis scope does not include the interchange ramp terminals, it is acknowledged that a v/c ratio mobility target of 0.85 applies to interchange ramp terminals. A v/c ratio mobility target of 0.90 may apply if an interchange meets the following conditions:

- Interchange is included in an adopted Interchange Area Management Plan (IAMP)
- It is shown that vehicle queues do not extend onto the freeway mainline or into the portion of the ramp needed to safely decelerate.

Figure 1: Study Corridor

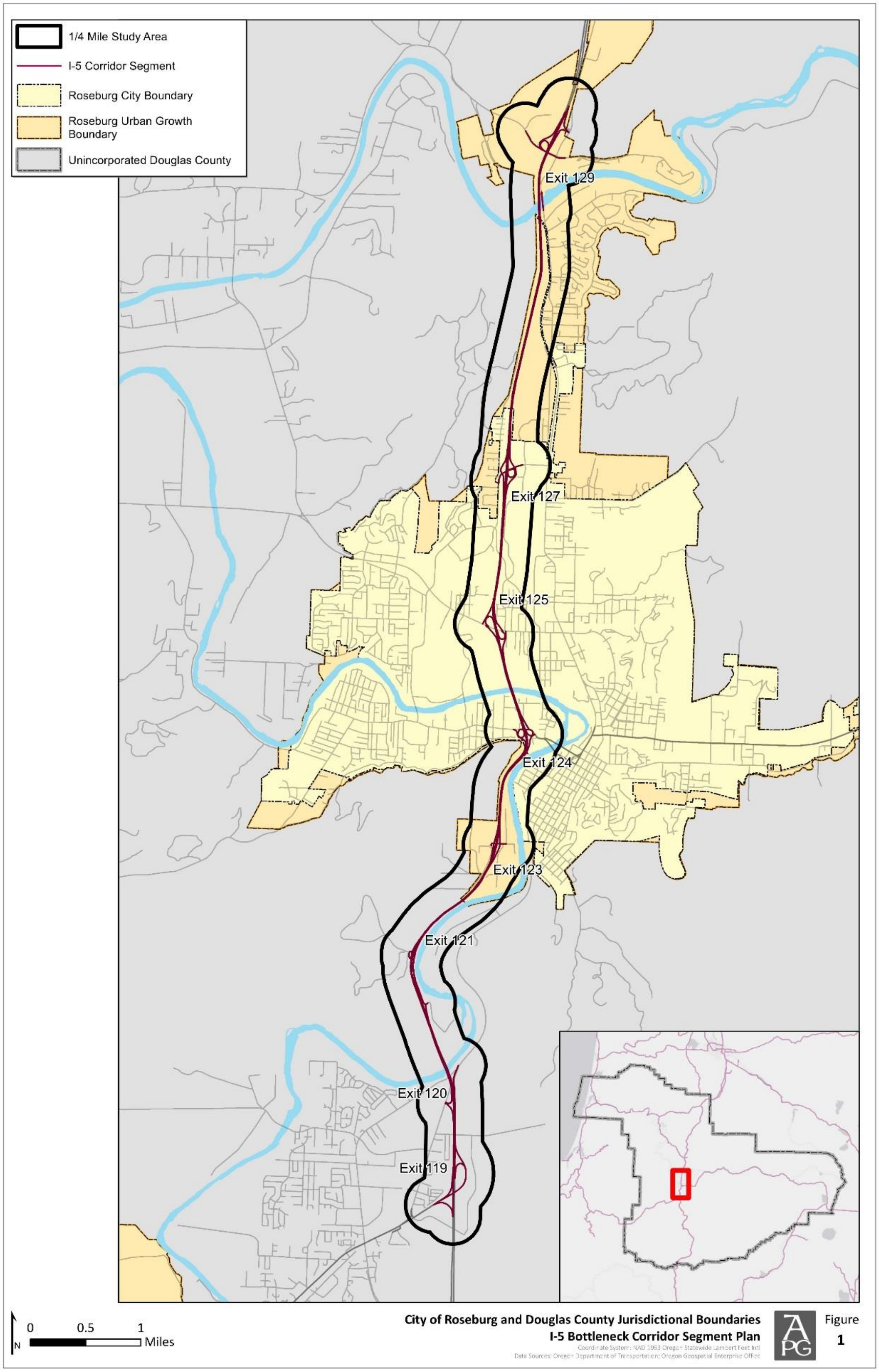
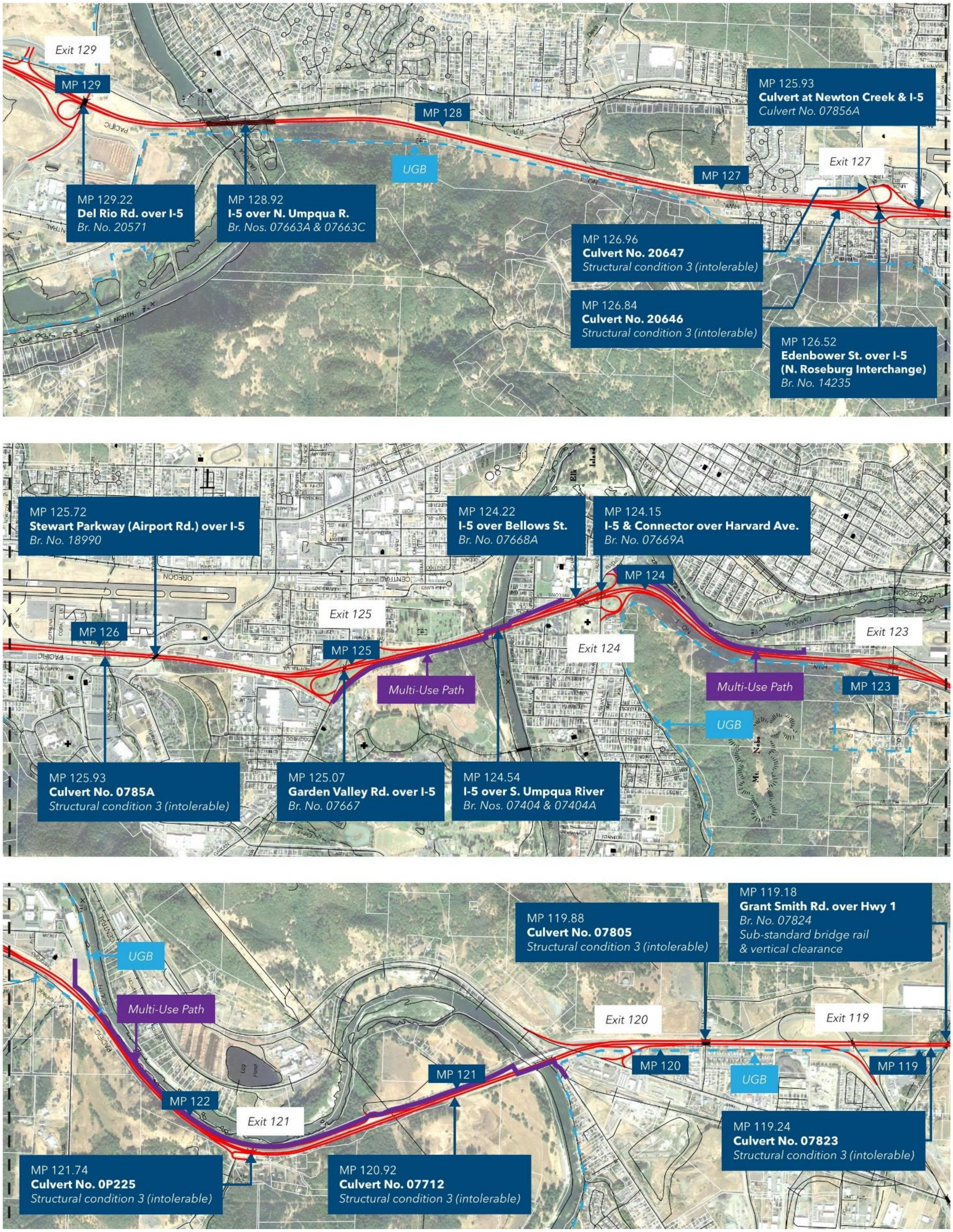


Figure 2: Study Corridor with Interchange Details



TRAFFIC OPERATIONS

Analysis procedures consistent with the methodologies in the *Highway Capacity Manual (HCM) 6th Edition* were used to analyze the freeway mainline, ramps, and weave segments along the corridor. Detailed documentation on the Analysis Methodology, Data Collection, and Volume Development are provided in *Appendix A*.

Ramp-freeway junctions create turbulence in the merging or diverging traffic streams, per the *Highway Capacity Manual (HCM) 6th Edition*. In general, the turbulence is the result of high lane-changing rates. The action of individual merging vehicles entering the traffic stream creates turbulence in the vicinity of the ramp. Approaching freeway vehicles move toward the left to avoid the turbulence. Thus, the ramp influence area experiences a higher rate of lane-changing than is normally present on a ramp-free portion of freeway.

Table 1 and Figure 3 summarize the freeway analysis results. Table 2 summarizes the freeway reliability analysis results. Detailed analysis outputs for the northbound and southbound directions are shown in Tables 3, 4, 5 and 6. Locations where operational deficiencies may form in the future, shown here as freeway segments with demand to capacity ratios greater than 0.70, are shown in red in Figure 4. The following are key findings from the traffic analysis of the I-5 study segment:

1. The most heavily traveled portion of the I-5 study corridor on a typical weekday are the segments between Exits 119 and 125. This portion provides a regional connection between the City of Winston/Green and Roseburg. A lack of regional connectivity between these two urban areas tends to focus the daily traffic demand on I-5.
2. Within the urbanized segments of Roseburg, the highest recorded travel demand exists on the I-5 segments between Exits 124 and 125. This can be attributed to the limited local system connectivity between Harvard Avenue and Garden Valley Boulevard and high peak hour traffic generators (commercial/retail and Roseburg High School) near the two interchanges. There is currently queueing at Exit 124 that has the potential to affect operational and safety performance of the freeway.
3. Average travel times from the HCM-based model is approximately 11-minutes for both the AM and PM peak periods. Field average travel times obtained through iPeMS are generally similar to the HCM-based model results. No calibration adjustments were needed, other than using the default Oregon capacity adjustment factor of 0.975.

4. In the northbound I-5 direction:

    a. The demand to capacity ratio for the I-5 mainline segments that include the Exit 119 on-ramp and Exit 120 off-ramp either temporarily exceed or approach the applicable 0.70 mobility target during the AM and PM peak periods. When exceeding the mobility target, it is only by a few percentage points and is limited to a relatively short (15-minute) period.

   b. All other northbound I-5 segments operate below their applicable 0.70 or 0.80 mobility targets during the weekday AM and PM peak periods.

5. In the southbound I-5 direction:

   a. The demand to capacity ratio for the I-5 mainline segments that include the on- and off-ramps at Exit 120 and Exit 119 temporarily exceed or approach the applicable 0.70 mobility target during the PM peak period. When exceeding the mobility target, it is only exceeding by a few percentage points and is limited to a 15-30-minute period.

   b. All other southbound I-5 segments operate below their applicable 0.70 or 0.80 mobility targets during the weekday AM and PM peak periods. However, the demand to capacity ratios for the I-5 mainline segments that include the Exit 125 on-ramp, Exit 124 off- and on-ramps, and Exit 123 off- and on-ramps are approaching their 0.80 mobility target.

6. Travel time reliability analysis shows that travel time along the I-5 study segment is generally consistent in both directions during the AM and PM peak periods, with median travel times generally being 5 – 6 % greater than the free-flow travel time.

Table 1: I-5 2017 Existing Peak Period Facility Summary

	Northbound		Southbound	
Performance Measure	AM Peak Period (7:30 - 7:45 AM)	PM Peak Period (3:45 - 4:00 PM)	AM Peak Period (7:45 - 8:00 AM)	PM Peak Period (5:15 - 5:30 PM)
Length (mi)	11.3		11.6	
Free Flow Travel Time (min)	10.5		10.7	
Average Travel Time (min)	11.08	11.08	11.27	11.28
iPeMS Average Travel Time (min)	11.33	11.27	11.18	11.28
Space Mean Speed (mi/h)	61.3	61.3	61.7	61.2
Average Density (pc/mi/ln)	15.7	17.0	12.6	17.1
Max LOS	D	D	C	D
Max D/C	0.75	0.73	0.58	0.79
Max V/C	0.75	0.73	0.58	0.79
Vehicle-Hours Delay (hrs)	4.2	4.4	2.8	4.9

Figure 3: Travel Time Comparison Between Analysis Scenarios

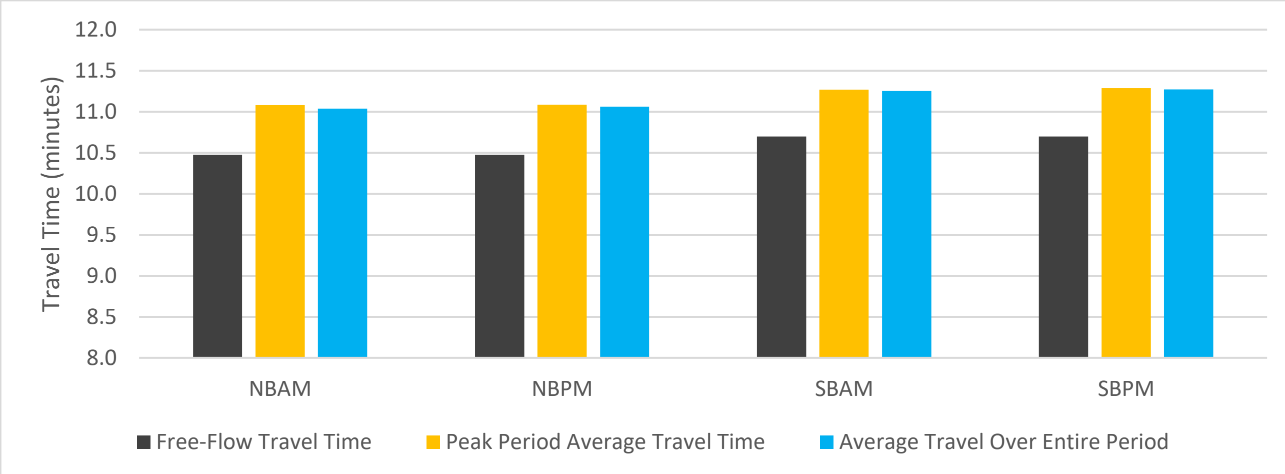


Table 2: Reliability Analysis Summary

Performance Measure	Northbound		Southbound	
	AM Peak Period	PM Peak Period	AM Peak Period	PM Peak Period
Mean Travel Time Index	1.06	1.07	1.06	1.06
Median Travel Time Index	1.05	1.06	1.05	1.05
95th Percentile Travel Time Index	1.11	1.12	1.11	1.12

Travel Time Index is the ratio of the peak-period travel time to the free-flow travel time.

Figure 4. Potential Future Operational Deficiency

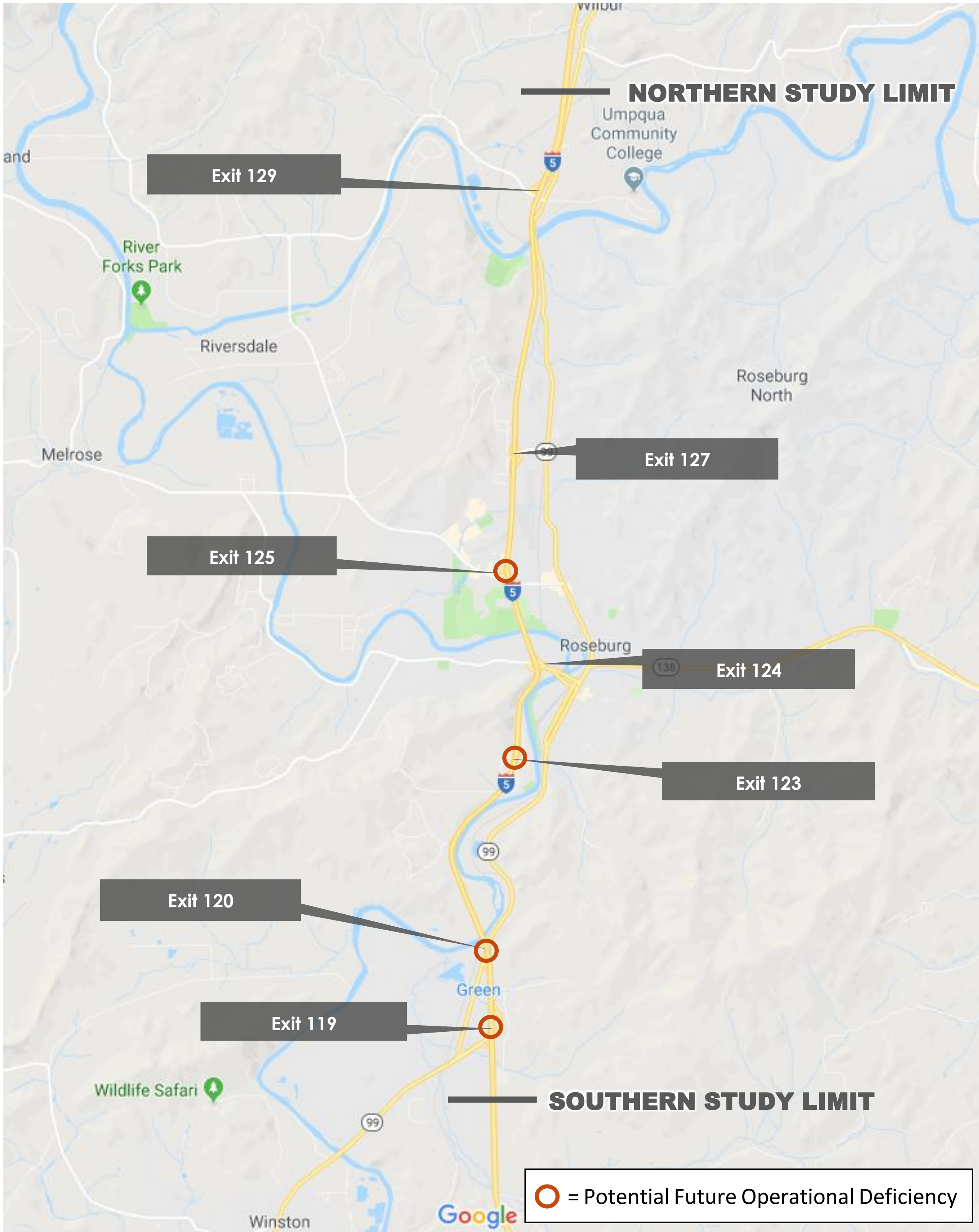
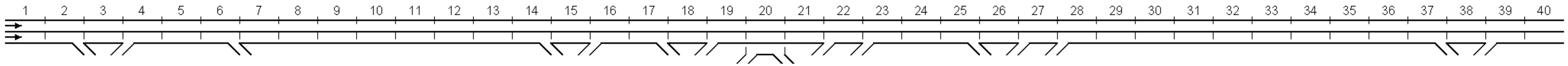


Table 3: I-5 Northbound AM Peak Period Traffic Analysis Results



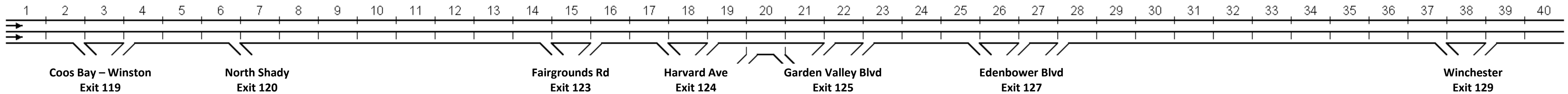
Coos Bay – Winston Exit 119 | North Shady Exit 120 | Fairgrounds Rd Exit 123 | Harvard Ave Exit 124 | Garden Valley Blvd Exit 125 | Edenbower Blvd Exit 127 | Winchester Exit 129

Measurement	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Number of Lanes	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3
Segment Type†	B	OF	B	ON	OV	OFF	B	B	B	B	B	B	B	OFF	B	ON	OFF	B	ON	W
Accel/Decel Length	-	247	-	476	-	334	-	-	-	-	-	-	-	310	-	240	237	-	307	0
LEVEL OF SERVICE																				
Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
6:00 - 6:15	A	A	A	A	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
6:15 - 6:30	A	A	A	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B	B	A
6:30 - 6:45	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A
6:45 - 7:00	A	A	A	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A
7:00 - 7:15	A	A	A	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A
7:15 - 7:30	B	A	B	B	C	C	C	C	C	C	C	C	C	B	C	C	C	B	B	B
7:30 - 7:45	B	B	B	C	D	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B
7:45 - 8:00	B	B	B	C	C	C	C	C	C	C	C	C	C	B	C	B	B	B	B	B
8:00 - 8:15	B	A	A	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A
8:15 - 8:30	B	A	A	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
8:30 - 8:45	B	A	A	B	C	B	C	C	C	C	C	C	C	B	B	B	B	B	B	B
8:45 - 9:00	B	B	B	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
9:00 - 9:15	B	A	A	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A
9:15 - 9:30	B	A	B	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A
9:30 - 9:45	B	B	B	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
9:45 - 10:00	B	B	B	B	C	B	C	C	C	C	C	C	C	B	C	B	B	B	B	B
DEMAND TO CAPACITY RATIO																				
Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
6:00 - 6:15	0.09	0.12	0.08	0.23	0.17	0.23	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.20	0.15	0.20	0.20	0.14	0.21	0.14
6:15 - 6:30	0.12	0.16	0.11	0.33	0.25	0.33	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.29	0.22	0.29	0.29	0.20	0.28	0.20
6:30 - 6:45	0.13	0.17	0.12	0.40	0.31	0.40	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.36	0.27	0.36	0.36	0.24	0.34	0.26
6:45 - 7:00	0.16	0.21	0.14	0.45	0.35	0.45	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.40	0.31	0.41	0.41	0.24	0.36	0.29
7:00 - 7:15	0.14	0.18	0.13	0.49	0.38	0.49	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.44	0.34	0.45	0.45	0.26	0.38	0.29
7:15 - 7:30	0.22	0.28	0.20	0.66	0.51	0.66	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.60	0.46	0.62	0.62	0.35	0.51	0.39
7:30 - 7:45	0.27	0.35	0.25	0.75	0.58	0.75	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.69	0.53	0.70	0.70	0.42	0.61	0.47
7:45 - 8:00	0.24	0.31	0.21	0.68	0.52	0.68	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.59	0.45	0.60	0.60	0.34	0.50	0.45
8:00 - 8:15	0.19	0.25	0.17	0.52	0.40	0.52	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.46	0.35	0.47	0.47	0.30	0.43	0.33
8:15 - 8:30	0.20	0.27	0.18	0.57	0.44	0.57	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.52	0.40	0.53	0.53	0.32	0.46	0.35
8:30 - 8:45	0.20	0.26	0.18	0.61	0.46	0.61	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.54	0.41	0.55	0.55	0.34	0.52	0.40
8:45 - 9:00	0.22	0.29	0.19	0.55	0.42	0.55	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.50	0.37	0.50	0.50	0.30	0.47	0.40
9:00 - 9:15	0.20	0.26	0.18	0.49	0.37	0.49	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.43	0.33	0.44	0.44	0.28	0.41	0.32
9:15 - 9:30	0.21	0.27	0.19	0.48	0.37	0.48	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.43	0.33	0.45	0.45	0.28	0.41	0.33
9:30 - 9:45	0.24	0.31	0.22	0.58	0.45	0.58	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.53	0.41	0.54	0.54	0.35	0.51	0.36
9:45 - 10:00	0.25	0.33	0.23	0.61	0.47	0.61	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.56	0.43	0.57	0.57	0.36	0.53	0.41
MAINLINE HOURLY VOLUMES																				
Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
6:00 - 6:15	332	332	298	298	670	670	594	594	594	594	594	594	594	594	592	592	604	546	546	610
6:15 - 6:30	440	440	410	410	986	986	860	860	860	860	860	860	860	860	858	858	874	750	750	830
6:30 - 6:45	484	484	434	434	1200	1200	1070	1070	1070	1070	1070	1070	1070	1070	1058	1058	1076	928	928	1030
6:45 - 7:00	608	608	524	524	1348	1348	1196	1196	1196	1196	1196	1196	1196	1196	1192	1192	1216	928	928	1060
7:00 - 7:15	516	516	488	488	1468	1468	1320	1320	1320	1320	1320	1320	1320	1320	1312	1312	1350	1006	1006	1132
7:15 - 7:30	800	800	744	744	1972	1972	1794	1794	1794	1794	1794	1794	1794	1794	1788	1788	1838	1314	1314	1506
7:30 - 7:45	984	984	918	918	2246	2246	2050	2050	2050	2050	2050	2050	2050	2050	2042	2042	2094	1586	1586	1792
7:45 - 8:00	872	872	796	796	2016	2016	1770	1770	1770	1770	1770	1770	1770	1770	1748	1748	1794	1276	1276	1484
8:00 - 8:15	700	700	626	626	1550	1550	1380	1380	1380	1380	1380	1380	1380	1380	1364	1364	1410	1136	1136	1286
8:15 - 8:30	756	756	678	678	1712	1712	1548	1548	1548	1548	1548	1548	1548	1548	1544	1544	1584	1204	1204	1374
8:30 - 8:45	748	748	656	656	1814	1814	1626	1626	1626	1626	1626	1626	1626	1626	1608	1608	1652	1298	1298	1548
8:45 - 9:00	820	820	720	720	1634	1634	1474	1474	1474	1474	1474	1474	1474	1474	1452	1452	1502	1158	1158	1408
9:00 - 9:15	736	736	666	666	1448	1448	1276	1276	1276	1276	1276	1276	1276	1276	1266	1266	1316	1064	1064	1206
9:15 - 9:30	768	768	692	692	1422	1422	1260	1260	1260	1260	1260	1260	1260	1260	1256	1256	1320	1050	1050	1194
9:30 - 9:45	876	876	826	826	1720	1720	1574	1574	1574	1574	1574	1574	1574	1574	1566	1566	1612	1318	1318	1496
9:45 - 10:00	936	936	870	870	1810	1810	1650	1650	1650	1650	1650	1650	1650	1650	1646	1646	1702	1386	1386	1574

Measurement	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Number of Lanes	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Segment Type†	B	ON	ON	B	OFF	B	ON	ON	B	B	B	B	B	B	B	B	OFF	B	ON	B
Accel/Decel Length	-	270	246	-	243	-	445	142	-	-	-	-	-	-	-	-	275	-	328	-
LEVEL OF SERVICE																				
Analysis Period	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
6:00 - 6:15	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
6:15 - 6:30	A	A	A	A	A	A	A	B	A	A	A	A	A	A	A	A	A	A	A	A
6:30 - 6:45	A	B	B	B	A	A	A	B	B	B	B	B	B	B	B	B	A	A	A	A
6:45 - 7:00	A	A	B	B	A	A	A	B	B	B	B	B	B	B	B	B	A	A	A	A
7:00 - 7:15	B	B	B	B	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B
7:15 - 7:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
7:30 - 7:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
7:45 - 8:00	B	B	B	B	B	A	A	B	B	B	B	B	B	B	B	B	A	A	A	A
8:00 - 8:15	B	B	B	B	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B
8:15 - 8:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
8:30 - 8:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
8:45 - 9:00	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	A	B
9:00 - 9:15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
9:15 - 9:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
9:30 - 9:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
9:45 - 10:00	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
DEMAND TO CAPACITY RATIO																				
Analysis Period	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
6:00 - 6:15	0.12	0.18	0.18	0.14	0.18	0.12	0.17	0.18	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.18	0.13	0.18	0.14
6:15 - 6:30	0.15	0.21	0.22	0.17	0.22	0.14	0.20	0.22	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.22	0.15	0.21	0.16
6:30 - 6:45	0.18	0.26	0.27	0.20	0.27	0.17	0.23	0.24	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.24	0.17	0.23	0.18
6:45 - 7:00	0.18	0.24	0.26	0.20	0.26	0.16	0.22	0.24	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.24	0.16	0.23	0.18
7:00 - 7:15	0.20	0.29	0.31	0.24	0.31	0.20	0.27	0.30	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.30	0.21	0.30	0.23
7:15 - 7:30	0.28	0.39	0.42	0.32	0.42	0.27	0.38	0.41	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.41	0.28	0.40	0.30
7:30 - 7:45	0.33	0.45	0.48	0.37	0.48	0.31	0.44	0.48	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.48	0.32	0.45	0.34
7:45 - 8:00	0.22	0.32	0.35	0.27	0.35	0.18	0.26	0.29	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.29	0.16	0.23	0.18
8:00 - 8:15	0.23	0.32	0.34	0.26	0.34	0.20	0.28	0.30	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.30	0.19	0.27	0.21
8:15 - 8:30	0.24	0.33	0.35	0.27	0.35	0.21	0.31	0.32	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.32	0.21	0.31	0.24
8:30 - 8:45	0.27	0.38	0.40	0.31	0.40	0.26	0.37	0.39	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.39	0.23	0.32	0.25
8:45 - 9:00	0.24	0.34	0.37	0.29	0.37	0.21	0.31	0.33	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.33	0.16	0.24	0.19
9:00 - 9:15	0.22	0.31	0.33	0.25	0.33	0.20	0.30	0.32	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.32	0.21	0.31	0.23
9:15 - 9:30	0.21	0.31	0.34	0.26	0.34	0.20	0.29	0.32	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.32	0.20	0.30	0.23
9:30 - 9:45	0.29	0.41	0.43	0.33	0.43	0.25	0.36	0.38	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.38	0.26	0.37	0.28
9:45 - 10:00	0.28	0.40	0.43	0.33	0.43	0.25	0.36	0.38	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.38	0.25	0.36	0.27
MAINLINE HOURLY VOLUMES																				
Analysis Period	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
6:00 - 6:15	454	454	510	536	536	468	468	488	514	514	514	514	514	514	514	514	514	486	486	516
6:15 - 6:30	568	568	614	644	644	532	532	572	624	624	624	624	624	624	624	624	624	570	570	600
6:30 - 6:45	686	686	736	772	772	628	628	656	696	696	696	696	696	696	696	696	696	620	620	652
6:45 - 7:00	642	642	688	736	736	560	560	614	682	682	682	682	682	682	682	682	682	564	564	632
7:00 - 7:15	742	742	816	882	882	724	724	766	838	838	838	838	838	838	838	838	838	758	758	840
7:15 - 7:30	1032	1032	1116	1190	1190	996	996	1070	1158	1158	1158	1158	1158	1158	1158	1158	1158	1020	1020	1106
7:30 - 7:45	1202	1202	1272	1364	1364	1122	1122	1252	1350	1350	1350	1350	1350	1350	1350	1350	1350	1146	1146	1236
7:45 - 8:00	792	792	888	976	976	622	622	710	784	784	784	784	784	784	784	784	784	528	528	596
8:00 - 8:15	838	838	910	982	982	720	720	778	844	844	844	844	844	844	844	844	844	696	696	748
8:15 - 8:30	870	870	932	986	986	764	764	856	914	914	914	914	914	914	914	914	914	776	776	850
8:30 - 8:45	994	994	1098	1168	1168	974	974	1050	1124	1124	1124	1124	1124	1124	1124	1124	1124	842	842	906
8:45 - 9:00	858	858	970	1068	1068	744	744	854	940	940	940	940	940	940	940	940	940	562	562	648
9:00 - 9:15	806	806	880	940	940	714	714	836	914	914	914	914	914	914	914	914	914	756	756	846
9:15 - 9:30	754	754	860	968	968	732	732	820	898	898	898	898	898	898	898	898	898	734	734	816
9:30 - 9:45	1062	1062	1154	1224	1224	914	914	1004	1070	1070	1070	1070	1070	1070	1070	1070	1070	952	952	1022
9:45 - 10:00	1020	1020	1138	1220	1220	914	914	996	1076	1076	1076	1076	1076	1076	1076	1076	1076	880	880	980

† B = Basic Segment, OFF = Off-Ramp, ON = On-Ramp, W = Weave, OV = Overlap

Table 4: I-5 Northbound PM Peak Period Traffic Analysis Results

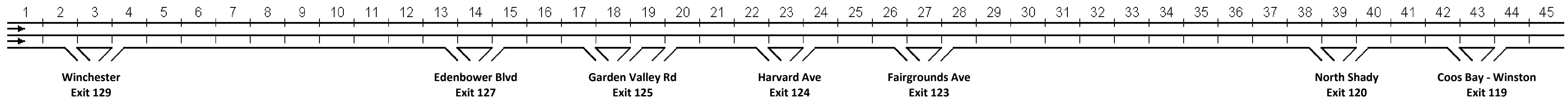


Measurement	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Number of Lanes	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3
Segment Type†	B	OFF	B	ON	OV	OFF	B	B	B	B	B	B	B	OFF	B	ON	OFF	B	ON	W
Accel/Decel Length	-	247	-	476	-	334	-	-	-	-	-	-	-	310	-	240	237	-	307	0
LEVEL OF SERVICE																				
Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
14:00 - 14:15	B	B	B	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
14:15 - 14:30	B	B	B	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
14:30 - 14:45	B	B	B	B	C	B	C	C	C	C	C	C	C	B	C	B	B	B	B	B
14:45 - 15:00	B	B	B	B	C	B	C	C	C	C	C	C	C	B	C	B	B	B	B	B
15:00 - 15:15	B	B	B	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
15:15 - 15:30	B	B	B	B	C	B	C	C	C	C	C	C	C	B	C	B	B	B	B	B
15:30 - 15:45	B	B	B	B	C	B	C	C	C	C	C	C	C	B	B	B	B	B	B	B
15:45 - 16:00	B	B	B	C	D	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B
16:00 - 16:15	B	B	B	C	C	C	C	C	C	C	C	C	C	B	C	C	C	B	B	B
16:15 - 16:30	B	B	B	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
16:30 - 16:45	B	B	B	B	C	C	C	C	C	C	C	C	C	B	C	B	B	B	B	B
16:45 - 17:00	B	B	B	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
17:00 - 17:15	B	B	B	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
17:15 - 17:30	B	B	B	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
17:30 - 17:45	B	B	B	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
17:45 - 18:00	B	B	B	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
DEMAND TO CAPACITY RATIO																				
Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
14:00 - 14:15	0.24	0.32	0.21	0.53	0.40	0.53	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.48	0.36	0.49	0.49	0.31	0.47	0.34
14:15 - 14:30	0.25	0.33	0.23	0.55	0.42	0.55	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.50	0.38	0.51	0.51	0.32	0.48	0.34
14:30 - 14:45	0.30	0.40	0.28	0.64	0.49	0.64	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.58	0.44	0.59	0.59	0.37	0.55	0.39
14:45 - 15:00	0.28	0.37	0.26	0.64	0.49	0.64	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.58	0.44	0.58	0.58	0.36	0.55	0.42
15:00 - 15:15	0.25	0.32	0.22	0.58	0.44	0.58	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.51	0.39	0.51	0.51	0.33	0.51	0.37
15:15 - 15:30	0.31	0.40	0.28	0.64	0.49	0.64	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.58	0.44	0.58	0.58	0.38	0.57	0.40
15:30 - 15:45	0.25	0.33	0.22	0.61	0.46	0.61	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.55	0.41	0.56	0.56	0.35	0.54	0.40
15:45 - 16:00	0.34	0.44	0.30	0.73	0.56	0.73	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.66	0.50	0.67	0.67	0.43	0.63	0.45
16:00 - 16:15	0.32	0.42	0.28	0.67	0.51	0.67	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.60	0.46	0.62	0.62	0.40	0.59	0.42
16:15 - 16:30	0.28	0.37	0.24	0.59	0.45	0.59	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.52	0.39	0.53	0.53	0.32	0.51	0.39
16:30 - 16:45	0.28	0.37	0.25	0.65	0.50	0.65	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.59	0.45	0.60	0.60	0.39	0.61	0.42
16:45 - 17:00	0.28	0.36	0.24	0.59	0.45	0.59	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.53	0.40	0.54	0.54	0.34	0.52	0.39
17:00 - 17:15	0.26	0.34	0.22	0.58	0.44	0.58	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.53	0.41	0.55	0.55	0.34	0.52	0.39
17:15 - 17:30	0.26	0.34	0.21	0.52	0.40	0.52	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.48	0.37	0.49	0.49	0.30	0.47	0.36
17:30 - 17:45	0.24	0.32	0.21	0.53	0.41	0.53	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.49	0.37	0.50	0.50	0.32	0.49	0.36
17:45 - 18:00	0.23	0.30	0.19	0.44	0.34	0.44	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.41	0.31	0.41	0.41	0.26	0.42	0.32
MAINLINE HOURLY VOLUMES																				
Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
14:00 - 14:15	860	860	752	752	1506	1506	1356	1356	1356	1356	1356	1356	1356	1356	1350	1350	1400	1142	1142	1356
14:15 - 14:30	888	888	802	802	1576	1576	1426	1426	1426	1426	1426	1426	1426	1426	1422	1422	1454	1176	1176	1352
14:30 - 14:45	1068	1068	974	974	1824	1824	1648	1648	1648	1648	1648	1648	1648	1648	1638	1638	1684	1342	1342	1552
14:45 - 15:00	1000	1000	916	916	1836	1836	1644	1644	1644	1644	1644	1644	1644	1644	1628	1628	1668	1304	1304	1568
15:00 - 15:15	864	864	754	754	1658	1658	1466	1466	1466	1466	1466	1466	1466	1466	1450	1450	1476	1206	1206	1460
15:15 - 15:30	1088	1088	984	984	1810	1810	1632	1632	1632	1632	1632	1632	1632	1632	1620	1620	1654	1390	1390	1616
15:30 - 15:45	884	884	770	770	1748	1748	1572	1572	1572	1572	1572	1572	1572	1572	1558	1558	1616	1304	1304	1558
15:45 - 16:00	1192	1192	1064	1064	2098	2098	1896	1896	1896	1896	1896	1896	1896	1896	1870	1870	1920	1562	1562	1792
16:00 - 16:15	1120	1120	990	990	1906	1906	1706	1706	1706	1706	1706	1706	1706	1706	1698	1698	1756	1444	1444	1668
16:15 - 16:30	996	996	848	848	1698	1698	1480	1480	1480	1480	1480	1480	1480	1480	1460	1460	1510	1174	1174	1440
16:30 - 16:45	1000	1000	878	878	1876	1876	1702	1702	1702	1702	1702	1702	1702	1702	1690	1690	1716	1426	1426	1752
16:45 - 17:00	968	968	826	826	1690	1690	1516	1516	1516	1516	1516	1516	1516	1516	1502	1502	1558	1220	1220	1494
17:00 - 17:15	920	920	782	782	1668	1668	1534	1534	1534	1534	1534	1534	1534	1534	1530	1530	1568	1242	1242	1494
17:15 - 17:30	904	904	732	732	1500	1500	1380	1380	1380	1380	1380	1380	1380	1380	1362	1362	1390	1082	1082	1360
17:30 - 17:45	860	860	730	730	1520	1520	1410	1410	1410	1410	1410	1410	1410	1410	1400	1400	1440	1166	1166	1412
17:45 - 18:00	808	808	676	676	1258	1258	1166	1166	1166	1166	1166	1166	1166	1166	1148	1148	1178	948	948	1194

Measurement	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Number of Lanes	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Segment Type†	B	ON	ON	B	OF	B	ON	ON	B	B	B	B	B	B	B	B	OFF	B	ON	B
Accel/Decel Length	-	270	246	-	243	-	445	142	-	-	-	-	-	-	-	-	275	-	328	-
LEVEL OF SERVICE																				
Analysis Period	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
14:00 - 14:15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
14:15 - 14:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
14:30 - 14:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
14:45 - 15:00	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
15:00 - 15:15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
15:15 - 15:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
15:30 - 15:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
15:45 - 16:00	B	B	B	C	B	B	B	B	C	C	C	C	C	C	C	C	B	B	B	C
16:00 - 16:15	B	B	B	C	B	B	B	C	C	C	C	C	C	C	C	C	B	B	B	C
16:15 - 16:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
16:30 - 16:45	B	B	B	C	B	B	B	B	C	C	C	C	C	C	C	C	B	B	B	C
16:45 - 17:00	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
17:00 - 17:15	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	B	B	B	C
17:15 - 17:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
17:30 - 17:45	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	B	B	B	B
17:45 - 18:00	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
DEMAND TO CAPACITY RATIO																				
Analysis Period	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
14:00 - 14:15	0.27	0.40	0.43	0.33	0.43	0.25	0.38	0.42	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.42	0.28	0.41	0.31
14:15 - 14:30	0.27	0.40	0.42	0.32	0.42	0.26	0.40	0.45	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.45	0.31	0.44	0.34
14:30 - 14:45	0.33	0.48	0.51	0.39	0.51	0.33	0.48	0.52	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.52	0.37	0.51	0.39
14:45 - 15:00	0.33	0.49	0.52	0.40	0.52	0.32	0.48	0.50	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.50	0.35	0.50	0.38
15:00 - 15:15	0.29	0.43	0.46	0.35	0.46	0.28	0.41	0.45	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.45	0.31	0.44	0.34
15:15 - 15:30	0.34	0.49	0.51	0.39	0.51	0.32	0.48	0.52	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.52	0.36	0.52	0.40
15:30 - 15:45	0.32	0.47	0.51	0.39	0.51	0.30	0.45	0.48	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.48	0.33	0.49	0.37
15:45 - 16:00	0.38	0.54	0.58	0.45	0.58	0.35	0.52	0.57	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.57	0.39	0.57	0.44
16:00 - 16:15	0.37	0.54	0.58	0.44	0.58	0.37	0.55	0.60	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.60	0.41	0.59	0.45
16:15 - 16:30	0.29	0.42	0.46	0.35	0.46	0.27	0.42	0.47	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.47	0.32	0.47	0.36
16:30 - 16:45	0.36	0.54	0.57	0.44	0.57	0.36	0.53	0.57	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.57	0.39	0.55	0.42
16:45 - 17:00	0.30	0.44	0.48	0.37	0.48	0.29	0.45	0.49	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.49	0.33	0.48	0.37
17:00 - 17:15	0.32	0.47	0.50	0.39	0.50	0.32	0.50	0.56	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.56	0.38	0.55	0.42
17:15 - 17:30	0.27	0.41	0.46	0.35	0.46	0.28	0.46	0.53	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.53	0.35	0.51	0.39
17:30 - 17:45	0.32	0.46	0.51	0.39	0.51	0.33	0.50	0.55	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.55	0.36	0.51	0.39
17:45 - 18:00	0.25	0.37	0.41	0.31	0.41	0.24	0.37	0.40	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.40	0.26	0.38	0.29
MAINLINE HOURLY VOLUMES																				
Analysis Period	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
14:00 - 14:15	976	976	1112	1226	1226	908	908	1072	1182	1182	1182	1182	1182	1182	1182	1182	1182	1036	1036	1154
14:15 - 14:30	964	964	1098	1182	1182	914	914	1130	1284	1284	1284	1284	1284	1284	1284	1284	1284	1144	1144	1254
14:30 - 14:45	1184	1184	1320	1438	1438	1174	1174	1348	1480	1480	1480	1480	1480	1480	1480	1480	1480	1348	1348	1446
14:45 - 15:00	1198	1198	1362	1480	1480	1162	1162	1346	1430	1430	1430	1430	1430	1430	1430	1430	1430	1278	1278	1408
15:00 - 15:15	1062	1062	1210	1304	1304	1010	1010	1156	1276	1276	1276	1276	1276	1276	1276	1276	1276	1126	1126	1262
15:15 - 15:30	1220	1220	1354	1440	1440	1120	1120	1336	1462	1462	1462	1462	1462	1462	1462	1462	1462	1296	1296	1458
15:30 - 15:45	1150	1150	1324	1462	1462	1094	1094	1288	1386	1386	1386	1386	1386	1386	1386	1386	1386	1222	1222	1394
15:45 - 16:00	1372	1372	1508	1638	1638	1252	1252	1462	1598	1598	1598	1598	1598	1598	1598	1598	1598	1404	1404	1612
16:00 - 16:15	1334	1334	1528	1642	1642	1330	1330	1576	1712	1712	1712	1712	1712	1712	1712	1712	1712	1532	1532	1700
16:15 - 16:30	1018	1018	1176	1298	1298	972	972	1192	1330	1330	1330	1330	1330	1330	1330	1330	1330	1172	1172	1324
16:30 - 16:45	1324	1324	1540	1632	1632	1304	1304	1504	1636	1636	1636	1636	1636	1636	1636	1636	1636	1472	1472	1594
16:45 - 17:00	1070	1070	1248	1354	1354	1042	1042	1276	1396	1396	1396	1396	1396	1396	1396	1396	1396	1202	1202	1366
17:00 - 17:15	1160	1160	1340	1440	1440	1150	1150	1434	1616	1616	1616	1616	1616	1616	1616	1616	1616	1444	1444	1600
17:15 - 17:30	974	974	1164	1316	1316	1018	1018	1326	1532	1532	1532	1532	1532	1532	1532	1532	1532	1330	1330	1488
17:30 - 17:45	1166	1166	1314	1470	1470	1214	1214	1450	1594	1594	1594	1594	1594	1594	1594	1594	1594	1376	1376	1490
17:45 - 18:00	902	902	1052	1160	1160	878	878	1044	1152	1152	1152	1152	1152	1152	1152	1152	1152	954	954	1092

† B = Basic Segment, OFF = Off-Ramp, ON = On-Ramp, W = Weave, OV = Overlap

Table 5: I-5 Southbound AM Peak Period Traffic Analysis Results



Measurement	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Number of Lanes	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Segment Type†	B	OFF	B	ON	B	B	B	B	B	B	B	B	OFF	B	ON	B	OF	B	ON	ON	B	OFF	B	ON	B	OF	B	ON	B	B	B	B	B	B	B	B	B	OFF	B	ON	OV	OFF	B	ON	B
Accel/Decel Length	-	241	-	289	-	-	-	-	-	-	-	-	242	-	323	-	235	-	254	178	-	249	-	197	-	252	-	297	-	-	-	-	-	-	-	-	-	207	-	219	-	297	-	199	-

LEVEL OF SERVICE

Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
6:00 - 6:15	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	A	A	A	A
6:15 - 6:30	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	A	A	A	B	B	A	B	A	B	B	B	B	B	B	B	B	B	A	A	A	B	A	A	A	A
6:30 - 6:45	B	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	A	A	A
6:45 - 7:00	B	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B	B	A	B	B	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	A	A	A
7:00 - 7:15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	A	A	A
7:15 - 7:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B
7:30 - 7:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	A	A
7:45 - 8:00	C	B	B	B	C	C	C	C	C	C	C	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	A	A
8:00 - 8:15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	A	A	A
8:15 - 8:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	A	A
8:30 - 8:45	B	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	A	A
8:45 - 9:00	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	B	A
9:00 - 9:15	B	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	A	A
9:15 - 9:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B
9:30 - 9:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B
9:45 - 10:00	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B

DEMAND TO CAPACITY RATIO

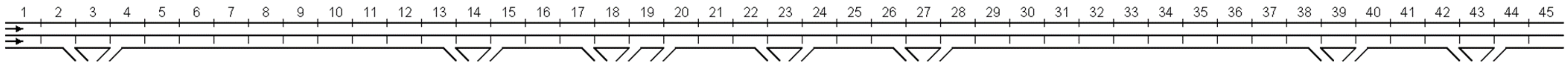
Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
6:00 - 6:15	0.13	0.16	0.11	0.16	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.16	0.10	0.16	0.12	0.16	0.10	0.15	0.17	0.13	0.17	0.12	0.19	0.15	0.19	0.14	0.19	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.19	0.13	0.18	0.14	0.18	0.08	0.14	0.11
6:15 - 6:30	0.16	0.20	0.15	0.21	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.21	0.14	0.22	0.17	0.22	0.14	0.20	0.23	0.18	0.23	0.15	0.25	0.19	0.25	0.19	0.25	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.25	0.16	0.22	0.17	0.22	0.09	0.14	0.11
6:30 - 6:45	0.23	0.30	0.21	0.31	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.31	0.19	0.30	0.23	0.30	0.19	0.28	0.33	0.25	0.33	0.20	0.32	0.25	0.32	0.25	0.32	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.32	0.22	0.30	0.23	0.30	0.13	0.20	0.15
6:45 - 7:00	0.23	0.30	0.21	0.31	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.31	0.18	0.29	0.22	0.29	0.16	0.25	0.33	0.25	0.33	0.17	0.29	0.22	0.29	0.22	0.29	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.29	0.19	0.25	0.19	0.25	0.09	0.14	0.11
7:00 - 7:15	0.23	0.29	0.20	0.32	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.32	0.19	0.32	0.24	0.32	0.20	0.30	0.37	0.28	0.37	0.19	0.31	0.24	0.31	0.23	0.30	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.30	0.20	0.27	0.21	0.27	0.12	0.18	0.14
7:15 - 7:30	0.29	0.37	0.25	0.39	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.39	0.24	0.40	0.30	0.40	0.25	0.39	0.50	0.39	0.50	0.22	0.38	0.29	0.38	0.28	0.39	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.39	0.27	0.37	0.28	0.37	0.18	0.27	0.21
7:30 - 7:45	0.34	0.44	0.30	0.45	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.45	0.25	0.41	0.32	0.41	0.26	0.39	0.48	0.37	0.48	0.21	0.35	0.27	0.35	0.25	0.34	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.34	0.24	0.33	0.25	0.33	0.15	0.23	0.18
7:45 - 8:00	0.44	0.58	0.39	0.58	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.58	0.31	0.48	0.37	0.48	0.27	0.41	0.50	0.38	0.50	0.21	0.34	0.26	0.34	0.24	0.32	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.32	0.23	0.31	0.24	0.31	0.15	0.22	0.17
8:00 - 8:15	0.31	0.40	0.27	0.40	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.40	0.22	0.36	0.27	0.36	0.21	0.31	0.38	0.29	0.38	0.19	0.31	0.24	0.31	0.23	0.30	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.30	0.22	0.30	0.23	0.30	0.15	0.22	0.17
8:15 - 8:30	0.28	0.36	0.25	0.38	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.38	0.21	0.35	0.27	0.35	0.21	0.33	0.40	0.31	0.40	0.20	0.32	0.25	0.32	0.24	0.31	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.31	0.23	0.30	0.23	0.30	0.12	0.20	0.16
8:30 - 8:45	0.25	0.32	0.21	0.32	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.32	0.17	0.30	0.23	0.30	0.19	0.31	0.38	0.29	0.38	0.19	0.31	0.24	0.31	0.23	0.31	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.31	0.22	0.30	0.23	0.30	0.15	0.23	0.18
8:45 - 9:00	0.29	0.37	0.25	0.38	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.38	0.21	0.35	0.27	0.35	0.22	0.35	0.43	0.33	0.43	0.22	0.37	0.28	0.37	0.27	0.36	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.36	0.27	0.36	0.27	0.36	0.16	0.24	0.18
9:00 - 9:15	0.24	0.32	0.22	0.33	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.33	0.19	0.32	0.24	0.32	0.20	0.30	0.38	0.29	0.38	0.21	0.33	0.25	0.33	0.24	0.32	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.32	0.24	0.32	0.25	0.32	0.14	0.22	0.17
9:15 - 9:30	0.25	0.33	0.22	0.34	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.34	0.20	0.33	0.25	0.33	0.21	0.33	0.41	0.32	0.41	0.24	0.37	0.29	0.37	0.28	0.37	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.37	0.27	0.37	0.28	0.37	0.18	0.27	0.21
9:30 - 9:45	0.27	0.36	0.24	0.36	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.36	0.20	0.34	0.26	0.34	0.20	0.31	0.38	0.29	0.38	0.22	0.35	0.27	0.35	0.26	0.34	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.34	0.25	0.33	0.25	0.33	0.16	0.25	0.19
9:45 - 10:00	0.27	0.36	0.24	0.38	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.38	0.22	0.36	0.28	0.36	0.23	0.35	0.45	0.35	0.45	0.25	0.39	0.30	0.39	0.29	0.38	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.38	0.28	0.38	0.29	0.38	0.18	0.27	0.20

MAINLINE HOURLY VOLUMES

Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
6:00 - 6:15	476	476	420	420	456	456	456	456	456	456	456	456	456	388	388	470	470	378	378	438	508	508	446	446	566	566	558	558	569	569	569	569	569	569	569	569	569	569	475	475	508	508	300	300	384
6:15 - 6:30	590	590	552	552	616	616	616	616	616	616	616	616	616	508	508	648	648	512	512	570	688	688	576	576	738	738	730	730	742	742	742	742	742	742	742	742	742	742	614	614	633	633	319	319	385
6:30 - 6:45	866	866	794	794	904	904	904	904	904	904	904	904	904	694	694	888	888	722	722	798	950	950	740	740	942	942	934	934	945	945	945	945	945	945	945	945	945	945	827	827	846	846	484	484	556
6:45 - 7:00	874	874	802	802	920	920	920	920	920	920	920	920	920	668	668	830	830	604	604	730	954	954	618	618	824	824	816	816	825	825	825	825	825	825	825	825	825	825	685	685	705	705	307	307	365
7:00 - 7:15	854	854	764	764	932	932	932	932	932	932	932	932	932	726	726	932	932	740	740	872	1086	1086	690	690	900	900	876	876	880	880	880	880	880	880	880	880	880	880	756	756	774	774	448	448	506
7:15 - 7:30	1084	1084	966	966	1152	1152	1152	1152	1152	1152	1152	1152	1152	880	880	1164	1164	926	926	1146	1490	1490	810	810	1110	1110	1070	1070	1116	1116	1116	1116	1116	1116	1116	1116	1116	1116	1016	1016	1042	1042	656	656	744
7:30 - 7:45	1272	1272	1130	1130	1320	1320	1320	1320	1320	1320	1320	1320	1320	936	936	1196	1196	948	948	1116	1404	1404	744	744	1008	1008	948	948	970	970	970	970	970	970	970	970	970	970	896	896	914	914	534	534	616
7:45 - 8:00	1686	1686	1492	1492	1696	1696	1696	1696	1696	1696	1696	1696	1696	1140	1140	1388	1388	996	996	1162	1426	1426	716	716	922	922	866	866	882	882	882	882	882	882	882	882	882	882	820	820	838	838	452	452	520
8:00 - 8:15	1166	1166	1042	1042	1184	1184	1184	1184	1184	1184	1184	1184	1184	816	816	1026	1026	786	786	876	1100	1100	692	692	874	874	838	838	850	850	850	850	850	850	850	850	850	850	794	794	826	826	536	536	600
8:15 - 8:30	1056	1056	960	960	1100	1100	1100	1100	1100	1100	1100	1100	1100	760	760	1020	1020	790	790	960	1172	1172	728	728	922	922	890	890	890	890	890	890	890	890	890	890	890	890	842	842	854	854	438	438	546
8:30 - 8:45	938	938	786	786	932	932	932	932	932	932	932	932	932	650	650	868	868	696	696	902	1120	1120	716	716	908	908	888	888	894	894	894	894	894	894	894	894	894	894	846	846	876	876	542	542	650
8:45 - 9:00	1084	1084	938	938	1128	1128	1128	1128	1128	1128	1128	1128	1128	788	788	1016	1016	806	806	1020	1262	1262	814	814	1076	1076	1032	1032	1046	1046	1046	1046	1046	1046	1046	1046	1046	1046	1002	1002	1030	1030	596	596	674
9:00 - 9:15	914	914	842	842	956	956	956	956	956	956	956	956	956	688	688	924	924	734	734	864	1126	1126	776	776	966	966	914	914	934	934	934	934	934	934	934	934	934	934	886	886	918	918	526	526	604
9:15 - 9:30	950	950	848	848	988	988	988	988	988	988	988	988	988	738	738	956	956	780	780	958	1220	1220	902	902	1092	1092	1060	1060	1082	1082	1082	1082	1082	1082	1082	1082	1082	1082	1038	1038	1068	1068	692	692	764
9:30 - 9:45	1032	1032	910	910	1044	1044	1044	1044	1044	1044	1044	1044	1044	762	762	996	996	750	750	906	1124	1124	822	822	1016	1016	988	988	994	994	994	994	994	994	994	994	994	994	936	936	954	954	612	612	700
9:45 - 10:00	1030	1030	928	928	1104	1104	1104	1104	1104	1104	1104	1104	1104	810	810	1056	1056	854	854	1022	1334	1334	946	946	1146	1146	1094	1094	1106	1106	1106	1106	1106	1106	1106	1106	1106	1106	1068	1068	1092	1092	682	682	760

† B = Basic Segment, OFF = Off-Ramp, ON = On-Ramp, W = Weave, OV = Overlap

Table 6: I-5 Southbound PM Peak Period Traffic Analysis Results



Measurement	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Number of Lanes	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Segment Type†	B	OFF	B	ON	B	B	B	B	B	B	B	B	OFF	B	ON	B	OF	B	ON	ON	B	OFF
Acceleration Lane	-	241	-	289	-	-	-	-	-	-	-	-	242	-	323	-	235	-	254	178	-	249
LEVEL OF SERVICE																						
Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
14:00 - 14:15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	B
14:15 - 14:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	B
14:30 - 14:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B
14:45 - 15:00	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C
15:00 - 15:15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	B	B	C	C	C
15:15 - 15:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B
15:30 - 15:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C
15:45 - 16:00	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	B	B	C	C	C
16:00 - 16:15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	B	B	C	C	C
16:15 - 16:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	B	B	C	C	C
16:30 - 16:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C
16:45 - 17:00	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C
17:00 - 17:15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C
17:15 - 17:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	B	B	C	C	C
17:30 - 17:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C
17:45 - 18:00	B	A	B	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B	B	B	C	B
DEMAND TO CAPACITY RATIO																						
Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
14:00 - 14:15	0.29	0.38	0.27	0.43	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.43	0.25	0.46	0.35	0.46	0.30	0.47	0.60	0.46	0.60
14:15 - 14:30	0.29	0.38	0.27	0.41	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.41	0.25	0.45	0.35	0.45	0.28	0.45	0.60	0.46	0.60
14:30 - 14:45	0.28	0.36	0.25	0.42	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.42	0.24	0.43	0.33	0.43	0.27	0.44	0.57	0.44	0.57
14:45 - 15:00	0.34	0.44	0.30	0.47	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.47	0.29	0.51	0.39	0.51	0.33	0.54	0.70	0.53	0.70
15:00 - 15:15	0.35	0.46	0.33	0.50	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.50	0.31	0.55	0.42	0.55	0.36	0.58	0.73	0.56	0.73
15:15 - 15:30	0.29	0.38	0.26	0.40	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.40	0.23	0.41	0.31	0.41	0.25	0.43	0.57	0.44	0.57
15:30 - 15:45	0.31	0.41	0.28	0.44	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.44	0.25	0.47	0.36	0.47	0.30	0.49	0.66	0.50	0.66
15:45 - 16:00	0.36	0.47	0.32	0.50	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.50	0.30	0.54	0.41	0.54	0.35	0.57	0.73	0.56	0.73
16:00 - 16:15	0.34	0.44	0.31	0.49	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.49	0.31	0.57	0.44	0.57	0.36	0.58	0.72	0.55	0.72
16:15 - 16:30	0.36	0.47	0.32	0.49	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.49	0.30	0.55	0.42	0.55	0.36	0.57	0.73	0.56	0.73
16:30 - 16:45	0.28	0.36	0.26	0.41	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.41	0.24	0.48	0.37	0.48	0.30	0.50	0.68	0.52	0.68
16:45 - 17:00	0.28	0.36	0.25	0.38	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.38	0.23	0.44	0.34	0.44	0.27	0.47	0.64	0.49	0.64
17:00 - 17:15	0.27	0.35	0.24	0.40	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.40	0.24	0.48	0.37	0.48	0.30	0.55	0.75	0.57	0.75
17:15 - 17:30	0.33	0.43	0.30	0.45	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.45	0.29	0.55	0.42	0.55	0.35	0.59	0.79	0.60	0.79
17:30 - 17:45	0.26	0.35	0.23	0.37	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.37	0.22	0.44	0.34	0.44	0.28	0.48	0.65	0.50	0.65
17:45 - 18:00	0.21	0.28	0.19	0.30	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.30	0.18	0.37	0.28	0.37	0.23	0.39	0.56	0.43	0.56
MAINLINE HOURLY VOLUMES																						
Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
14:00 - 14:15	1094	1094	998	998	1232	1232	1232	1232	1232	1232	1232	1232	1232	928	928	1356	1356	1134	1134	1390	1824	1824
14:15 - 14:30	1096	1096	998	998	1192	1192	1192	1192	1192	1192	1192	1192	1192	908	908	1326	1326	1042	1042	1328	1816	1816
14:30 - 14:45	1034	1034	924	924	1204	1204	1204	1204	1204	1204	1204	1204	1204	862	862	1274	1274	1028	1028	1314	1724	1724
14:45 - 15:00	1254	1254	1116	1116	1360	1360	1360	1360	1360	1360	1360	1360	1360	1050	1050	1492	1492	1264	1264	1594	2110	2110
15:00 - 15:15	1300	1300	1220	1220	1432	1432	1432	1432	1432	1432	1432	1432	1432	1134	1134	1612	1612	1378	1378	1708	2206	2206
15:15 - 15:30	1086	1086	960	960	1156	1156	1156	1156	1156	1156	1156	1156	1156	832	832	1180	1180	948	948	1284	1728	1728
15:30 - 15:45	1156	1156	1022	1022	1264	1264	1264	1264	1264	1264	1264	1264	1264	900	900	1382	1382	1120	1120	1448	1996	1996
15:45 - 16:00	1328	1328	1184	1184	1432	1432	1432	1432	1432	1432	1432	1432	1432	1116	1116	1588	1588	1320	1320	1684	2226	2226
16:00 - 16:15	1268	1268	1162	1162	1428	1428	1428	1428	1428	1428	1428	1428	1428	1132	1132	1682	1682	1366	1366	1718	2188	2188
16:15 - 16:30	1336	1336	1202	1202	1408	1408	1408	1408	1408	1408	1408	1408	1408	1108	1108	1622	1622	1352	1352	1682	2208	2208
16:30 - 16:45	1040	1040	952	952	1188	1188	1188	1188	1188	1188	1188	1188	1188	888	888	1428	1428	1158	1158	1498	2068	2068
16:45 - 17:00	1028	1028	924	924	1092	1092	1092	1092	1092	1092	1092	1092	1092	842	842	1290	1290	1032	1032	1422	1972	1972
17:00 - 17:15	998	998	910	910	1160	1160	1160	1160	1160	1160	1160	1160	1160	868	868	1440	1440	1166	1166	1680	2316	2316
17:15 - 17:30	1232	1232	1110	1110	1300	1300	1300	1300	1300	1300	1300	1300	1300	1054	1054	1616	1616	1332	1332	1782	2414	2414
17:30 - 17:45	986	986	868	868	1064	1064	1064	1064	1064	1064	1064	1064	1064	826	826	1308	1308	1090	1090	1442	1988	1988
17:45 - 18:00	796	796	718	718	876	876	876	876	876	876	876	876	876	660	660	1090	1090	872	872	1176	1712	1712

Measurement	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Number of Lanes	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Segment Type†	B	ON	B	OFF	B	ON	B	B	B	B	B	B	B	B	B	OFF	B	ON	OV	OFF	B	ON	B
Acceleration Lane	-	197	-	252	-	297	-	-	-	-	-	-	-	-	-	207	-	219	-	297	-	199	-
LEVEL OF SERVICE																							
Analysis Period	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
14:00 - 14:15	B	B	C	B	C	B	C	C	C	C	C	C	C	C	C	B	C	B	C	B	B	B	B
14:15 - 14:30	B	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	B	B	B
14:30 - 14:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	B	B	B
14:45 - 15:00	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B
15:00 - 15:15	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	D	C	B	B	B
15:15 - 15:30	B	B	C	B	C	B	C	C	C	C	C	C	C	C	C	B	C	B	C	B	B	B	B
15:30 - 15:45	B	C	C	C	C	B	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B	B
15:45 - 16:00	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	D	C	B	B	B
16:00 - 16:15	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	D	C	B	B	B
16:15 - 16:30	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	D	C	B	B	B
16:30 - 16:45	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B
16:45 - 17:00	B	C	C	B	C	B	C	C	C	C	C	C	C	C	C	B	C	B	C	B	B	B	B
17:00 - 17:15	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	D	C	B	B	B
17:15 - 17:30	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	D	C	B	B	B
17:30 - 17:45	B	C	C	C	C	B	C	C	C	C	C	C	C	C	C	C	C	B	C	B	B	B	B
17:45 - 18:00	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	A	B	B
DEMAND TO CAPACITY RATIO																							
Analysis Period	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
14:00 - 14:15	0.36	0.57	0.44	0.57	0.43	0.57	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.57	0.43	0.58	0.44	0.58	0.27	0.39	0.30
14:15 - 14:30	0.34	0.55	0.42	0.55	0.41	0.54	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.54	0.41	0.56	0.43	0.56	0.25	0.37	0.28
14:30 - 14:45	0.31	0.52	0.39	0.52	0.38	0.52	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.52	0.39	0.53	0.41	0.53	0.22	0.33	0.26
14:45 - 15:00	0.39	0.65	0.50	0.65	0.49	0.66	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.66	0.50	0.67	0.52	0.67	0.34	0.49	0.38
15:00 - 15:15	0.43	0.71	0.54	0.71	0.52	0.70	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.70	0.53	0.71	0.54	0.71	0.33	0.46	0.36
15:15 - 15:30	0.33	0.57	0.44	0.57	0.42	0.55	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.55	0.42	0.56	0.43	0.56	0.24	0.36	0.27
15:30 - 15:45	0.38	0.63	0.48	0.63	0.47	0.62	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.62	0.47	0.63	0.48	0.63	0.29	0.42	0.32
15:45 - 16:00	0.44	0.68	0.52	0.68	0.51	0.68	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.68	0.52	0.69	0.53	0.69	0.33	0.47	0.36
16:00 - 16:15	0.43	0.70	0.54	0.70	0.53	0.70	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.70	0.52	0.71	0.54	0.71	0.32	0.47	0.36
16:15 - 16:30	0.43	0.69	0.53	0.69	0.51	0.68	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.68	0.51	0.68	0.52	0.68	0.29	0.43	0.33
16:30 - 16:45	0.39	0.64	0.49	0.64	0.48	0.64	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.64	0.47	0.64	0.49	0.64	0.28	0.42	0.32
16:45 - 17:00	0.37	0.61	0.47	0.61	0.45	0.60	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.60	0.44	0.60	0.46	0.60	0.25	0.38	0.29
17:00 - 17:15	0.43	0.75	0.58	0.75	0.56	0.74	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.74	0.54	0.73	0.56	0.73	0.32	0.47	0.36
17:15 - 17:30	0.46	0.78	0.59	0.78	0.57	0.76	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.76	0.55	0.74	0.56	0.74	0.29	0.42	0.32
17:30 - 17:45	0.37	0.63	0.48	0.63	0.47	0.62	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.62	0.45	0.61	0.46	0.61	0.24	0.36	0.28
17:45 - 18:00	0.30	0.50	0.38	0.50	0.37	0.49	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.49	0.34	0.46	0.35	0.46	0.17	0.26	0.20
MAINLINE HOURLY VOLUMES																							
Analysis Period	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
14:00 - 14:15	1394	1394	1732	1732	1688	1688	1718	1718	1718	1718	1718	1718	1718	1718	1718	1718	1712	1712	1746	1746	1062	1062	1160
14:15 - 14:30	1322	1322	1652	1652	1608	1608	1628	1628	1628	1628	1628	1628	1628	1628	1628	1628	1624	1624	1678	1678	982	982	1082
14:30 - 14:45	1182	1182	1562	1562	1514	1514	1554	1554	1554	1554	1554	1554	1554	1554	1554	1554	1536	1536	1602	1602	858	858	972
14:45 - 15:00	1532	1532	1986	1986	1938	1938	1990	1990	1990	1990	1990	1990	1990	1990	1990	1990	1968	1968	2030	2030	1312	1312	1448
15:00 - 15:15	1684	1684	2144	2144	2076	2076	2114	2114	2114	2114	2114	2114	2114	2114	2114	2114	2094	2094	2146	2146	1272	1272	1374
15:15 - 15:30	1278	1278	1734	1734	1662	1662	1674	1674	1674	1674	1674	1674	1674	1674	1674	1674	1652	1652	1694	1694	940	940	1058
15:30 - 15:45	1500	1500	1908	1908	1856	1856	1884	1884	1884	1884	1884	1884	1884	1884	1884	1884	1856	1856	1912	1912	1154	1154	1260
15:45 - 16:00	1702	1702	2076	2076	2028	2028	2068	2068	2068	2068	2068	2068	2068	2068	2068	2068	2048	2048	2094	2094	1276	1276	1382
16:00 - 16:15	1698	1698	2138	2138	2094	2094	2124	2124	2124	2124	2124	2124	2124	2124	2124	2124	2070	2070	2144	2144	1256	1256	1386
16:15 - 16:30	1654	1654	2082	2082	2034	2034	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2016	2016	2066	2066	1146	1146	1274
16:30 - 16:45	1556	1556	1980	1980	1940	1940	1958	1958	1958	1958	1958	1958	1958	1958	1958	1958	1902	1902	1968	1968	1098	1098	1262
16:45 - 17:00	1442	1442	1870	1870	1806	1806	1824	1824	1824	1824	1824	1824	1824	1824	1824	1824	1756	1756	1830	1830	1008	1008	1134
17:00 - 17:15	1698	1698	2346	2346	2270	2270	2304	2304	2304	2304	2304	2304	2304	2304	2304	2304	2196	2196	2270	2270	1282	1282	1434
17:15 - 17:30	1820	1820	2386	2386	2306	2306	2322	2322	2322	2322	2322	2322	2322	2322	2322	2322	2200	2200	2262	2262	1162	1162	1266
17:30 - 17:45	1482	1482	1932	1932	1872	1872	1892	1892	1892	1892	1892	1892	1892	1892	1892	1892	1804	1804	1862	1862	980	980	1092
17:45 - 18:00	1200	1200	1532	1532	1492	1492	1516	1516	1516	1516	1516	1516	1516	1516	1516	1516	1382	1382	1426	1426	680	680	780

† B = Basic Segment, OFF = Off-Ramp, ON = On-Ramp, W = Weave, OV = Overlap

CRASH ANALYSIS

Reported crash data was analyzed to identify patterns and trends that may indicate an opportunity to reduce crash potential. Crash data was obtained from ODOT for the five-year period from October 1, 2012 through September 30, 2017. The data includes information about crash location, type, weather, roadway surface conditions, traffic control, and vehicle information.

Figure 5 through Figure 12 illustrates the location of 261 reported crashes within the I-5 corridor over the five-year study period. The figure classifies crashes by severity and indicates whether a pedestrian or bicyclist was involved. Crash severity is defined used KABCO injury-severity scale in the ODOT database. This scale was developed by the National Safety Council (NSC) and is frequently used by law enforcement for classifying injuries as:

- K – Fatal;
- A – Incapacitating injury;
- B – Non-incapacitating injury;
- C – Possible injury; and,
- O – No injury.

Table 7 summarizes the reported crashes during the 5-year analysis period from October 1, 2012 through September 30, 2017. During this period there were 5 fatal crashes. 2 crashes involved non-motorists who were illegally in the roadway, 2 crashes involved collision with a median or crash attenuator, and 1 crash involved a head-on collision where the driver was under the influence of alcohol.

Table 7: Summary of Crashes within the Study Corridor (2012-2017)

Crash Severity	Frequency	%
Property Damage Only	110	42.1%
Injury C	79	30.3%
Injury B	56	21.5%
Injury A	11	4.2%
Fatal	5	1.9%
Road Conditions	**Frequency**	**%**
Dry	156	59.8%
Wet	88	33.7%
Ice	12	4.6%
Snow	3	1.1%
Unknown	2	0.8%
Light Conditions	**Frequency**	**%**
Daylight	181	69.3%
Darkness - no street lights	42	16.1%
Darkness - with street lights	16	6.1%
Dawn (Twilight)	12	4.6%
Dusk (Twilight)	10	3.8%
Others	**Frequency**	**%**
Excessive Speed Involved	90	34.5%
Alcohol Involved	10	3.8%
Hit and Run	10	3.8%
Drugs Involved	2	0.8%
Collision Type	**Frequency**	**%**
Fixed-Object or Other-Object	116	44.4%
Rear-End	70	26.8%
Sideswipe-overtaking	47	18.0%
Miscellaneous	12	4.6%
Non-collision	9	3.4%
Head on	3	1.1%
Pedestrian	3	1.1%
Turning Movement	1	0.4%
Weather Conditions	**Frequency**	**%**
Clear	144	55.2%
Rain	77	29.5%
Cloudy	26	10.0%
Fog	8	3.1%
Snow	3	1.1%
Unknown	2	0.8%
Sleet	1	0.4%

Figure 5: Crash Types and Severity along I-5 (1 of 8)

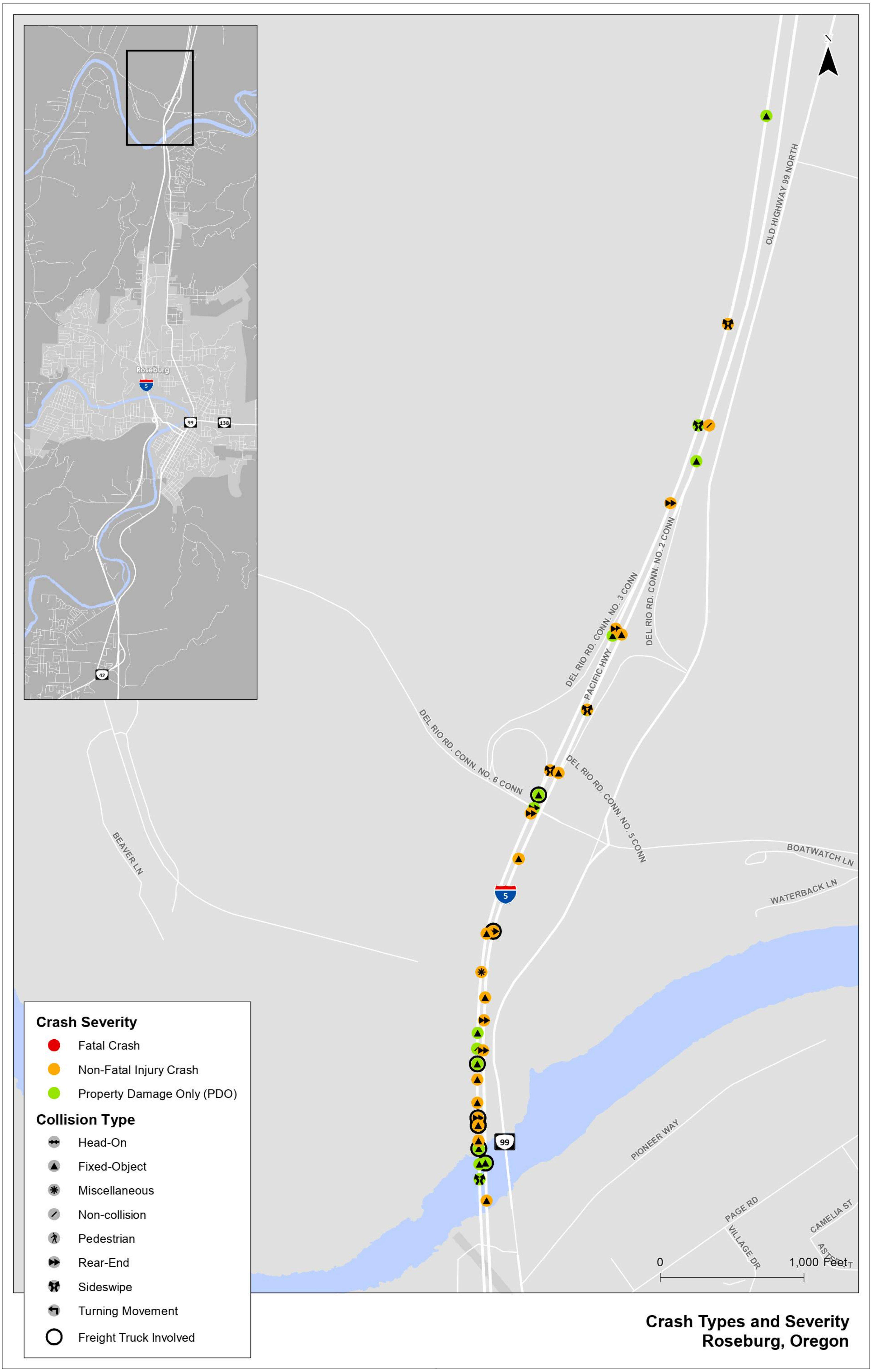


Figure 6: Crash Types and Severity along I-5 (2 of 8)

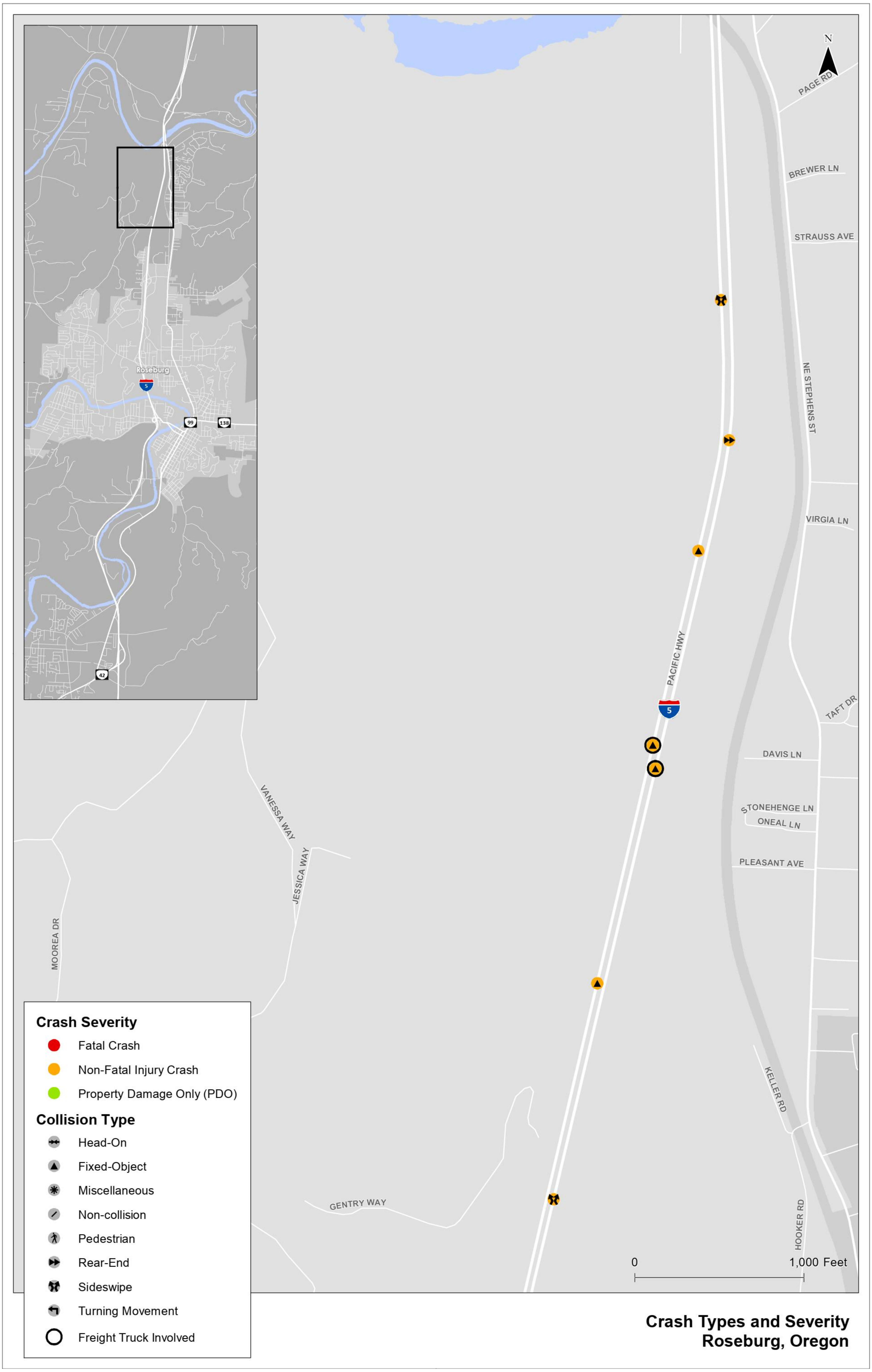


Figure 7: Crash Types and Severity along I-5 (3 of 8)

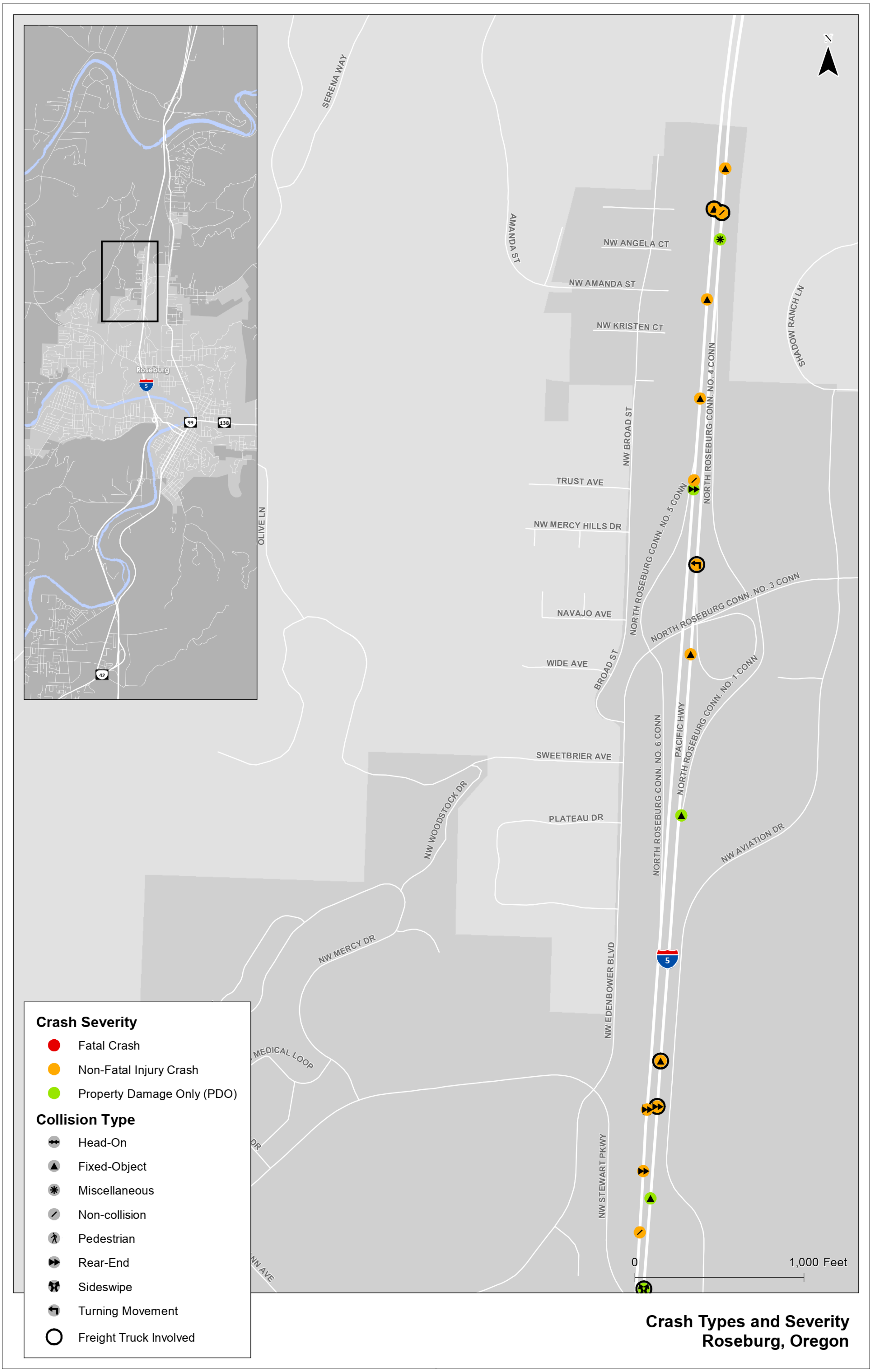


Figure 8: Crash Types and Severity along I-5 (4 of 8)

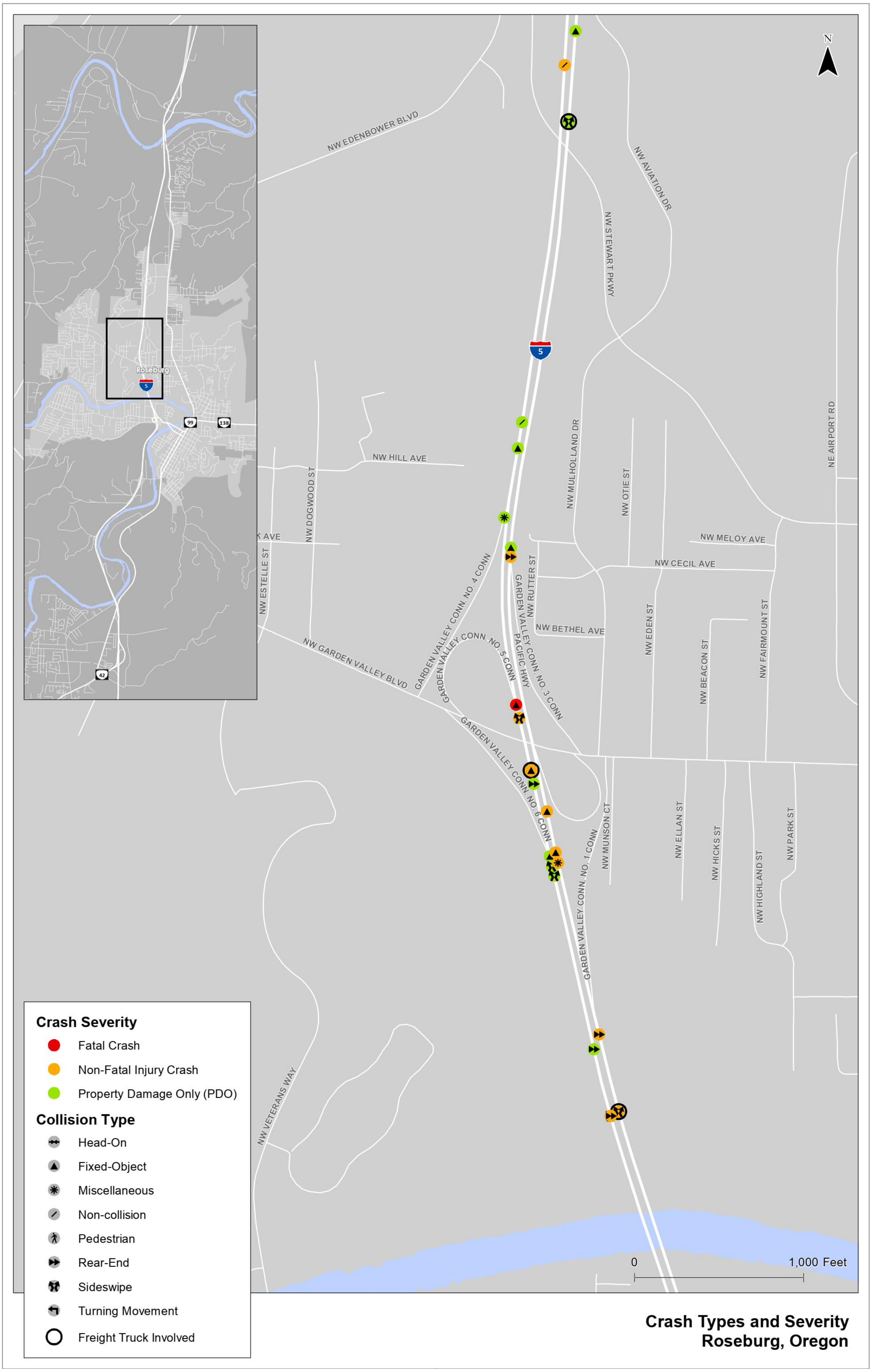


Figure 9: Crash Types and Severity along I-5 (5 of 8)

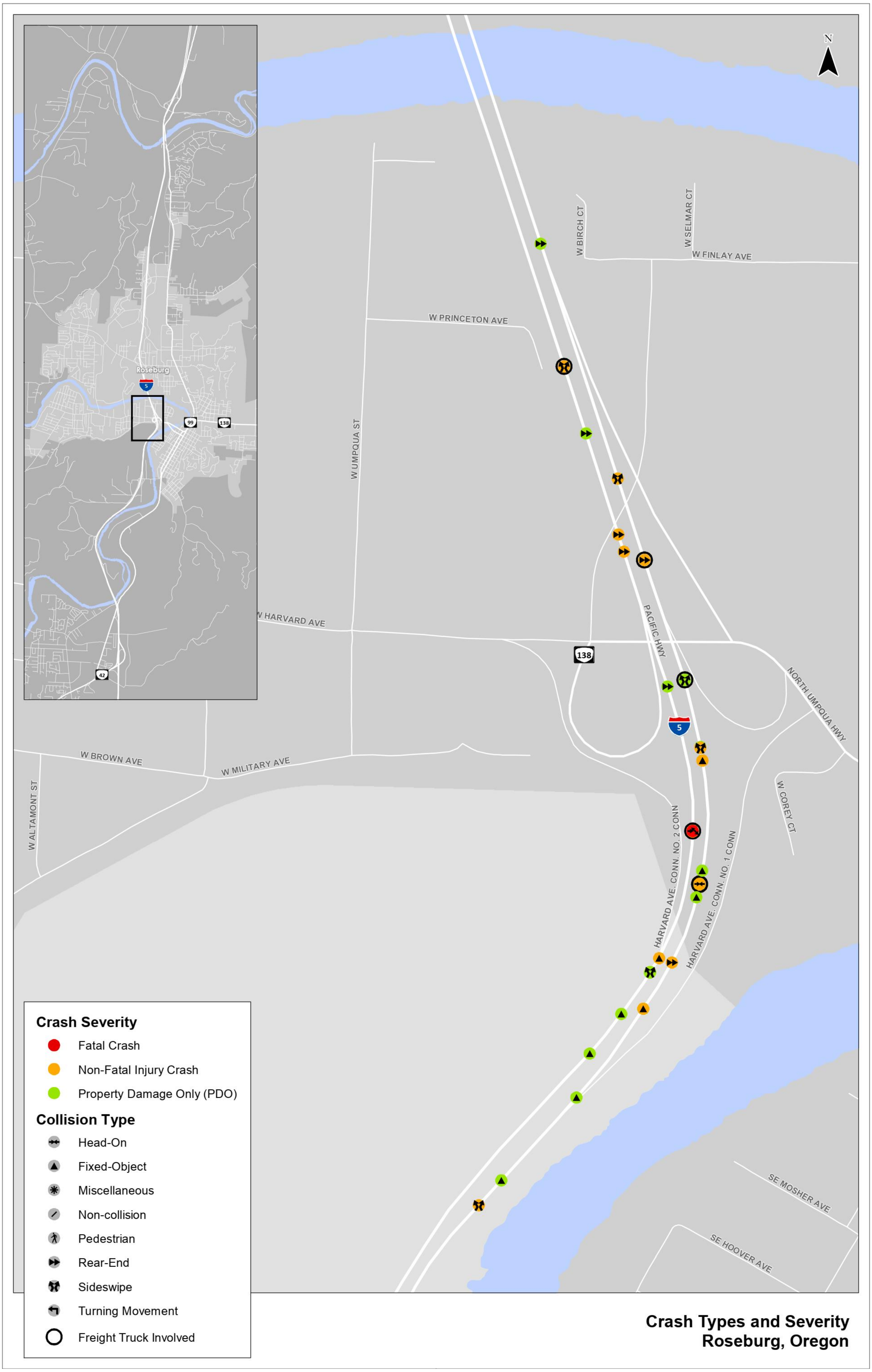


Figure 10: Crash Types and Severity along I-5 (6 of 8)

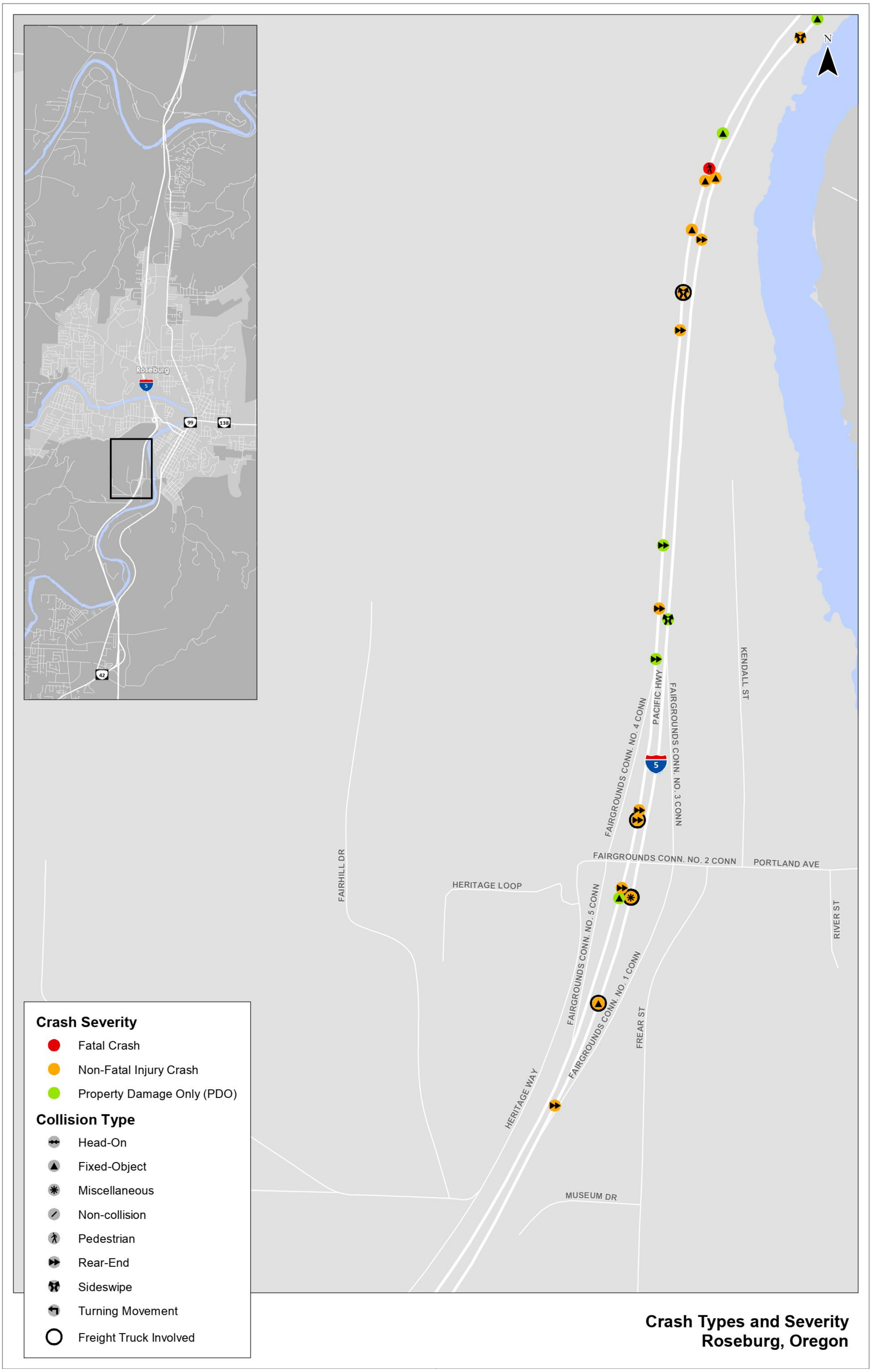


Figure 11: Crash Types and Severity along I-5 (7 of 8)

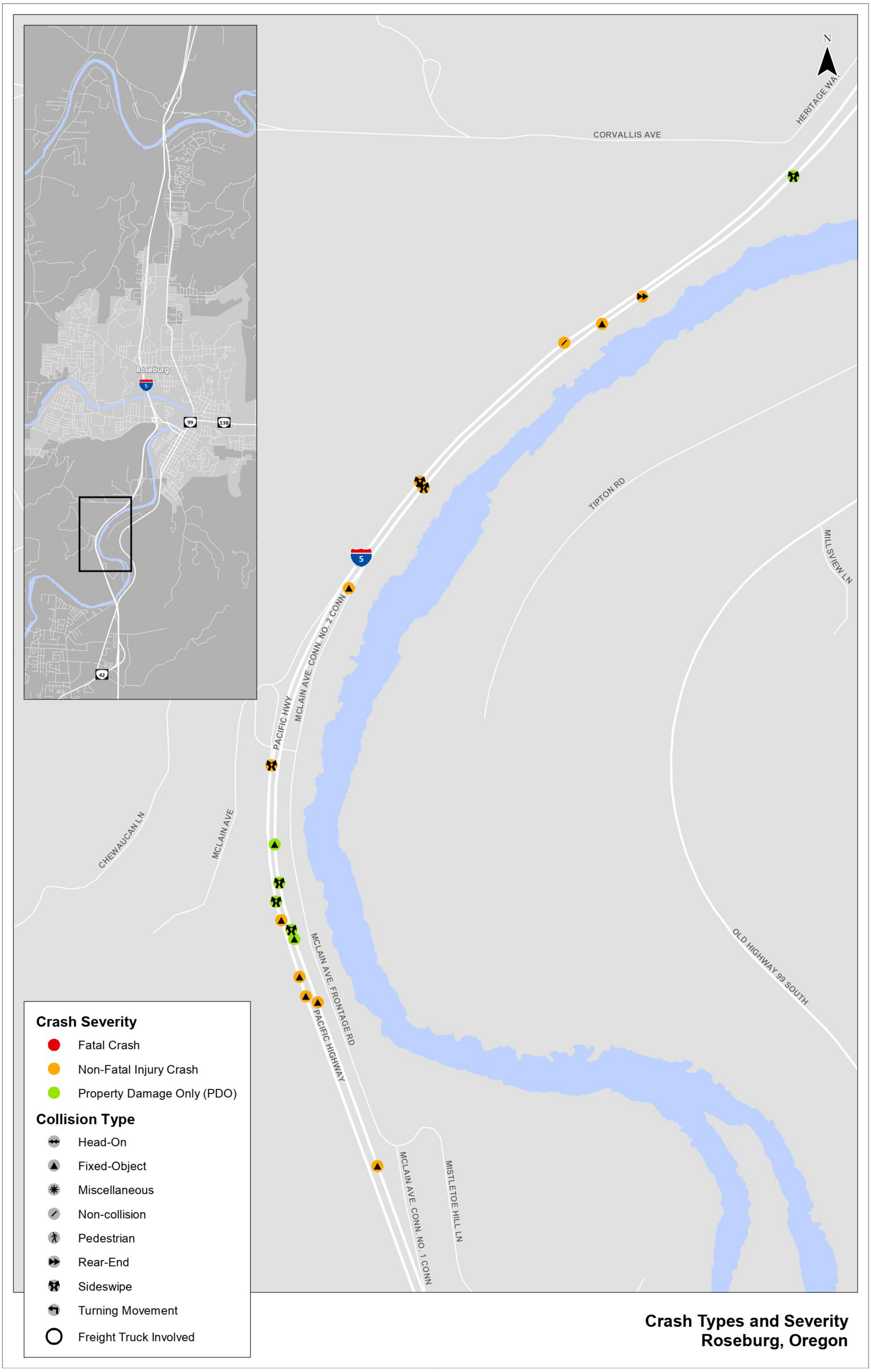
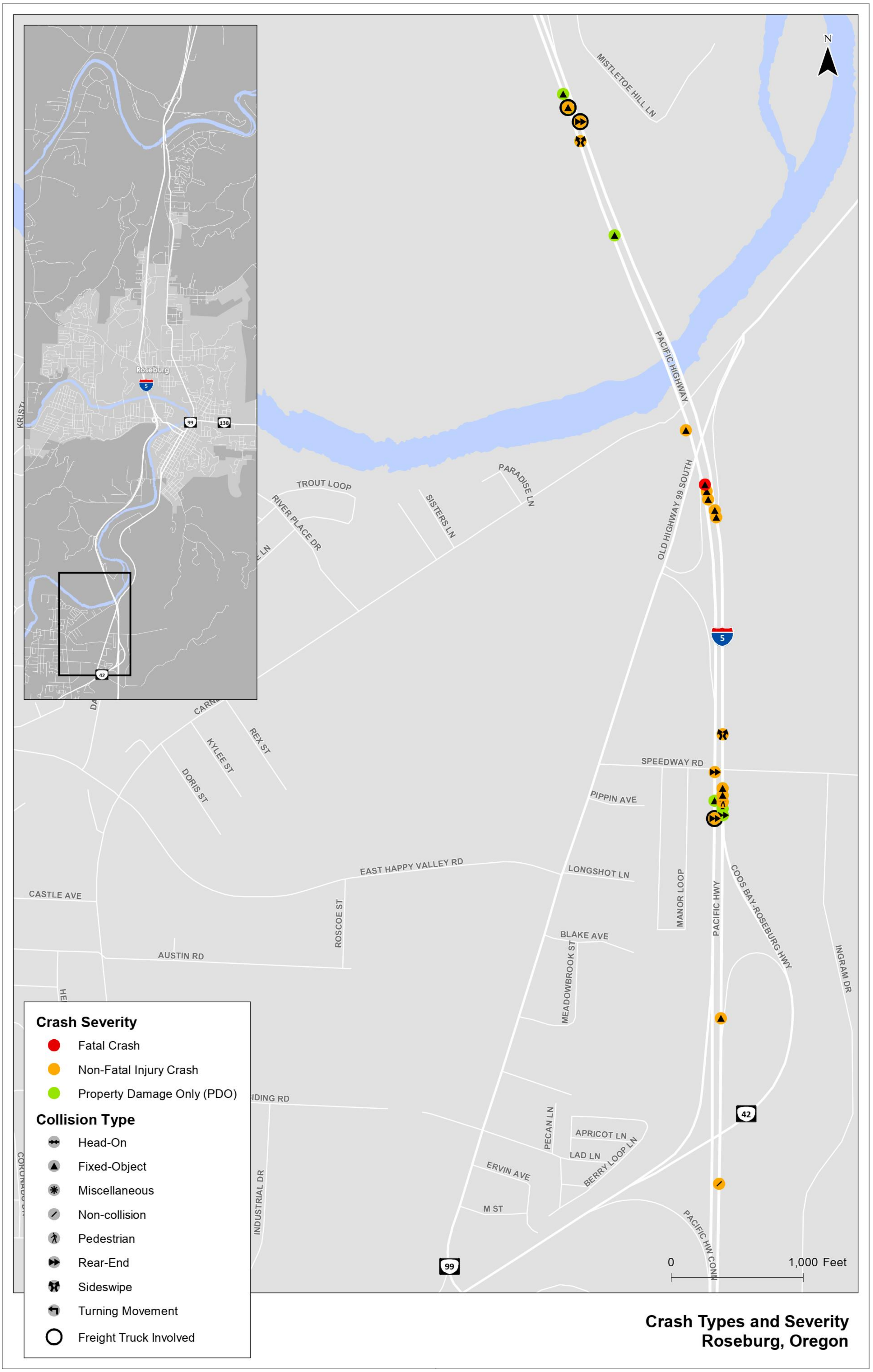


Figure 12: Crash Types and Severity along I-5 (8 of 8)



CRASH FREQUENCY, TYPE AND SEVERITY

Analysis of crash patterns is focused at the study segments and interchanges where the highest density of crashes exists. The following is a summary of key observations by location:

- **Exit 120** – There were 5 reported crashes involving collision with a crash attenuator associated with the off-ramps at Exit 120.
    - Three of these crashes occurred in the southbound direction while two occurred in the northbound direction.
    - No heavy vehicles/trucks were involved in the crashes.
    - One fatal crash occurred in the southbound direction reported on June 7, 2013, where the driver was under the influence of drugs.
    - The identified cause of four of the crashes ranged from inattention (resulting in an Injury A), improper change of traffic lanes (resulting in an Injury A), and improper driving.
    - Given the frequency and similar type of crashes, this location is identified as SPIS Top 10% Grouped Site (MP 120.36 – 120.48).
- **Exit 124** – There were 3 reported fatal crashes within the vicinity of Exit 124. The following summarizes the three crashes:
    - On July 31, 2013, a fatal crash involving a non-motorist occurred in the southbound direction, south of the Harvard Avenue Interchange (MP 123.6). The non-motorist was struck while illegally being on the highway. The non-motorist was identified as being under the influence of alcohol.
    - On January 29, 2014, a fatal crash involving a non-motorist was reported in the southbound direction between the Harvard Avenue loop off-ramp and on-ramp (MP 124). The non-motorist was struck while illegally being on the highway.
    - On March 19, 2017, a fatal head-on crash was reported in the southbound direction (MP 124) between the loop off-ramp and on-ramp. The crash was caused due to wrong way driving, driving in excess of the posted speed limit, and driving under the influence of alcohol.
- **Exit 124** – The segment of I-5 from MP 123.90 to 124.06 is identified as a SPIS Top 10% Grouped Site.
    - This segment includes the non-motorist fatalities identified above as well as 15 other crashes ranging from fixed-object collisions with guard rails, sliding or swerving due to wet conditions, and driving in excess of the posted speed limit.
- **Exit 125** – The segment of I-5 from MP 124.98 to 125.11 is identified as a SPIS Top 10% Grouped Site.
    - A fatal crash involving collision with a fixed object was reported on August 11, 2014 at the Garden Valley Boulevard southbound loop on-ramp. The motorist was identified as making an improper turn.

   - There were five rear-end collisions all occurring within the vicinity of the of the Garden Valley on- or off-ramps. Although difficult to determine if it is a contributing factor, some on these crashes occurred along or near the Exit 125 on ramps where the ramps have been found to not meet current acceleration length design standards.
   - There were three sideswipe collisions occurring along southbound I-5 at the southbound loop on-ramp of the southbound diamond on-ramp.
- **North Umpqua River Bridge to MP 129** – There were approximately 25 crashes located within vicinity of the North Umpqua River Bridge to Mile Post 129. 15 of the reported crashes involve a fixed-object collision, and 13 of the reported crashes involve drivers in excess of the posted speed limit. While crash details are limited, the narrow inside shoulder width of 4' in the southbound direction could be a contributing factor to some of these crashes. It is likely that vehicles are colliding with Jersey barriers since there is limited shoulder over the bridge.

FREIGHT ASSESSMENT

Freight usage was assessed using a variety of data sources, including mainline and ramp detector count data provided by ODOT, a historical review of crash data involving heavy vehicles, and 2045 forecast truck demands from the *Freight Analysis Framework Version 4* published by FHWA. The following summarizes the key points regarding the freight assessment:

- Based on ODOT detector count data, freight represents a relatively high usage of the study corridor. Approximately 24% of daily traffic on the I-5 study corridor are heavy vehicles – about 4% single unit trucks and 20% tractor trailer trucks. Statewide average truck percentages for similar facility types in small urban areas is 19%. From a traffic operations perspective, high truck usage can reduce the capacity of the I-5 study corridor compared to other typical rural freeway sections across the state. Truck percentages may be higher in Roseburg than other areas along I-5 based on Roseburg's industrial land uses and its lack of a parallel street system. Since heavy vehicles operate with different acceleration and deceleration profiles than automobiles, a relatively high percentage of trucks on a freeway segment can reduce the facility's operational performance.
- Based on data from the Freight Analysis Framework Version 4[1], it is expected there would be considerable growth in truck traffic on I-5 in the Roseburg, Oregon area. Annual Average Daily Truck Traffic is expected to generally increase by approximately 160% within Roseburg, Oregon from 12,000 daily trucks in 2012 to 30,000 daily trucks in 2045. Figure 13 and Figure 14 show the Average Annual Daily Truck Traffic on I-5 and other major roadways around Roseburg, Oregon.
- There were 37 reported crashes involving trucks on the I-5 study corridor – 14 (38%) are side-swipes, 11 (30%) are rear-end, and 7 (19%) are fixed-object crashes. 4 of the 7 fixed-object crashes occurred around the vicinity of the North Umpqua River.
- HCM-based operations analysis presented in this memorandum does not distinguish performance measures by vehicle class. Therefore, automobile performance measures such as level-of-service presented in earlier sections of this document applies to trucks.

[1] The Freight Analysis Framework (FAF), produced through a partnership between Bureau of Transportation Statistics and Federal Highway Administration, integrates data from a variety of sources to create a comprehensive picture of freight movement among states and major metropolitan areas by all modes of transportation.
https://faf.ornl.gov/fafweb/

Figure 13: 2012 Average Annual Daily Truck Traffic

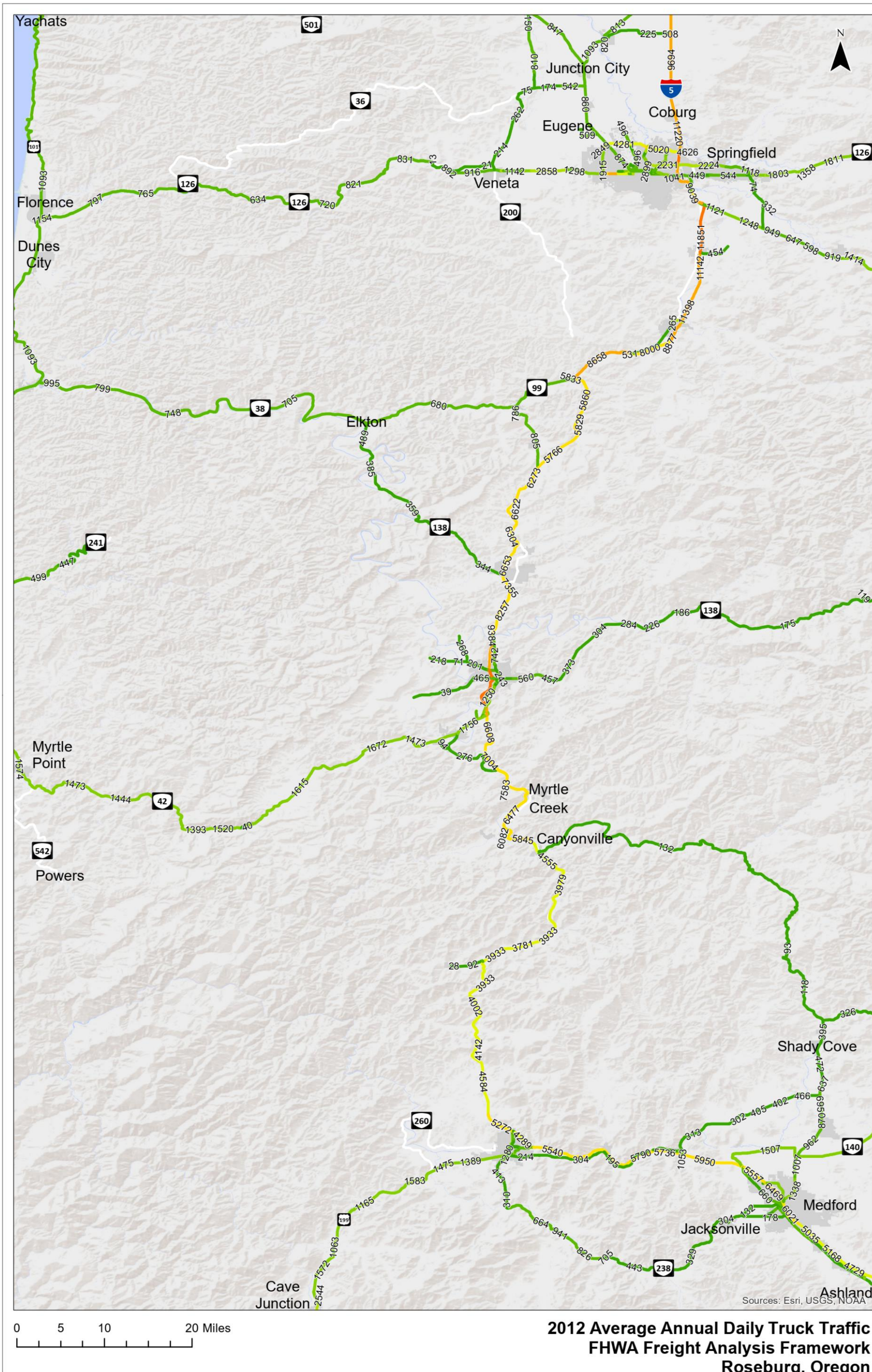
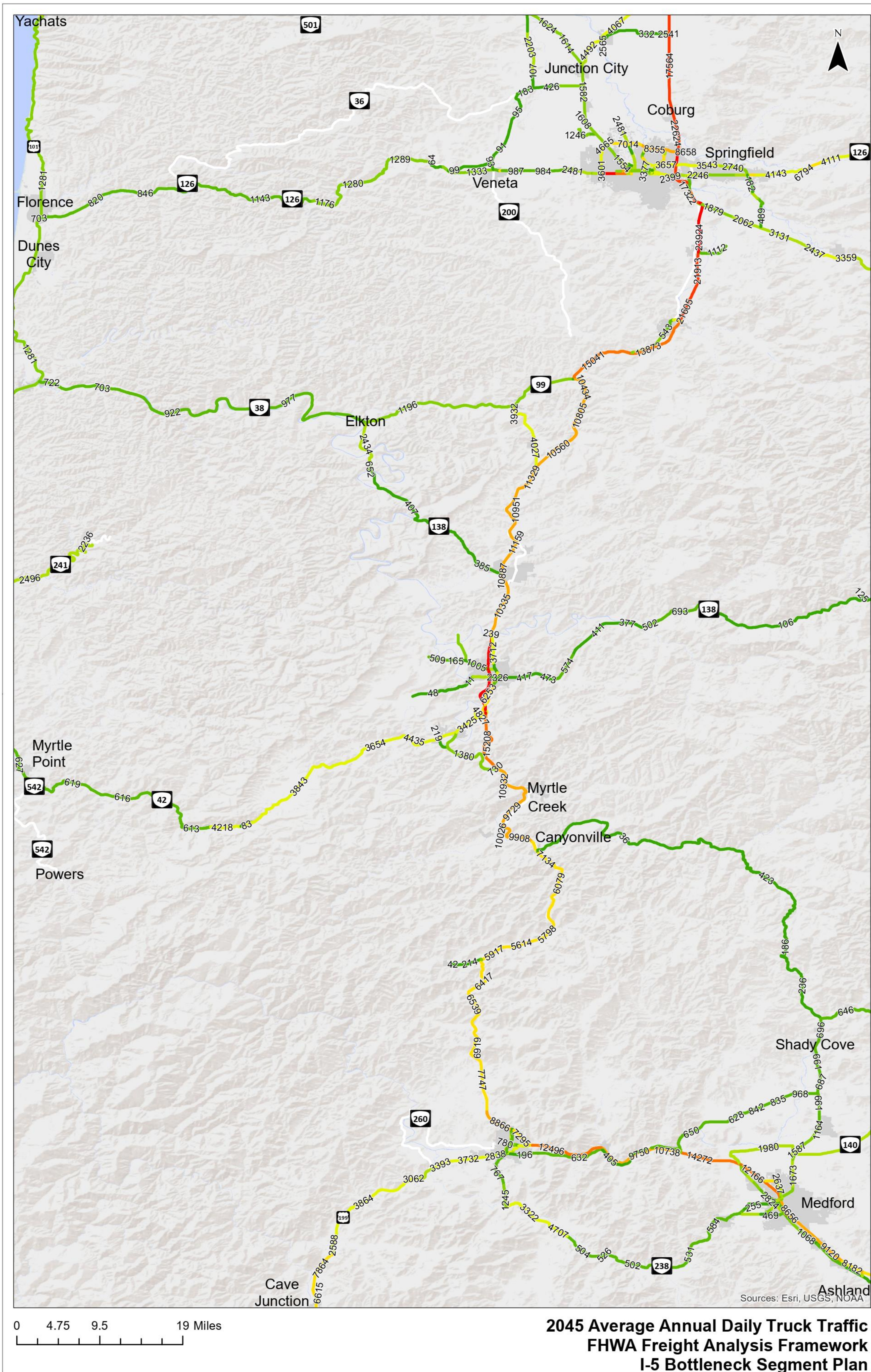


Figure 14: 2045 Average Annual Daily Truck Traffic



SYSTEM FINDINGS

The following key findings represent the project team's understanding of the traffic and safety issues within the study area based on the existing conditions analysis:

- **Travel Demand** –
    - The most heavily traveled portion of the I-5 study corridor on a typical weekday are the segments between Exits 119 and 125. This portion provides a regional connection between the City of Winston/Green and Roseburg. A lack of regional connectivity between these two urban areas tends to focus the peak hour traffic demand on I-5.
    - Within the urbanized segments of Roseburg, the highest recorded travel demand exists on the I-5 segments between Exits 124 and 125. This can be attributed to the limited local system connectivity between Harvard Avenue and Garden Valley Boulevard and high peak hour traffic generators (commercial/retail at Garden Valley Boulevard and Roseburg High School/downtown Roseburg access at Harvard Avenue) near the two interchanges.
    - Exit 124 Southbound Loop Off-Ramp – Queueing is currently observed on at the Exit 124 southbound looping off-ramp during the peak Roseburg High School traffic periods. During the peak school traffic periods, congestion at the interchange ramp terminal can cause off-ramp traffic to experience cycle failures and result in extended queue lengths along the off-ramp. These queues can influence the freeway mainline operations beyond what the HCM-based analysis results is able to capture.
    - Southbound Queues at Exit 121 – While not scoped and included as part of this study, it is noted that off-ramp traffic headed towards Douglas County Disposal and Recycling facility generates vehicle queues during the evening peak hours and weekends. Queueing from the southbound off-ramp at Exit 121 have been observed to spillback into the freeway mainline between 11:00 AM and 1:00 PM on Saturdays. Queue spillback onto the freeway has the potential to affect operational and safety performance of the freeway.
- **Corridor Capacity** – No I-5 study corridor segments currently exceed or approach capacity. Existing demand to capacity ratios generally do not exceed the applicable mobility targets during the weekday AM and PM peak periods with the exception of the following segments:
    - The I-5 northbound mainline segments that include the Exit 119 on-ramp and Exit 120 off-ramp either exceed or approach the applicable 0.70 mobility target during the both the weekday AM and PM peak periods. When exceeding the mobility target, it is only by a few percentage points and is limited to a relatively short (15-minute) period.
    - The I-5 southbound mainline segments that include the on- and off-ramps at Exit 120 and Exit 119 exceed or approach the applicable 0.70 mobility target during the weekday PM peak period. When exceeding the mobility target, it is only by a few percentage points and is limited to a relatively short (15-30 minute) period.

- While they don't exceed the applicable 0.80 mobility target, the southbound I-5 mainline segments that include the Exit 125 on-ramp, Exit 124 off- and on-ramps, and Exit 123 off- and on-ramps do approach their 0.80 mobility target during the weekday PM peak period.

- **Travel Time** - Average travel times based on field measured data obtained through iPeMS and from the HCM-based model is approximately 11-minutes for both the AM and PM peak periods, which represents an average travel speed of approximately 60 mph. Some segments (particularly the urbanized segments between Exits 123 and 127) had slower travel speeds due to higher travel demand and a lower posted speed limit.
- **Travel Time Reliability** – Travel time reliability analysis shows that travel time along the I-5 study segment is generally consistent in both directions during the AM and PM peak periods, with median travel times generally being 5 – 6 % greater than the free-flow travel time.
- **Freight Usage** –
  - Freight represents a relatively high usage of the study corridor, with heavy vehicles representing approximately 17% of the existing daily traffic. Approximately 11% of traffic are single unit trucks and 6% tractor trailer trucks. It is expected there would be approximately 160% increase in Annual Average Daily Truck Traffic from 2012 through 2045 on I-5 in the Roseburg, Oregon area.
  - Heavy Vehicle Traffic at Exit 119 – There is a heavier percentage of heavy vehicle traffic on the segments near Exit 119. This is due to a high concentration of industrial uses near the freeway, the presence of commercial truck stops, and the regional connections provided by OR 42.

- **Crash History -**
  - North Umpqua River Bridge Collisions – There were approximately 25 crashes located within vicinity of the North Umpqua River Bridge to Mile Post 129. 15 of the reported crashes involve a fixed-object collision, and 13 of the reported crashes involve drivers in excess of the posted speed limit. While crash details are limited, the narrow inside shoulder width of 4' in the southbound direction could be a contributing factor to some of these crashes. Visual observations appear to show a high frequency of sideswipe collisions with the adjacent jersey barriers.
  - Southbound Collisions at Exit 125 – There are numerous crashes reported in the southbound direction, including the fatal crash involving a fixed-object in 2014. The segment of I-5 from MP 124.98 to 125.11 is identified as a SPIS Top 10% Grouped Site.
  - There were 3 reported fatal crashes within the vicinity of Exit 124. Two of the crashes involved non-motorists on the roadway, while the other involved a wrong-way collision, driving in excess of the posted speed limit, and driving under the influence of alcohol. The segment of I-5 from MP 123.90 to 124.06 is identified as a SPIS Top 10% Grouped Site. The segment includes the fatal crashes described and 15 other crashes ranging from fixed-object collisions with guard rails, sliding or swerving due to wet conditions, and driving in excess of the posted speed limit.

- Fixed Object Crashes at Exit 120 – There were 5 reported crashes involving crash attenuators associated with the off-ramps at Exit 120. Three of the crashes occurred in the southbound direction, while the other two occurred in the northbound direction. Given the frequency and similar type of crashes, this location is identified as SPIS Top 10% Grouped Site (MP 120.36 – 120.48).

Appendix A Analysis Methodology, Data Collection, and Volume Development

ANALYSIS METHODOLOGY

The I-5 Bottleneck Segment Plan employs macroscopic traffic analysis based on the *Highway Capacity Manual (HCM) 6th Edition* procedures for freeway facility analysis, as implemented in the FREEVAL software. The analysis will be used to develop concept alternatives for the corridor. Analysis procedures for the HCM-based analysis was conducted consistent with the methodology outlined in the new Chapter 11 of the ODOT Analysis Procedures Manual V2. The analysis uses the Oregon DOT version of FREEVAL dated June 30, 2018.

Measurements for freeway segments such as ramp acceleration and deceleration lane lengths, and segment lengths were measured from Google Maps aerial imagery. Study corridor segmentation was based on HCM methodologies. The following describes a few exceptions to the segmentation of the study corridor:

- Ramp detector data for Exit 121 was not available for us in this study. On-ramp and off-ramp segments between Exit 120 and Exit 123 were assumed to be basic segments with no entering or exiting vehicles modeled.
- Basic freeway segments that were greater than 3,000 feet in length were divided in equal segments between 1,000 – 1,500 feet. This includes the freeway segment between (1) Exit 120 and Exit 123, and (2) Exit 127 and Exit 129.

Bottleneck capacities, assuming a rural driver population behavior, used in the HCM-based analysis are based on Oregon Default Values for Freeway Analysis provided in Chapter 11 of the *ODOT Analysis Procedures Manual, Version 2*, as shown in Exhibit 1. Other parameters, such as ramp free-flow speeds were assumed to be consistent with posted ramp advisory speed limits. If no posted advisory speed limits were present, the analysis assumed the Oregon Default Values for Freeway Analysis.

Exhibit 1: Oregon Default Values for Freeway Analysis

<table>
<tr><th>Required Data and Units</th><th>Source</th><th colspan="3">Suggested Default Value</th></tr>
<tr><td>Terrain Type</td><td>HPMS and ODOT Vertical Grade Information</td><td colspan="3">Generally level with few exceptions in the Cascade Range and Blue Mountains (see Exhibit 11-28)</td></tr>
<tr><td>Weave Volumes</td><td>Traffic Counts</td><td colspan="3">(Ramp to ramp flow) = (on-ramp flow)/(mainline flow) * (off-ramp flow)</td></tr>
<tr><td rowspan="2">Driver Population Factor</td><td rowspan="2">Exhibit 11-15</td><td>Rural:</td><td colspan="2">0.939</td></tr>
<tr><td>Urban:</td><td colspan="2">0.968</td></tr>
<tr><td>Free Flow Speed (mph)</td><td>ODOT TransGIS</td><td colspan="3">Speed Limit + 5 mph</td></tr>
<tr><td>Ramp Free Flow Speed (mph)</td><td>HCM 6th Edition, and ODOT 2012 HDM</td><td colspan="3">25 mi/h for loops ramps, 45 mi/h for diamond ramps</td></tr>
<tr><td>Jam Density (pc/mi/ln)</td><td>HCM 6th Edition</td><td colspan="3">190 pc/mi/ln</td></tr>
<tr><td>Queue Discharge Capacity Drop (%)</td><td>HCM 6th Edition</td><td colspan="3">7%</td></tr>
<tr><td rowspan="6">Default Bottleneck[2] Capacities (pc/hr/ln)</td><td rowspan="6">Florida DOT Defaults for Freeway Segments</td><td rowspan="2">Urban merge and diverge freeway segments</td><td>3 lanes</td><td>2,100</td></tr>
<tr><td>2: 3> lanes</td><td>2,000</td></tr>
<tr><td rowspan="2">Urban weaving freeway segments</td><td>3 lanes</td><td>2,200</td></tr>
<tr><td>2: 3> lanes</td><td>2,100</td></tr>
<tr><td rowspan="2">Rural merge and diverge segments</td><td>3 lanes</td><td>1,900</td></tr>
<tr><td>2: 3> lanes</td><td>1,800</td></tr>
</table>

In addition to evaluating average travel times on the I-5 study corridor, freeway travel time reliability was also evaluated for the I-5 study corridor. The reliability analysis included a year-long analysis of travel times along the I-5 study corridor to capture variations on travel times due to changes in travel demand, incidences, and weather effects. Key assumptions used in the reliability analysis are described below:

- Daily demand multipliers capture the variation in travel demand by day-of-week and month-of-year. ODOT's Automatic Traffic Recorder 10-005, located 0.30 miles north of Exit 129, was used to develop the month-of-year variations. Day-of-week variations were assumed to be consistent with national averages provided in the HCM 6th Edition. Exhibit 2 summarizes the daily demand multipliers used in the freeway reliability analysis.

- Incidents are non-reoccurring events that temporarily reduce capacity along the freeway segment. Incident frequencies were developed assuming the HCM-default national average of 4.9 incidents per reported crash. Crash frequencies by month-of-year was calculated using ODOT crash data and used to develop the incident frequencies. Exhibit 3 summarizes the incident frequencies used in the freeway reliability analysis.

- Severe weather may temporarily reduce speeds and capacity, as well as influence travel demand along the analysis freeway segment. Regional weather data for the Portland Metropolitan Area, as shown in Exhibit 4, was used in the freeway reliability analysis. Further guidance for default values for freeway reliability analysis is currently under development for Chapter 11 of the *ODOT*

[2] Per *HCM 6th Edition*, a bottleneck is a location where the capacity provided is insufficient to meet the demand over a given period of time.

Analysis Procedures Manual, Version 2. The update may include further guidance on default weather data that is more applicable to the Roseburg, Oregon area.

Exhibit 2: Daily Demand Multipliers

	Monday	Tuesday	Wednesday	Thursday	Friday
January	0.90	0.90	0.88	0.85	0.76
February	0.94	0.94	0.92	0.90	0.80
March	1.02	1.02	1.00	0.97	0.87
April	1.02	1.02	1.00	0.97	0.87
May	1.06	1.06	1.04	1.01	0.90
June	1.16	1.16	1.14	1.11	0.99
July	1.18	1.18	1.16	1.13	1.01
August	1.17	1.17	1.15	1.12	1.00
September	1.09	1.09	1.07	1.04	0.93
October	1.02	1.02	1.00	0.97	0.87
November	1.04	1.04	1.02	0.99	0.89
December	1.05	1.05	1.02	0.99	0.89

Exhibit 3: Incident Frequencies Along the I-5 Study Corridor

Month	Crashes (2012-2017)	Average Crash Rate	Incident Frequency†
January	20	40.23	0.08
February	18	34.48	0.07
March	21	37.15	0.08
April	21	37.11	0.08
May	17	28.89	0.06
June	19	29.46	0.06
July	27	41.14	0.08
August	27	41.53	0.09
September	17	28.16	0.06
October	24	42.61	0.09
November	25	43.23	0.09
December	25	43.12	0.09

† Frequencies represent the number of incidents per study period per month.

Exhibit 4: Probability, Duration and Adjustment Factors for Weather Events based on Portland, OR

	Medium Rain	Heavy Rain	Light Snow	Light-Medium Snow	Medium-Heavy Snow	Heavy Snow	Severe Cold	Low Visibility	Very Low Visibility	Minimal Visibility	Normal Weather
January	1.0%	0.2%	1.6%	0.0%	0.1%	0.0%	0.0%	1.5%	0.0%	5.4%	90.2%
February	0.4%	0.1%	0.3%	0.1%	0.0%	0.0%	0.0%	1.5%	0.0%	7.4%	90.1%
March	1.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	1.6%	0.0%	1.8%	95.5%
April	0.5%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	0.0%	0.7%	98.0%
May	0.4%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.1%	99.2%
June	0.4%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	99.5%
July	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	99.8%
August	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	99.6%
September	0.3%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%	0.0%	0.8%	97.9%
October	0.8%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	2.0%	0.0%	5.0%	92.0%
November	1.9%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	2.8%	0.0%	7.2%	87.6%

December	1.9%	0.3%	2.0%	0.1%	0.0%	0.0%	0.0%	0.9%	0.0%	3.8%	91.0%
Avg Dur (min)	37.9	18.3	112.6	20.5	21.9	6.6	0.0	37.4	0.0	131.2	-
CAF	0.93	0.86	0.96	0.91	0.89	0.78	0.92	0.90	0.88	0.90	1.00
SAF	0.94	0.93	0.89	0.88	0.86	0.85	0.94	0.94	0.93	0.93	1.00
DAF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

DATA COLLECTION AND VOLUME DEVELOPMENT

ODOT provided 24-hour detector count data for all freeway mainline, on-ramp and off-ramp detectors along the I-5 study corridor. The detector data includes vehicles classification counts, and counts aggregated into 15-minute intervals for the 4-hour peak periods between 6:00 AM – 10:00 AM and 2:00 PM – 6:00 PM. Traffic count data were provided in hourly intervals for all other times of day. Data collection dates varied depending on the specific detector, but the traffic counts were generally collected between April and May 2017. Exhibit 5 and Exhibit 6 summarizes the detector location and data collection dates used in the traffic analysis models.

The following describes the volume development process of converting the detector counts into volume inputs for the traffic analysis models:

- In the northbound direction, the freeway mainline volumes used in the traffic analysis was based on ODOT Site #10015, which is the southern-most mainline detector on the study corridor located just south of Exit 119.
- In the southbound direction, the northern-most freeway mainline detector is located just north of Exit 129. However, the detector counts at this location was only available in hourly intervals. To capture peak period volume profiles in 15-minute intervals, detector counts from ODOT Site #47, which is located just south of the Winchester Interchange, was used instead.
- Average heavy vehicle percentages were calculated for single unit trucks and tractor trailer trucks for each mainline and ramp segment. Individual percentages were calculated for the AM and PM peak period. Exhibit 7 and Exhibit 8 summarizes the truck percentages for all entering vehicles into the I-5 study segment.

In addition, 24-hour field travel time data was downloaded using ODOT iPeMS for the study corridor. Field travel time data for Monday through Thursday from April 3, 2018 through April 13, 2018 was used for calibration of traffic analysis models. Exhibit 9 shows the travel time data extracted from the iPeMS site services.

RAW DATA SOURCES

Many of the data sources used in the existing conditions analysis were not originally provided in a printable format. The following raw data sources used in the existing conditions analysis will be provided digitally upon request:

- Volume Development Spreadsheet
- ODOT Ramp and Mainline Detector Data
- ODOT Crash Data
- Freight Analysis Framework Version 4 Database

Exhibit 5: Summary of Freeway Detector Counts Provided by ODOT

ODOT Site #	Location Name	Data Collection Date
47	On I-5, 0.10 mile south of Exit 129	5/2/2017 – 5/3/2017
10015	On I-5, south of Exit 119	5/2/2017 – 5/3/2017

Exhibit 6: Summary of Ramp Detector Counts Provided by ODOT

ODOT Site #	Location Name	Data Collection Date
99915677	Exit 129 SB Diagonal Off-Ramp	4/3/2017 – 4/5/2017
99916068	Exit 129 NB Diagonal On-Ramp	4/10/2017 – 4/12/2017
99916025	Exit 129 NB Diagonal Off-Ramp	4/10/2017 – 4/12/2017
99916026	Exit 129 SB Loop On-Ramp	4/3/2017 – 4/5/2017
99916061	Exit 127 SB Diagonal Off-Ramp	4/3/2017 – 4/5/2017
99916060	Exit 127 NB Diagonal On-Ramp	4/10/2017 – 4/12/2017
99917929	Exit 127 NB Loop On-Ramp	4/10/2017 – 4/12/2017
99916056	Exit 127 NB Diagonal Off-Ramp	4/10/2017 – 4/12/2017
99916062	Exit 127 SB Diagonal On-Ramp	4/3/2017 – 4/5/2017
99915673	Exit 125 SB Diagonal Off-Ramp	4/3/2017 – 4/5/2017
20928	Exit 125 NB Diagonal On-Ramp	4/10/2017 – 4/12/2017
20927	Exit 125 NB Loop On-Ramp	4/10/2017 – 4/12/2017
20929	Exit 125 SB Loop On-Ramp	4/3/2017 – 4/5/2017
99915670	Exit 125 NB Diagonal Off-Ramp	4/10/2017 – 4/12/2017
20926	Exit 125 SB Diagonal On-Ramp	4/3/2017 – 4/5/2017
99915668	Exit 124 NB Diagonal Off-Ramp	4/10/2017 – 4/12/2017
99917466	Exit 124 NB Loop On-Ramp	4/10/2017 – 4/12/2017
99917459	Exit 124 SB Loop Off-Ramp	4/3/2017 – 4/5/2017
99915669	Exit 124 SB Diagonal On-Ramp	4/3/2017 – 4/5/2017
99917462	Exit 124 NB Diagonal On-Ramp	4/10/2017 – 4/12/2017
99915666	Exit 123 SB Diagonal Off-Ramp	4/3/2017 – 4/5/2017
99915665	Exit 123 NB Diagonal On-Ramp	4/10/2017 – 4/12/2017
99915663	Exit 123 NB Diagonal Off-Ramp	4/10/2017 – 4/12/2017
99915667	Exit 123 SB Diagonal On-Ramp	4/3/2017 – 4/5/2017
99916053	Exit 120 SB Diagonal Off-Ramp	4/3/2017 – 4/5/2017
99915657	Exit 120 NB Diagonal Off-Ramp	4/10/2017 – 4/12/2017
99916069	Exit 120 SB Loop On-Ramp	4/3/2017 – 4/5/2017
99915656	Exit 119 NB Loop Off-Ramp	4/10/2017 – 4/12/2017
99916944	Exit 119 NB Diagonal On-Ramp	4/10/2017 – 4/12/2017
99916945	Exit 119 SB Diagonal Off-Ramp	4/3/2017 – 4/5/2017
99916950	Exit 119 SB Diagonal On-Ramp	4/3/2017 – 4/5/2017

Exhibit 7: Truck Percentages for I-5 Northbound

Location	AM Peak Hour		PM Peak Hour	
	Single Unit	Tractor Trailer	Single Unit	Tractor Trailer
Mainline, South of Exit 119	5%	17%	4%	25%
Exit 119 Diagonal On-Ramp	11%	16%	10%	18%
Exit 119 Loop Off-Ramp	9%	4%	10%	4%
Exit 120 Diagonal Off-Ramp	13%	5%	13%	5%
Exit 123 Diagonal Off-Ramp	24%	4%	14%	5%
Exit 123 Diagonal On-Ramp	13%	1%	10%	2%
Exit 124 Diagonal On-Ramp	8%	1%	8%	1%
Exit 124 Loop On-Ramp	8%	1%	7%	1%
Exit 124 Diagonal Off-Ramp	13%	2%	7%	2%
Exit 125 Diagonal Off-Ramp	7%	2%	7%	2%
Exit 125 Loop On-Ramp	9%	3%	7%	1%
Exit 125 Diagonal On-Ramp	13%	2%	10%	1%
Exit 127 Diagonal Off-Ramp	10%	2%	10%	1%
Exit 127 Loop On-Ramp	8%	2%	6%	1%
Exit 127 On-Ramp	14%	6%	11%	2%
Exit 129 Diagonal Off-Ramp	10%	4%	13%	2%
Exit 129 Diagonal On-Ramp	24%	9%	10%	3%

Exhibit 8: Truck Percentage for I-5 Southbound

Location	AM Peak Hour		PM Peak Hour	
	Single Unit	Tractor Trailer	Single Unit	Tractor Trailer
Mainline, North of Exit 129	3%	17%	3%	19%
Exit 129 SB Diagonal Off-Ramp	7%	18%	11%	11%
Exit 129 SB Loop On-Ramp	10%	3%	11%	2%
Exit 127 SB Diagonal Off-Ramp	7%	2%	9%	2%
Exit 127 SB Diagonal On-Ramp	8%	3%	6%	1%
Exit 125 SB Diagonal Off-Ramp	8%	3%	9%	2%
Exit 125 SB Loop On-Ramp	8%	2%	6%	0%
Exit 125 SB Diagonal On-Ramp	11%	2%	7%	1%
Exit 124 SB Loop Off-Ramp	7%	4%	7%	2%
Exit 124 SB Diagonal On-Ramp	9%	3%	6%	1%
Exit 123 SB Diagonal Off-Ramp	24%	6%	12%	3%
Exit 123 SB Diagonal On-Ramp	31%	24%	29%	11%
Exit 120 SB Diagonal Off-Ramp	4%	1%	17%	2%
Exit 120 SB Loop On-Ramp	22%	15%	17%	5%
Exit 119 SB Diagonal Off-Ramp	11%	9%	7%	6%
Exit 119 SB Diagonal On-Ramp	14%	22%	10%	19%

Exhibit 9: iPeMS travel time data collected (minutes) between 4/3/2017 – 4/28/2017

Northbound

Time	15th	Median	85th
0:00	11.24	11.41	11.77
1:00	10.96	11.4	11.55
2:00	10.94	11.17	11.81
3:00	10.98	11.47	11.74
4:00	10.81	11.37	11.59
5:00	11.15	11.4	11.7
6:00	11.2	11.33	11.56
7:00	10.95	11.22	11.34
8:00	11.03	11.29	11.42
9:00	11.03	11.17	11.44
10:00	10.97	11.12	11.24
11:00	11	11.2	11.37
12:00	11.04	11.15	11.43
13:00	11.06	11.22	11.42
14:00	11.16	11.24	11.4
15:00	11.11	11.26	11.39
16:00	11.06	11.22	11.35
17:00	10.94	11.22	11.5
18:00	11.23	11.42	11.53
19:00	11.34	11.57	11.69
20:00	11.42	11.52	11.73
21:00	11.43	11.53	11.78
22:00	11.39	11.63	11.84
23:00	11.26	11.53	11.89

Southbound

Time	15th	Median	85th
0:00	11.17	11.68	11.81
1:00	11.22	11.43	11.65
2:00	11.25	11.59	11.87
3:00	11.27	11.37	11.72
4:00	10.99	11.3	12.12
5:00	10.89	11.32	11.6
6:00	10.96	11.15	11.42
7:00	10.73	11.05	11.37
8:00	10.86	11.06	11.17
9:00	10.8	11.19	11.32
10:00	10.88	11.24	11.41
11:00	10.93	11.17	11.43
12:00	10.98	11.24	11.52
13:00	11.19	11.24	11.46
14:00	11.24	11.29	11.49
15:00	11.16	11.25	11.51
16:00	11.09	11.29	11.42
17:00	11.14	11.28	11.45
18:00	11.36	11.5	11.61
19:00	11.19	11.39	11.67
20:00	11.39	11.54	11.72
21:00	11.52	11.59	11.82
22:00	11.54	11.8	12.01
23:00	11.54	11.63	11.71

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TECHNICAL MEMORANDUM #4

Date:	August 18, 2020	Project #: 21339
To:	Thomas Guevara Oregon Department of Transportation 3500 NW Stewart Parkway Roseburg, OR 97470	
From:	Bryan Graveline, Yi-Min Ha, Matt Hughart	
Project:	I-5 Bottleneck Corridor Segment Plan	
Subject:	Future Baseline (No Build)	

This memorandum provides a summary of the future baseline (no build) traffic operations along the 11-mile segment of I-5 from Exist 129 to Exit 119. The future no build conditions analysis includes a freeway traffic operations analysis, a future crash analysis, and a future freight assessment along the corridor. Figure 1 and Figure 2 show the study limits for the future baseline conditions analysis.

MOBILITY TARGET RECAP

The future no-build baseline analysis uses the mobility targets as shown in Table 6 of the Oregon Highway Plan. As an Interstate Highway with speeds greater than 45 mph, a v/c ratio mobility target of 0.80 applies to all I-5 segments within the Roseburg Urban Growth Boundary (Exit 123, 124, 125, 127 & 129). A v/c ratio mobility target of 0.70 applies for I-5 segments located outside formally defined Urban Growth Boundaries in unincorporated communities or rural lands (Exit 119 and 120).

Although the focus of this analysis is a future no-build scenario, the upcoming concept alternatives will use the design-mobility standards shown in Table 10-2 of the *Oregon Highway Design Manual* (HDM). The HDM v/c ratio applies to project development work and refinement studies. As an Interstate Highway with speeds greater than 45 mph, a v/c ratio design-mobility target of 0.65 will apply for I-5 segments within the Roseburg Urban Growth Boundary (UGB). A v/c ratio design-mobility target of 0.60 will apply for I-5 segments when located outside the Roseburg UGB.

Figure 1: Study Corridor

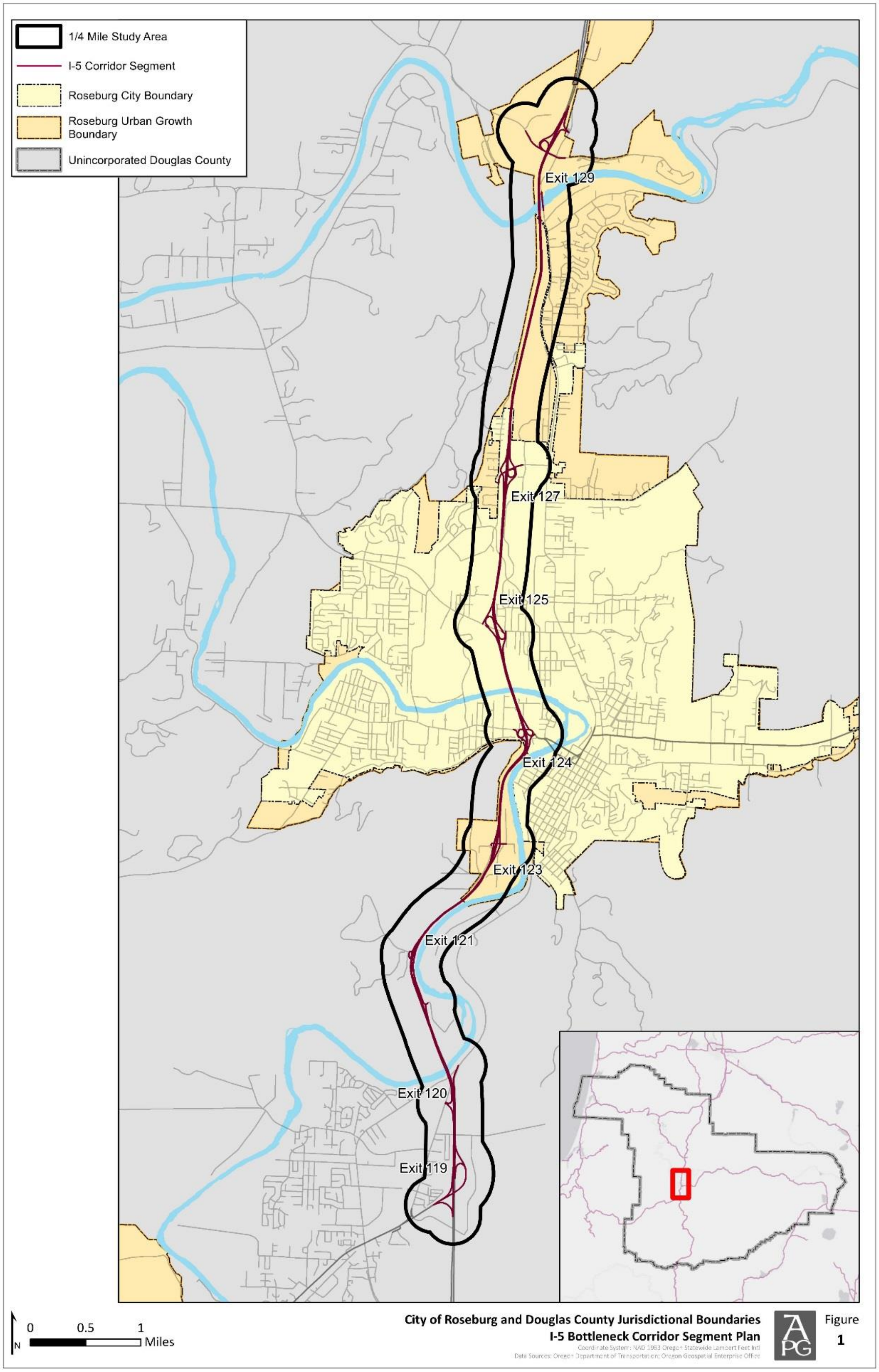
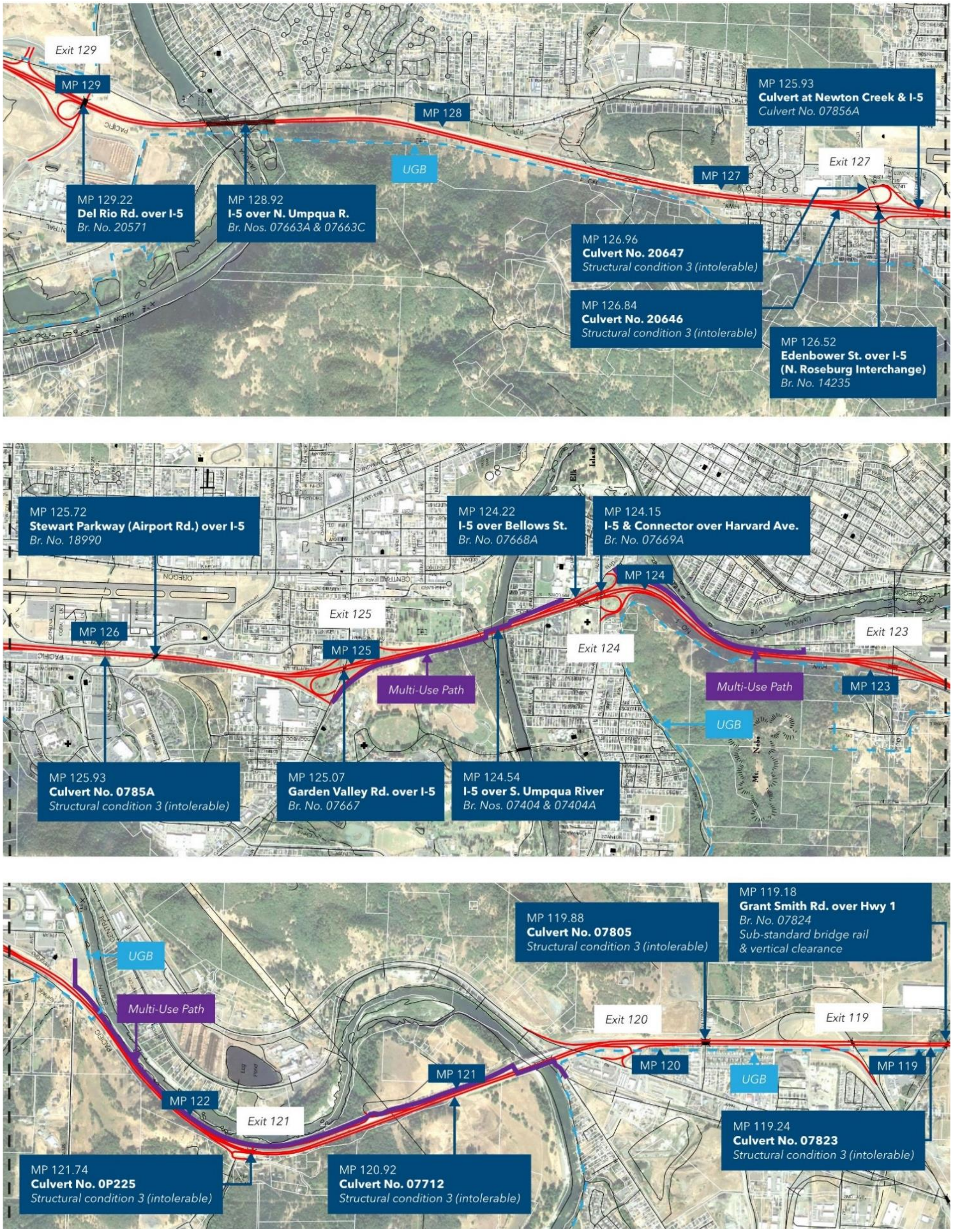


Figure 2: Study Corridor with Interchange Details



TRAFFIC OPERATIONS

Future Volume Development

Previous long-term traffic forecasting work in the Roseburg area has noted the potential for significant traffic volume growth along the I-5 corridor between Exits 119 and 129. In recognition of this previous analysis, the I-5 Bottleneck Corridor Segment Plan formally developed long-term peak hour traffic volumes for the I-5 study corridor. These volumes were determined using future fiscally-constrained forecast outputs from the Roseburg Travel Demand Model. This is the same travel demand model used to develop the recently completed Roseburg Transportation System Plan.

The travel demand model provides base year 2015 and forecast year 2040 traffic volume projections that reflect anticipated land use changes and planned transportation improvements within the study area. The forecast traffic volumes were developed by applying the post-processing methodology presented in the National Cooperative Highway Research Program (NCHRP) Report 765 *Analytical Travel Forecasting Approaches for Project-Level Planning and Design*, in conjunction with engineering judgment and knowledge of the study area.

Figure 3 and Figure 4 illustrate the volume development process. The data points are shown as follows:

- 2018 Counts: ODOT provided 24-hour detector count data for all freeway mainline, on-ramp, and off-ramp detectors along the I-5 study corridor. The counts were collected between April and May 2017. The volume development process described in *Technical Memorandum #3* was used to convert the detector counts into volume inputs.
- 2018 Model Interpolation: 2010 base model volumes were obtained from the Roseburg Travel Demand Model. Outputs from the I-5 mainline and all ramps within the study area were used to determine the 2010 base volumes at each segment along the mainline. To match the 2018 counts obtained from ODOT, a 2018 model demand was linearly interpolated from the 2010 model demand and the 2040 model demand.
- 2040 Model Demands: 2040 model demands were obtained from the fiscally constrained forecast outputs from the Roseburg Travel Demand Model. Outputs from the I-5 mainline and all ramps within the study area were used to determine the 2040 forecast volumes at each segment along the mainline.
- 2040 NCHRP 765 Volumes: Using the 2018 model demand interpolation, 2018 counts, and 2040 model demand, NCHRP 765 methodology was applied to determine the forecasted 2040 volume. These forecast volumes were used to inform the future operations analysis presented within this memorandum.

Figure 3. I-5 Northbound Future Year (2040) PM Peak Hour Traffic Volume Development

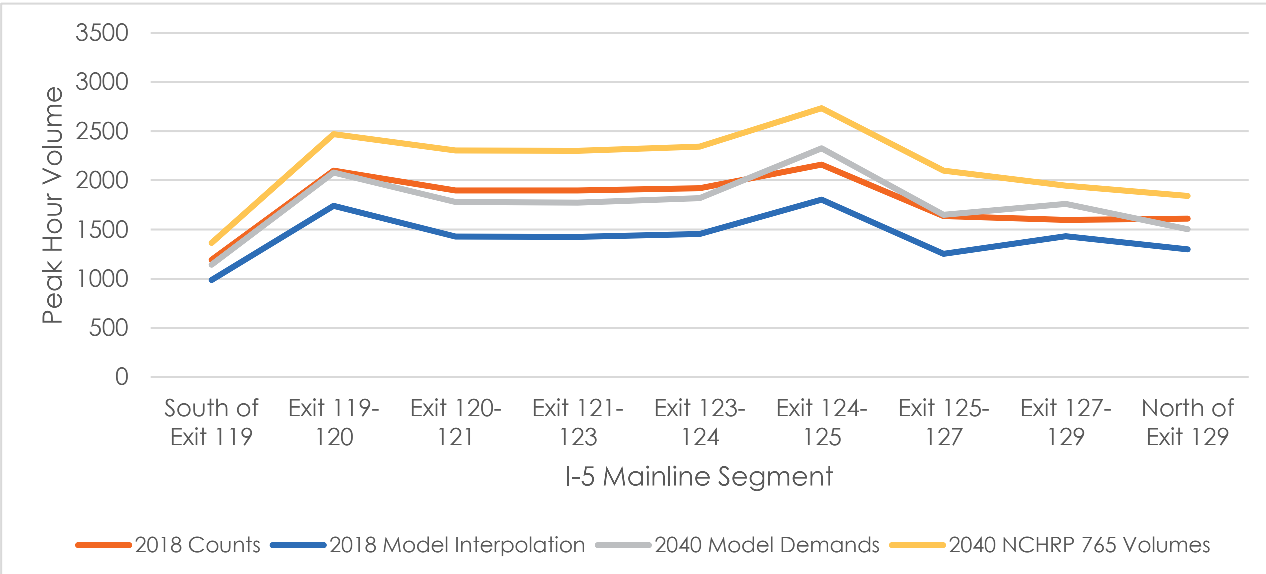
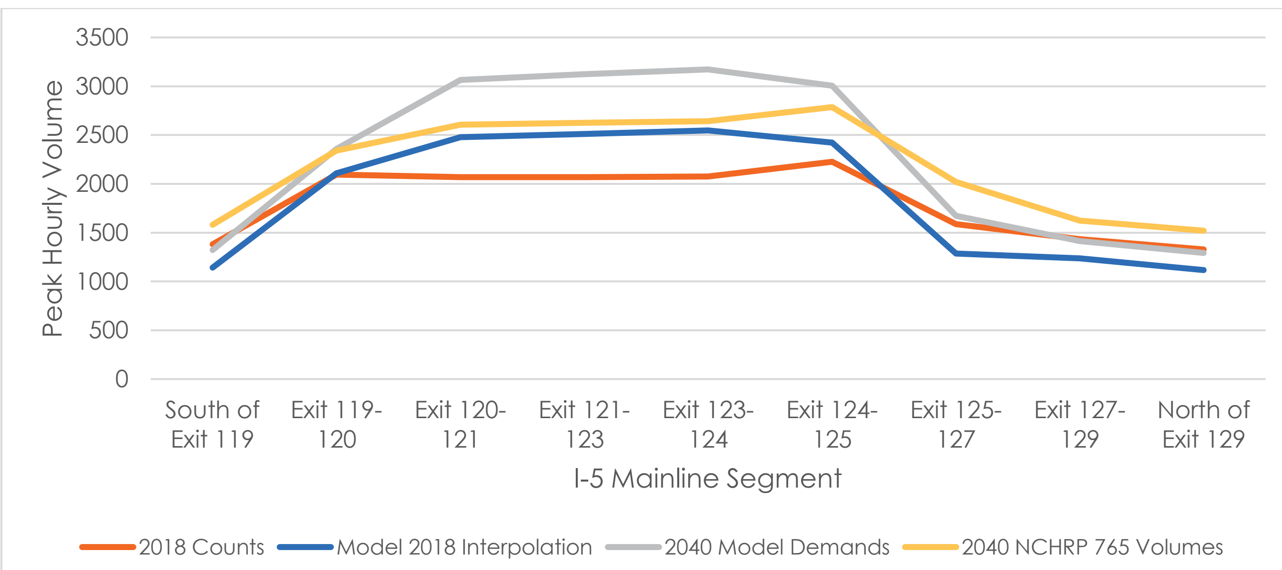


Figure 4. I-5 Southbound Future Year (2040) PM Peak Hour Volume Development



Important takeaways from the future volume output include:

- 2040 I-5 northbound volumes during the PM peak hour are projected to average between 1,000-1,500 vph south of Exit 119 and approximately 1,500 vph north of Exit 129. By Exits 119-120, traffic volumes increase nearly twofold and peak between Exits 124-125. Future I-5 southbound volumes during the PM peak hour are projected to average between 1,000–1,500 vph north of Exit 129 and 1,000-1,500 vph south of Exit 119. By Exits 124-125, traffic volumes increase nearly twofold and peak between Exits 123-124.
  - These directional volume forecasts show significant peak hour demand along the I-5 corridor suggesting current commuting (work, school, and shopping) patterns between Roseburg and Winston/Green will continue in the future.

HCM-Based Analysis Findings (Using FREEVAL)

Analysis procedures consistent with the methodologies in the *Highway Capacity Manual (HCM) 6th Edition* were used to analyze the freeway mainline, ramps, and weave segments along the corridor in the future no build scenario.

Potential Operational Issues/Capacity Constraints

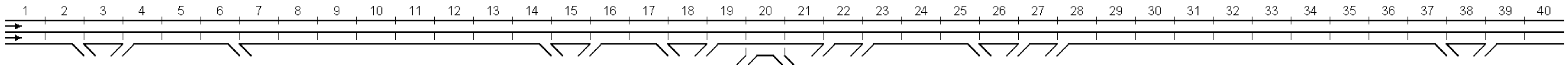
Table 1 summarizes those segments along the I-5 study corridor where 2040 forecast traffic demand is either exceeding the applicable mobility targets or approaching the capacity of the highway. Detailed analysis outputs for the northbound and southbound directions are shown in Table 2 through Table 5.

Table 1: Forecast Operational Issues/Capacity Constraints Under Future 2040 No-Build Conditions

Operations/ Capacity Constraint[1]	Direction	Location	Time Period/ Duration	Peak D/C Ratio	Summary Notes
1	Northbound	Exit 123 Off-ramp to Exit 124 Off-ramp	7:30-7:45 AM	0.85	• Volumes between Exits 123 and 124 are forecast to exceed the 0.80 mobility target for a short 15-minute period but will not approach the capacity of the highway segment. • This time period/segment is forecast to have the highest volumes during the PM study period.
2	Northbound	Exit 123 On-ramp to Exit 124 On-ramp	3:45 – 4:00 PM	0.81	• Volumes between Exits 123 and 124 are forecast to approximately meet the 0.80 mobility target for a short 15-minute period but will not approach the capacity of the highway segment.
3	Southbound	Exit 125 On-ramp to Exit 123 On-ramp	2:45-5:45 PM	1.00	• Volumes are forecast to exceed the 0.80 mobility target for a sustained three-hour period. Volumes between 5:00-5:30 PM are forecast to approach or operate at capacity. • This time period/segment is forecast to have the highest volumes during the PM study period.
4	Southbound	Exit 120 Off-ramp to Exit 119 Off-ramp	2:00-5:45 PM	0.97	• Volumes during this period are forecast to exceed the more conservative 0.70 rural mobility target with some volumes approaching the capacity of the highway segment.

[1]See callout number references in Table 2 through Table 5 below.

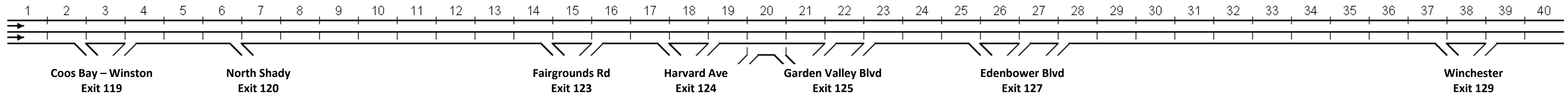
Table 2: I-5 Northbound AM Peak Period Traffic Analysis Results – Year 2040 No-Build Analysis



	Measurement	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
	Number of Lanes	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Segment Type†	B	OF	B	ON	OV	OFF	B	B	B	B	B	B	B	OFF	B	ON	OFF	B	ON	W	B	ON	ON	B	OFF	B	ON	ON	B	B	B	B	B	B	B	B	OFF	B	ON	B
	Accel/Decel Length	-	247	-	476	-	334	-	-	-	-	-	-	-	310	-	240	237	-	307	0	-	270	246	-	243	-	445	142	-	-	-	-	-	-	-	-	275	-	328	-
LEVEL OF SERVICE	**Analysis Period**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
	6:00 - 6:15	A	A	A	A	A	A	A	B	B	B	B	B	B	A	B	B	B	B	B	A	A	B	B	B	A	A	A	B	B	B	B	B	B	B	B	B	A	A	A	A
	6:15 - 6:30	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B
	6:30 - 6:45	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	6:45 - 7:00	B	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B
	7:00 - 7:15	A	A	A	B	B	B	B	C	C	C	C	C	C	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	7:15 - 7:30	B	B	B	B	C	B	B	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	7:30 - 7:45	B	B	B	C	C	B	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B	C	C	B	B	B	B	C	C	C	C	C	C	C	C	B	B	B	B
	7:45 - 8:00	B	B	B	B	C	B	B	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B
	8:00 - 8:15	B	B	B	B	B	B	B	C	C	C	C	C	C	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	8:15 - 8:30	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	8:30 - 8:45	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	8:45 - 9:00	B	B	B	B	B	B	B	C	C	C	C	C	C	B	C	C	C	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B
	9:00 - 9:15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	9:15 - 9:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	9:30 - 9:45	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	9:45 - 10:00	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
DEMAND TO CAPACITY RATIO	**Analysis Period**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
	6:00 - 6:15	0.12	0.15	0.10	0.19	0.16	0.19	0.14	0.22	0.22	0.22	0.22	0.22	0.22	0.28	0.22	0.29	0.29	0.20	0.32	0.21	0.17	0.26	0.28	0.21	0.28	0.17	0.24	0.25	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.25	0.16	0.23	0.18
	6:15 - 6:30	0.15	0.19	0.14	0.27	0.22	0.27	0.20	0.29	0.29	0.29	0.29	0.29	0.29	0.38	0.29	0.39	0.39	0.26	0.40	0.29	0.21	0.30	0.32	0.25	0.32	0.19	0.27	0.29	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.29	0.19	0.26	0.20
	6:30 - 6:45	0.16	0.21	0.14	0.32	0.25	0.32	0.23	0.35	0.35	0.35	0.35	0.35	0.35	0.46	0.35	0.46	0.46	0.31	0.48	0.36	0.25	0.35	0.37	0.28	0.37	0.22	0.30	0.32	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.32	0.20	0.28	0.22
	6:45 - 7:00	0.20	0.26	0.17	0.35	0.28	0.35	0.26	0.39	0.39	0.39	0.39	0.39	0.39	0.51	0.39	0.52	0.52	0.32	0.49	0.39	0.24	0.34	0.36	0.28	0.36	0.20	0.29	0.32	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.32	0.19	0.28	0.21
	7:00 - 7:15	0.17	0.22	0.16	0.38	0.31	0.38	0.28	0.42	0.42	0.42	0.42	0.42	0.4[illegible] 1	0.55	0.42	0.57	0.57	0.34	0.52	0.40	0.27	0.39	0.42	0.32	0.42	0.25	0.35	0.38	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.38	0.24	0.36	0.28
	7:15 - 7:30	0.25	0.33	0.23	0.50	0.40	0.50	0.37	0.56	0.56	0.56	0.56	0.56	0.56	**0.73**	0.56	**0.75**	**0.75**	0.44	**0.67**	0.52	0.36	0.51	0.55	0.42	0.55	0.33	0.47	0.51	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.51	0.32	0.47	0.36
	7:30 - 7:45	0.31	0.40	0.28	0.56	0.45	0.56	0.42	0.63	0.63	0.63	0.63	0.63	0.63	**0.83**	0.63	**0.85**	**0.85**	0.51	**0.78**	0.60	0.41	0.57	0.61	0.47	0.61	0.37	0.54	0.58	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.58	0.35	0.51	0.39
	7:45 - 8:00	0.27	0.36	0.25	0.51	0.41	0.51	0.37	0.55	0.55	0.55	0.55	0.55	0.55	**0.72**	0.55	**0.74**	**0.74**	0.43	**0.67**	0.58	0.30	0.43	0.47	0.36	0.47	0.22	0.34	0.36	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.36	0.17	0.26	0.20
	8:00 - 8:15	0.22	0.29	0.20	0.40	0.32	0.40	0.29	0.44	0.44	0.44	0.44	0.44	0.44	0.58	0.44	0.59	0.59	0.38	0.58	0.44	0.30	0.42	0.46	0.35	0.46	0.24	0.35	0.38	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.38	0.22	0.32	0.24
	8:15 - 8:30	0.24	0.31	0.21	0.44	0.35	0.44	0.33	0.49	0.49	0.49	0.49	0.49	0.49	0.64	0.49	**0.65**	**0.65**	0.40	0.62	0.47	0.31	0.44	0.46	0.36	0.46	0.26	0.39	0.41	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.41	0.25	0.36	0.28
	8:30 - 8:45	0.24	0.31	0.21	0.46	0.37	0.46	0.34	0.51	0.51	0.51	0.51	0.51	0.51	**0.67**	0.51	**0.68**	**0.68**	0.43	**0.68**	0.52	0.35	0.50	0.53	0.41	0.53	0.32	0.46	0.49	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.49	0.26	0.38	0.29
	8:45 - 9:00	0.26	0.34	0.23	0.42	0.34	0.42	0.31	0.47	0.47	0.47	0.47	0.47	0.47	0.61	0.46	0.63	0.63	0.39	0.63	0.52	0.31	0.45	0.50	0.38	0.50	0.25	0.38	0.41	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.41	0.17	0.27	0.21
	9:00 - 9:15	0.24	0.31	0.21	0.37	0.30	0.37	0.28	0.41	0.41	0.41	0.41	0.41	0.41	0.54	0.41	0.56	0.56	0.36	0.55	0.43	0.29	0.41	0.44	0.34	0.44	0.24	0.38	0.40	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.40	0.24	0.36	0.27
	9:15 - 9:30	0.24	0.32	0.22	0.37	0.30	0.37	0.27	0.41	0.41	0.41	0.41	0.41	0.41	0.53	0.41	0.56	0.56	0.35	0.55	0.44	0.27	0.41	0.46	0.35	0.46	0.25	0.37	0.40	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.40	0.23	0.35	0.26
	9:30 - 9:45	0.28	0.36	0.26	0.44	0.35	0.44	0.33	0.50	0.50	0.50	0.50	0.50	0.50	**0.65**	0.50	**0.67**	**0.67**	0.43	**0.66**	0.48	0.36	0.52	0.55	0.42	0.55	0.30	0.44	0.46	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.46	0.29	0.42	0.32
	9:45 - 10:00	0.29	0.38	0.27	0.46	0.37	0.46	0.35	0.52	0.52	0.52	0.52	0.52	0.52	**0.68**	0.52	**0.70**	**0.70**	0.45	**0.69**	0.53	0.35	0.51	0.55	0.42	0.55	0.30	0.44	0.47	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.47	0.27	0.41	0.31
MAINLINE HOURLY VOLUMES	**Analysis Period**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
	6:00 - 6:15	436	436	387	906	906	906	838	838	838	838	838	838	838	838	836	859	859	779	948	1038	661	759	811	811	811	638	703	732	732	732	732	732	732	732	732	732	732	613	667	667
	6:15 - 6:30	553	553	508	1256	1256	1256	1139	1139	1139	1139	1139	1139	1139	1139	1137	1165	1165	1013	1204	1339	792	877	935	935	935	701	789	845	845	845	845	845	845	845	845	845	845	692	746	746
	6:30 - 6:45	600	600	533	1494	1494	1494	1373	1373	1373	1373	1373	1373	1373	1373	1360	1391	1391	1213	1433	1618	923	1013	1077	1077	1077	801	875	918	918	918	918	918	918	918	918	918	918	736	792	792
	6:45 - 7:00	734	734	629	1654	1654	1654	1512	1512	1512	1512	1512	1512	1512	1512	1508	1546	1546	1218	1476	1672	881	967	1046	1046	1046	725	829	902	902	902	902	902	902	902	902	902	902	663	762	762
	7:00 - 7:15	635	635	593	1793	1793	1793	1655	1655	1655	1655	1655	1655	1655	1655	1646	1702	1702	1313	1564	1786	998	1116	1217	1217	1217	921	1011	1088	1088	1088	1088	1088	1088	1088	1088	1088	1088	900	1015	1015
	7:15 - 7:30	941	941	868	2346	2346	2346	2178	2178	2178	2178	2178	2178	2178	2178	2172	2242	2242	1660	1997	2348	1323	1453	1564	1564	1564	1219	1346	1439	1439	1439	1439	1439	1439	1439	1439	1439	1439	1174	1293	1293
	7:30 - 7:45	1140	1140	1055	2645	2645	2645	2460	2460	2460	2460	2460	2460	2460	2460	2451	2524	2524	1959	2315	2691	1506	1620	1752	1752	1752	1342	1533	1636	1636	1636	1636	1636	1636	1636	1636	1636	1636	1284	1408	1408
	7:45 - 8:00	1019	1019	923	2392	2392	2392	2158	2158	2158	2158	2158	2158	2158	2158	2136	2201	2201	1625	1983	2289	1066	1211	1338	1338	1338	775	918	997	997	997	997	997	997	997	997	997	997	575	674	674
	8:00 - 8:15	833	833	740	1877	1877	1877	1717	1717	1717	1717	1717	1717	1717	1717	1701	1766	1766	1453	1735	1956	1104	1220	1328	1328	1328	891	999	1069	1069	1069	1069	1069	1069	1069	1069	1069	1069	791	871	871
	8:15 - 8:30	894	894	795	2056	2056	2056	1903	1903	1903	1903	1903	1903	1903	1903	1898	1956	1956	1529	1837	2056	1142	1246	1333	1333	1333	950	1097	1159	1159	1159	1159	1159	1159	1159	1159	1159	1159	894	1000	1000
	8:30 - 8:45	885	885	771	2171	2171	2171	1994	1994	1994	1994	1994	1994	1994	1994	1975	2038	2038	1639	2052	2316	1296	1450	1556	1556	1556	1211	1340	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418	962	1056	1056
	8:45 - 9:00	963	963	840	1966	1966	1966	1816	1816	1816	1816	1816	1816	1816	1816	1794	1864	1864	1475	1889	2213	1131	1295	1434	1434	1434	913	1081	1171	1171	1171	1171	1171	1171	1171	1171	1171	1171	588	708	708
	9:00 - 9:15	872	872	783	1761	1761	1761	1600	1600	1600	1600	1600	1600	1600	1600	1588	1659	1659	1370	1641	1916	1059	1178	1271	1271	1271	883	1065	1147	1147	1147	1147	1147	1147	1147	1147	1147	1147	856	980	980
	9:15 - 9:30	906	906	811	1731	1731	1731	1579	1579	1579	1579	1579	1579	1579	1579	1574	1662	1662	1353	1628	1902	1000	1156	1308	1308	1308	906	1049	1131	1131	1131	1131	1131	1131	1131	1131	1131	1131	832	947	947
	9:30 - 9:45	1023	1023	956	2060	2060	2060	1924	1924	1924	1924	1924	1924	1924	1924	1915	1981	1981	1646	1965	2248	1343	1483	1589	1589	1589	1086	1231	1302	1302	1302	1302	1302	1302	1302	1302	1302	1302	1063	1164	1164
	9:45 - 10:00	1088	1088	1003	2158	2158	2158	2009	2009	2009	2009	2009	2009	2009	2009	2004	2082	2082	1724	2056	2341	1297	1468	1588	1588	1588	1091	1227	1312	1312	1312	1312	1312	1312	1312	1312	1312	1312	970	1106	1106

† B = Basic Segment, OFF = Off-Ramp, ON = On-Ramp, W = Weave, OV = Overlap

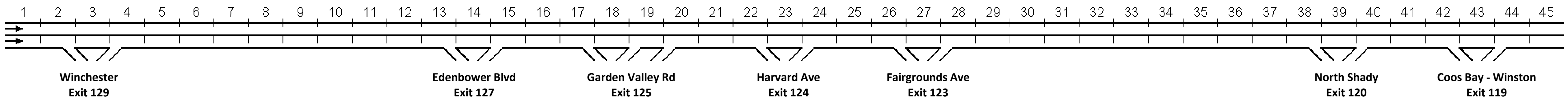
Table 3: I-5 Northbound PM Peak Period Traffic Analysis Results – Year 2040 No-Build Analysis



Measurement	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Number of Lanes	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Segment Type†	B	OFF	B	ON	OV	OFF	B	B	B	B	B	B	B	OFF	B	ON	OFF	B	ON	W	B	ON	ON	B	OF	B	ON	ON	B	B	B	B	B	B	B	B	OFF	B	ON	B
Accel/Decel Length	-	247	-	476	-	334	-	-	-	-	-	-	-	310	-	240	237	-	307	0	-	270	246	-	243	-	445	142	-	-	-	-	-	-	-	-	275	-	328	-
LEVEL OF SERVICE																																								
Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
14:00 - 14:15	B	B	B	B	B	B	B	C	C	C	C	C	C	B	C	B	B	B	C	B	B	B	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
14:15 - 14:30	B	B	B	B	B	B	B	C	C	C	C	C	C	B	C	C	C	B	C	B	B	B	B	C	B	B	B	B	C	C	C	C	C	C	C	C	B	B	B	B
14:30 - 14:45	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B	C	C	C	B	B	C	C	C	C	C	C	C	C	C	C	C	B	C
14:45 - 15:00	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B	C	C	C	B	B	C	C	C	C	C	C	C	C	C	B	B	B	C
15:00 - 15:15	B	B	B	B	B	B	B	C	C	C	C	C	C	B	C	C	C	B	C	B	B	B	B	C	B	B	B	B	C	C	C	C	C	C	C	C	B	B	B	B
15:15 - 15:30	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	B	C	B	C	C	C	B	B	C	C	C	C	C	C	C	C	C	B	B	B	C
15:30 - 15:45	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B	C	C	C	B	B	B	C	C	C	C	C	C	C	C	B	B	B	C
15:45 - 16:00	B	B	B	C	C	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C
16:00 - 16:15	B	B	B	B	C	B	B	C	C	C	C	C	C	C	C	C	C	C	C	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
16:15 - 16:30	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	B	C	B	B	B	B	C	B	B	B	B	C	C	C	C	C	C	C	C	B	B	B	B
16:30 - 16:45	B	B	B	B	C	B	B	C	C	C	C	C	C	C	C	C	C	C	C	B	C	C	C	C	C	C	B	C	C	C	C	C	C	C	C	C	C	C	C	C
16:45 - 17:00	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B	C	C	B	B	B	C	C	C	C	C	C	C	C	C	B	B	B	C
17:00 - 17:15	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B	C	C	C	B	B	C	C	C	C	C	C	C	C	C	C	C	B	C
17:15 - 17:30	B	B	B	B	B	B	B	C	C	C	C	C	C	B	C	B	B	B	C	B	B	B	B	C	B	B	B	C	C	C	C	C	C	C	C	C	C	B	B	C
17:30 - 17:45	B	B	B	B	B	B	B	C	C	C	C	C	C	B	C	C	C	B	C	B	B	B	C	C	C	B	B	C	C	C	C	C	C	C	C	C	C	B	B	C
17:45 - 18:00	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
DEMAND TO CAPACITY RATIO																																								
Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
14:00 - 14:15	0.29	0.37	0.25	0.40	0.32	0.40	0.30	0.45	0.45	0.45	0.45	0.45	0.45	0.59	0.45	0.61	0.61	0.39	0.63	0.45	0.35	0.51	0.56	0.43	0.56	0.31	0.47	0.51	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.51	0.32	0.47	0.36
14:15 - 14:30	0.29	0.38	0.26	0.42	0.34	0.42	0.31	0.47	0.47	0.47	0.47	0.47	0.47	0.61	0.47	0.63	0.63	0.41	0.63	0.46	0.34	0.51	0.54	0.42	0.54	0.31	0.49	0.54	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.54	0.35	0.50	0.39
14:30 - 14:45	0.35	0.46	0.32	0.48	0.39	0.48	0.36	0.54	0.54	0.54	0.54	0.54	0.54	0.70	0.54	0.72	0.72	0.46	0.71	0.49	0.41	0.60	0.65	0.50	0.65	0.39	0.58	0.63	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.63	0.42	0.59	0.45
14:45 - 15:00	0.33	0.43	0.30	0.48	0.39	0.48	0.36	0.54	0.54	0.54	0.54	0.54	0.54	0.70	0.53	0.71	0.71	0.45	0.72	0.53	0.41	0.61	0.66	0.51	0.66	0.38	0.58	0.60	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.60	0.39	0.57	0.43
15:00 - 15:15	0.29	0.38	0.25	0.44	0.35	0.44	0.32	0.48	0.48	0.48	0.48	0.48	0.48	0.63	0.48	0.64	0.64	0.41	0.67	0.48	0.37	0.55	0.59	0.45	0.59	0.34	0.50	0.54	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.54	0.35	0.51	0.39
15:15 - 15:30	0.36	0.46	0.32	0.48	0.38	0.48	0.36	0.53	0.53	0.53	0.53	0.53	0.53	0.70	0.53	0.71	0.71	0.47	0.73	0.51	0.42	0.61	0.65	0.50	0.65	0.37	0.57	0.61	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.61	0.39	0.58	0.45
15:30 - 15:45	0.29	0.38	0.25	0.46	0.37	0.46	0.34	0.51	0.51	0.51	0.51	0.51	[illegible] 2	0.67	0.51	0.69	0.69	0.44	0.71	0.51	0.40	0.59	0.65	0.50	0.65	0.36	0.55	0.58	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.58	0.37	0.55	0.42
15:45 - 16:00	0.39	0.51	0.34	0.54	0.44	0.54	0.41	0.61	0.61	0.61	0.61	0.61	0.61	0.80	0.60	0.81	0.81	0.52	0.80	0.56	0.47	0.67	0.73	0.56	0.73	0.41	0.62	0.67	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.67	0.42	0.64	0.49
16:00 - 16:15	0.37	0.48	0.32	0.50	0.40	0.50	0.37	0.55	0.55	0.55	0.55	0.55	0.55	0.72	0.55	0.75	0.75	0.49	0.75	0.53	0.45	0.67	0.72	0.55	0.72	0.43	0.66	0.71	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.71	0.46	0.67	0.51
16:15 - 16:30	0.33	0.43	0.28	0.45	0.36	0.45	0.33	0.49	0.49	0.49	0.49	0.49	0.49	0.64	0.48	0.65	0.65	0.41	0.67	0.51	0.36	0.54	0.59	0.46	0.59	0.33	0.52	0.56	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.56	0.36	0.53	0.41
16:30 - 16:45	0.33	0.43	0.29	0.49	0.39	0.49	0.37	0.55	0.55	0.55	0.55	0.55	0.55	0.72	0.55	0.73	0.73	0.48	0.78	0.53	0.45	0.68	0.72	0.55	0.72	0.42	0.63	0.68	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.68	0.44	0.63	0.48
16:45 - 17:00	0.32	0.42	0.27	0.44	0.36	0.44	0.33	0.50	0.50	0.50	0.50	0.50	0.50	0.65	0.49	0.67	0.67	0.42	0.69	0.51	0.38	0.57	0.61	0.47	0.61	0.35	0.55	0.59	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.59	0.37	0.55	0.42
17:00 - 17:15	0.30	0.40	0.26	0.44	0.35	0.44	0.33	0.50	0.50	0.50	0.50	0.50	0.50	0.65	0.50	0.67	0.67	0.42	0.68	0.49	0.40	0.59	0.64	0.49	0.64	0.37	0.60	0.66	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.66	0.43	0.62	0.48
17:15 - 17:30	0.30	0.39	0.24	0.40	0.32	0.40	0.30	0.45	0.45	0.45	0.45	0.45	0.45	0.59	0.45	0.60	0.60	0.38	0.63	0.48	0.34	0.53	0.59	0.45	0.59	0.34	0.56	0.63	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.63	0.39	0.58	0.44
17:30 - 17:45	0.29	0.37	0.24	0.40	0.33	0.40	0.31	0.46	0.46	0.46	0.46	0.46	0.46	0.60	0.46	0.62	0.62	0.40	0.65	0.46	0.40	0.58	0.65	0.49	0.65	0.39	0.61	0.65	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.65	0.41	0.58	0.44
17:45 - 18:00	0.27	0.35	0.23	0.34	0.28	0.34	0.26	0.39	0.39	0.39	0.39	0.39	0.39	0.51	0.39	0.52	0.52	0.34	0.56	0.42	0.32	0.48	0.53	0.41	0.53	0.29	0.45	0.49	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.49	0.29	0.43	0.33
MAINLINE HOURLY VOLUMES																																								
Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
14:00 - 14:15	1006	1006	874	1821	1821	1821	1681	1681	1681	1681	1681	1681	1681	1681	1674	1745	1745	1449	1815	2094	1255	1447	1606	1606	1606	1092	1322	1437	1437	1437	1437	1437	1437	1437	1437	1437	1437	1162	1319	1319
14:15 - 14:30	1036	1036	929	1898	1898	1898	1758	1758	1758	1758	1758	1758	1758	1758	1754	1802	1802	1484	1801	2090	1230	1420	1543	1543	1543	1097	1387	1547	1547	1547	1547	1547	1547	1547	1547	1547	1547	1279	1427	1427
14:30 - 14:45	1230	1230	1114	2169	2169	2169	2003	2003	2003	2003	2003	2003	2003	2003	1992	2058	2058	1671	2032	2338	1483	1675	1839	1839	1839	1399	1640	1778	1778	1778	1778	1778	1778	1778	1778	1778	1778	1521	1654	1654
14:45 - 15:00	1157	1157	1052	2185	2185	2185	2004	2004	2004	2004	2004	2004	2004	2004	1987	2045	2045	1635	2067	2518	1502	1727	1890	1890	1890	1377	1630	1718	1718	1718	1718	1718	1718	1718	1718	1718	1718	1435	1606	1606
15:00 - 15:15	1010	1010	876	1991	1991	1991	1810	1810	1810	1810	1810	1810	1810	1810	1793	1834	1834	1525	1944	2262	1360	1566	1700	1700	1700	1220	1429	1554	1554	1554	1554	1554	1554	1554	1554	1554	1554	1274	1452	1452
15:15 - 15:30	1252	1252	1124	2152	2152	2152	1985	1985	1985	1985	1985	1985	1985	1985	1971	2022	2022	1720	2102	2432	1518	1708	1833	1833	1833	1317	1606	1738	1738	1738	1738	1738	1738	1738	1738	1738	1738	1436	1644	1644
15:30 - 15:45	1032	1032	893	2091	2091	2091	1926	1926	1926	1926	1926	1926	1926	1926	1911	1992	1992	1637	2056	2439	1454	1691	1879	1879	1879	1297	1562	1665	1665	1665	1665	1665	1665	1665	1665	1665	1665	1365	1585	1585
15:45 - 16:00	1364	1364	1210	2470	2470	2470	2280	2280	2280	2280	2280	2280	2280	2280	2253	2324	2324	1920	2307	2700	1690	1883	2060	2060	2060	1455	1737	1879	1879	1879	1879	1879	1879	1879	1879	1879	1879	1540	1802	1802
16:00 - 16:15	1286	1286	1130	2258	2258	2258	2069	2069	2069	2069	2069	2069	2069	2069	2060	2141	2141	1787	2166	2546	1648	1910	2068	2068	2068	1563	1886	2028	2028	2028	2028	2028	2028	2028	2028	2028	2028	1708	1923	1923
16:15 - 16:30	1152	1152	976	2030	2030	2030	1824	1824	1824	1824	1824	1824	1824	1824	1803	1874	1874	1494	1928	2325	1309	1527	1695	1695	1695	1171	1465	1609	1609	1609	1609	1609	1609	1609	1609	1609	1609	1317	1514	1514
16:30 - 16:45	1157	1157	1009	2230	2230	2230	2066	2066	2066	2066	2066	2066	2066	2066	2053	2094	2094	1763	2277	2597	1658	1945	2077	2077	2077	1550	1821	1959	1959	1959	1959	1959	1959	1959	1959	1959	1959	1659	1821	1821
16:45 - 17:00	1122	1122	952	2022	2022	2022	1859	1859	1859	1859	1859	1859	1859	1859	1844	1922	1922	1540	1985	2339	1368	1610	1759	1759	1759	1254	1564	1689	1689	1689	1689	1689	1689	1689	1689	1689	1689	1350	1561	1561
17:00 - 17:15	1070	1070	905	2000	2000	2000	1876	1876	1876	1876	1876	1876	1876	1876	1871	1927	1927	1557	1974	2372	1454	1698	1840	1840	1840	1365	1732	1921	1921	1921	1921	1921	1921	1921	1921	1921	1921	1611	1812	1812
17:15 - 17:30	1053	1053	850	1812	1812	1812	1702	1702	1702	1702	1702	1702	1702	1702	1683	1726	1726	1376	1827	2194	1251	1507	1711	1711	1711	1225	1620	1833	1833	1833	1833	1833	1833	1833	1833	1833	1833	1484	1687	1687
17:30 - 17:45	1006	1006	849	1836	1836	1836	1736	1736	1736	1736	1736	1736	1736	1736	1725	1783	1783	1469	1878	2262	1460	1666	1875	1875	1875	1446	1758	1908	1908	1908	1908	1908	1908	1908	1908	1908	1908	1537	1690	1690
17:45 - 18:00	950	950	791	1545	1545	1545	1462	1462	1462	1462	1462	1462	1462	1462	1443	1489	1489	1223	1631	1989	1164	1372	1524	1524	1524	1059	1291	1405	1405	1405	1405	1405	1405	1405	1405	1405	1405	1060	1240	1240

† B = Basic Segment, OFF = Off-Ramp, ON = On-Ramp, W = Weave, OV = Overlap

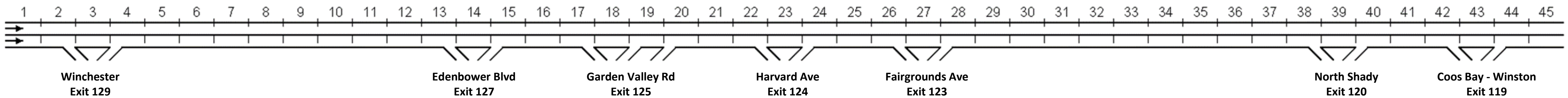
Table 4: I-5 Southbound AM Peak Period Traffic Analysis Results – Year 2040 No-Build Analysis



	Measurement	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
	Number of Lanes	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Segment Type†	B	OFF	B	ON	B	B	B	B	B	B	B	B	OFF	B	ON	B	OF	B	ON	ON	B	OFF	B	ON	B	OF	B	ON	B	B	B	B	B	B	B	B	B	OFF	B	ON	OV	OFF	B	ON	B
	Accel/Decel Length	-	241	-	289	-	-	-	-	-	-	-	-	242	-	323	-	235	-	254	178	-	249	-	197	-	252	-	297	-	-	-	-	-	-	-	-	-	207	-	219	-	297	-	199	-
LEVEL OF SERVICE	**Analysis Period**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**
	6:00 - 6:15	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B	A	A	A	A
	6:15 - 6:30	B	A	A	B	B	B	B	B	B	B	B	B	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	A	A	A
	6:30 - 6:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B
	6:45 - 7:00	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	A	A
	7:00 - 7:15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B
	7:15 - 7:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	B	C	B	B	B	C	C	C	C	C	C	C	C	C	B	B	B	C	B	B	B	B
	7:30 - 7:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	B	B	B
	7:45 - 8:00	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	C	B	B	B	C	C	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	B	B	B
	8:00 - 8:15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	B	B	B
	8:15 - 8:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	A	B	B
	8:30 - 8:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	B	B	B
	8:45 - 9:00	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	B	B	B
	9:00 - 9:15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	B	B	B
	9:15 - 9:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	B	B	B
	9:30 - 9:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	B	B	B
	9:45 - 10:00	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	B	B	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	B	B	B
DEMAND TO CAPACITY RATIO	**Analysis Period**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**
	6:00 - 6:15	0.16	0.21	0.14	0.20	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.20	0.13	0.24	0.18	0.24	0.15	0.23	0.29	0.22	0.29	0.20	0.32	0.24	0.32	0.24	0.32	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.32	0.17	0.24	0.18	0.24	0.11	0.19	0.14
	6:15 - 6:30	0.19	0.25	0.17	0.26	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.26	0.17	0.31	0.24	0.31	0.20	0.28	0.36	0.28	0.36	0.24	0.39	0.30	0.39	0.29	0.39	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.39	0.22	0.29	0.22	0.29	0.13	0.20	0.15
	6:30 - 6:45	0.27	0.35	0.24	0.36	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.36	0.23	0.40	0.31	0.40	0.26	0.37	0.47	0.36	0.47	0.29	0.47	0.36	0.47	0.36	0.47	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.47	0.28	0.38	0.29	0.38	0.18	0.27	0.21
	6:45 - 7:00	0.27	0.36	0.24	0.37	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.37	0.22	0.38	0.29	0.38	0.23	0.35	0.47	0.36	0.47	0.26	0.43	0.33	0.43	0.33	0.43	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.43	0.25	0.33	0.25	0.33	0.13	0.20	0.16
	7:00 - 7:15	0.27	0.35	0.23	0.37	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.37	0.23	0.42	0.32	0.42	0.26	0.39	0.51	0.39	0.51	0.28	0.46	0.35	0.46	0.34	0.45	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.45	0.26	0.35	0.27	0.35	0.17	0.25	0.19
	7:15 - 7:30	0.33	0.43	0.29	0.45	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.45	0.28	0.51	0.39	0.51	0.32	0.50	0.67	0.51	0.67	0.33	0.55	0.42	0.55	0.41	0.55	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.55	0.35	0.47	0.36	0.47	0.24	0.36	0.27
	7:30 - 7:45	0.39	0.50	0.33	0.51	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.51	0.30	0.53	0.40	0.53	0.33	0.49	0.64	0.49	0.64	0.31	0.52	0.40	0.52	0.37	0.50	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.50	0.32	0.42	0.32	0.42	0.21	0.31	0.24
	7:45 - 8:00	0.50	0.66	0.43	0.65	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.65	0.36	0.60	0.46	0.60	0.35	0.52	0.66	0.51	0.66	0.31	0.50	0.38	0.50	0.36	0.48	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.48	0.31	0.41	0.31	0.41	0.20	0.29	0.22
	8:00 - 8:15	0.35	0.46	0.31	0.46	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.46	0.27	0.46	0.35	0.46	0.28	0.41	0.53	0.41	0.53	0.29	0.46	0.35	0.46	0.34	0.45	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.45	0.29	0.39	0.30	0.39	0.21	0.30	0.23
	8:15 - 8:30	0.32	0.42	0.29	0.43	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.43	0.25	0.46	0.35	0.46	0.29	0.43	0.55	0.42	0.55	0.30	0.48	0.37	0.48	0.35	0.46	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.46	0.30	0.39	0.30	0.39	0.18	0.28	0.22
	8:30 - 8:45	0.29	0.38	0.24	0.37	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.37	0.21	0.40	0.30	0.40	0.25	0.40	0.52	0.40	0.52	0.29	0.46	0.35	0.46	0.34	0.45	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.45	0.29	0.39	0.30	0.39	0.20	0.31	0.24
	8:45 - 9:00	0.33	0.43	0.28	0.44	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.44	0.25	0.46	0.35	0.46	0.29	0.45	0.58	0.45	0.58	0.32	0.53	0.40	0.53	0.39	0.51	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.51	0.34	0.45	0.35	0.45	0.22	0.32	0.25
	9:00 - 9:15	0.28	0.37	0.25	0.38	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.38	0.23	0.42	0.32	0.42	0.27	0.40	0.54	0.41	0.54	0.31	0.49	0.38	0.49	0.36	0.47	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.47	0.31	0.42	0.32	0.42	0.20	0.30	0.23
	9:15 - 9:30	0.29	0.38	0.25	0.39	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.39	0.24	0.43	0.33	0.43	0.28	0.42	0.57	0.43	0.57	0.34	0.53	0.41	0.53	0.39	0.52	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.52	0.35	0.47	0.36	0.47	0.24	0.35	0.27
	9:30 - 9:45	0.32	0.41	0.27	0.41	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.41	0.25	0.45	0.34	0.45	0.27	0.41	0.53	0.41	0.53	0.32	0.50	0.39	0.50	0.37	0.49	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.49	0.32	0.42	0.33	0.42	0.22	0.33	0.25
	9:45 - 10:00	0.32	0.41	0.28	0.43	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.43	0.26	0.47	0.36	0.47	0.30	0.45	0.61	0.47	0.61	0.36	0.56	0.43	0.56	0.41	0.54	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.54	0.36	0.48	0.37	0.48	0.24	0.36	0.27
MAINLINE HOURLY VOLUMES	**Analysis Period**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**
	6:00 - 6:15	601	601	515	574	574	574	574	574	574	574	574	574	574	508	713	713	713	586	669	860	860	860	763	946	946	946	928	941	941	941	941	941	941	941	941	941	941	941	640	675	675	675	413	518	518
	6:15 - 6:30	724	724	659	750	750	750	750	750	750	750	750	750	750	644	921	921	921	746	827	1077	1077	1077	927	1156	1156	1156	1138	1152	1152	1152	1152	1152	1152	1152	1152	1152	1152	1152	804	825	825	825	453	537	537
	6:30 - 6:45	1022	1022	916	1057	1057	1057	1057	1057	1057	1057	1057	1057	1057	850	1194	1194	1194	986	1086	1379	1379	1379	1123	1396	1396	1396	1378	1390	1390	1390	1390	1390	1390	1390	1390	1390	1390	1390	1057	1077	1077	1077	655	746	746
	6:45 - 7:00	1030	1030	925	1074	1074	1074	1074	1074	1074	1074	1074	1074	1074	825	1130	1130	1130	856	1007	1390	1390	1390	999	1276	1276	1276	1258	1268	1268	1268	1268	1268	1268	1268	1268	1268	1268	1268	904	926	926	926	466	542	542
	7:00 - 7:15	1009	1009	882	1086	1086	1086	1086	1086	1086	1086	1086	1086	1086	882	1242	1242	1242	1006	1162	1533	1533	1533	1077	1359	1359	1359	1322	1327	1327	1327	1327	1327	1327	1327	1327	1327	1327	1327	985	1005	1005	1005	620	696	696
	7:15 - 7:30	1257	1257	1096	1320	1320	1320	1320	1320	1320	1320	1320	1320	1320	1051	1508	1508	1508	1221	1468	2001	2001	2001	1240	1620	1620	1620	1565	1611	1611	1611	1611	1611	1611	1611	1611	1611	1611	1611	1303	1330	1330	1330	883	992	992
	7:30 - 7:45	1460	1460	1270	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1118	1545	1545	1545	1247	1440	1904	1904	1904	1165	1505	1505	1505	1426	1448	1448	1448	1448	1448	1448	1448	1448	1448	1448	1448	1175	1195	1195	1195	754	856	856
	7:45 - 8:00	1906	1906	1655	1898	1898	1898	1898	1898	1898	1898	1898	1898	1898	1346	1758	1758	1758	1303	1494	1927	1927	1927	1135	1412	1412	1412	1337	1354	1354	1354	1354	1354	1354	1354	1354	1354	1354	1354	1097	1117	1117	1117	670	756	756
	8:00 - 8:15	1345	1345	1177	1353	1353	1353	1353	1353	1353	1353	1353	1353	1353	989	1353	1353	1353	1064	1178	1561	1561	1561	1093	1343	1343	1343	1292	1306	1306	1306	1306	1306	1306	1306	1306	1306	1306	1306	1058	1092	1092	1092	744	827	827
	8:15 - 8:30	1227	1227	1092	1266	1266	1266	1266	1266	1266	1266	1266	1266	1266	929	1356	1356	1356	1078	1273	1641	1641	1641	1135	1398	1398	1398	1352	1353	1353	1353	1353	1353	1353	1353	1353	1353	1353	1353	1116	1129	1129	1129	651	782	782
	8:30 - 8:45	1099	1099	898	1078	1078	1078	1078	1078	1078	1078	1078	1078	1078	799	1174	1174	1174	959	1191	1567	1567	1567	1103	1365	1365	1365	1333	1340	1340	1340	1340	1340	1340	1340	1340	1340	1340	1340	1103	1134	1134	1134	742	873	873
	8:45 - 9:00	1257	1257	1063	1291	1291	1291	1291	1291	1291	1291	1291	1291	1291	954	1341	1341	1341	1085	1325	1731	1731	1731	1220	1558	1558	1558	1498	1512	1512	1512	1512	1512	1512	1512	1512	1512	1512	1512	1281	1311	1311	1311	814	911	911
	9:00 - 9:15	1074	1074	968	1113	1113	1113	1113	1113	1113	1113	1113	1113	1113	848	1245	1245	1245	1011	1165	1596	1596	1596	1190	1449	1449	1449	1379	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1163	1197	1197	1197	743	841	841
	9:15 - 9:30	1112	1112	971	1144	1144	1144	1144	1144	1144	1144	1144	1144	1144	897	1272	1272	1272	1053	1256	1687	1687	1687	1315	1575	1575	1575	1529	1551	1551	1551	1551	1551	1551	1551	1551	1551	1551	1551	1320	1352	1352	1352	915	1006	1006
	9:30 - 9:45	1201	1201	1035	1202	1202	1202	1202	1202	1202	1202	1202	1202	1202	923	1318	1318	1318	1022	1203	1579	1579	1579	1224	1488	1488	1488	1447	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1203	1223	1223	1223	821	930	930
	9:45 - 10:00	1199	1199	1057	1270	1270	1270	1270	1270	1270	1270	1270	1270	1270	979	1388	1388	1388	1141	1335	1828	1828	1828	1381	1651	1651	1651	1581	1594	1594	1594	1594	1594	1594	1594	1594	1594	1594	1594	1371	1397	1397	1397	925	1023	1023

† B = Basic Segment, OFF = Off-Ramp, ON = On-Ramp, W = Weave, OV = Overlap

Table 5: I-5 Southbound PM Peak Period Traffic Analysis Results – Year 2040 No-Build Analysis



Measurement	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Number of Lanes	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Segment Type†	B	OFF	B	ON	B	B	B	B	B	B	B	B	OFF	B	ON	B	OF	B	ON	ON	B	OFF	B	ON	B	OFF	B	ON	B	B	B	B	B	B	B	B	B	OFF	B	ON	OV	OFF	B	ON	B
Acceleration Lane	-	241	-	289	-	-	-	-	-	-	-	-	242	-	323	-	235	-	254	178	-	249	-	197	-	252	-	297	-	-	-	-	-	-	-	-	-	207	-	219	-	297	-	199	-
LEVEL OF SERVICE																																													
Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
14:00 - 14:15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	D	C	B	B	B
14:15 - 14:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	D	C	B	B	B
14:30 - 14:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B
14:45 - 15:00	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	C	C	D	C	C	C	D	D	D	D	D	D	D	D	D	C	C	C	D	C	C	C	C
15:00 - 15:15	B	B	B	B	C	C	C	C	C	C	C	C	B	B	C	C	C	C	C	D	D	D	C	D	D	D	D	C	D	D	D	D	D	D	D	D	D	D	C	C	D	C	C	B	C
15:15 - 15:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B
15:30 - 15:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	B	C	C	D	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	D	C	B	B	C
15:45 - 16:00	B	B	B	B	C	C	C	C	C	C	C	C	B	B	C	C	C	C	C	D	D	D	C	C	D	D	D	C	D	D	D	D	D	D	D	D	D	D	C	C	D	C	C	B	C
16:00 - 16:15	B	B	B	B	C	C	C	C	C	C	C	C	B	B	C	C	C	C	C	D	D	D	C	D	D	D	D	C	D	D	D	D	D	D	D	D	D	D	C	C	D	C	B	B	C
16:15 - 16:30	B	B	B	B	C	C	C	C	C	C	C	C	B	B	C	C	C	C	C	D	D	D	C	D	D	D	D	C	D	D	D	D	D	D	D	D	D	D	C	C	D	C	B	B	C
16:30 - 16:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	B	C	C	D	C	C	C	D	C	D	C	D	D	D	D	D	D	D	D	D	C	C	C	D	C	B	B	C
16:45 - 17:00	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	D	C	B	B	B
17:00 - 17:15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	B	C	D	D	D	C	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	D	C	B	B	C
17:15 - 17:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	C	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	D	C	B	B	B
17:30 - 17:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	B	B	C	D	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	D	C	B	B	B
17:45 - 18:00	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	C	B	B	B	B
DEMAND TO CAPACITY RATIO																																													
Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
14:00 - 14:15	0.34	0.44	0.31	0.49	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.49	0.30	0.59	0.45	0.59	0.38	0.59	0.79	0.60	0.79	0.49	0.76	0.58	0.76	0.57	0.76	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.76	0.53	0.71	0.54	0.71	0.35	0.51	0.39
14:15 - 14:30	0.34	0.45	0.30	0.47	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.47	0.29	0.58	0.44	0.58	0.36	0.56	0.78	0.60	0.78	0.47	0.74	0.56	0.74	0.55	0.72	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.72	0.51	0.68	0.52	0.68	0.33	0.48	0.37
14:30 - 14:45	0.32	0.42	0.28	0.48	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.48	0.28	0.56	0.43	0.56	0.36	3	0.75	0.57	0.75	0.43	0.70	0.54	0.70	0.52	0.70	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.70	0.48	0.65	0.50	0.65	4	0.44	0.34
14:45 - 15:00	0.39	0.51	0.34	0.53	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.53	0.33	0.64	0.49	0.64	0.42	0.66	0.89	0.68	0.89	0.53	0.85	0.65	0.85	0.64	0.85	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.85	0.60	0.81	0.62	0.81	0.42	0.61	0.47
15:00 - 15:15	0.40	0.52	0.37	0.56	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.56	0.36	0.69	0.53	0.69	0.46	0.71	0.93	0.71	0.93	0.57	0.91	0.70	0.91	0.68	0.90	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.90	0.64	0.85	0.65	0.85	0.42	0.59	0.45
15:15 - 15:30	0.34	0.44	0.29	0.46	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.46	0.27	0.52	0.40	0.52	0.33	0. 54	0.75	0.57	0.75	0.45	0.76	0.58	0.76	0.55	0.73	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.73	0.51	0.68	0.52	0.68	0.31	0.46	0.35
15:30 - 15:45	0.36	0.47	0.31	0.50	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.50	0.29	0.60	0.46	0.60	0.38	0.61	0.85	0.65	0.85	0.52	0.83	0.63	0.83	0.62	0.82	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.82	0.57	0.77	0.59	0.77	0.38	0.54	0.42
15:45 - 16:00	0.41	0.53	0.36	0.56	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.56	0.35	0.67	0.52	0.67	0.44	0.69	0.93	0.71	0.93	0.57	0.89	0.68	0.89	0.66	0.88	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.88	0.63	0.83	0.64	0.83	0.42	0.59	0.45
16:00 - 16:15	0.39	0.51	0.35	0.56	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.56	0.36	0.71	0.54	0.71	0.45	0.71	0.92	0.71	0.92	0.57	0.91	0.70	0.91	0.68	0.90	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.90	0.63	0.85	0.65	0.85	0.41	0.59	0.45
16:15 - 16:30	0.41	0.54	0.36	0.55	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.55	0.35	0.69	0.53	0.69	0.45	0.69	0.93	0.71	0.93	0.56	0.89	0.68	0.89	0.67	0.88	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.88	0.62	0.82	0.63	0.82	0.38	0.55	0.42
16:30 - 16:45	0.32	0.42	0.29	0.47	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.47	0.29	0.62	0.47	0.62	0.39	0.63	0.88	0.67	0.88	0.53	0.85	0.65	0.85	0.64	0.84	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0. 65	0.84	0.58	0.78	0.60	0.78	0.36	0.54	0.42
16:45 - 17:00	0.32	0.42	0.28	0.44	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.44	0.27	0.56	0.43	0.56	0.35	0.59	0.83	0.64	0.83	0.50	0.81	0.62	0.81	0.60	0.79	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.79	0.53	0.72	0.55	0.72	0.33	0.49	0.37
17:00 - 17:15	0.31	0.41	0.28	0.46	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.46	0.28	0.62	0.47	0.62	0.40	0.68	0.96	0.74	0.96	0.57	0.98	0.75	0.98	0.72	0.96	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.96	0.65	0.87	0.67	0.87	0.40	0.59	0.45
17:15 - 17:30	0.38	0.50	0.34	0.51	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.51	0.33	0.68	0.52	0.68	0.44	0.72	1.00	0.77	1.00	0.61	1.00	0.76	1.00	0.74	0.97	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.97	0.65	0.88	0.67	0.88	0.38	0.54	0.41
17:30 - 17:45	0.31	0.40	0.27	0.42	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.42	0.27	0.57	0.43	0.57	0.37	0.60	0.84	0.64	0.84	0.51	0.83	0.63	0.83	0.61	0.81	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.81	0.54	0.73	0.56	0.73	0.32	0.47	0.36
17:45 - 18:00	0.25	0.33	0.22	0.36	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.36	0.22	0.48	0.37	0.48	0.31	0.50	0.74	0.57	0.74	0.43	0.69	0.52	0.69	0.51	0.68	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.68	0.43	0.57	0.44	0.57	0.24	0.35	0.27
MAINLINE HOURLY VOLUMES																																													
Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
14:00 - 14:15	1268	1268	1133	1410	1410	1410	1410	1410	1410	1410	1410	1410	1410	1109	1745	1745	1745	1476	1759	2405	2405	2405	1913	2335	2335	2335	2274	2305	2305	2305	2305	2305	2305	2305	2305	2305	2305	2305	2126	2162	2162	2162	1404	1524	1524
14:15 - 14:30	1270	1270	1133	1366	1366	1366	1366	1366	1366	1366	1366	1366	1366	1085	1709	1709	1709	1372	1686	2399	2399	2399	1838	2251	2251	2251	2190	2211	2211	2211	2211	2211	2211	2211	2211	2211	2211	2211	2035	2091	2091	2091	1321	1443	1443
14:30 - 14:45	1203	1203	1052	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378	1040	1656	1656	1656	1361	1675	2290	2290	2290	1678	2146	2146	2146	2081	2121	2121	2121	2121	2121	2121	2121	2121	2121	2121	2121	1926	1994	1994	1994	1174	1312	1312
14:45 - 15:00	1440	1440	1256	1543	1543	1543	1543	1543	1543	1543	1543	1543	1543	1236	1890	1890	1890	1614	1973	2721	2721	2721	2070	2619	2619	2619	2554	2607	2607	2607	2607	2607	2607	2607	2607	2607	2607	2607	2406	2470	2470	2470	1677	1839	1839
15:00 - 15:15	1490	1490	1375	1627	1627	1627	1627	1627	1627	1627	1627	1627	1627	1332	2031	2031	2031	1749	2108	2833	2833	2833	2242	2798	2798	2798	2708	2747	2747	2747	2747	2747	2747	2747	2747	2747	2747	2747	2549	2603	2603	2603	1648	1772	1772
15:15 - 15:30	1259	1259	1089	1324	1324	1324	1324	1324	1324	1324	1324	1324	1324	1003	1539	1539	1539	1259	1624	2282	2282	2282	1769	2320	2320	2320	2226	2239	2239	2239	2239	2239	2239	2239	2239	2239	2239	2239	2038	2082	2082	2082	1252	1394	1394
15:30 - 15:45	1335	1335	1155	1440	1440	1440	1440	1440	1440	1440	1440	1440	1440	1079	1783	1783	1783	1470	1827	2615	2615	2615	2052	2551	2551	2551	2481	2509	2509	2509	2509	2509	2509	2509	2509	2509	2509	2509	2300	2358	2358	2358	1523	1652	1652
15:45 - 16:00	1520	1520	1328	1620	1620	1620	1620	1620	1620	1620	1620	1620	1620	1307	1999	1999	1999	1679	2073	2853	2853	2853	2260	2721	2721	2721	2656	2697	2697	2697	2697	2697	2697	2697	2697	2697	2697	2697	2498	2547	2547	2547	1649	1778	1778
16:00 - 16:15	1455	1455	1309	1620	1620	1620	1620	1620	1620	1620	1620	1620	1620	1327	2116	2116	2116	1744	2125	2816	2816	2816	2260	2793	2793	2793	2733	2763	2763	2763	2763	2763	2763	2763	2763	2763	2763	2763	2518	2595	2595	2595	1625	1780	1780
16:15 - 16:30	1529	1529	1349	1595	1595	1595	1595	1595	1595	1595	1595	1595	1595	1298	2042	2042	2042	1720	2079	2839	2839	2839	2214	2735	2735	2735	2669	2684	2684	2684	2684	2684	2684	2684	2684	2684	2684	2684	2469	2521	2521	2521	1518	1671	1671
16:30 - 16:45	1209	1209	1085	1363	1363	1363	1363	1363	1363	1363	1363	1363	1363	1066	1843	1843	1843	1521	1890	2706	2706	2706	2126	2642	2642	2642	2586	2604	2604	2604	2604	2604	2604	2604	2604	2604	2604	2604	2356	2425	2425	2425	1474	1667	1667
16:45 - 17:00	1196	1196	1053	1257	1257	1257	1257	1257	1257	1257	1257	1257	1257	1010	1671	1671	1671	1362	1783	2573	2573	2573	1974	2494	2494	2494	2410	2428	2428	2428	2428	2428	2428	2428	2428	2428	2428	2428	2164	2240	2240	2240	1339	1490	1490
17:00 - 17:15	1164	1164	1039	1333	1333	1333	1333	1333	1333	1333	1333	1333	1333	1044	1861	1861	1861	1534	2081	2979	2979	2979	2286	3047	3047	3047	2948	2983	2983	2983	2983	2983	2983	2983	2983	2983	2983	2983	2663	2740	2740	2740	1665	1845	1845
17:15 - 17:30	1417	1417	1251	1479	1479	1479	1479	1479	1479	1479	1479	1479	1479	1236	2040	2040	2040	1703	2184	3077	3077	3077	2409	3081	3081	3081	2977	2994	2994	2994	2994	2994	2994	2994	2994	2994	2994	2994	2655	2719	2719	2719	1528	1655	1655
17:30 - 17:45	1151	1151	991	1225	1225	1225	1225	1225	1225	1225	1225	1225	1225	990	1694	1694	1694	1429	1811	2596	2596	2596	2023	2567	2567	2567	2487	2508	2508	2508	2508	2508	2508	2508	2508	2508	2508	2508	2216	2276	2276	2276	1312	1448	1448
17:45 - 18:00	946	946	833	1027	1027	1027	1027	1027	1027	1027	1027	1027	1027	813	1452	1452	1452	1188	1520	2293	2293	2293	1713	2128	2128	2128	2072	2097	2097	2097	2097	2097	2097	2097	2097	2097	2097	2097	1741	1787	1787	1787	965	1087	1087

† B = Basic Segment, OFF = Off-Ramp, ON = On-Ramp, W = Weave, OV = Overlap

Overall Corridor Findings

Table 6 and Figure 5 summarize the freeway analysis results. Table 7 summarizes the freeway reliability analysis results. The following are key findings from the future no build traffic analysis of the I-5 study segment:

1. The most heavily forecasted traveled portion of the I-5 study corridor are the segments between Exit 119 and 125. This portion of the study corridor provides a regional connection between the City of Winston/Green and Roseburg. A lack of convenient alternative connections between these two urban areas focuses the daily traffic demand on I-5.
2. The highest forecast travel demand within the urbanized segments of Roseburg exists on the I-5 segments between Exits 124 and 125. This can be attributed to the limited local system connectivity between Harvard Avenue and Garden Valley Boulevard and high peak hour traffic generators (commercial/retail and Roseburg High School) near the two interchanges.
3. In the northbound I-5 direction:
    a. Demand to capacity ratio for the I-5 mainline segments between Exit 123 and Exit 124 are forecast to briefly meet or exceed their applicable 0.80 mobility targets during the weekday AM and PM peak periods. These segments are not expected to exceed a demand to capacity ratio of 0.90 in 2040. See Table 1 and callout numbers 1 and 2 in Table 2 and Table 3.
    b. All other northbound I-5 segments are forecast to operate below their applicable 0.70 or 0.80 mobility targets.
4. In the southbound I-5 direction:
    a. The demand to capacity ratio for the I-5 mainline segments between Exit 119 and Exit 125 are forecast to exceed their applicable 0.70 or 0.80 mobility targets during the average weekday PM peak periods. See callout number 6 in Table 5.
    b. Segments between Exit 123 and Exit 125 are forecast to operate near or at capacity during the average week PM peak period in May, and are expected to exceed capacity for approximately 57% of the weekday PM in a year. This is primarily caused by annual changes in travel demand, particularly in June through August when congestion in this section may last for approximately 2-hours. See callout number 5 in Table 5.
    c. All other southbound I-5 segments are forecast to operate below their applicable 0.70 or 0.80 mobility targets.
5. Travel time reliability analysis shows that the median travel time is forecast to be generally consistent in both directions during the AM and PM peak periods, at about 5-6% greater than the free-flow travel time. However, the mean travel time index in the southbound direction during the PM peak hour is forecast to be 16% greater than the free-flow travel time, showing that travel times can increase in the presence of additional demand (as well as incidents, work zones, and adverse weather situations).

a. ODOT has set a performance measure for truck travel time reliability of 1.45 to fulfill federal FAST Act requirements. As shown in Table 7, this standard is projected to be met in the existing condition, but in the future no-build condition, the 95th percentile travel time index in the southbound direction is expected to exceed this standard.
b. The poor travel time index experienced in the future no-build condition, while occasionally caused or exacerbated by non-recurring events such as incidents (crashes) and inclement weather, is primarily caused simply by high volumes along the corridor that lead to traffic flow breakdown. This condition is most pertinent in summer months on weekdays.

Table 6: Existing / Future No Build Peak Period Facility Summary

Performance Measure	Northbound		Southbound	
	AM Peak Period (7:30 - 7:45 AM)	PM Peak Period (3:45 - 4:00 PM)	AM Peak Period (7:45 - 8:00 AM)	PM Peak Period (5:15 - 5:30 PM)
Length (mi)	11.3 / 11.3		11.6 / 11.6	
Free Flow Travel Time (min)	10.5 / 10.5		10.7 / 10.7	
Average Travel Time (min)	11.08 / 11.13	11.08 / 11.13	11.27 / 11.28	11.28 / 11.40
Space Mean Speed (mi/h)	61.3 / 61.2	61.3 / 61.2	61.7 / 61.5	61.2 / 60.3
Average Density (pc/mi/ln)	15.7 / 18.2	17.0 / 19.4	12.6 / 15.5	17.1 / 21.1
Max LOS	C / C	C / C	C / C	D / D
Max D/C	0.75 / 0.85	0.73 / 0.81	0.58 / 0.66	0.79 / 1.00
Max V/C	0.75 / 0.85	0.73 / 0.81	0.58 / 0.66	0.79 / 1.00
Vehicle-Hours Delay (hrs)	4.2 / 5.2	4.4 / 5.4	2.8 / 3.8	4.9 / 7.6

Figure 5: Existing and Future No Build Peak Period Travel Time Comparison Between Analysis Scenarios

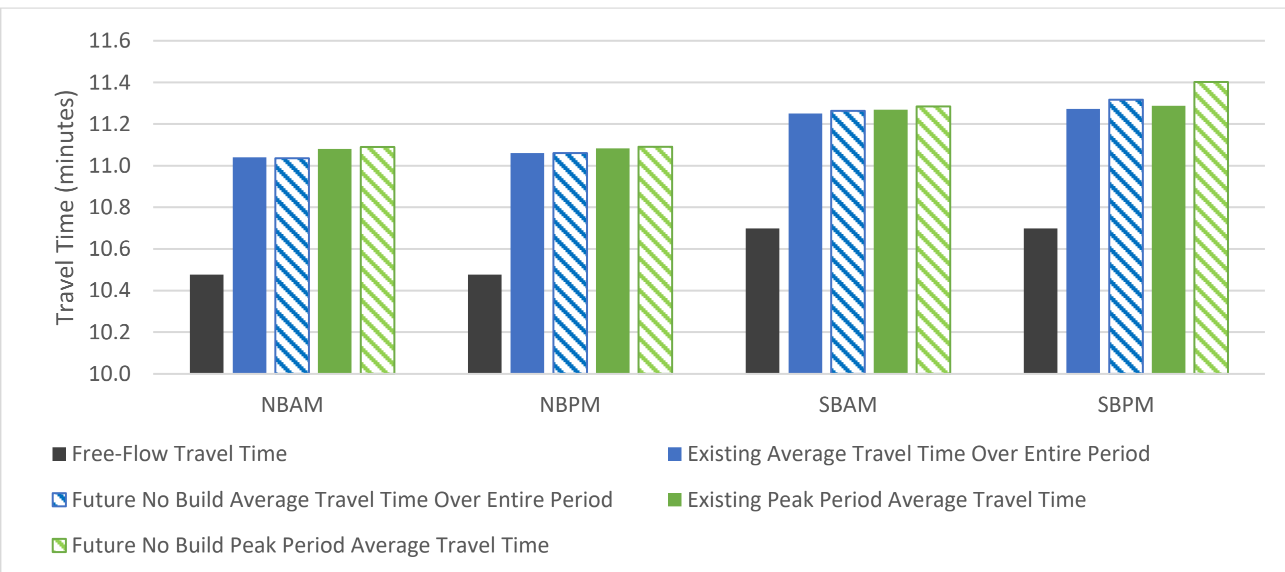


Table 7: Existing / Future No Build Reliability Analysis Summary

Performance Measure	Northbound		Southbound	
	AM Peak Period	PM Peak Period	AM Peak Period	PM Peak Period
Mean Travel Time Index	1.06 / 1.06	1.07 / 1.07	1.06 / 1.06	1.06 / 1.16
Median Travel Time Index	1.05 / 1.05	1.06 / 1.06	1.05 / 1.05	1.05 / 1.06
95th Percentile Travel Time Index	1.11 / 1.11	1.12 / 1.12	1.11 / 1.11	1.12 / **1.63**

Travel Time Index is the ratio of the peak-period travel time to the free-flow travel time.

FREIGHT ANALYSIS

As described in *Technical Memorandum #3,* freight usage was assessed using a variety of data sources, including mainline and ramp detector count data provided by ODOT, a historical review of crash data involving heavy vehicles, and 2045 forecast truck demands from the *Freight Analysis Framework Version 4* published by FHWA. In addition, travel demand forecasts from the Roseburg Travel Demand Model were also reviewed. The following summarizes the key points regarding the freight assessment:

- Based on ODOT detector count data, freight represents a relatively high usage of the study corridor. Approximately 24% of daily traffic on the I-5 study corridor are heavy vehicles – about 4% single unit trucks and 20% tractor trailer trucks. The Oregon Default Values for Freeway Analysis, which is based on a statewide average for similar facility types, assumes a default total heavy vehicle percentage of 26% for rural areas. From a traffic operations perspective, high truck usage can reduce the capacity of the I-5 study corridor compared to other typical rural freeway sections across the state.
- The Roseburg travel demand model was used for the growth projections in the Future No Build analysis. Growth projections from the Roseburg travel demand model and the Freight Analysis Framework (FAF) Version 4[1] were reviewed. The following summarizes key findings from the review and describes the decision to use the projections from the Roseburg travel demand model:
    - The Roseburg travel demand model projects 1% growth in overall volume along the corridor between 2010 and 2040, compared to 3% in the FAF between 2012 and 2045.
    - FAF model assumes the freight vehicle percentage remains constant during this time period and growths proportionally to the overall vehicle growth. There is no dedicated freight projection model in the FAF.

[1] The Freight Analysis Framework (FAF), produced through a partnership between Bureau of Transportation Statistics and Federal Highway Administration, integrates data from a variety of sources to create a comprehensive picture of freight movement among states and major metropolitan areas by all modes of transportation. https://faf.ornl.gov/fafweb/

- The FAF is a national-level model that while accurate at capturing changes in traffic flow at the national-level, may not be intended for use at a local-level, such as the study corridor in Roseburg. By comparison, the Roseburg travel demand model is a local, area-specific model. Therefore, volume projections from the Roseburg travel demand model was used instead.

HCM-based operations analysis presented in this memorandum does not distinguish performance measures by vehicle class. Therefore, automobile performance measures such as level-of-service presented in earlier sections of this document applies to trucks.

FUTURE CRASH ASSESSMENT

Reported crashes for the five-year period from October 1, 2012 through September 30, 2017 were analyzed in *Technical Memorandum #3*. To prepare for the analysis of alternatives in future tasks, a baseline estimate of future safety outcomes was performed using the Enhanced Interchange Safety Analysis Tool (ISATe).

The ISATe tool was developed under NCHRP Project 17-45: Safety Prediction Methodology and Analysis Tool for Freeways and Interchanges and available on the Highway Safety Manual website. It implements predictive crash methodologies consistent with the Highway Safety Manual 1st Edition and develops an expected average crash frequency based on various design elements (e.g., lane width) or design components. The methodology is intended to help designers make informed judgements about the safety performance of design alternatives.

Expected average crash frequency for Year 2040 by segment throughout the study area was estimated based on geometric features of each segment, the presence of freeway entrance and exit ramps, and mainline and ramp traffic volumes. Since the ISATe tool is not calibrated to Oregon freeways, the magnitude of expected average crash frequencies will not be used to draw conclusions about specific safety outcomes between the existing and future no-build conditions. However, changes in expected average crash frequencies from the ISATe tool will be used to estimate future safety outcomes between concept alternatives in subsequent tasks in relative terms. A summary of the expected average crash frequencies by segment in the future no-build scenario is shown in Table 8 and detailed output summaries from this analysis are provided in Appendix A.

Table 8. Expected Average Crash Frequency Summary

HSM Segment Number	Corresponding Exit Numbers	Future No-Build Projected Annual Fatal and Injury Crashes Per Mile (Uncalibrated)[2]
1	South of Exit 119	5.163
2	Exit 119	4.421
3	Exit 119	4.024
4	Exit 119	5.514
5	Between Exits 119 and 120	7.525
6	Exit 120	7.164
7	Exit 120	6.233
8	Between Exits 120 and 123	7.606
9	Between Exits 120 and 123	7.670
10	Between Exits 120 and 123	8.920
11	Exit 123	10.071
12	Exit 123	8.394
13	Exit 123	10.773
14	Between Exits 123 and 124	9.696
15	Exit 124	12.694
16	Exit 124	11.289
17	Exit 124	10.002
18	Exit 124	9.540
19	Between Exits 124 and 125	10.723
20	Exit 125	8.942
21	Exit 125	6.661
22	Exit 125	9.144
23	Exit 125	6.132
24	Exit 125	7.947
25	Between Exits 125 and 127	6.967
26	Exit 127	6.314
27	Exit 127	4.522
28	Exit 127	5.899
29	Exit 127	6.026
30	Between Exits 127 and 129	6.221
31	Exit 129	6.160
32	Exit 129	4.610
33	Exit 129	5.017
34	North of Exit 129	5.360

[2] Since the ISATe tool is not calibrated to Oregon freeways, the magnitude of expected average crash frequencies will not be used to draw conclusions about specific safety outcomes between the existing and future no-build conditions. However, changes in expected average crash frequencies from the ISATe tool will be used to estimate future safety outcomes between concept alternatives in subsequent tasks in relative terms.

Appendix A Estimated Future Crashes

Figure A.1. Expected Future Crashes for Segment between Exit 119 to Exit 123

Output Summary

General Information					
Project description:	I-5 Bottleneck Corridor Segment Plan - Exit 119 to Exit 123				
Analyst:	RBG	Date:	8/18/2020	Area type:	Rural
First year of analysis:	2033				
Last year of analysis:	2036				

Crash Data Description				
Freeway segments	Segment crash data available?	Yes	First year of crash data:	2013
	Project-level crash data available?	No	Last year of crash data:	2016
Ramp segments	Segment crash data available?	Yes	First year of crash data:	2013
	Project-level crash data available?	No	Last year of crash data:	2016
Ramp terminals	Segment crash data available?	Yes	First year of crash data:	2013
	Project-level crash data available?	No	Last year of crash data:	2016

Estimated Crash Statistics

Crashes for Entire Facility	Total	K	A	B	C	PDO
Estimated number of crashes during Study Period, crashes:	89.1	0.8	2.0	11.1	16.7	58.4
Estimated average crash freq. during Study Period, crashes/yr:	22.3	0.2	0.5	2.8	4.2	14.6

Crashes by Facility Component	Nbr. Sites	Total	K	A	B	C	PDO
Freeway segments, crashes:	9	89.1	0.8	2.0	11.1	16.7	58.4
Ramp segments, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0
Crossroad ramp terminals, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0

Crashes for Entire Facility by Year	Year	Total	K	A	B	C	PDO
Estimated number of crashes during the Study Period, crashes:	2033	22.3	0.2	0.5	2.8	4.2	14.6
	2034	22.3	0.2	0.5	2.8	4.2	14.6
	2035	22.3	0.2	0.5	2.8	4.2	14.6
	2036	22.3	0.2	0.5	2.8	4.2	14.6
	2037						
	2038						
	2039						
	2040						
	2041						
	2042						
	2043						
	2044						
	2045						
	2046						
	2047						
	2048						
	2049						
	2050						
	2051						
	2052						
	2053						
	2054						
	2055						
	2056						

Distribution of Crashes for Entire Facility

Crash Type	Crash Type Category	Estimated Number of Crashes During the Study Period					
		Total	K	A	B	C	PDO
Multiple vehicle	Head-on crashes:	0.3	0.0	0.0	0.1	0.1	0.1
	Right-angle crashes:	1.3	0.0	0.0	0.2	0.4	0.7
	Rear-end crashes:	20.3	0.2	0.5	2.8	4.2	12.5
	Sideswipe crashes:	12.4	0.1	0.2	1.0	1.5	9.5
	Other multiple-vehicle crashes:	2.5	0.0	0.0	0.2	0.3	1.8
	Total multiple-vehicle crashes:	36.8	0.3	0.8	4.4	6.6	24.7
Single vehicle	Crashes with animal:	2.4	0.0	0.0	0.1	0.1	2.2
	Crashes with fixed object:	31.6	0.3	0.7	3.8	5.7	21.0
	Crashes with other object:	4.9	0.0	0.0	0.2	0.3	4.3
	Crashes with parked vehicle:	1.2	0.0	0.0	0.2	0.2	0.8
	Other single-vehicle crashes	12.3	0.2	0.5	2.5	3.7	5.4
	Total single-vehicle crashes:	52.4	0.5	1.2	6.7	10.1	33.7
	Total crashes:	89.1	0.8	2.0	11.1	16.7	58.4

Evaluation Site Summary

General Information					
Project description:	I-5 Bottleneck Corridor Segment Plan - Exit 119 to Exit 123				
Analyst:	RBG	Date:	8/18/2020	Area type:	Rural
First year of analysis:	2033	Total length of freeway segments for Study Period (mi):	3.220		
Last year of analysis:	2036				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Crash Period Description	Study Period Description
1	4	0.120	1	1
2	4	0.320	2	2
3	4	0.080	3	3
4	4	0.220	4	4
5	5	0.190	5	5
6	5	0.250	6	6
7	5	0.100	7	7
8	5	0.100	8	8
9	4	1.840	9	9
10	0	0.000	0	0
11	0	0.000	0	0
12	0	0.000	0	0
13	0	0.000	0	0
14	0	0.000	0	0
15	0	0.000	0	0
16	0	0.000	0	0
17	0	0.000	0	0
18	0	0.000	0	0
19	0	0.000	0	0
20	0	0.000	0	0

Ramp Segments

Number	Crash Period Description	Study Period Description	Number	Crash Period Description	Study Period Description
1	0	0	21	0	0
2	0	0	22	0	0
3	0	0	23	0	0
4	0	0	24	0	0
5	0	0	25	0	0
6	0	0	26	0	0
7	0	0	27	0	0
8	0	0	28	0	0
9	0	0	29	0	0
10	0	0	30	0	0
11	0	0	31	0	0
12	0	0	32	0	0
13	0	0	33	0	0
14	0	0	34	0	0
15	0	0	35	0	0
16	0	0	36	0	0
17	0	0	37	0	0
18	0	0	38	0	0
19	0	0	39	0	0
20	0	0	40	0	0

Crossroad Ramp Terminals

Number	Config.	Control	Crash Period Description	Study Period Description
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0

Figure A.2. Expected Future Crashes for Segment between Exit 123 to Exit 127

Output Summary

General Information

Project description:	I-5 Bottleneck Corridor Segment Plan - Exit 123 to Exit 127				
Analyst:	MBM	Date:	8/18/2020	Area type:	Urban
First year of analysis:	2033				
Last year of analysis:	2036				

Crash Data Description

Freeway segments	Segment crash data available?	Yes	First year of crash data:	2013
	Project-level crash data available?	No	Last year of crash data:	2016
Ramp segments	Segment crash data available?	Yes	First year of crash data:	2013
	Project-level crash data available?	No	Last year of crash data:	2016
Ramp terminals	Segment crash data available?	Yes	First year of crash data:	2013
	Project-level crash data available?	No	Last year of crash data:	2016

Estimated Crash Statistics

Crashes for Entire Facility	Total	K	A	B	C	PDO
Estimated number of crashes during Study Period, crashes:	136.6	0.9	2.5	16.3	30.0	87.0
Estimated average crash freq. during Study Period, crashes/yr:	34.2	0.2	0.6	4.1	7.5	21.7

Crashes by Facility Component	Nbr. Sites	Total	K	A	B	C	PDO
Freeway segments, crashes:	17	136.6	0.9	2.5	16.3	30.0	87.0
Ramp segments, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0
Crossroad ramp terminals, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0

Crashes for Entire Facility by Year	Year	Total	K	A	B	C	PDO
Estimated number of crashes during the Study Period, crashes:	2033	34.2	0.2	0.6	4.1	7.5	21.7
	2034	34.2	0.2	0.6	4.1	7.5	21.7
	2035	34.2	0.2	0.6	4.1	7.5	21.7
	2036	34.2	0.2	0.6	4.1	7.5	21.7
	2037						
	2038						
	2039						
	2040						
	2041						
	2042						
	2043						
	2044						
	2045						
	2046						
	2047						
	2048						
	2049						
	2050						
	2051						
	2052						
	2053						
	2054						
	2055						
	2056						

Distribution of Crashes for Entire Facility

Crash Type	Crash Type Category	Estimated Number of Crashes During the Study Period					
		Total	K	A	B	C	PDO
Multiple vehicle	Head-on crashes:	0.3	0.0	0.0	0.1	0.1	0.1
	Right-angle crashes:	1.7	0.0	0.0	0.3	0.5	0.9
	Rear-end crashes:	52.7	0.4	1.0	6.6	12.2	32.4
	Sideswipe crashes:	17.8	0.1	0.2	1.6	3.0	12.9
	Other multiple-vehicle crashes:	1.9	0.0	0.0	0.3	0.5	1.1
	Total multiple-vehicle crashes:	74.2	0.5	1.3	8.8	16.2	47.3
Single vehicle	Crashes with animal:	0.9	0.0	0.0	0.0	0.0	0.8
	Crashes with fixed object:	44.7	0.3	0.8	5.4	9.9	28.4
	Crashes with other object:	6.8	0.0	0.1	0.4	0.7	5.6
	Crashes with parked vehicle:	1.0	0.0	0.0	0.1	0.2	0.6
	Other single-vehicle crashes	9.0	0.1	0.2	1.6	2.9	4.2
	Total single-vehicle crashes:	62.4	0.4	1.1	7.5	13.7	39.6
Total crashes:		136.6	0.9	2.5	16.3	30.0	87.0

Evaluation Site Summary

General Information

Project description:	I-5 Bottleneck Corridor Segment Plan - Exit 123 to Exit 127				
Analyst:	MBM	Date:	8/18/2020	Area type:	Urban
First year of analysis:	2033	Total length of freeway segments for Study Period (mi):	3.880		
Last year of analysis:	2036				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Crash Period Description	Study Period Description
1	4	0.380	10	10
2	4	0.040	11	11
3	4	0.340	12	12
4	4	0.020	13	13
5	4	0.620	14	14
6	4	0.110	15	15
7	4	0.190	16	16
8	4	0.040	17	17
9	4	0.270	18	18
10	4	0.340	19	19
11	4	0.180	20	20
12	4	0.080	21	21
13	4	0.110	22	22
14	4	0.120	23	23
15	4	0.060	24	24
16	4	0.880	25	25
17	4	0.100	26	26
18	0	0.000	0	0
19	0	0.000	0	0
20	0	0.000	0	0

Ramp Segments

Number	Crash Period Description	Study Period Description	Number	Crash Period Description	Study Period Description
1	0	0	21	0	0
2	0	0	22	0	0
3	0	0	23	0	0
4	0	0	24	0	0
5	0	0	25	0	0
6	0	0	26	0	0
7	0	0	27	0	0
8	0	0	28	0	0
9	0	0	29	0	0
10	0	0	30	0	0
11	0	0	31	0	0
12	0	0	32	0	0
13	0	0	33	0	0
14	0	0	34	0	0
15	0	0	35	0	0
16	0	0	36	0	0
17	0	0	37	0	0
18	0	0	38	0	0
19	0	0	39	0	0
20	0	0	40	0	0

Crossroad Ramp Terminals

Number	Config.	Control	Crash Period Description	Study Period Description
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0

Figure A.3. Expected Future Crashes for Segment between Exit 127 to Exit 129

Output Summary

General Information							
Project description:	I-5 Bottleneck Corridor Segment Plan - Exit 127 to Exit 129						
Analyst:	RBG	Date:	8/18/2020		Area type:	Urban	
First year of analysis:	2033						
Last year of analysis:	2036						
Crash Data Description							
Freeway segments	Segment crash data available?		Yes	First year of crash data:			2013
	Project-level crash data available?		No	Last year of crash data:			2016
Ramp segments	Segment crash data available?		Yes	First year of crash data:			2013
	Project-level crash data available?		No	Last year of crash data:			2016
Ramp terminals	Segment crash data available?		Yes	First year of crash data:			2013
	Project-level crash data available?		No	Last year of crash data:			2016

Estimated Crash Statistics

Crashes for Entire Facility		Total	K	A	B	C	PDO
Estimated number of crashes during Study Period, crashes:		89.9	0.7	1.9	11.3	19.1	57.0
Estimated average crash freq. during Study Period, crashes/yr:		22.5	0.2	0.5	2.8	4.8	14.2
Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	8	89.9	0.7	1.9	11.3	19.1	57.0
Ramp segments, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0
Crossroad ramp terminals, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0
Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2033	22.5	0.2	0.5	2.8	4.8	14.2
	2034	22.5	0.2	0.5	2.8	4.8	14.2
	2035	22.5	0.2	0.5	2.8	4.8	14.2
	2036	22.5	0.2	0.5	2.8	4.8	14.2
	2037						
	2038						
	2039						
	2040						
	2041						
	2042						
	2043						
	2044						
	2045						
	2046						
	2047						
	2048						
	2049						
	2050						
	2051						
	2052						
	2053						
	2054						
	2055						
	2056						

Distribution of Crashes for Entire Facility

Crash Type	Crash Type Category	Estimated Number of Crashes During the Study Period					
		Total	K	A	B	C	PDO
Multiple vehicle	Head-on crashes:	0.2	0.0	0.0	0.0	0.1	0.0
	Right-angle crashes:	0.9	0.0	0.0	0.2	0.3	0.5
	Rear-end crashes:	28.8	0.2	0.6	3.9	6.6	17.5
	Sideswipe crashes:	9.7	0.1	0.2	0.9	1.6	6.9
	Other multiple-vehicle crashes:	1.0	0.0	0.0	0.2	0.3	0.6
	Total multiple-vehicle crashes:	40.6	0.3	0.9	5.2	8.8	25.5
Single vehicle	Crashes with animal:	0.7	0.0	0.0	0.0	0.0	0.7
	Crashes with fixed object:	35.4	0.3	0.7	4.4	7.4	22.6
	Crashes with other object:	5.4	0.0	0.1	0.3	0.5	4.4
	Crashes with parked vehicle:	0.8	0.0	0.0	0.1	0.2	0.5
	Other single-vehicle crashes	7.1	0.1	0.2	1.3	2.2	3.3
	Total single-vehicle crashes:	49.3	0.4	1.0	6.1	10.3	31.5
	Total crashes:	89.9	0.7	1.9	11.3	19.1	57.0

Evaluation Site Summary

General Information					
Project description:	I-5 Bottleneck Corridor Segment Plan - Exit 127 to Exit 129				
Analyst:	RBG	Date:	8/18/2020	Area type:	Urban
First year of analysis:	2033	Total length of freeway segments for Study Period (mi):	3.840		
Last year of analysis:	2036				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Crash Period Description	Study Period Description
1	4	0.310	27	27
2	4	0.070	28	28
3	4	0.180	29	29
4	4	2.490	30	30
5	4	0.130	31	31
6	4	0.280	32	32
7	4	0.120	33	33
8	4	0.260	34	34
9	0	0.000	0	0
10	0	0.000	0	0
11	0	0.000	0	0
12	0	0.000	0	0
13	0	0.000	0	0
14	0	0.000	0	0
15	0	0.000	0	0
16	0	0.000	0	0
17	0	0.000	0	0
18	0	0.000	0	0
19	0	0.000	0	0
20	0	0.000	0	0

Ramp Segments

Number	Crash Period Description	Study Period Description	Number	Crash Period Description	Study Period Description
1	0	0	21	0	0
2	0	0	22	0	0
3	0	0	23	0	0
4	0	0	24	0	0
5	0	0	25	0	0
6	0	0	26	0	0
7	0	0	27	0	0
8	0	0	28	0	0
9	0	0	29	0	0
10	0	0	30	0	0
11	0	0	31	0	0
12	0	0	32	0	0
13	0	0	33	0	0
14	0	0	34	0	0
15	0	0	35	0	0
16	0	0	36	0	0
17	0	0	37	0	0
18	0	0	38	0	0
19	0	0	39	0	0
20	0	0	40	0	0

Crossroad Ramp Terminals

Number	Config.	Control	Crash Period Description	Study Period Description
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0

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MEMORANDUM

Date:	July 13, 2021	Project #: 21339.0
To:	Tom Guevara, Oregon Department of Transportation	
From:	Matt Hughart, AICP, Yi-Min Ha, and Molly McCormick, Kittelson & Associates, Inc.	
Project:	I-5 Bottleneck Corridor Segment Plan	
Subject:	Final Project Concepts	

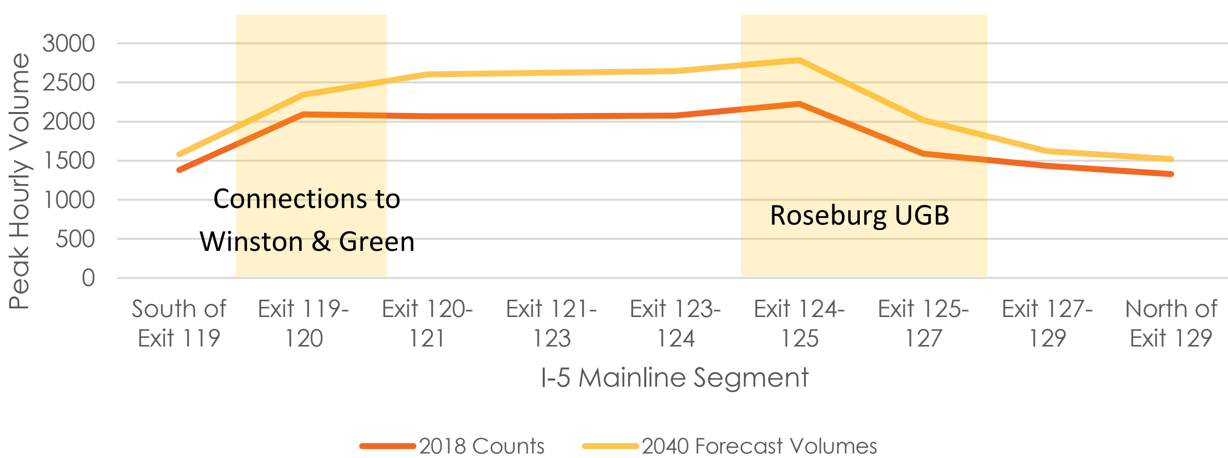
This memorandum provides a summary of potential projects, and the accompanying key considerations, along the 11-mile segment of Interstate 5 between Exit 119 and Exit 129. Concept alternatives presented in this memorandum were developed based on findings from a traffic operations analysis model using Highway Capacity Manual 6th Edition (HCM6) methodologies and feedback from the Oregon Department of Transportation, City of Roseburg and Douglas County staff.

SUMMARY OF OPERATIONAL CHALLENGES

The following describes key operational challenges identified along the study corridor:

- **Winston-Green Commuter Pattern** – Roseburg is a center of employment and retail in the study area. As such, approximately 25% of travel on I-5 represent commuter/shopping trips between Winston and Green (which is primarily residential) to Roseburg. These commuter patterns are expected to intensify as Winton and Green continue to grow.

Figure 1: 2018 and 2040 Future Year PM Peak Hour Volumes in the Southbound Direction



- **Topographical Constraints Restricting Regional Connectivity** –Topographical and natural feature constraints abound in the larger Roseburg study area, including Mount Nebo, the Umpqua River, and steeply sloped hillsides. These constraints have inhibited the development of a continuous parallel arterial/collector grid pattern. As such, I-5 currently serves as an extension of the local arterial network, especially between Exits 125 and 124. These local trips along I-5 generate additional merge, diverge and weaving maneuvers, contributing to congestion and slowdowns along the I-5 mainline.

- **Southbound Congestion** – Compared to the northbound direction, I-5 in the southbound direction only has two travel lanes throughout the entire study segment. As such, I-5 southbound is generally more capacity constrained, particularly in the weekday PM peak period. Based on 2040 forecast volumes, corridor bottlenecks are expected to form at the Exit 124 southbound on-ramp on weekdays during the peak summer travel periods. Figure 2 illustrates changes in demand-over-capacity ratios by month of year.

- **Interchange Ramp Geometric Challenges** – Due to the topographical constraints of the area, there are existing interchanges (Exit 125, Exit 124, and Exit 121) with less than ideal offramp lengths, acceleration lanes, and diverge angles. These geometric challenges can lead to safety concerns and contribute to mainline congestion. Addressing some of these geometric issues is a focus of the improvement concepts.

- **Lack of Adequate Shoulders** – Due to the topographical constraints of the area, majority of the study corridor has less than standard shoulder width, especially at certain bridges/overpasses and between Exits 125 and 119. The lack of room on the shoulder for vehicles to pull over in the event of an incident or crash can exacerbate congestion along the I-5 corridor. Additionally, the lack of shoulders also limits the ability to conduct speed enforcement along the study corridor.

As the project team gathered feedback and input on the operations of the corridor from those who drive it daily, it became apparent that some parameters of the FREEVAL analysis should be updated to better reflect conditions on the ground. Although FREEVAL was forecasting several on-ramp and off-ramp locations to have high d/c ratios, local agency staff flagged these locations as minimal friction points for through vehicles due to low merge and diverge traffic. As noted in HCM Chapter 14, "a merge segment with a low on-ramp traffic (and thus little resulting merge turbulence) is expected to have a capacity similar to that of a basic segment…". The FREEVAL parameter updates completed to better reflect these conditions included:

- Adjusting the urban area type to "median urban" instead of "urban", which increased the base capacity for merge and diverge segments to 2000 pc/hr/ln.

- Increasing the capacity to 2250 pc/hr/ln, which is the same as basic segments, for merge and diverge segments where the entering and existing traffic is low. The "low" ramp volume threshold applied to determine the adjusted merge and diverge segments was 120 pc/hr under 2040 demand-adjusted conditions. The exits where ramp capacities were adjusted included Exit 123 (Fairgrounds) northbound and southbound, Exit 127 (Edenbower Boulevard) northbound, and Exit 120 (North Shady) southbound.

- Because standard bottlenecks were not forecast through the FREEVAL analysis with volumes representing future year 2040 spring conditions, the seed entering demand adjustment factor and seed exit demand adjustment factor were adjusted from 1.00 to 1.18 to represent peak summer conditions. This adjustment allowed the project team to consider a range of alternatives.

Because of these adjustments made as part of the alternatives development, it should be noted that the existing and no-build future conditions are not directly comparable to the future alternatives analysis. Comparisons of the analyses between the supporting technical memos must account for these modifications.

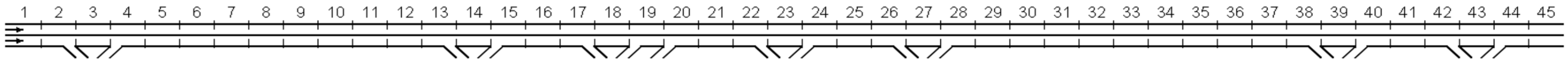
CONCEPTS FOR REVIEW

This section describes each of the concept alternatives developed for the projects along I-5. These concepts were developed based on the noted operational challenges, existing infrastructure limitations, considerations toward the operational need, constructability, and cost feasibility of the concepts. The following summarizes concepts presented in this section:

Project Name	Description
I-5 Southbound Auxiliary Lane (Exit 125 to 124)	Widen I-5 southbound to include an auxiliary lane between Exit 125 on-ramp and 124 off-ramp.
Exit 125 Southbound Ramp Meters	Install ramp meters for southbound on-ramps at Exit 125.
Exit 124 Northbound & Southbound Ramp Meters	Install ramp meters for northbound and southbound on-ramps at Exit 124.
Exit 124 Southbound Geometric Modifications	Reconfigure southbound on-ramp at Exit 125 to reduce friction with mainline.
Exit 121 Southbound Geometric Modifications	Reconfigure southbound off-ramp at Exit 121 to reduce friction with mainline.
Exit 119 Southbound Deceleration Lane Modification	Reconfigure southbound off-ramp deceleration lane length at Exit 119 to reduce friction with mainline.
Shoulder Widening	Widen or restripe I-5 to add shoulders where feasible.

Figure 2: I-5 Southbound PM Peak Period Reliability Results (2040 No-Build Analysis)

Max Demand-Capacity Ration During 5:15-5:30 PM Analysis Period



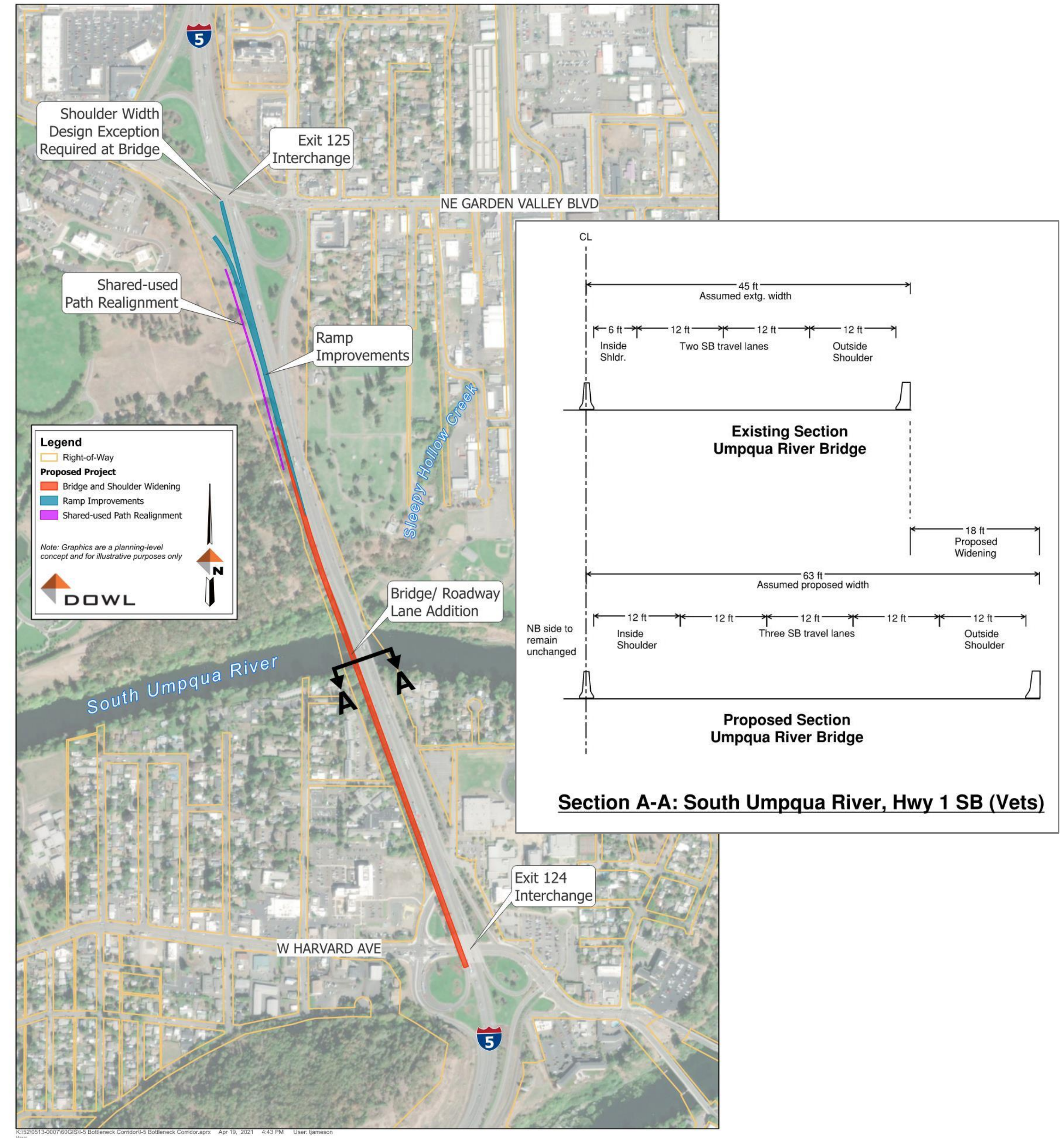
				Winchester Exit 129											Edenbower Blvd Exit 127				Garden Valley Rd Exit 125					Harvard Ave Exit 124				Fairgrounds Ave Exit 123												North Shady Exit 120				Coos Bay - Winston Exit 119		
Month	Day of Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
January	Monday	0.37	0.43	0.33	0.46	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.46	0.32	0.57	0.49	0.57	0.41	0.58	0.81	0.69	0.81	0.54	0.80	0.68	0.71	0.66	0.69	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.78	0.59	0.62	0.60	0.71	0.38	0.49	0.42
	Tuesday	0.37	0.43	0.33	0.46	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.46	0.32	0.57	0.49	0.57	0.41	0.58	0.81	0.69	0.81	0.54	0.80	0.68	0.71	0.66	0.69	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.78	0.59	0.62	0.60	0.71	0.38	0.49	0.42
	Wednesday	0.36	0.42	0.33	0.45	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.45	0.32	0.56	0.48	0.56	0.40	0.57	0.79	0.67	0.79	0.53	0.79	0.67	0.70	0.65	0.68	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.77	0.57	0.61	0.59	0.69	0.37	0.48	0.41
	Thursday	0.35	0.41	0.32	0.43	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.43	0.31	0.55	0.46	0.55	0.39	0.56	0.77	0.65	0.77	0.52	0.76	0.65	0.68	0.63	0.66	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.74	0.56	0.59	0.57	0.67	0.36	0.47	0.40
	Friday	0.31	0.37	0.28	0.39	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.39	0.28	0.49	0.42	0.49	0.35	0.50	0.69	0.58	0.69	0.46	0.68	0.58	0.61	0.56	0.59	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.67	0.50	0.53	0.51	0.60	0.32	0.42	0.36
February	Monday	0.39	0.45	0.35	0.48	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.48	0.34	0.60	0.51	0.60	0.43	0.61	0.85	0.72	0.85	0.57	0.84	0.72	0.75	0.69	0.73	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.82	0.62	0.66	0.63	0.74	0.40	0.52	0.44
	Tuesday	0.39	0.45	0.35	0.48	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.48	0.34	0.60	0.51	0.60	0.43	0.61	0.85	0.72	0.85	0.57	0.84	0.72	0.75	0.69	0.73	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.82	0.62	0.66	0.63	0.74	0.40	0.52	0.44
	Wednesday	0.38	0.45	0.34	0.47	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.47	0.33	0.59	0.50	0.59	0.42	0.60	0.83	0.71	0.83	0.56	0.83	0.70	0.73	0.68	0.71	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.80	0.60	0.64	0.62	0.73	0.39	0.51	0.43
	Thursday	0.37	0.43	0.33	0.45	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.45	0.32	0.57	0.49	0.57	0.41	0.58	0.81	0.69	0.81	0.54	0.80	0.68	0.71	0.66	0.69	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.78	0.59	0.62	0.60	0.71	0.38	0.49	0.42
	Friday	0.33	0.39	0.30	0.41	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.41	0.29	0.51	0.44	0.51	0.37	0.52	0.72	0.61	0.72	0.49	0.72	0.61	0.64	0.59	0.62	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.70	0.52	0.56	0.54	0.63	0.34	0.44	0.37
March	Monday	0.42	0.49	0.38	0.52	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.52	0.37	0.65	0.55	0.65	0.47	0.66	0.92	0.78	0.92	0.62	0.91	0.78	0.81	0.75	0.79	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.89	0.67	0.71	0.68	0.80	0.43	0.56	0.48
	Tuesday	0.42	0.49	0.38	0.52	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.52	0.37	0.65	0.55	0.65	0.47	0.66	0.92	0.78	0.92	0.62	0.91	0.78	0.81	0.75	0.79	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.89	0.67	0.71	0.68	0.80	0.43	0.56	0.48
	Wednesday	0.41	0.48	0.37	0.51	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.51	0.36	0.64	0.54	0.64	0.46	0.65	0.90	0.76	0.90	0.60	0.90	0.76	0.79	0.74	0.77	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.87	0.65	0.70	0.67	0.79	0.42	0.55	0.47
	Thursday	0.40	0.47	0.36	0.49	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.49	0.35	0.62	0.53	0.62	0.44	0.63	0.87	0.74	0.87	0.59	0.87	0.74	0.77	0.71	0.75	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.85	0.63	0.68	0.65	0.76	0.41	0.53	0.45
	Friday	0.36	0.42	0.32	0.44	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.44	0.31	0.56	0.47	0.56	0.40	0.57	0.78	0.66	0.78	0.53	0.78	0.66	0.69	0.64	0.67	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.76	0.57	0.61	0.58	0.68	0.37	0.48	0.41
April	Monday	0.42	0.49	0.38	0.52	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.52	0.37	0.65	0.56	0.65	0.47	0.66	0.92	0.78	0.92	0.62	0.91	0.78	0.81	0.75	0.79	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.89	0.67	0.71	0.68	0.80	0.43	0.56	0.48
	Tuesday	0.42	0.49	0.38	0.52	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.52	0.37	0.65	0.56	0.65	0.47	0.66	0.92	0.78	0.92	0.62	0.91	0.78	0.81	0.75	0.79	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.89	0.67	0.71	0.68	0.80	0.43	0.56	0.48
	Wednesday	0.41	0.48	0.37	0.51	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.51	0.36	0.64	0.54	0.64	0.46	0.65	0.90	0.77	0.90	0.61	0.90	0.76	0.79	0.74	0.77	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.87	0.65	0.70	0.67	0.79	0.42	0.55	0.47
	Thursday	0.40	0.47	0.36	0.49	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.49	0.35	0.62	0.53	0.62	0.44	0.63	0.87	0.74	0.87	0.59	0.87	0.74	0.77	0.72	0.75	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.85	0.63	0.68	0.65	0.76	0.41	0.53	0.45
	Friday	0.36	0.42	0.32	0.44	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.44	0.31	0.56	0.47	0.56	0.40	0.57	0.78	0.67	0.78	0.53	0.78	0.66	0.69	0.64	0.67	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.76	0.57	0.61	0.58	0.68	0.37	0.48	0.41
May	Monday	0.44	0.51	0.39	0.54	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.54	0.38	0.68	0.58	0.68	0.48	0.69	0.95	0.81	0.95	0.64	0.95	0.81	0.84	0.78	0.82	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.92	0.69	0.74	0.71	0.84	0.45	0.58	0.50
	Tuesday	0.44	0.51	0.39	0.54	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.54	0.38	0.68	0.58	0.68	0.48	0.69	0.95	0.81	0.95	0.64	0.95	0.81	0.84	0.78	0.82	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.92	0.69	0.74	0.71	0.84	0.45	0.58	0.50
	Wednesday	0.43	0.50	0.38	0.53	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.53	0.38	0.66	0.57	0.66	0.47	0.68	0.93	0.80	0.93	0.63	0.93	0.79	0.82	0.77	0.80	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.91	0.68	0.72	0.70	0.82	0.44	0.57	0.49
	Thursday	0.41	0.49	0.37	0.51	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.51	0.36	0.65	0.55	0.65	0.46	0.66	0.91	0.77	0.91	0.61	0.90	0.77	0.80	0.74	0.78	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.88	0.66	0.70	0.68	0.80	0.43	0.55	0.47
	Friday	0.37	0.44	0.33	0.46	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.46	0.33	0.58	0.49	0.58	0.41	0.59	0.81	0.69	0.81	0.55	0.81	0.69	0.72	0.67	0.70	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.79	0.59	0.63	0.61	0.71	0.38	0.50	0.42
June	Monday	0.48	0.56	0.43	0.59	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.59	0.42	0.74	0.63	0.74	0.53	0.76	1.05	0.89	1.05	0.70	1.04	0.89	0.92	0.86	0.90	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	1.01	0.76	0.81	0.78	0.92	0.49	0.64	0.54
	Tuesday	0.48	0.56	0.43	0.59	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.59	0.42	0.74	0.63	0.74	0.53	0.76	1.05	0.89	1.05	0.70	1.04	0.89	0.92	0.86	0.90	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	1.01	0.76	0.81	0.78	0.92	0.49	0.64	0.54
	Wednesday	0.47	0.55	0.42	0.58	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.58	0.41	0.73	0.62	0.73	0.52	0.74	1.02	0.87	1.02	0.69	1.02	0.87	0.90	0.84	0.88	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.99	0.74	0.79	0.76	0.90	0.48	0.63	0.53
	Thursday	0.45	0.53	0.41	0.56	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.56	0.40	0.71	0.60	0.71	0.51	0.72	0.99	0.85	0.99	0.67	0.99	0.84	0.88	0.82	0.85	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.96	0.72	0.77	0.74	0.87	0.47	0.61	0.52
	Friday	0.41	0.48	0.37	0.50	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.50	0.36	0.63	0.54	0.63	0.45	0.65	0.89	0.76	0.89	0.60	0.89	0.76	0.79	0.73	0.76	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.86	0.65	0.69	0.66	0.78	0.42	0.54	0.46
July	Monday	0.49	0.57	0.44	0.60	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.60	0.43	0.76	0.64	0.76	0.54	0.77	1.06	0.91	1.06	0.72	1.06	0.90	0.94	0.87	0.91	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	1.03	0.77	0.82	0.79	0.93	0.50	0.65	0.55
	Tuesday	0.49	0.57	0.44	0.60	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.60	0.43	0.76	0.64	0.76	0.54	0.77	1.06	0.91	1.06	0.72	1.06	0.90	0.94	0.87	0.91	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	1.03	0.77	0.82	0.79	0.93	0.50	0.65	0.55
	Wednesday	0.48	0.56	0.43	0.59	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.59	0.42	0.74	0.63	0.74	0.53	0.75	1.04	0.89	1.04	0.70	1.04	0.88	0.92	0.85	0.89	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	1.01	0.76	0.81	0.78	0.91	0.49	0.64	0.54
	Thursday	0.46	0.54	0.42	0.57	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.57	0.41	0.72	0.61	0.72	0.51	0.73	1.01	0.86	1.01	0.68	1.01	0.86	0.89	0.83	0.87	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.98	0.74	0.78	0.75	0.89	0.48	0.62	0.53
	Friday	0.41	0.49	0.37	0.51	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.51	0.36	0.64	0.55	0.64	0.46	0.66	0.91	0.77	0.91	0.61	0.90	0.77	0.80	0.74	0.78	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.88	0.66	0.70	0.68	0.79	0.43	0.55	0.47
August	Monday	0.48	0.57	0.43	0.60	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.60	0.42	0.75	0.64	0.75	0.54	0.76	1.05	0.90	1.05	0.71	1.05	0.89	0.93	0.86	0.90	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	1.02	0.77	0.82	0.79	0.92	0.49	0.64	0.55
	Tuesday	0.48	0.57	0.43	0.60	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.60	0.42	0.75	0.64	0.75	0.54	0.76	1.05	0.90	1.05	0.71	1.05	0.89	0.93	0.86	0.90	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	1.02	0.77	0.82	0.79	0.92	0.49	0.64	0.55
	Wednesday	0.47	0.55	0.42	0.58	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.58	0.41	0.73	0.63	0.73	0.52	0.75	1.03	0.88	1.03	0.70	1.03	0.88	0.91	0.85	0.89	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	1.00	0.75	0.80	0.77	0.90	0.48	0.63	0.54
	Thursday	0.46	0.54	0.41	0.57	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.57	0.40	0.71	0.61	0.71	0.51	0.73	1.00	0.85	1.00	0.67	1.00	0.85	0.88	0.82	0.86	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.97	0.73	0.78	0.75	0.88	0.47	0.61	0.52
	Friday	0.41	0.48	0.37	0.51	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.51	0.36	0.64	0.54	0.64	0.46	0.65	0.90	0.76	0.90	0.60	0.90	0.76	0.79	0.74	0.77	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.87	0.65	0.70	0.67	0.79	0.42	0.55	0.47
September	Monday	0.45	0.53	0.40	0.55	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.55	0.39	0.70	0.59	0.70	0.50	0.71	0.98	0.83	0.98	0.66	0.98	0.83	0.86	0.80	0.84	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.95	0.71	0.76	0.73	0.86	0.46	0.60	0.51
	Tuesday	0.45	0.53	0.40	0.55	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.55	0.39	0.70	0.59	0.70	0.50	0.71	0.98	0.83	0.98	0.66	0.98	0.83	0.86	0.80	0.84	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.95	0.71	0.76	0.73	0.86	0.46	0.60	0.51
	Wednesday	0.44	0.51	0.39	0.54	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.54	0.38	0.68	0.58	0.68	0.49	0.69	0.96	0.82	0.96	0.65	0.96	0.81	0.85	0.79	0.82	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.93	0.70	0.74	0.71	0.84	0.45	0.59	0.50
	Thursday	0.43	0.50	0.38	0.53	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.53	0.37	0.66	0.56	0.66	0.47	0.67	0.93	0.79	0.93	0.63	0.93	0.79	0.82	0.76	0.80	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.90	0.68	0.72	0.69	0.82	0.44	0.57	0.48
	Friday	0.38	0.45	0.34	0.47	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.47	0.33	0.59	0.50	0.59	0.42	0.60	0.83	0.71	0.83	0.56	0.83	0.71	0.74	0.68	0.72	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.81	0.61	0.65	0.62	0.73	0.39	0.51	0.43
October	Monday	0.42	0.49	0.38	0.52	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.52	0.37	0.65	0.55	0.65	0.46	0.66	0.91	0.78	0.91	0.61	0.91	0.77	0.81	0.75	0.78	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.88	0.66	0.71	0.68	0.80	0.43	0.56	0.47
	Tuesday	0.42	0.49	0.38	0.52	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.52	0.37	0.65	0.55	0.65	0.46	0.66	0.91	0.78	0.91	0.61	0.91	0.77	0.81	0.75	0.78	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.88	0.66	0.71	0.68	0.80	0.43	0.56	0.47
	Wednesday	0.41	0.48	0.37	0.51	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.51	0.36	0.64	0.54	0.64	0.45	0.65	0.89	0.76	0.89	0.60	0.89	0.76	0.79	0.73	0.77	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.87	0.65	0.69	0.67	0.78	0.42	0.55	0.47
	Thursday	0.40	0.47	0.36	0.49	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.49	0.35	0.62	0.53	0.62	0.44	0.63	0.87	0.74	0.87	0.58	0.87	0.74	0.77	0.71	0.75	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.84	0.63	0.67	0.65	0.76	0.41	0.53	0.45
	Friday	0.36	0.42	0.32	0.44	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.44	0.31	0.55	0.47	0.55	0.40	0.56	0.78	0.66	0.78	0.52	0.78	0.66	0.69	0.64	0.67	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.75	0.57	0.60	0.58	0.68	0.37	0.48	0.40
November	Monday	0.43	0.50	0.39	0.53	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.53	0.38	0.67	0.57	0.67	0.48	0.68	0.94	0.80	0.94	0.63	0.93	0.80	0.83	0.77	0.80	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.91	0.68	0.73	0.70	0.82	0.44	0.57	0.49
	Tuesday	0.43	0.50	0.39	0.53	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.53	0.38	0.67	0.57	0.67	0.48	0.68	0.94	0.80	0.94	0.63	0.93	0.80	0.83	0.77	0.80	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.91	0.68	0.73	0.70	0.82	0.44	0.57	0.49
	Wednesday	0.42	0.49	0.38	0.52	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.52	0.37	0.65	0.56	0.65	0.47	0.67	0.92	0.78	0.92	0.62	0.92	0.78	0.81	0.75	0.79	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.89	0.67	0.71	0.68	0.80	0.43	0.56	0.48
	Thursday	0.41	0.48	0.37	0.50	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.50	0.36	0.63	0.54	0.63	0.45	0.65	0.89	0.76	0.89	0.60	0.89	0.76	0.79	0.73	0.77	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.86	0.65	0.69	0.66	0.78	0.42	0.54	0.46
	Friday	0.36	0.43	0.33	0.45	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.45	0.32	0.57	0.48	0.57	0.41	0.58	0.80	0.68	0.80	0.54	0.80	0.68	0.70	0.65	0.69	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.77	0.58	0.62	0.60	0.70	0.38	0.49	0.42
December	Monday	0.43	0.50	0.39	0.53	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.53	0.38	0.67	0.57	0.67	0.48	0.68	0.94	0.80	0.94	0.63	0.94	0.80	0.83	0.77	0.81	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.91	0.68	0.73	0.70	0.82	0.44	0.57	0.49
	Tuesday	0.43	0.50	0.39	0.53	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.53	0.38	0.67	0.57	0.67	0.48	0.68	0.94	0.80	0.94	0.63	0.94	0.80	0.83	0.77	0.81	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.91	0.68	0.73	0.70	0.82	0.44	0.57	0.49
	Wednesday	0.42	0.49	0.38	0.52	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.52	0.37	0.66	0.56	0.66	0.47	0.67	0.92	0.78	0.92	0.62	0.92	0.78	0.81	0.75	0.79	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.89	0.67	0.71	0.69	0.81	0.43	0.56	0.48
	Thursday	0.41	0.48	0.37	0.51	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.51	0.36	0.64	0.54	0.64	0.45	0.65	0.89	0.76	0.89	0.60	0.89	0.76	0.79	0.73	0.77	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.87	0.65	0.69	0.67	0.78	0.42	0.55	0.47
	Friday	0.37	0.43	0.33	0.45	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.45	0.32	0.57	0.48	0.57	0.41	0.58	0.80	0.68	0.80	0.54	0.80	0.68	0.71	0.66	0.69	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.78	0.58	0.62	0.60	0.70	0.38	0.49	0.42

Concept #1: I-5 Southbound Auxiliary Lane (Exit 125 to Exit 124)

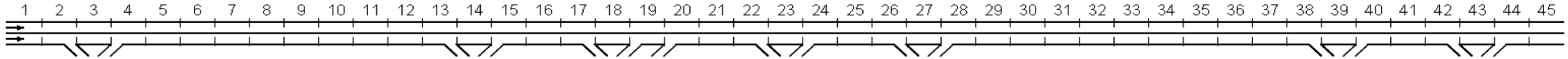
Project Details

Location	I-5 Mile Points: 124-125
Transportation Facility Characteristics	**Facility Type:** Interstate Highway **Jurisdiction:** ODOT **Functional Classification:** • Federal – Urban Interstate • OHP – Interstate • NHS • Seismic Program 2 **Freight Route Designation:** • National Highway Freight Route • OHP Freight Route • Reduction Review Route • High Clearance Route **Posted Speed:** • 65 mph **Travel Lanes:** • Two Southbound Lanes • Two Northbound Lanes **Mobility Target:** • OHP: 0.80 • HDM: 0.65 **Cross Section Elements:** • Inside Shoulder - 6 feet • Travel Lanes - 12 feet • Outside Shoulder - 12 feet **Mainline Hourly Volumes between Exits 125 and 124 during the Southbound Peak Hour (5:15-6:15 PM):** • Southbound ○ 2414 – Year 2017 ○ 3079 – Year 2040 • Northbound ○ 1704 – Year 2017 ○ 2193 – Year 2040
Project Description/Purpose	Construct a southbound auxiliary lane on I-5 between Exit 125 and Exit 124. In recognition that I-5 is used as an extension of the local transportation network between the two interchanges, the auxiliary lane would better accommodate existing and projected travel demand and increase capacity for southbound through traffic on I-5. This helps minimize friction at the ramps, by removing the need for local traffic to merge and/or diverge with mainline traffic In addition to the auxiliary lane, lengthen the southbound on-ramp to increase the acceleration distance. As part of the bridge widening, multi-modal impacts will be considered, including shared-use path realignment and improvements. A second alternative was considered for this location to modify operations to a part-time shoulder use application. Due to the lack of adequate existing shoulders at this location, part-time shoulder use would necessitate widening. Because both alternatives would require widening and part-time shoulder use would provide less additional capacity, the part-time shoulder use alternative was not explored.
Operational Considerations	An auxiliary lane would allow ramp-to-ramp maneuvers that reduces friction with I-5 mainline between Exit 125 and Exit 124. Although the auxiliary lane will allow more vehicles to be processed within the extents of the modification, the additional through traffic will interact with merging vehicles at the Exit 124 on-ramp just downstream of the auxiliary lane. As such, an existing bottleneck may be removed, but the bottleneck at Exit 124 on-ramp still occurs during the same time period. The auxiliary lane will reduce the intensity of congestion in the area. See the graphics after the project sheet. **2040 No-Build Conditions (no changes):** • Max D/C between Exit 125 on-ramp and Exit 124 off-ramp: 1.06 • Max Queue: 1.5 miles to the Garden Valley Road southbound off-ramp (for 30 minutes) **2040 Modified Conditions (with proposed auxiliary lane):** • Max D/C of new weaving segment: 0.67 (bottleneck downstream maintains max D/C = 1.06) • Max Queue: 1.0 miles to the Garden Valley Road southbound diagonal on-ramp (for 15 minutes)
Project Considerations	• There is insufficient width on I-5 to accommodate a southbound auxiliary lane. To accommodate the needed width, the existing bridge structure would need to be widened as shown in the project cross section. • There is an existing shared-use path along the west side of I-5 that would need to be relocated. As a major reconstruction project, improvements such as repaving/widening, lighting, and signage will be considered. • The existing looping on ramp acceleration lane under the NE Garden Valley Boulevard bridge would become the beginning of the southbound auxiliary lane. The shoulder width is insufficient under the bridge. A design exception for the shoulder width would be necessary to avoid extensive bridge work. • The existing Garden Valley diamond on ramp acceleration lane does not meet current standards. The ramp should be improved to extend the acceleration lane into the new auxiliary lane, which would require roadway widening. • The roadway would need to be widened at several locations between the ramps and bridges to accommodate the additional southbound auxiliary lane.
Land Use Considerations	• No land use impacts are anticipated as all widenings can occur within the existing I-5 right of way. • No impacts are anticipated to Title VI and Environmental Justice populations.
Environmental/ Right of way Considerations	• Two waterways: South Umpqua River (major river) and Sleepy Hollow Creek (small stream) cross the proposed project area. Wetlands are likely to be associated with both streams within the project area based on review of the National Wetlands Inventory (NWI) and National Resources Conservation Services (NRCS) soil survey. • Hydric soils are mapped throughout approximately 15% of the anticipated project area along the S. Umpqua River and a small portion of the southernmost extent of the project area. A wetland delineation would need to be conducted and a Wetland Delineation Report would need to be prepared. • A Joint Permit Application (JPA) would need to be submitted for below-ordinary high water (OHW) elevation and wetland impacts. • Proposed roadway widening (adding impervious surface) and widening the bridge deck would trigger the Federal-Aid Highway Programmatic (FAHP) documentation for stormwater management and impacts on Endangered Species Act (ESA)-listed species under the jurisdiction of the National Marine Fisheries Service (NMFS) and Essential Fish Habitat (EFH). • The proposed project footprint is within the 100-year floodplain; hydraulic analysis and no-rise certification will be required as per the City of Roseburg Code (CRC) 12.04.090.
Planning Level Cost Estimate	$25.8M (Design Engineering, Construction, Construction Engineering, 32% Contingency – 2021 Dollars)
Implementation	A future IAMP should include additional analysis of this location, especially to understand impacts of the auxiliary lane on the ramp terminals and the supporting local network. The IAMP should also consider multimodal improvements as part of the recommendations.

Concept Illustration



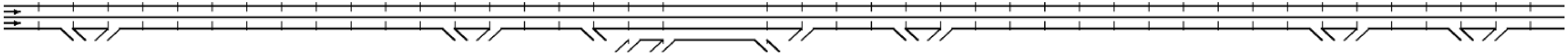
I-5 Southbound PM Peak Period Traffic Analysis Results – Year 2040 No-Build Analysis Factored to Represent Peak Summer Traffic Conditions



			Winchester Exit 129											Edenbower Blvd Exit 127				Garden Valley Rd Exit 125					Harvard Ave Exit 124				Fairgrounds Ave Exit 123												North Shady Exit 120				Coos Bay - Winston Exit 119		
Measurement	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Number of Lanes	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Segment Type	B	OF	B	ON	B	B	B	B	B	B	B	B	OF	B	ON	B	OF	B	ON	ON	B	OF	B	ON	B	OF	B	ON	B	B	B	B	B	B	B	B	B	OF	B	ON	OV	OF	B	ON	B
Acceleration Lane	-	241	-	289	-	-	-	-	-	-	-	-	242	-	323	-	235	-	254	178	-	249	-	197	-	252	-	297	-	-	-	-	-	-	-	-	-	207	-	219	-	297	-	199	-
LEVEL OF SERVICE																																													
Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
14:00 - 14:15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	C	D	C	D	C	D	C	D	C	C	C	C	C	C	C	C	C	C	C	D	C	C	D	C	B	B	B
14:15 - 14:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	C	B	C	D	C	D	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B
14:30 - 14:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	C	B	C	C	C	D	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B
14:45 - 15:00	B	B	B	C	B	B	B	B	B	B	B	B	C	B	C	C	C	B	C	D	D	D	C	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	C	C
15:00 - 15:15	B	C	B	C	B	B	B	B	B	B	B	B	C	B	C	C	C	C	C	D	D	D	C	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	B	C	C
15:15 - 15:30	B	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B	C	B	C	C	C	C	C	C	C	D	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B
15:30 - 15:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	C	D	D	D	C	D	D	D	C	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	C	B
15:45 - 16:00	B	C	B	C	B	B	B	B	B	B	B	B	C	B	C	C	C	B	C	D	D	D	C	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	B	C	C
16:00 - 16:15	B	B	B	C	B	B	B	B	B	B	B	B	C	B	C	C	C	C	C	D	D	D	C	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	B	C	C
16:15 - 16:30	B	C	B	C	B	B	B	B	B	B	B	B	C	B	C	C	C	C	C	D	D	D	C	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	C	B
16:30 - 16:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	C	D	D	D	C	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	C	B
16:45 - 17:00	B	B	B	B	B	B	B	B	B	B	B	B	B	A	C	B	C	B	C	D	D	D	C	D	C	D	C	D	C	C	C	C	C	C	C	C	C	D	C	C	D	C	B	B	B
17:00 - 17:15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	C	D	E	F	F	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	C	B
17:15 - 17:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	F	F	F	F	F	F	F	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	B	B
17:30 - 17:45	B	B	A	B	B	B	B	B	B	B	B	B	B	A	C	C	F	F	F	E	F	F	F	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	B	B
17:45 - 18:00	A	B	A	B	A	A	A	A	A	A	A	A	B	A	B	B	B	B	C	F	F	F	E	D	D	D	C	D	D	D	D	D	D	D	D	D	D	D	C	C	C	C	B	B	B
DEMAND TO CAPACITY RATIO																																													
Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
14:00 - 14:15	0.40	0.47	0.36	0.52	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.52	0.35	0.62	0.53	0.62	0.45	0.63	0.84	0.71	0.84	0.57	0.81	0.69	0.72	0.67	0.71	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.80	0.63	0.66	0.64	0.75	0.42	0.54	0.46
14:15 - 14:30	0.40	0.47	0.36	0.50	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.50	0.35	0.61	0.52	0.61	0.42	0.60	0.83	0.71	0.83	0.55	0.78	0.66	0.69	0.65	0.68	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.77	0.60	0.64	0.62	0.73	0.39	0.51	0.43
14:30 - 14:45	0.38	0.45	0.33	0.51	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.51	0.33	0.59	0.50	0.59	0.42	0.59	0.80	0.68	0.80	0.50	0.74	0.63	0.66	0.61	0.65	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.74	0.57	0.61	0.59	0.69	0.35	0.47	0.40
14:45 - 15:00	0.46	0.54	0.40	0.57	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.57	0.39	0.68	0.58	0.68	0.50	0.70	**0.95**	0.80	**0.95**	0.62	**0.91**	0.77	0.80	0.75	0.80	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	**0.91**	0.71	0.76	0.73	**0.86**	0.50	0.65	0.55
15:00 - 15:15	0.47	0.56	0.44	0.60	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.60	0.43	0.73	0.62	0.73	0.54	0.75	**0.99**	0.84	**0.99**	0.67	**0.97**	0.83	**0.86**	0.80	**0.85**	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	**0.96**	0.75	0.80	0.77	**0.90**	0.49	0.62	0.53
15:15 - 15:30	0.40	0.47	0.35	0.49	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.49	0.32	0.55	0.47	0.55	0.39	0.58	0.79	0.68	0.79	0.53	0.80	0.68	0.71	0.65	0.69	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.77	0.60	0.64	0.61	0.72	0.37	0.49	0.42
15:30 - 15:45	0.42	0.50	0.37	0.53	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.53	0.35	0.64	0.54	0.64	0.45	0.65	**0.91**	0.77	**0.91**	0.61	**0.88**	0.75	0.78	0.73	0.77	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	**0.87**	0.67	0.72	0.69	0.81	0.45	0.58	0.49
15:45 - 16:00	0.48	0.57	0.42	0.60	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.60	0.42	0.72	0.61	0.72	0.52	0.74	**0.99**	0.84	**0.99**	0.68	**0.94**	0.80	0.84	0.78	0.83	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	**0.94**	0.74	0.78	0.75	**0.88**	0.49	0.63	0.53
16:00 - 16:15	0.46	0.54	0.42	0.60	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.60	0.42	0.75	0.64	0.75	0.53	0.75	**0.98**	0.83	**0.98**	0.68	**0.97**	0.82	**0.86**	0.80	**0.85**	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	**0.96**	0.74	0.80	0.76	**0.90**	0.48	0.62	0.53
16:15 - 16:30	0.48	0.57	0.43	0.59	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.59	0.42	0.73	0.62	0.73	0.53	0.74	**0.99**	0.84	**0.99**	0.66	**0.95**	0.81	0.84	0.79	0.83	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	**0.93**	0.73	0.77	0.74	**0.87**	0.45	0.59	0.50
16:30 - 16:45	0.38	0.45	0.34	0.50	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.50	0.34	0.65	0.56	0.65	0.46	0.66	**0.93**	0.79	**0.93**	0.63	**0.91**	0.77	0.80	0.76	0.79	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	**0.89**	0.69	0.74	0.71	0.83	0.43	0.58	0.49
16:45 - 17:00	0.38	0.45	0.33	0.46	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.46	0.32	0.60	0.51	0.60	0.42	0.63	**0.89**	0.75	**0.89**	0.58	**0.86**	0.73	0.76	0.70	0.74	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.83	0.63	0.68	0.65	0.77	0.39	0.52	0.44
17:00 - 17:15	0.37	0.43	0.33	0.49	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.49	0.33	0.66	0.56	0.66	0.47	0.72	**1.02**	**0.87**	**1.02**	0.67	**1.04**	**0.88**	**0.92**	**0.85**	**0.90**	**0.86**	**0.86**	**0.86**	**0.86**	**0.86**	**0.86**	**0.86**	**0.86**	**0.86**	**1.02**	0.77	0.82	0.79	**0.93**	0.48	0.63	0.54
17:15 - 17:30	0.45	0.53	0.40	0.55	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.55	0.39	0.73	0.62	0.73	0.52	0.77	**1.06**	**0.90**	**1.06**	0.71	**1.06**	**0.90**	**0.94**	**0.87**	**0.91**	**0.88**	**0.88**	**0.88**	**0.88**	**0.88**	**0.88**	**0.88**	**0.88**	**0.88**	**1.03**	0.77	0.82	0.79	**0.93**	0.44	0.57	0.49
17:30 - 17:45	0.36	0.43	0.31	0.45	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.45	0.32	0.60	0.51	0.60	0.44	0.63	**0.89**	0.76	**0.89**	0.60	**0.88**	0.75	0.78	0.72	0.76	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	**0.86**	0.64	0.69	0.66	0.78	0.38	0.50	0.42
17:45 - 18:00	0.30	0.35	0.26	0.38	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.38	0.26	0.51	0.44	0.51	0.36	0.53	0.79	0.67	0.79	0.50	0.73	0.62	0.64	0.60	0.64	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.72	0.50	0.54	0.52	0.61	0.28	0.38	0.32
MAINLINE HOURLY VOLUMES																																													
Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
14:00 - 14:15	1268	1268	1134	1134	1410	1410	1410	1410	1410	1410	1410	1410	1410	1109	1109	1746	1746	1477	1477	1760	2406	2406	1914	1914	2336	2336	2275	2275	2306	2306	2306	2306	2306	2306	2306	2306	2306	2306	2127	2127	2163	2163	1405	1405	1525
14:15 - 14:30	1270	1270	1133	1133	1366	1366	1366	1366	1366	1366	1366	1366	1366	1085	1085	1709	1709	1372	1372	1686	2399	2399	1838	1838	2251	2251	2190	2190	2211	2211	2211	2211	2211	2211	2211	2211	2211	2211	2035	2035	2091	2091	1321	1321	1443
14:30 - 14:45	1203	1203	1052	1052	1379	1379	1379	1379	1379	1379	1379	1379	1379	1040	1040	1657	1657	1361	1361	1675	2291	2291	1679	1679	2147	2147	2082	2082	2123	2123	2123	2123	2123	2123	2123	2123	2123	2123	1927	1927	1996	1996	1176	1176	1314
14:45 - 15:00	1440	1440	1255	1255	1542	1542	1542	1542	1542	1542	1542	1542	1542	1235	1235	1889	1889	1613	1613	1972	2720	2720	2069	2069	2618	2618	2553	2553	2606	2606	2606	2606	2606	2606	2606	2606	2606	2606	2405	2405	2469	2469	1676	1676	1838
15:00 - 15:15	1490	1490	1375	1375	1627	1627	1627	1627	1627	1627	1627	1627	1627	1332	1332	2031	2031	1749	1749	2108	2834	2834	2243	2243	2798	2798	2709	2709	2748	2748	2748	2748	2748	2748	2748	2748	2748	2748	2550	2550	2604	2604	1648	1648	1772
15:15 - 15:30	1259	1259	1089	1089	1324	1324	1324	1324	1324	1324	1324	1324	1324	1003	1003	1540	1540	1260	1260	1625	2283	2283	1770	1770	2321	2321	2227	2227	2240	2240	2240	2240	2240	2240	2240	2240	2240	2240	2039	2039	2083	2083	1252	1252	1394
15:30 - 15:45	1335	1335	1155	1155	1440	1440	1440	1440	1440	1440	1440	1440	1440	1079	1079	1783	1783	1470	1470	1827	2615	2615	2052	2052	2550	2550	2480	2480	2509	2509	2509	2509	2509	2509	2509	2509	2509	2509	2300	2300	2358	2358	1523	1523	1652
15:45 - 16:00	1520	1520	1328	1328	1620	1620	1620	1620	1620	1620	1620	1620	1620	1307	1307	1998	1998	1678	1678	2072	2853	2853	2260	2260	2721	2721	2656	2656	2697	2697	2697	2697	2697	2697	2697	2697	2697	2697	2499	2499	2547	2547	1650	1650	1779
16:00 - 16:15	1455	1455	1309	1309	1620	1620	1620	1620	1620	1620	1620	1620	1620	1327	1327	2116	2116	1744	1744	2125	2816	2816	2260	2260	2793	2793	2732	2732	2763	2763	2763	2763	2763	2763	2763	2763	2763	2763	2518	2518	2595	2595	1625	1625	1780
16:15 - 16:30	1529	1529	1349	1349	1595	1595	1595	1595	1595	1595	1595	1595	1595	1298	1298	2042	2042	1720	1720	2079	2840	2840	2215	2215	2735	2735	2670	2670	2685	2685	2685	2685	2685	2685	2685	2685	2685	2685	2470	2470	2522	2522	1519	1519	1672
16:30 - 16:45	1209	1209	1084	1084	1362	1362	1362	1362	1362	1362	1362	1362	1362	1065	1065	1841	1841	1519	1519	1888	2704	2704	2124	2124	2640	2640	2584	2584	2603	2603	2603	2603	2603	2603	2603	2603	2603	2603	2355	2355	2424	2424	1473	1473	1666
16:45 - 17:00	1196	1196	1052	1052	1256	1256	1256	1256	1256	1256	1256	1256	1256	1009	1009	1671	1671	1362	1362	1782	2573	2573	1974	1974	2494	2494	2409	2409	2428	2428	2428	2428	2428	2428	2428	2428	2428	2428	2163	2163	2240	2240	1339	1339	1490
17:00 - 17:15	1164	1164	1039	1039	1333	1333	1333	1333	1333	1333	1333	1333	1333	1044	1044	1860	1860	1534	1534	2081	2979	2979	2285	2285	3046	3046	2947	2947	2982	2982	2982	2982	2982	2982	2982	2982	2982	2982	2662	2662	2739	2739	1665	1665	1845
17:15 - 17:30	1417	1417	1252	1252	1480	1480	1480	1480	1480	1480	1480	1480	1480	1237	1237	2041	2041	1704	1704	2186	3079	3079	2411	2411	3083	3083	2979	2979	2996	2996	2996	2996	2996	2996	2996	2996	2996	2996	2657	2657	2721	2721	1530	1530	1657
17:30 - 17:45	1151	1151	990	990	1225	1225	1225	1225	1225	1225	1225	1225	1225	990	990	1694	1694	1429	1429	1810	2596	2596	2023	2023	2567	2567	2487	2487	2508	2508	2508	2508	2508	2508	2508	2508	2508	2508	2216	2216	2276	2276	1312	1312	1447
17:45 - 18:00	946	946	833	833	1026	1026	1026	1026	1026	1026	1026	1026	1026	813	813	1452	1452	1187	1187	1519	2292	2292	1712	1712	2127	2127	2071	2071	2096	2096	2096	2096	2096	2096	2096	2096	2096	2096	1740	1740	1786	1786	964	964	1086

I-5 Southbound PM Peak Period Traffic Analysis Results – Year 2040 Build Analysis Factored to Represent Peak Summer Traffic Conditions (Auxiliary Lane Between Exits 125 and 124)

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43



Winchester Exit 129 | Edenbower Blvd Exit 127 | Garden Valley Rd Exit 125 | Harvard Ave Exit 124 | Fairgrounds Ave Exit 123 | North Shady Exit 120 | Coos Bay - Winston Exit 119

	Measurement	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	Number of Lanes	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	2
	Segment Type	B	OF	B	ON	B	B	B	B	B	B	B	B	OF	B	ON	B	OF	B	ON	W	B
	Acceleration Lane	-	241	-	289	-	-	-	-	-	-	-	-	242	-	323	-	235	-	254	0	-
LEVEL OF SERVICE	Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	14:00 - 14:15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	B	B	C
	14:15 - 14:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	C	B	B	B	C
	14:30 - 14:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	C	B	B	B	B
	14:45 - 15:00	B	B	B	C	B	B	B	B	B	B	B	B	C	B	C	C	C	B	B	C	C
	15:00 - 15:15	B	C	B	C	B	B	B	B	B	B	B	B	C	B	C	C	C	C	B	C	C
	15:15 - 15:30	B	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B	C	B	A	B	C
	15:30 - 15:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	B	C	C
	15:45 - 16:00	B	C	B	C	B	B	B	B	B	B	B	B	C	B	C	C	C	B	B	C	C
	16:00 - 16:15	B	B	B	C	B	B	B	B	B	B	B	B	C	B	C	C	C	C	B	C	C
	16:15 - 16:30	B	C	B	C	B	B	B	B	B	B	B	B	C	B	C	C	C	C	B	C	C
	16:30 - 16:45	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	B	C	C
	16:45 - 17:00	B	B	B	B	B	B	B	B	B	B	B	B	B	A	C	B	C	B	B	C	C
	17:00 - 17:15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	B	C	F
	17:15 - 17:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	B	C	F
	17:30 - 17:45	B	B	A	B	B	B	B	B	B	B	B	B	B	A	C	B	C	B	B	F	F
	17:45 - 18:00	A	B	A	B	A	A	A	A	A	A	A	A	B	A	B	B	B	B	A	D	F
DEMAND TO CAPACITY RATIO	Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	14:00 - 14:15	0.40	0.47	0.36	0.52	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.52	0.35	0.62	0.53	0.62	0.45	0.40	0.51	0.57
	14:15 - 14:30	0.40	0.47	0.36	0.50	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.50	0.35	0.61	0.52	0.61	0.42	0.38	0.54	0.55
	14:30 - 14:45	0.38	0.45	0.33	0.51	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.51	0.33	0.59	0.50	0.59	0.42	0.38	0.52	0.50
	14:45 - 15:00	0.46	0.54	0.40	0.57	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.57	0.39	0.68	0.58	0.68	0.50	0.44	0.60	0.62
	15:00 - 15:15	0.47	0.56	0.44	0.60	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.60	0.43	0.73	0.62	0.73	0.54	0.48	0.60	0.67
	15:15 - 15:30	0.40	0.47	0.35	0.49	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.49	0.32	0.55	0.47	0.55	0.39	0.37	0.51	0.53
	15:30 - 15:45	0.42	0.50	0.37	0.53	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.53	0.35	0.64	0.54	0.64	0.45	0.41	0.58	0.61
	15:45 - 16:00	0.48	0.57	0.42	0.60	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.60	0.42	0.72	0.61	0.72	0.52	0.47	0.61	0.67
	16:00 - 16:15	0.46	0.54	0.42	0.60	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.60	0.42	0.75	0.64	0.75	0.53	0.48	0.59	0.67
	16:15 - 16:30	0.48	0.57	0.43	0.59	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.59	0.42	0.73	0.62	0.73	0.53	0.47	0.61	0.66
	16:30 - 16:45	0.38	0.45	0.34	0.50	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.50	0.34	0.65	0.56	0.65	0.46	0.42	0.60	0.63
	16:45 - 17:00	0.38	0.45	0.33	0.46	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.46	0.32	0.60	0.51	0.60	0.42	0.40	0.59	0.58
	17:00 - 17:15	0.37	0.43	0.33	0.49	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.49	0.33	0.66	0.56	0.66	0.47	0.46	0.67	0.67
	17:15 - 17:30	0.45	0.53	0.40	0.55	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.55	0.39	0.73	0.62	0.73	0.52	0.49	0.67	0.71
	17:30 - 17:45	0.36	0.43	0.31	0.45	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.45	0.32	0.60	0.51	0.60	0.44	0.40	0.58	0.60
	17:45 - 18:00	0.30	0.35	0.26	0.38	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.38	0.26	0.51	0.44	0.51	0.36	0.34	0.55	0.50
MAINLINE HOURLY VOLUMES	Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	14:00 - 14:15	1268	1268	1134	1134	1410	1410	1410	1410	1410	1410	1410	1410	1410	1109	1109	1746	1746	1477	1477	1760	1914
	14:15 - 14:30	1270	1270	1133	1133	1366	1366	1366	1366	1366	1366	1366	1366	1366	1085	1085	1709	1709	1372	1372	1686	1838
	14:30 - 14:45	1203	1203	1052	1052	1379	1379	1379	1379	1379	1379	1379	1379	1379	1040	1040	1657	1657	1361	1361	1675	1679
	14:45 - 15:00	1440	1440	1255	1255	1542	1542	1542	1542	1542	1542	1542	1542	1542	1235	1235	1889	1889	1613	1613	1972	2069
	15:00 - 15:15	1490	1490	1375	1375	1627	1627	1627	1627	1627	1627	1627	1627	1627	1332	1332	2031	2031	1749	1749	2108	2243
	15:15 - 15:30	1259	1259	1089	1089	1324	1324	1324	1324	1324	1324	1324	1324	1324	1003	1003	1540	1540	1260	1260	1625	1770
	15:30 - 15:45	1335	1335	1155	1155	1440	1440	1440	1440	1440	1440	1440	1440	1440	1079	1079	1783	1783	1470	1470	1827	2052
	15:45 - 16:00	1520	1520	1328	1328	1620	1620	1620	1620	1620	1620	1620	1620	1620	1307	1307	1998	1998	1678	1678	2072	2260
	16:00 - 16:15	1455	1455	1309	1309	1620	1620	1620	1620	1620	1620	1620	1620	1620	1327	1327	2116	2116	1744	1744	2125	2260
	16:15 - 16:30	1529	1529	1349	1349	1595	1595	1595	1595	1595	1595	1595	1595	1595	1298	1298	2042	2042	1720	1720	2079	2215
	16:30 - 16:45	1209	1209	1084	1084	1362	1362	1362	1362	1362	1362	1362	1362	1362	1065	1065	1841	1841	1519	1519	1888	2124
	16:45 - 17:00	1196	1196	1052	1052	1256	1256	1256	1256	1256	1256	1256	1256	1256	1009	1009	1671	1671	1362	1362	1782	1974
	17:00 - 17:15	1164	1164	1039	1039	1333	1333	1333	1333	1333	1333	1333	1333	1333	1044	1044	1860	1860	1534	1534	2081	2285
	17:15 - 17:30	1417	1417	1252	1252	1480	1480	1480	1480	1480	1480	1480	1480	1480	1237	1237	2041	2041	1704	1704	2186	2411
	17:30 - 17:45	1151	1151	990	990	1225	1225	1225	1225	1225	1225	1225	1225	1225	990	990	1694	1694	1429	1429	1810	2023
	17:45 - 18:00	946	946	833	833	1026	1026	1026	1026	1026	1026	1026	1026	1026	813	813	1452	1452	1187	1187	1519	1712

	Measurement	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
	Number of Lanes	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Segment Type	ON	B	OF	B	ON	B	B	B	B	B	B	B	B	B	OF	B	ON	OV	OF	B	ON	B
	Acceleration Lane	197	-	252	-	297	-	-	-	-	-	-	-	-	-	207	-	219	-	297	-	199	-
LEVEL OF SERVICE	Analysis Period	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
	14:00 - 14:15	D	C	D	C	C	C	C	C	C	C	C	C	C	C	D	C	C	D	C	B	B	B
	14:15 - 14:30	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B
	14:30 - 14:45	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B
	14:45 - 15:00	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	C	C
	15:00 - 15:15	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	B	C	C
	15:15 - 15:30	C	C	D	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B
	15:30 - 15:45	D	D	D	C	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	C	B
	15:45 - 16:00	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	B	C	C
	16:00 - 16:15	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	B	C	C
	16:15 - 16:30	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	C	B
	16:30 - 16:45	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	C	B
	16:45 - 17:00	D	C	D	C	D	C	C	C	C	C	C	C	C	C	D	C	C	D	C	B	B	B
	17:00 - 17:15	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	C	B
	17:15 - 17:30	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	B	B
	17:30 - 17:45	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	D	D	D	B	B	B
	17:45 - 18:00	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	C	C	D	C	B	B	B
DEMAND TO CAPACITY RATIO	Analysis Period	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
	14:00 - 14:15	0.81	0.69	0.72	0.67	0.71	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.80	0.63	0.66	0.64	0.75	0.42	0.54	0.46
	14:15 - 14:30	0.78	0.66	0.69	0.65	0.68	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.77	0.60	0.64	0.62	0.72	0.39	0.51	0.43
	14:30 - 14:45	0.74	0.63	0.66	0.61	0.65	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.74	0.57	0.61	0.59	0.69	0.35	0.46	0.39
	14:45 - 15:00	0.91	0.77	0.80	0.75	0.80	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.91	0.71	0.76	0.73	0.86	0.50	0.65	0.55
	15:00 - 15:15	0.97	0.83	0.86	0.80	0.85	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.96	0.75	0.80	0.77	0.90	0.49	0.62	0.53
	15:15 - 15:30	0.80	0.68	0.71	0.65	0.68	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.77	0.60	0.63	0.61	0.72	0.37	0.49	0.41
	15:30 - 15:45	0.88	0.75	0.78	0.73	0.77	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.87	0.67	0.72	0.69	0.81	0.45	0.58	0.49
	15:45 - 16:00	0.94	0.80	0.83	0.78	0.83	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.94	0.74	0.78	0.75	0.88	0.49	0.62	0.53
	16:00 - 16:15	0.97	0.82	0.85	0.80	0.85	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.96	0.74	0.79	0.76	0.90	0.48	0.62	0.53
	16:15 - 16:30	0.95	0.81	0.84	0.79	0.82	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.93	0.73	0.77	0.74	0.87	0.45	0.59	0.50
	16:30 - 16:45	0.91	0.77	0.80	0.75	0.79	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.89	0.68	0.73	0.71	0.83	0.43	0.58	0.49
	16:45 - 17:00	0.85	0.73	0.76	0.70	0.74	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.83	0.63	0.68	0.65	0.77	0.39	0.51	0.44
	17:00 - 17:15	1.03	0.88	0.92	0.85	0.90	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	1.01	0.77	0.82	0.79	0.93	0.47	0.63	0.53
	17:15 - 17:30	1.06	0.90	0.93	0.87	0.91	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	1.03	0.77	0.82	0.79	0.93	0.44	0.57	0.48
	17:30 - 17:45	0.88	0.75	0.78	0.72	0.76	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.86	0.64	0.69	0.66	0.77	0.38	0.50	0.42
	17:45 - 18:00	0.73	0.62	0.64	0.60	0.64	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.72	0.50	0.54	0.52	0.61	0.28	0.38	0.32
MAINLINE HOURLY VOLUMES	Analysis Period	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
	14:00 - 14:15	1914	2336	2336	2275	2275	2306	2306	2306	2306	2306	2306	2306	2306	2306	2306	2127	2127	2163	2163	1405	1405	1525
	14:15 - 14:30	1838	2251	2251	2190	2190	2211	2211	2211	2211	2211	2211	2211	2211	2211	2211	2035	2035	2091	2091	1321	1321	1443
	14:30 - 14:45	1679	2147	2147	2082	2082	2123	2123	2123	2123	2123	2123	2123	2123	2123	2123	1927	1927	1996	1996	1176	1176	1314
	14:45 - 15:00	2069	2618	2618	2553	2553	2606	2606	2606	2606	2606	2606	2606	2606	2606	2606	2405	2405	2469	2469	1676	1676	1838
	15:00 - 15:15	2243	2798	2798	2709	2709	2748	2748	2748	2748	2748	2748	2748	2748	2748	2748	2550	2550	2604	2604	1648	1648	1772
	15:15 - 15:30	1770	2321	2321	2227	2227	2240	2240	2240	2240	2240	2240	2240	2240	2240	2240	2039	2039	2083	2083	1252	1252	1394
	15:30 - 15:45	2052	2550	2550	2480	2480	2509	2509	2509	2509	2509	2509	2509	2509	2509	2509	2300	2300	2358	2358	1523	1523	1652
	15:45 - 16:00	2260	2721	2721	2656	2656	2697	2697	2697	2697	2697	2697	2697	2697	2697	2697	2499	2499	2547	2547	1650	1650	1779
	16:00 - 16:15	2260	2793	2793	2732	2732	2763	2763	2763	2763	2763	2763	2763	2763	2763	2763	2518	2518	2595	2595	1625	1625	1780
	16:15 - 16:30	2215	2735	2735	2670	2670	2685	2685	2685	2685	2685	2685	2685	2685	2685	2685	2470	2470	2522	2522	1519	1519	1672
	16:30 - 16:45	2124	2640	2640	2584	2584	2603	2603	2603	2603	2603	2603	2603	2603	2603	2603	2355	2355	2424	2424	1473	1473	1666
	16:45 - 17:00	1974	2494	2494	2409	2409	2428	2428	2428	2428	2428	2428	2428	2428	2428	2428	2163	2163	2240	2240	1339	1339	1490
	17:00 - 17:15	2285	3046	3046	2947	2947	2982	2982	2982	2982	2982	2982	2982	2982	2982	2982	2662	2662	2739	2739	1665	1665	1845
	17:15 - 17:30	2411	3083	3083	2979	2979	2996	2996	2996	2996	2996	2996	2996	2996	2996	2996	2657	2657	2721	2721	1530	1530	1657
	17:30 - 17:45	2023	2567	2567	2487	2487	2508	2508	2508	2508	2508	2508	2508	2508	2508	2508	2216	2216	2276	2276	1312	1312	1447
	17:45 - 18:00	1712	2127	2127	2071	2071	2096	2096	2096	2096	2096	2096	2096	2096	2096	2096	1740	1740	1786	1786	964	964	1086

† B = Basic Segment, OFF = Off-Ramp, ON = On-Ramp, W = Weave, OV = Overlap

Concept #2: I-5 Exit 125 Southbound Ramp Meters

Project Details

Location

I-5 Mile Point: 125

Transportation Facility Characteristics

Facility Type: Interstate Highway
Jurisdiction: ODOT
Functional Classification:
- Federal – Urban Interstate
- OHP – Interstate
- NHS
- Seismic Program 2

Freight Route Designation:
- National Highway Freight Route
- OHP Freight Route
- Reduction Review Route
- High Clearance Route

Posted Speed:
- 65 mph

Travel Lanes:
- Two Southbound Lanes
- Two Northbound Lanes

Exit 125 Southbound Loop On-Ramp Peak Hour Volumes (5:00-6:00 PM):
- 514 – Year 2017
- 547 – Year 2040

Exit 125 Southbound Diagonal On-Ramp Peak Hour Volumes (5:00-6:00 PM):
- 636 – Year 2017
- 898 – Year 2040

Mobility Target:
- OHP: 0.80
- HDM: 0.65

Cross Section Elements:
- Inside Shoulder - 6 feet
- Travel Lanes - 12 feet
- Outside Shoulder - 6 feet

Project Purpose/Description

Install ramp meters on the two Exit 125 southbound on-ramps. Ramp metering is used to control the rate of entry for vehicles at on-ramps, creating a more consistent entry flow that helps minimize friction for the mainline.

Operational Considerations

For ramp meters to provide an operational benefit over non-metered entry traffic flow, a metering rate must be low enough to create gaps. For a single lane on-ramp that allows one vehicle per green, a metering rate less than 900 vehicles per hour is recommended. Minimum metering rates are provided below assuming a single storage lane.

Exit 125 Southbound Loop On-Ramp Minimum Metering Rates (vehicles per hour):
- Storage length: 665 feet
- 2017
  - 165 vph – AM Peak Period
  - 435 vph – PM Peak Period
- 2040
  - 190 vph – AM Peak Period
  - 470 vph – PM Peak Period

Exit 125 Southbound Diagonal On-Ramp Minimum Metering Rates (vehicles per hour):
- Storage length: 760 feet
- 2017
  - 265 vph – AM Peak Period
  - 580 vph – PM Peak Period
- 2040
  - 445 vph – AM Peak Period
  - 845 vph – PM Peak Period

Project Considerations

- As traffic volumes increase, ramp widening to provide two storage lanes may be needed to increase storage capacity of the ramp in the long-term and maintain lower metering rates. If widening is needed, there is sufficient right of way to accommodate widening. ODOT Region 1 has completed similar projects in the Portland area that could be used as examples if two lanes are needed. Based on the 2017 hourly volumes and forecasted 2040 volumes, the metering rates can be maintained below 900 vehicles per hour within the available storage length.
- If implemented in combination with the auxiliary lane, the operations and design should consider the limited distance upstream to detect traffic.
- Sufficient space for maintenance personnel and their vehicles also needs to be a design consideration if ramp widening is needed in the future.
- Public education on the operations and use of ramp meters will be needed when implemented in the Roseburg area.

Land Use Considerations

- No impacts are anticipated to Title VI and Environmental Justice populations.

Environmental/ Right of way Considerations

- No land use impacts are anticipated as all ramp meter installation can occur within the existing I-5 right of way.
- Likelihood of wetland presence is low, but a field visit would be needed to verify.

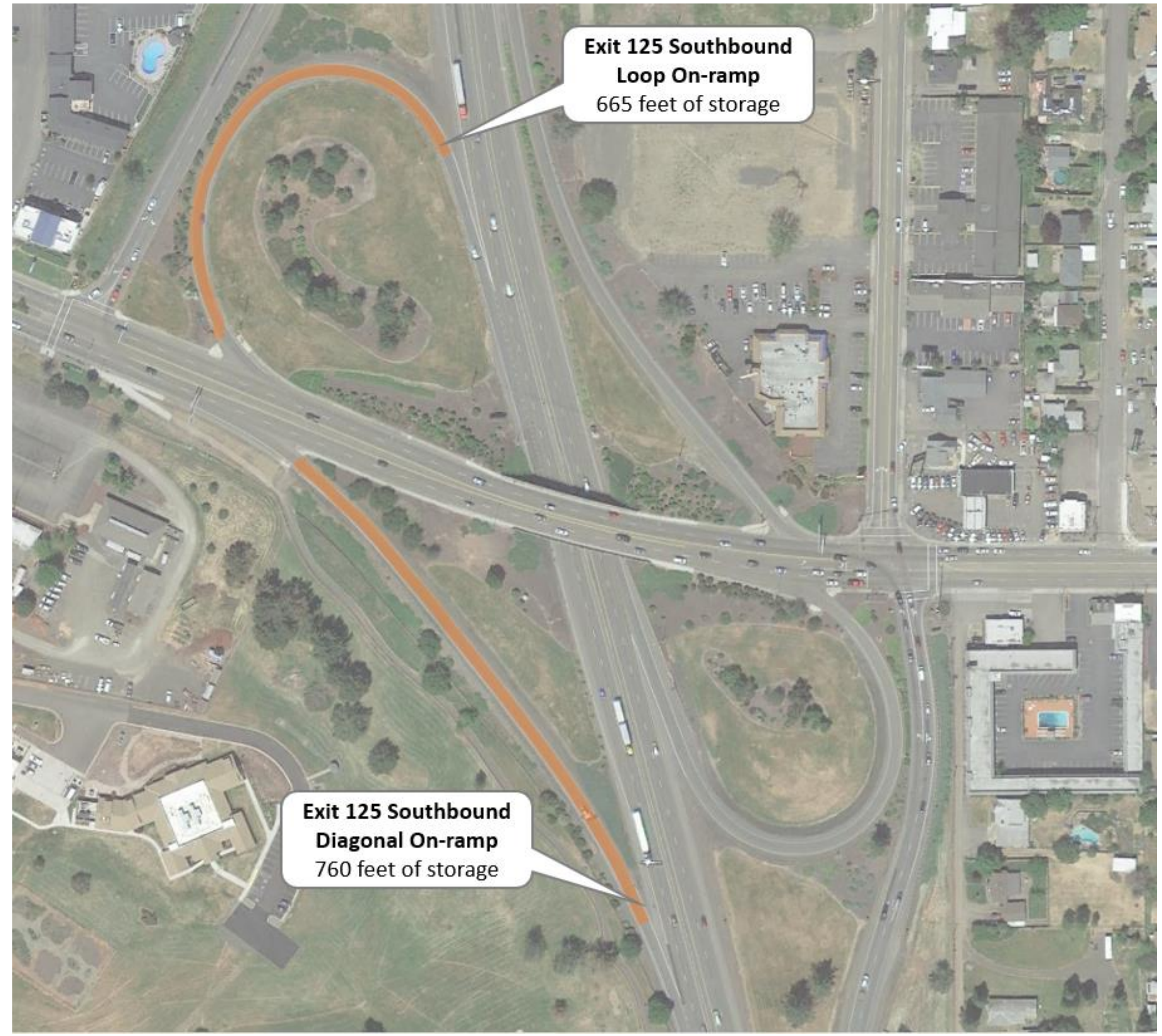
Planning Level Cost Estimate

$200K (Design Engineering, Construction, Construction Engineering, 32% Contingency – 2021 Dollars) per ramp.

Implementation

A future IAMP will include additional analysis of this location, including impacts of ramp metering to the local street network. Utilize ramp metering lessons learned from ODOT Region 1, including adjustments allowing for more adaptive operations.

Concept Illustration



Concept #3: I-5 Exit 124 Northbound & Southbound Ramp Meters

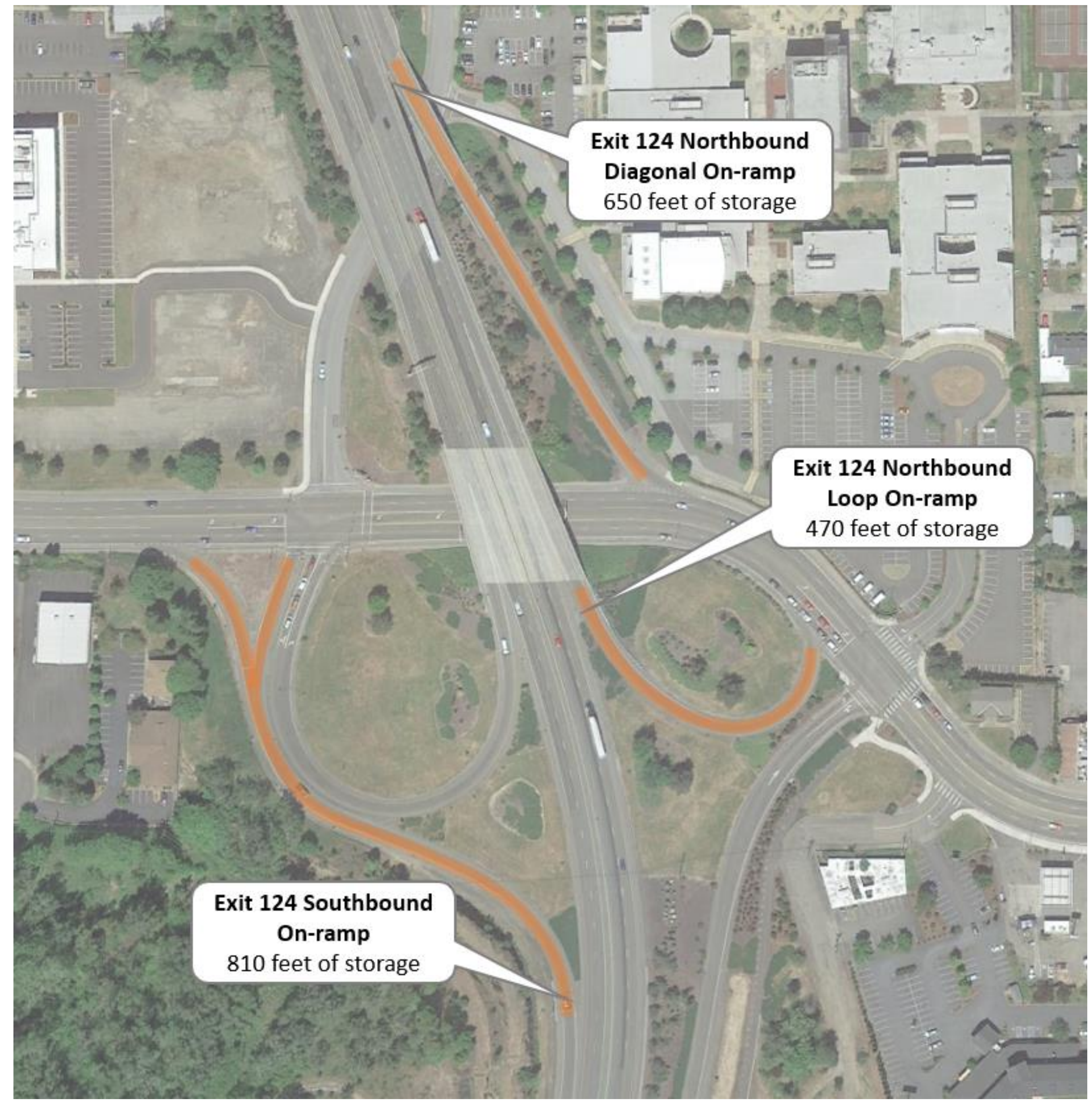
Project Details

Location	I-5 Mile Point: 124
Transportation Facility Characteristics	**Facility Type:** Interstate Highway **Jurisdiction:** ODOT **Functional Classification:** • Federal – Urban Interstate • OHP – Interstate • NHS • Seismic Program 2 **Freight Route Designation:** • National Highway Freight Route • OHP Freight Route • Reduction Review Route • High Clearance Route **Posted Speed:** • 65 mph **Travel Lanes:** • Two Southbound Lanes • Two Northbound Lanes **Exit 124 Northbound On-Ramp Peak Hour Volumes (4:30-5:30 PM):** • 326 – Year 2017 • 514 – Year 2040 **Exit 124 Southbound On-Ramp Peak Hour Volumes (5:00-6:00 PM):** • 648 – Year 2017 • 761 – Year 2040 **Mobility Target:** • OHP: 0.80 • HDM: 0.65 **Cross Section Elements:** • Inside Shoulder - 6 feet • Travel Lanes - 12 feet • Outside Shoulder - 6 feet
Project Purpose/Description	Install ramp meters on the Exit 124 southern northbound on-ramp and southbound on-ramp. Ramp metering is used to control the rate of entry for vehicles at on-ramps, creating a more consistent entry flow that helps minimize friction for the mainline.

Operational Considerations	For ramp meters to provide an operational benefit over non-metered entry traffic flow, a metering rate must be low enough to create gaps. For a single lane on-ramp that allows one vehicle per green, a metering rate less than 900 vehicles per hour is recommended. Minimum metering rates are provided below assuming a single storage lane.
	
	Exit 124 Northbound On-Ramp Minimum Metering Rates (vehicles per hour):
	• Storage length: 470 feet
	• 2017
	  ○ 220 vph – AM Peak Period
	  ○ 270 vph – PM Peak Period
	• 2040
	  ○ 380 vph – AM Peak Period
	  ○ 445 vph – PM Peak Period
	
	Exit 124 Southbound Loop On-Ramp Minimum Metering Rates (vehicles per hour):
	• Storage length: 810 feet
	• 2017
	  ○ 225 vph – AM Peak Period
	  ○ 550 vph – PM Peak Period
	• 2040
	  ○ 305 vph – AM Peak Period
	  ○ 660 vph – PM Peak Period

Project Considerations	• As traffic volumes increase, ramp widening to provide two storage lanes may be needed to increase storage capacity of the ramp in the long-term and maintain lower metering rates. If widening is needed, there is sufficient right of way to accommodate widening. ODOT Region 1 has completed similar projects in the Portland area that could be used as examples if two lanes are needed. Based on the 2017 hourly volumes and forecasted 2040 volumes, the metering rates can be maintained below 900 vehicles per hour within the available storage length. • Sufficient space for maintenance personnel and their vehicles also needs to be a design consideration if ramp widening is needed in the future. • Public education on the operations and use of ramp meters will be needed when implemented in the Roseburg area.
Land Use Considerations	• No impacts are anticipated to Title VI and Environmental Justice populations.
Environmental/ Right of way Considerations	• No land use impacts are anticipated as all ramp meter installation can occur within the existing I-5 right of way. • Likelihood of wetland presence is low, but a field visit would be needed to verify.
Planning Level Cost Estimate	$200K (Design Engineering, Construction, Construction Engineering, 32% Contingency – 2021 Dollars) per ramp.
Implementation	A future IAMP should include additional analysis of this location including impacts of ramp metering to the local street network. Utilize ramp metering lessons learned from ODOT Region 1, including adjustments allowing for more adaptive operations.

Concept Illustration

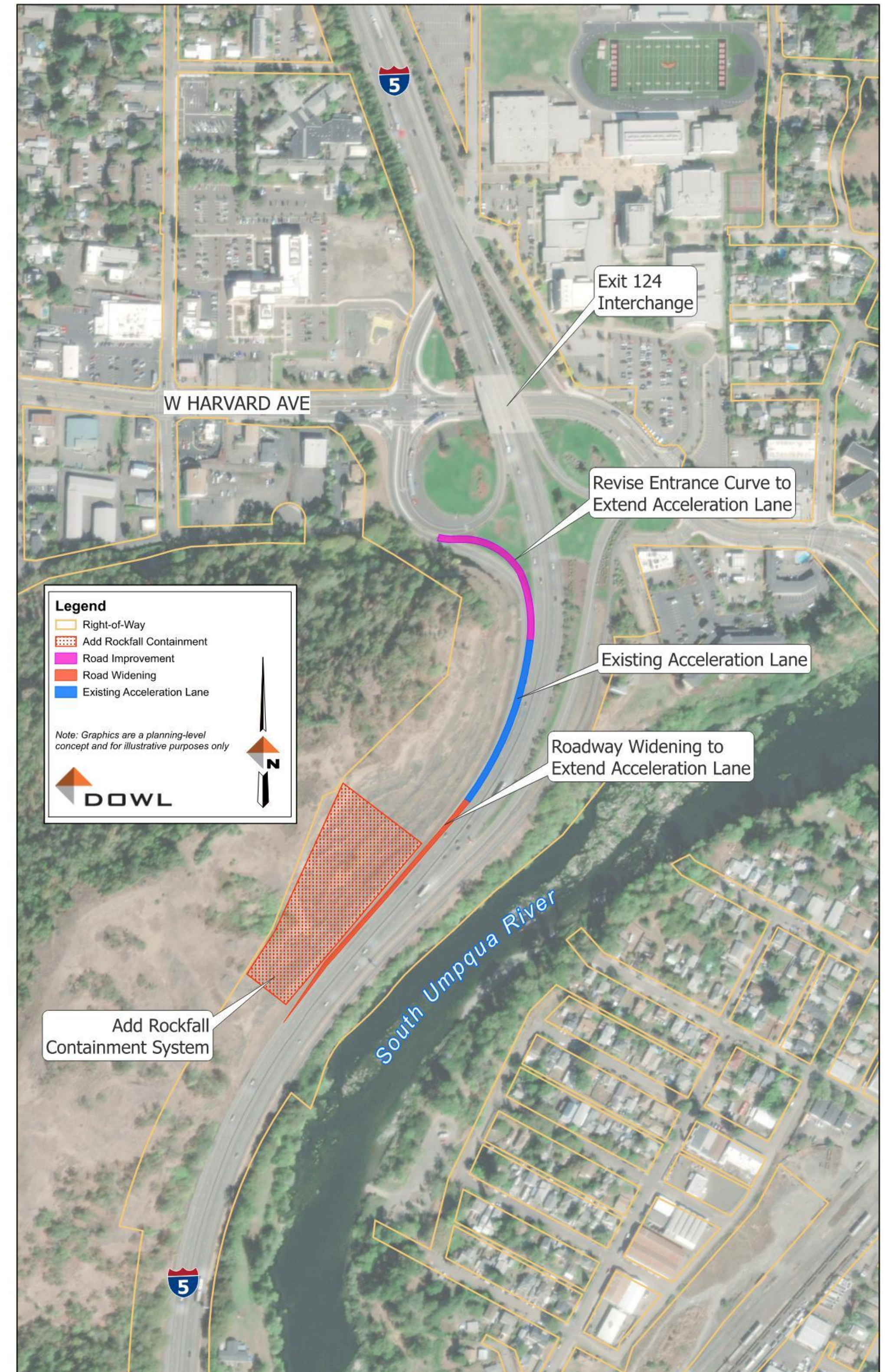


Concept #4: Exit 124 Southbound Geometric Modifications

Project Details

Location	I-5 Mile Point: 124
Transportation Facility Characteristics	**Facility Type:** Interstate Highway **Jurisdiction:** ODOT **Functional Classification:** • Federal – Urban Interstate • OHP – Interstate • NHS • Seismic Program 2 **Freight Route Designation:** • National Highway Freight Route • OHP Freight Route • Reduction Review Route • High Clearance Route **Posted Speed:** • 65 mph **Travel Lanes:** • Two Southbound Lanes • Two Northbound Lanes **Exit 124 Southbound On-Ramp Peak Hour Volumes (5:00-6:00 PM):** • 648 – Year 2017 • 761 – Year 2040 **Mobility Target:** • OHP: 0.80 • HDM: 0.65 **Cross Section Elements:** • Inside Shoulder - 6 feet • Travel Lanes - 12 feet • Outside Shoulder - 6 feet
Project Purpose/Description	The existing southbound on-ramp converge angle is aligned in a manner that could lead mainline drivers to think vehicles will enter earlier than the ramp entrance, resulting in slow-downs and friction north of the gore point. Reconstruct existing southbound on-ramp to align entering vehicles parallel to the mainline further west of the main line to reduce the existing geometric and safety concerns associated with the current on-ramp alignment.
Operational Considerations	Travel demand for I-5 within the vicinity of the southbound on-ramp is expected to be 6% over capacity during the peak 15-minute period with forecast 2040 volumes. Minor points of friction, such as the proximity of east-facing vehicles to the mainline, may cause slowdowns that can cause operational impacts and shockwaves through a congested segment. The reconstructed on-ramp may reduce the operational effects of the ramp geometrics and reduce the possibility of a bottleneck forming at this location.
Project Considerations	• The existing southbound entrance ramp acceleration lane could be lengthened to improve traffic flow. • The ramp entrance curve could be revised to extend the acceleration lane approximately 100 to 200 feet. • With the tighter on-ramp curvature, the acceleration lane could be extended south approximately 500 to 700 feet. This would reduce the clearance between the roadway and the adjacent rock slope and would require the installation of a rockfall protection system. • The design is should avoid the topographical constraints (Mount Nebo) as much as possible.
Land Use Considerations	• No impacts are anticipated to Title VI and Environmental Justice populations.
Environmental/ Right of way Considerations	• Likelihood of wetland presence is low, but a field visit would be needed to verify. • No right of way impacts are anticipated.
Planning Level Cost Estimate	$3.5M (Design Engineering, Construction, Construction Engineering, 32% Contingency – 2021 Dollars)
Implementation	A future IAMP should include additional analysis of this location. Other ramp configurations may be evaluated and impacts of ramp modifications to the local street network will be analyzed.

Concept Illustration



Concept #5: Exit 121 Southbound Geometric Modifications

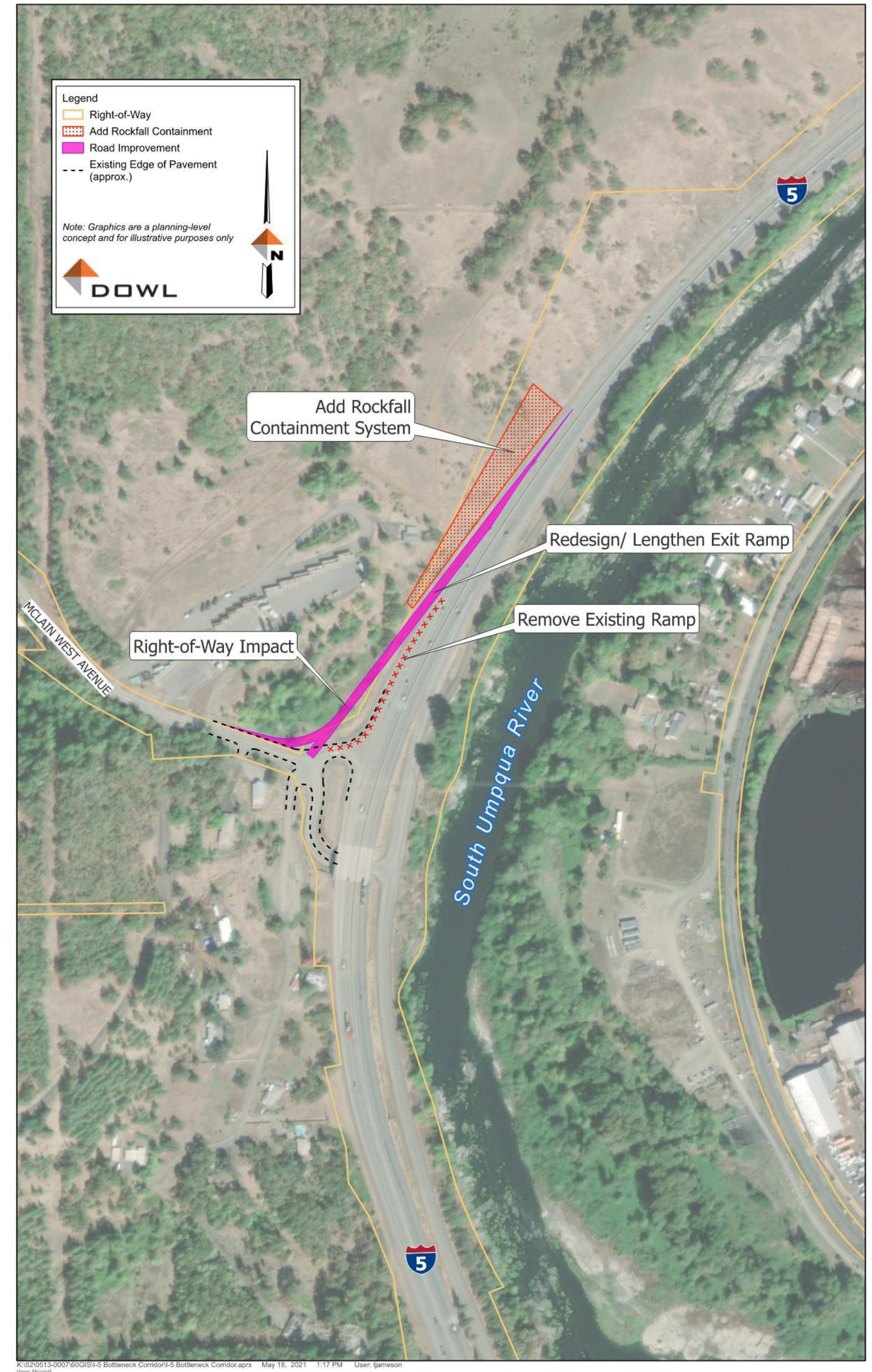
Project Details

Location	I-5 Mile Point: 121

Transportation Facility Characteristics	**Facility Type:** Interstate Highway
	Jurisdiction: ODOT
	Functional Classification:
	• Federal – Urban Interstate
	• OHP – Interstate
	• NHS
	• Seismic Program 2
	Freight Route Designation:
	• National Highway Freight Route
	• OHP Freight Route
	• Reduction Review Route
	• High Clearance Route
	Posted Speed:
	• 65 mph
	Travel Lanes:
	• Two Southbound Lanes
	• Two Northbound Lanes
	Mainline Hourly Volumes between Exits 123 and 120 during the Southbound Peak Hour (5:15-6:15 PM):
	• Southbound
	  ○ 2322 – Year 2017
	  ○ 2996 – Year 2040
	Mobility Target:
	• OHP: 0.80
	• HDM: 0.65
	Cross Section Elements:
	• Inside Shoulder - 6 feet
	• Travel Lanes - 12 feet
	• Outside Shoulder - 6 feet

Project Purpose/Description	The existing SB off-ramp has a deceleration lane with insufficient length to allow for ideal deceleration prior to the controlling curve on the off-ramp. In addition, the existing diverge angle to the off-ramp is aligned in a manner that could lead to drivers inadvertently leaving the mainline of the freeway through the wraparound design of I-5. Reconstruct existing SB off-ramp to provide a more traditional offramp geometry with an extended deceleration lane. This offramp would reduce the existing geometric and safety concerns associated with the current offramp alignment.
Operational Considerations	Exit 121 is located in the section of I-5 with some of the heaviest southbound volumes in the study corridor, including mainline segments that are expected to experience D/C ratios up to 0.88 under year 2040 no-build traffic conditions. Minor points of friction, such as driver confusion due to a non-tangential ramp alignment and the short deceleration lane, may cause slowdowns that can cause operational impacts and shockwaves through a congested segment. The reconstructed off-ramp will reduce those operational impacts of geometrics.
Project Considerations	• The existing southbound exit ramp geometry does not meet current standards. The entire ramp would need to be removed and replaced with a gore point extended approximately 300 feet north. • This would require extensive excavation into the rock hillside adjacent to the freeway. Rock cutting may be a viable excavation method. A rockfall protection system would likely need to be installed. This area is already a regular rock maintenance location for ODOT. • Through this project, ODOT should coordinate with the landfill property managers to understand the lifespan of the site and any on-site modifications that can be made to reduce occurrences of queue spillback onto the mainline with updated exit geometry.
Land Use Considerations	• Right of way would need to be acquired to flare the ramp away from the mainline.
Environmental/ Right of way Considerations	• Likelihood of wetland presence is low, but a field visit would be needed to verify. • Right of way would need to be acquired to flare the ramp away from the mainline.
Planning Level Cost Estimate	$5M (Design Engineering, Construction, Construction Engineering, 32% Contingency – 2021 Dollars)
Implementation	Implementation may occur when funding becomes available or when needed to address additional safety concerns. This a future capital project separate from a future IAMP.

Concept Illustration



Concept #6: Exit 119 Southbound Deceleration Lane Modification

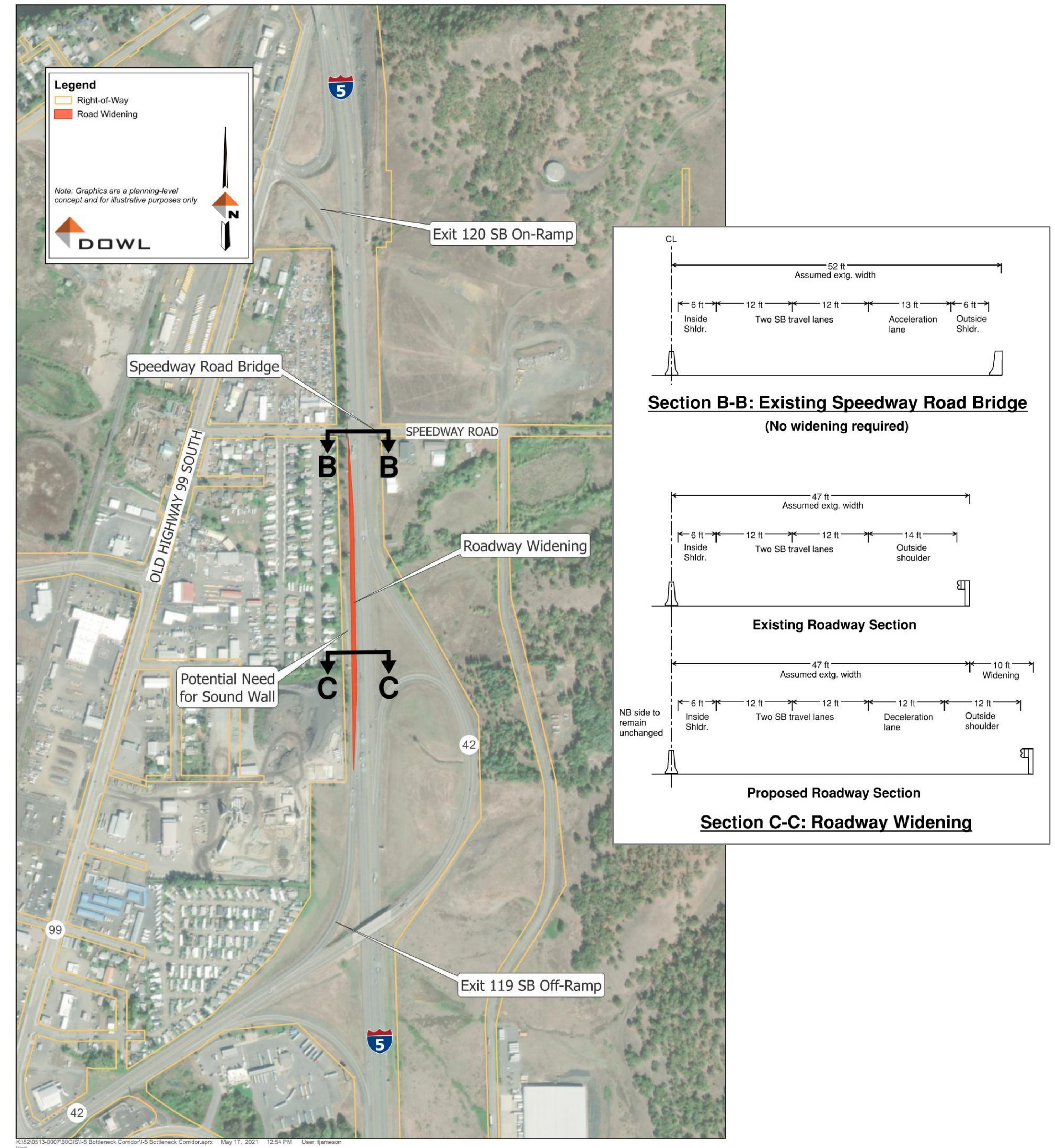
Project Details

Location	I-5 Mile Point: 119

Transportation Facility Characteristics	**Facility Type:** Interstate Highway
	Jurisdiction: ODOT
	Functional Classification:
	• Federal – Urban Interstate
	• OHP – Interstate
	• NHS
	• Seismic Program 2
	• OHP – Expressway (off ramp to OR 42
	Freight Route Designation:
	• National Highway Freight Route
	• OHP Freight Route
	• Reduction Review Route
	• High Clearance Route
	
	Posted Speed:
	• 65 mph
	Travel Lanes:
	• Two Southbound Lanes
	• Two Northbound Lanes
	Mainline Hourly Volumes between Exits 120 and 119 during the Southbound Peak Hour (5:00-6:00 PM):
	• SB
	  ○ 2270 – Year 2017
	  ○ 2739 – Year 2040
	• NB
	  ○ 1668 – Year 2017
	  ○ 2000 – Year 2040
	
	Mobility Target:
	• OHP: 0.80
	• HDM: 0.65
	Cross Section Elements:
	• Inside Shoulder - 6 feet
	• Travel Lanes - 12 feet
	• Outside Shoulder - 6 feet

Project Purpose/Description	Projected travel demand along I-5 between Roseburg and the Winston/Green area is projected to measurably increase in the long-term. Southbound mainline volumes between Exit 120 and 119 are projected to approach capacity conditions. Lengthen the Exit 119 SB off-ramp.
Operational Considerations	Exit 119 is located at the end of the heavy southbound volume section of I-5. The southbound off-ramp is expected to experience D/C ratios up to 0.93 under year 2040 no-build traffic conditions. Minor points of friction, such as the short deceleration lane, may cause slowdowns that can cause operational impacts and shockwaves through a congested segment. The reconstructed off-ramp will reduce those operational impacts of geometrics.
Project Considerations	• The deceleration lane for the Exit 119 southbound off-ramp could be extended to improve traffic flow. This would involve roadway widening extending from the Speedway Road bridge to the existing off-ramp. • A soundwall may be needed for this project to address noise impacts to the adjacent residential areas.
Land Use Considerations	• No land use impacts are anticipated as all widenings can occur within the existing I-5 right of way. • No impacts are anticipated to Title VI and Environmental Justice populations.
Environmental/ Right of way Considerations	• Likelihood of wetlands and resources is high within the API based on review of aerial imagery and hydric soils mapped by the NRCS within the API. • Proposed roadway widening (adding impervious surface) would likely trigger FAHP documentation for stormwater management and impacts on ESA-listed species under the jurisdiction of the NMFS.
Planning Level Cost Estimate	$1.8M (Design Engineering, Construction, Construction Engineering, 32% Contingency – 2021 Dollars)
Implementation	Implementation may occur when funding becomes available or when needed to address long-term traffic growth. This a future capital project separate from a future IAMP.

Concept Illustration

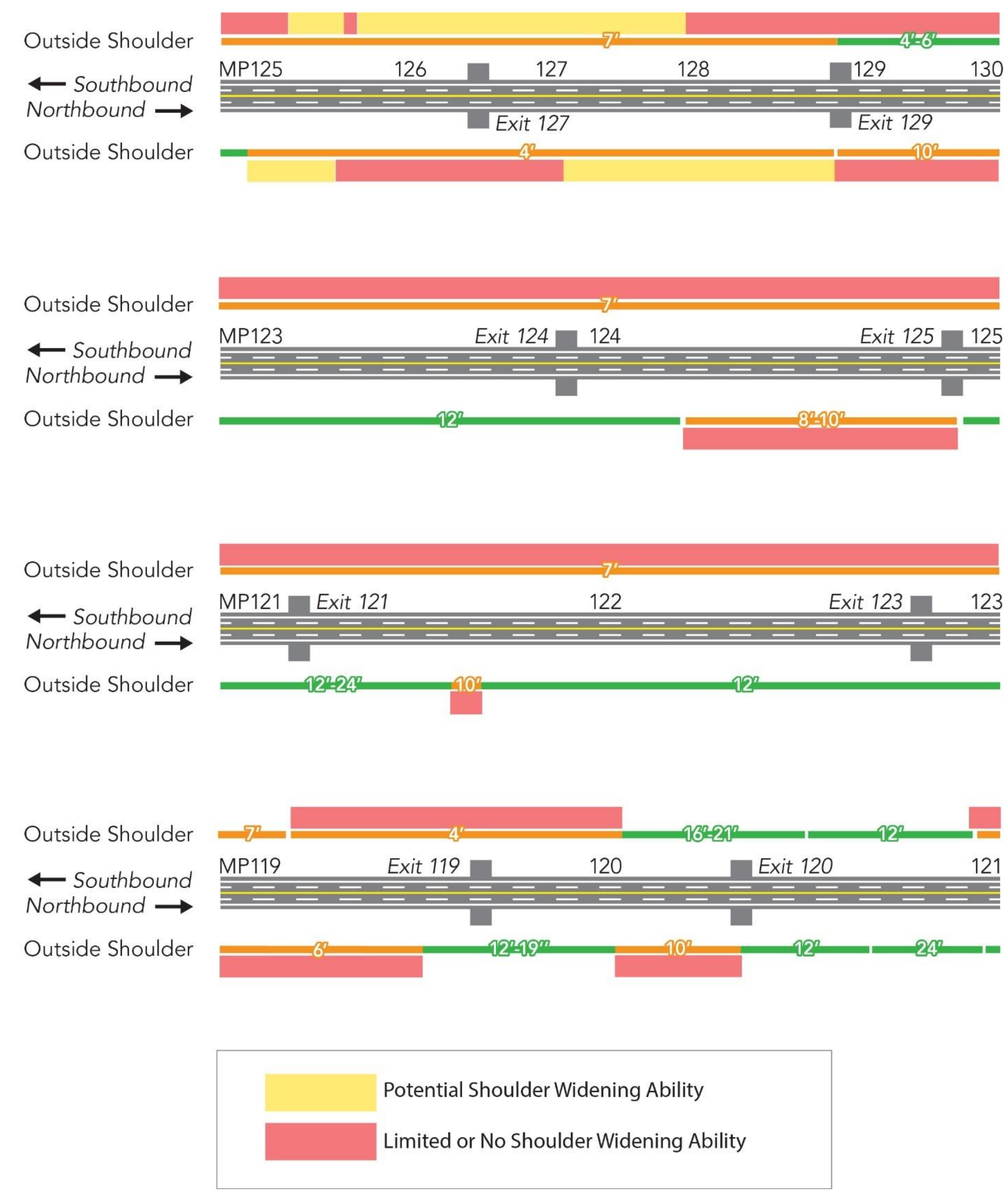


Concept #7: Shoulder Widening

Project Details

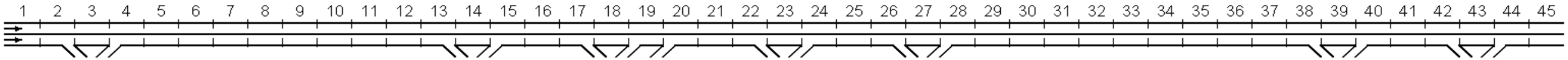
Location	I-5 Mile Point: 129 to 119
Transportation Facility Characteristics	**Facility Type:** Interstate Highway **Jurisdiction:** ODOT **Functional Classification:** • Federal – Urban Interstate • OHP – Interstate • NHS • Seismic Program 2 • OHP – Expressway (off ramp to OR 42 **Freight Route Designation:** • National Highway Freight Route • OHP Freight Route • Reduction Review Route • High Clearance Route **Posted Speed:** • 65 mph **Travel Lanes:** • Two Southbound Lanes • Two Northbound Lanes **Mobility Target:** • OHP: 0.80 • HDM: 0.65
Project Purpose/Description	There are long stretches of the corridor that lack adequate shoulder widths, especially between Exit 125 and Exit 121. Provide shoulder enhancements throughout the corridor for incident management, maintenance staff access, and speed enforcement activities.
Operational Considerations	When incidents occur at locations without shoulders, the impacted vehicles or wreckage could block one or more travel lanes, reducing the roadway capacity and/or causing bottlenecks. In congested segments, the reduced capacity can further increase the D/C ratios and cause shockwaves in the queue that lengthen the time to fully clear the incident-related bottleneck. The graphic provided below the project sheet shows an example incident, with and without a shoulder available. As shown, the scenario without shoulder available has a blocked lane for 45 minutes. The queue from that blockage near Exit 120 extends north, which interacts with high volume segments and extends the queue all the way to Exit 127. If the same incident with the same 45-minute duration had the impacted vehicles and wreckage moved to the shoulder instead of blocking a lane, no queue would be produced.
Project Considerations	• Existing shoulder grades vary widely along the corridor. Larger grading impacts would result in higher costs. • Considerations are needed to address stormwater impacts and connecting to existing drainage systems. • Review shoulder widening locations for potential speed enforcement observation points. • Based on each shoulder widening location, consider whether a soundwall is needed as part of the project. • ODOT Region 1 has used predictive methods when considering shoulder widening in constrained areas.
Land Use Considerations	• No land use impacts are anticipated as all widenings can occur within the existing I-5 right of way. • No impacts are anticipated to Title VI and Environmental Justice populations.
Environmental/ Right of way Considerations	• Likelihood of wetland presence is low, but a field visit would be needed to verify. • Proposed roadway widening (adding impervious surface) would potentially trigger FAHP documentation for stormwater management and impacts on ESA-listed species under the jurisdiction of the NMFS.
Planning Level Cost Estimate	$750K to $1M per mile (Design Engineering, Construction, Construction Engineering, Contingency – 2021 Dollars)
Implementation	As other capital projects occur, consider whether shoulder widening can be added to the project. Implementation may also be triggered when funding becomes available or when needed to address safety issues or long-term traffic growth. Higher priority should be given to implementing shoulder widening on high-volume segments or segments immediately downstream of high-volume segments.

Concept Illustration



I-5 Southbound PM Peak Period Reliability Results – Year 2040 No-Build Analysis

Example Level of Service Comparison for Incident when a Shoulder is or is not Available



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
			Winchester Exit 129											Edenbower Blvd Exit 127				Garden Valley Rd Exit 125					Harvard Ave Exit 124				Fairgrounds Ave Exit 123												North Shady Exit 120				Coos Bay - Winston Exit 119		
Measurement	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**
Number of Lanes	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Segment Type	B	OF	B	ON	B	B	B	B	B	B	B	B	OF	B	ON	B	OF	B	ON	ON	B	OF	B	ON	B	OF	B	ON	B	B	B	B	B	B	B	B	B	OF	B	ON	OV	OF	B	ON	B
Acceleration Lane	-	241	-	289	-	-	-	-	-	-	-	-	242	-	323	-	235	-	254	178	-	249	-	197	-	252	-	297	-	-	-	-	-	-	-	-	-	207	-	219	-	297	-	199	-

Incident Scenario #1: No shoulder available (wreckage blocks a travel lane)

LEVEL OF SERVICE

Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
14:00 - 14:15	B	B	A	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B	C	C	C	C	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B
14:15 - 14:30	B	B	A	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B	B	C	C	C	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	C	C	C	B	B	B
14:30 - 14:45	B	B	A	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B	B	C	C	C	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	C	C	C	A	B	B
14:45 - 15:00	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	C	B	C	D	C	D	C	C	C	D	C	C	C	C	C	C	C	C	C	C	C	D	C	C	D	C	B	C	B
15:00 - 15:15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	C	D	D	D	C	D	C	D	C	D	C	C	C	C	C	C	C	C	C	D	C	C	D	C	B	C	B
15:15 - 15:30	B	B	A	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B	B	C	C	C	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	C	C	C	A	B	B
15:30 - 15:45	B	B	A	B	B	B	B	B	B	B	B	B	B	A	C	B	C	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B
15:45 - 16:00	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	C	D	D	D	C	D	C	D	C	C	C	C	C	C	C	C	C	C	C	D	C	C	D	C	B	C	B
16:00 - 16:15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	C	D	C	D	C	D	C	D	C	D	C	C	C	C	C	C	C	C	C	D	C	C	D	C	B	C	B
16:15 - 16:30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	B	C	D	D	D	C	D	C	D	C	C	C	C	C	E	F	F	F	F	F	F	D	B	B	B	A	B	A
16:30 - 16:45	B	B	A	B	B	B	B	B	B	B	B	B	B	A	C	B	C	B	C	D	C	D	C	D	E	F	F	F	F	F	F	F	F	F	F	F	F	F	D	B	B	B	A	B	A
16:45 - 17:00	B	B	A	B	B	B	B	B	B	B	B	B	B	A	B	B	B	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	D	B	B	B	A	B	A
17:00 - 17:15	A	B	A	B	B	B	B	B	B	B	B	B	B	A	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	C	D	D	D	B	C	B
17:15 - 17:30	B	B	B	B	B	B	B	B	B	B	B	B	E	F	F	F	F	F	F	F	F	F	F	F	E	F	D	D	D	D	D	D	F	F	F	F	F	D	C	D	D	D	B	B	B
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Incident Scenario #2: Shoulder available (wreckage is pulled onto shoulder)

LEVEL OF SERVICE

Analysis Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
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14:15 - 14:30	B	B	A	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B	B	C	C	C	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	C	C	C	B	B	B
14:30 - 14:45	B	B	A	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B	B	C	C	C	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	C	C	C	A	B	B
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15:15 - 15:30	B	B	A	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B	B	C	C	C	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	C	C	C	A	B	B
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† B = Basic Segment, OFF = Off-Ramp, ON = On-Ramp, W = Weave, OV = Overlap

= lane blocked

= capacity reduced by 30% due to incident

CONSIDERATIONS FOR FUTURE INTERCHANGE AREA MANAGEMENT PLANS (IAMPS)

Throughout the I-5 Bottleneck Corridor Segment Plan process, ODOT and partner agencies have acknowledged the need for future Interchange Area Management Plans (IAMPs) to analyze the connections between I-5 and the local street network. The above concept sheets focus on the I-5 mainline, and future IAMPs will be in a better position to inform concepts that extend beyond the I-5 mainline and on/off ramps. The following describes IAMP considerations that have been discussed through development of I-5 mainline concepts:

- Analyze and/or model non-SOV modes, including potential mode shift when enhancements occur.
  - There are a lot of opportunities to improve or add transit within Roseburg and between Roseburg and Green.
  - Improvements to the regional/local bicycle and pedestrian systems should be considered, including connections between the west on Garden Valley Boulevard and Harvard Avenue and the east on Diamond Lake Boulevard. Those streets are currently barriers and would create key connections that could support more people choosing to walk or bike instead of driving.
- Utilize previous work, including alternatives for potential ramp and interchange closures and reconfigurations. It is important to note that removal of a ramp or interchange would distribute the demand to other access points. Future IAMPs may need to explore those shifts, especially if that shifted demand would intensify other potential bottlenecks. Although this project does not dive into the details for these types of concepts, it does not seem beneficial to fully close any of the interchanges in the study area.
- Conduct queuing analyses to understand impacts of potential ramp reconfigurations on the local system and verify queue storage on the ramp.
- Complete a high-level review of the region’s connectivity. Are there opportunities for parallel routes or enhancements to a parallel route?
- Explore a potential local street connection between Exit 123 and Exit 121 (such as a connection between McLane Avenue and the fairgrounds).
- Concepts 2 through 6 described above interact with the entrance and exit ramps and therefore the local system as well. Future IAMPs should analyze local system impacts of these concepts.
- Consider how drivers already may detour to the local system when I-5 is congested and limits their ability to load onto the mainline. Rerouting considerations will likely require a sophisticated modeling exercise, such as through a travel demand model.