



I-5 JBLM Vicinity Congestion Relief Study

Phase 2 – Multi-modal Alternatives Analysis

March 2015

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ACRONYMS

AC	Active Component (part of the Camp Murray training mission)
ACP	Access Control Point (military installation gate)
ADT	Average Daily Traffic (volumes)
Amtrak	American Passenger Rail Corporation
BNSF	Burlington Northern Santa Fe (railroad)
BRAC	Base Realignment and Closure Commission
CAC	Collision Analysis Corridor
CAL	Collision Analysis Location
C/D	Collector/Distributor (road)
DOD	Department of Defense
EIS	Environmental Impact Statement
FAZ	Forecast Analysis Zones
FHWA	Federal Highway Administration
GP	General Purpose (travel lane)
GPS	Global Positioning System
HOT	High Occupancy Toll (travel lane)
HOV	High Occupancy Vehicle (travel lane)
IAL	Intersection Analysis Location
IJR	Interchange Justification Report
INRIX	Private corporation engaged in roadway operational data collection and reporting
IT	Intercity Transit
ITS	Intelligent Transportation Systems
JBLM	Joint Base Lewis McChord
LOS	Level of Service
LTB	Leadership Training Brigade (Western Army National Guard)
MP	Milepost
MVMT	Million Vehicle Miles of Travel
NCHRP	National Cooperative Highway Research Program
NCOE	Noncommissioned Officer Education System
NEPA	National Environmental Policy Act
OCS	Officer Candidate School
PSRC	Puget Sound Regional Council
ROW	Right of Way
SEPA	State Environmental Policy Act
SOV	Single Occupant Vehicle
SR	State Route
SSMCP	South Sound Military Communities Partnership
TASS	Total Army School System
TAZ	Transportation Analysis Zone
TDM	Transportation Demand Management
TIGER III	Transportation Investment Generating Economic Recovery (federal grant-funding program, third series)
TRB	Transportation Research Board
TRPC	Thurston Regional Planning Council
USAR	United States Army Reserve
WSDOT	Washington State Department of Transportation

GLOSSARY

Auxiliary Lane: Can improve safety and reduce congestion by accommodating cars and trucks entering or exiting the highway or traveling short distances between adjacent interchanges, and reduce conflicting weaving and merging movements.

Average Daily Traffic (ADT): The average number of vehicles passing a certain point on a highway, road, or street each day.

Cloverleaf Interchange: A two-level interchange where left turns are handled by physically-separated, free-flowing ramps. When viewed from the air this interchanges resemble a four-leaf clover.

Collector-Distributor (CD): A roadway that typically parallels a higher capacity and/or limited access roadway. A CD road is designed to accommodate weaving and merging activity separately from the mainline of the higher capacity road and to reduce the number of mainline entrances and exits.

Diamond Interchange: The simplest and perhaps most common type of interchange. This type of interchange has two on-ramps and two off-ramps, and forms the shape of a diamond when viewed from the air.

Diverging Diamond Interchange: This interchange configuration improves left and right turn movements by removing them from the signal operations into free or yield movements. It also reduces signal operations to two phases and provides more green time for through traffic.

Environmental Justice (EJ): Executive Order that ensures that highway projects do not disproportionately impact one segment of the population, e.g., low-income or minorities.

Environmental Justice Population: Refers collectively to the low-income and minority populations in a given area.

Latent Demand: Travel desire or demand that goes unsatisfied because there is not sufficient capacity on a roadway to accommodate it.

Level of Service (LOS): A qualitative measure of transportation system performance. LOS is most commonly used to describe roadway or intersection performance, but can also be applied to pedestrian, bicycle, transit, or other infrastructure elements. The American Association of State Highway and Transportation Officials defines the following levels of service: A= Free flow; B=Reasonably free flow; C=Stable flow; D=Approaching unstable flow; E=Unstable flow; and F=Forced or breakdown flow.

Maintenance Area: An area that has a history of not meeting air quality standards for a particular air pollutant, but is now meeting the standards and has a maintenance plan for monitoring levels of that pollutant and ensuring continued conformity to the appropriate standards.

Mode Split: The percentage of total travel in a given area by different forms of transportation, typically single-occupant vehicles, high-occupancy vehicles (two or more persons in a car), transit, walk, and bicycle.

Moving Washington: A policy-based framework used in Washington State for making transparent, cost-effective decisions about transportation infrastructure improvements.

National Environmental Policy Act (NEPA): Established in 1969, this act requires public disclosure of all environmental, social, and economic impacts for federally funded projects with significant impacts.

Non-attainment area: An area that fails to meet air quality standards for one or more pollutants.

Particulate Matter (PM): A mixture of extremely small particles or liquid droplets suspended in the air.

Peak Period: Informally known as “rush hour,” this term refers to the time of the day when traffic volumes in an urban area are the highest and when travel patterns generate the most traffic, especially in a peak direction.

Section 4(f): Section 4(f) of the U.S. Department of Transportation Act (49 USC 303) concerns the use of or impacts on any significant public park, recreation area, wildlife or waterfowl refuge, or historic site by a transportation project. Section 4(f) applies to impacts caused by programs and policies undertaken by the USDOT.

Section 6(f): Section 6(f) of the Land and Water Conservation Fund Act is similar to Section 4(f) but concerns only those parks and recreational facilities that have received funding through this act. While Section 4(f) applies only to USDOT actions, Section 6(f) applies to impacts caused by programs and policies of any federal agency.

Single-Point Urban Interchange (SPUI): This interchange configuration reduces the number of signals to one location in the center of an interchange rather than two signals as is common with the diamond configuration. Left turn movements are combined at a single and more efficient intersection.

Transportation Demand Management (TDM): Measures that seek to reduce the number of vehicles using the road system, especially single-occupant vehicles, while providing alternative options to auto travel.

Throughput: The number of users being served at any time by the transportation system.

Vehicles Miles of Travel (VMT): The number of miles traveled per vehicle multiplied by the total number of vehicles.

VII. Performance Evaluation of Alternative Packages

The evaluation of the alternative packages included a performance evaluation using quantitative data and a qualitative evaluation using implementation and environmental impacts. This section describes the performance evaluation of the alternative packages using the methodology and criteria described in Chapter V. These performance criteria included:

- Average SOV and HOV speeds
- SOV and HOV hours of congestion over the 6-hour PM peak period
- Average SOV and HOV travel times over a 3-hour PM Peak period
- Person throughput over the 6-hour PM peak period
- Percent of person demand served over a 2-hour PM peak period
- Change in HOV trips over a 6-hour PM peak period
- Change in transit trips over a 3-hour PM peak period

The first two criteria were analyzed by four segments as well as for the overall I-5 corridor between Mounts Road and Bridgeport Way. The other five criteria are system related and only evaluated at the corridor level.

A summary of the quantitative performance evaluation of the package alternatives are presented in the following below.

P1 – No Action Alternative

With only the programed improvements contained in the agencies' TIPs and STIP, travel conditions are expected to continue to deteriorate over the next several years. Figure VII-1 shows the rating of Alternative P1 – No Action for each of the performance criteria. Overall, these ratings show:

- **Average I-5 Speeds:** Average PM peak hour speeds along I-5 in both 2020 and 2040 will be below 20 mph for all modes. The 2040 average speeds are only slightly lower, because 2020 average speeds, already impacted by traffic volumes, are at or over the capacity of the corridor.
- **Hours of Congestion:** I-5 congestion is expected to spread to between 4 to 5 hours during the 2020 PM peak period for all modes and by 2040 will extend past 6 hours.
- **Average Travel Times:** In 2020, travel along I-5 is expected to take 21 to 28 minutes to travel between Mounts Road and Bridgeport Way; by 2040 the average travel time will increase to 27 to 37 minutes for all modes.
- **Person Throughput:** Persons travelling along the I-5 corridor will be restricted due to I-5 capacity to the south and north of the study area.
- **Transit Trips:** The number of transit riders will remain low as buses will be operating in the same lanes and thus the same slow speeds as automobiles.

Figure VII-1: Performance Evaluation: Alternative P1 – No Action

Alternative Package: P1 - NO ACTION																				
2020 PM PEAK																				
SEGMENT EVALUATION	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips				
	PM Peak Hour								6-hour PM Peak Period				3-hour PM Peak Period				6-hour PM Peak Period	2-hour PM Peak Period	6-hour PM Peak Period	3-hour PM Peak Period
	HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode		Regional Trips	2-way On I-5	Regional Trips	Regional Trips				
	(mph)		(mph)		(hours)		(hours)		(minutes)		(minutes)		Change from 2013 Existing	Change from 2020 Base	Change from 2013 Existing	Change from 2013 Existing				
Location	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB				
Mounts - Steilacoom-DuPont	39 (W)	11 (R)	39 (W)	11 (R)	2.8 (G)	3.5 (W)	2.8 (G)	3.5 (W)	See Corridor Summary		See Corridor Summary		See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary				
Steilacoom-DuPont - Berkeley	26 (W)	19 (R)	26 (W)	19 (R)	4.6 (W)	5.3 (R)	4.6 (W)	5.3 (R)	See Corridor Summary		See Corridor Summary		See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary				
Berkeley - Thome	7 (R)	47 (G)	7 (R)	47 (G)	3.3 (W)	0.0 (G)	3.3 (W)	0.0 (G)	See Corridor Summary		See Corridor Summary		See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary				
Thome - Bridgeport	7 (R)	64 (G)	7 (R)	64 (G)	2.8 (G)	0.0 (G)	2.8 (G)	0.0 (G)	See Corridor Summary		See Corridor Summary		See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary				
2040 PM PEAK																				
SEGMENT EVALUATION	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips				
	PM Peak Hour								6-hour PM Peak Period				3-hour PM Peak Period				6-hour PM Peak Period	2-hour PM Peak Period	6-hour PM Peak Period	3-hour PM Peak Period
	HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode		Regional Trips	2-way On I-5	Regional Trips	Regional Trips				
	(mph)		(mph)		(hours)		(hours)		(minutes)		(minutes)		Change from 2040 Base	Change from 2040 Base	Change from 2040 Base	Change from 2040 Base				
Location	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB				
Mounts - Steilacoom-DuPont	15 (R)	8 (R)	15 (R)	8 (R)	5.4 (R)	5.3 (R)	5.4 (R)	5.3 (R)	See Corridor Summary		See Corridor Summary		See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary				
Steilacoom-DuPont - Berkeley	24 (W)	18 (R)	24 (W)	18 (R)	5.8 (R)	5.8 (R)	5.8 (R)	5.8 (R)	See Corridor Summary		See Corridor Summary		See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary				
Berkeley - Thome	9 (R)	43 (G)	9 (R)	43 (G)	5.3 (R)	5.6 (R)	5.3 (R)	5.6 (R)	See Corridor Summary		See Corridor Summary		See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary				
Thome - Bridgeport	5 (R)	64 (G)	5 (R)	64 (G)	4.9 (W)	0.0 (G)	4.9 (W)	0.0 (G)	See Corridor Summary		See Corridor Summary		See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary				
2020 & 2040 PM PEAK																				
CORRIDOR EVALUATION	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips				
	PM Peak Hour								6-hour PM Peak Period				3-hour PM Peak Period				6-hour PM Peak Period	2-hour PM Peak Period	6-hour PM Peak Period	3-hour PM Peak Period
	HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode		Regional Trips	2-way On I-5	Regional Trips	Regional Trips				
	(mph)		(mph)		(hours)		(hours)		(minutes)		(minutes)		Change from 2013 Existing	Change from 2020 Base	Change from 2013 Existing	Change from 2013 Existing				
Location	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB				
Overall Corridor - 2020	14 (R)	19 (R)	14 (R)	19 (R)	4.6 (W)	5.3 (R)	4.6 (W)	5.3 (R)	21 (W)	28 (W)	21 (W)	28 (W)	5,437 (G)	0.0% (R)	2,266 (W)	120 (R)				
													Change from 2040 Base	Change from 2040 Base	Change from 2040 Base	Change from 2040 Base				
Overall Corridor - 2040	11 (R)	16 (R)	11 (R)	16 (R)	5.8 (R)	5.8 (R)	5.8 (R)	5.8 (R)	27 (W)	37 (R)	27 (W)	37 (R)	0 (R)	0.0% (R)	0 (R)	0 (R)				

Overall, with no additional improvements to I-5, drivers through the JBLM area will continue to experience increased congestion along I-5 with stop and go traffic, long travel times, and poor reliability.

P2 – Enhanced Transit Alternative

With enhanced transit service but no improvements to I-5, some increase in transit usage is expected; however, travel conditions along I-5 through the JBLM area are similar to the No Action Alternative because of increasing congestion and slow travel speeds. Figure VII-2 shows the rating of Alternative P2 for each of the performance criteria. Overall, these ratings show:

- **Average I-5 Speeds:** Average PM peak hour speeds along I-5 in 2020 will range from 14 to 23 mph for all modes. For 2040, average speeds will be between 10 to 16 mph for all modes. The 2040 average speeds are only slightly lower, because 2020 average speeds, already impacted by traffic volumes, are at or over the capacity of the corridor.
- **Hours of Congestion:** I-5 congestion is expected to spread to between 4 to 5 hours during the 2020 PM peak period and by 2040 will extend past 6 hours for all modes, which may cause drivers to travel later at night or not at all.
- **Average Travel Times:** In 2020, travel along I-5 is expected to take 21 to 26 minutes to travel between Mounts Road and Bridgeport Way; by 2040 the average travel time will increase to 28 to 36 minutes for all modes.
- **Person Throughput:** Persons travelling along the I-5 corridor in 2020 will increase over the existing 2013 conditions. However in 2040 the person throughput will be similar to the No Action Alternative due to I-5's capacity to the south and north of the study area.
- **Transit & HOV Trips:** The number of transit riders will increase in 2020 and 2040 because of increased service but will carry only a small percent of total trips. HOV trips on I-5 remain low as carpools/vanpools will be operating in the same lanes and thus the same slow speeds as automobiles.

Overall, Alternative P2 with enhanced transit service will attract some new riders, these buses as well as other drivers and freight haulers will continue to experience increased I-5 congestion with stop and go traffic, long travel times, and poor reliability through the JBLM area of I-5. This alternative shows little change over the No Action Alternative.

Figure VII-2: Performance Evaluation: Alternative P2 –Enhanced Transit

Alternative Package: P2 - ENHANCED TRANSIT																				
2020 PM PEAK																				
SEGMENT EVALUATION																				
Location	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips				
	PM Peak Hour								6-hour PM Peak Period				3-hour PM Peak Period				6-hour PM Peak Period	2-hour PM Peak Period	6-hour PM Peak Period	3-hour PM Peak Period
	HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode		Regional Trips	2-way On I-5	Regional Trips	Regional Trips				
	(mph)		(mph)		(hours)		(hours)		(minutes)		(minutes)									
	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB		
Mounts - Steilacoom-DuPont	41	16	41	16	2.0	3.0	2.0	3.0	See Corridor Summary				See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary			
Steilacoom-DuPont - Berkeley	24	19	24	19	4.3	4.9	4.3	4.9	See Corridor Summary				See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary			
Berkeley - Thome	5	46	5	46	3.2	4.8	3.2	4.8	See Corridor Summary				See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary			
Thome - Bridgeport	8	64	8	64	2.8	0.0	2.8	0.0	See Corridor Summary				See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary			
2040 PM PEAK																				
SEGMENT EVALUATION																				
Location	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips				
	PM Peak Hour								6-hour PM Peak Period				3-hour PM Peak Period				6-hour PM Peak Period	2-hour PM Peak Period	6-hour PM Peak Period	3-hour PM Peak Period
	HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode		Regional Trips	2-way On I-5	Regional Trips	Regional Trips				
	(mph)		(mph)		(hours)		(hours)		(minutes)		(minutes)									
	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB		
Mounts - Steilacoom-DuPont	14	8	14	8	5.4	5.3	5.4	5.3	See Corridor Summary				See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary			
Steilacoom-DuPont - Berkeley	16	19	16	19	5.6	5.6	5.6	5.6	See Corridor Summary				See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary			
Berkeley - Thome	8	47	8	47	5.1	5.5	5.1	5.5	See Corridor Summary				See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary			
Thome - Bridgeport	5	64	5	64	4.8	0.0	4.8	0.0	See Corridor Summary				See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary			
2020 & 2040 PM PEAK																				
CORRIDOR EVALUATION																				
Location	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips				
	PM Peak Hour								6-hour PM Peak Period				3-hour PM Peak Period				6-hour PM Peak Period	2-hour PM Peak Period	6-hour PM Peak Period	3-hour PM Peak Period
	HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode		Regional Trips	2-way On I-5	Regional Trips	Regional Trips				
	(mph)		(mph)		(hours)		(hours)		(minutes)		(minutes)									
	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB		
Overall Corridor - 2020	14	23	14	23	4.3	4.9	4.3	4.9	21	26	21	26	5,416	0.5%	2,353	420				
Overall Corridor - 2040	10	16	10	16	5.6	5.6	5.6	5.6	28	36	28	36	240	1.3%	1,051	300				

P3 – Local Road Improvements with Enhanced Transit Alternative

With selected local road improvements included with the enhanced transit service but no improvements to I-5, some increase in transit usage is expected; however, travel conditions along I-5 through the JBLM area are similar to the No Action Alternative because of increasing congestion and slow travel speeds. Figure VII-3 shows the rating of Alternative P3 for each of the performance criteria. Overall, these ratings show:

- **Average I-5 Speeds:** Average PM peak hour speeds along I-5 in 2020 will range from 14 to 22 mph for all modes. For 2040, average speeds will be between 9 to 16 mph for all modes. The 2040 average speeds are only slightly lower, because 2020 average speeds, already impacted by traffic volumes, are at or over the capacity of the corridor. These I-5 speeds are relatively the same as the No Action Alternative.
- **Hours of Congestion:** I-5 congestion is expected to spread to between 4 to 5 hours during the 2020 PM peak period and by 2040 will extend past 6 hours, which are generally the same as the No Action Alternative.
- **Average Travel Times:** In 2020, travel on I-5 is expected to take 23 to 26 minutes to travel between Mounts Road and Bridgeport Way; by 2040 the average travel time will increase to 30 to 36 minutes for all modes. These average travel times are slightly better than the No Action Alternative, particularly in the southbound direction.
- **Person Throughput:** Alternative P3 will accommodate more regional person trips travelling along the I-5 corridor in 2020 over the existing 2013 conditions. In 2040, more regional person trips are also expected as compared to the No Action Alternative. The amount is low because of I-5's capacity constraints to the south and north of the study area.
- **Transit & HOV Trips:** The number of transit riders will increase in 2020 and 2040 because of increased service but will carry only a small percent of person trips. HOV trips remain low as carpools/vanpools will be operating in the same lanes and thus the same slow speeds as automobiles.

Overall, Alternative P3 with local road improvements and enhanced transit service but no I-5 improvements will attract some new riders, these buses as well as other drivers and freight haulers will continue to experience increased I-5 congestion with stop and go traffic, long travel times, and poor reliability through the JBLM area. This alternative shows little change over the No Action Alternative.

Figure VII-3: Performance Evaluation: Alternative P3 – Local Road Improvements with Enhanced Transit

Alternative Package: P3 - LOCAL ROAD IMPROVEMENTS with ENHANCED TRANSIT																
2020 PM PEAK																
SEGMENT EVALUATION	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips
	PM Peak Hour				6-hour PM Peak Period				3-hour PM Peak Period				6-hour PM Peak Period	2-hour PM Peak Period	6-hour PM Peak Period	3-hour PM Peak Period
	HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode		Regional Trips	2-way On I-5	Regional Trips	Regional Trips
	{mph}		{mph}		{hours}		{hours}		{minutes}		{minutes}		Change from 2013 Existing	Change from 2020 Base	Change from 2013 Existing	Change from 2013 Existing
	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB
MOUNTS - STEILACOOM-DUPONT	42 (S/W)	15 (R)	42 (S/W)	15 (R)	2.1 (S/W)	3.0 (S/W)	2.1 (S/W)	3.0 (S/W)	See Corridor Summary		See Corridor Summary		See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary
STEILACOOM-DUPONT - BERKELEY	22 (W/R)	18 (R)	22 (W/R)	18 (R)	4.6 (W/R)	4.9 (W/R)	4.6 (W/R)	4.9 (W/R)	See Corridor Summary		See Corridor Summary		See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary
BERKELEY - THOME	5 (R)	46 (S/W)	5 (R)	46 (S/W)	3.2 (W)	4.8 (W/R)	3.2 (W)	4.8 (W/R)	See Corridor Summary		See Corridor Summary		See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary
THOME - BRIDGEPORT	9 (R)	63 (G)	9 (R)	63 (G)	2.8 (S/W)	0.0 (G)	2.8 (S/W)	0.0 (G)	See Corridor Summary		See Corridor Summary		See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary
2040 PM PEAK																
SEGMENT EVALUATION	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips
	PM Peak Hour				6-hour PM Peak Period				3-hour PM Peak Period				6-hour PM Peak Period	2-hour PM Peak Period	6-hour PM Peak Period	3-hour PM Peak Period
	HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode		Regional Trips	2-way On I-5	Regional Trips	Regional Trips
	{mph}		{mph}		{hours}		{hours}		{minutes}		{minutes}		Change from 2040 Base	Change from 2040 Base	Change from 2040 Base	Change from 2040 Base
	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB
MOUNTS - STEILACOOM-DUPONT	12 (R)	8 (R)	12 (R)	8 (R)	5.3 (R)	5.3 (R)	5.3 (R)	5.3 (R)	See Corridor Summary		See Corridor Summary		See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary
STEILACOOM-DUPONT - BERKELEY	16 (R)	18 (R)	16 (R)	18 (R)	5.6 (R)	5.8 (R)	5.6 (R)	5.8 (R)	See Corridor Summary		See Corridor Summary		See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary
BERKELEY - THOME	5 (R)	47 (S/W)	5 (R)	47 (S/W)	5.0 (W/R)	5.3 (R)	5.0 (W/R)	5.3 (R)	See Corridor Summary		See Corridor Summary		See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary
THOME - BRIDGEPORT	5 (R)	64 (G)	5 (R)	64 (G)	4.8 (W/R)	0.0 (G)	4.8 (W/R)	0.0 (G)	See Corridor Summary		See Corridor Summary		See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary
2020 & 2040 PM PEAK																
CORRIDOR EVALUATION	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips
	PM Peak Hour				6-hour PM Peak Period				3-hour PM Peak Period				6-hour PM Peak Period	2-hour PM Peak Period	6-hour PM Peak Period	3-hour PM Peak Period
	HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode		Regional Trips	2-way On I-5	Regional Trips	Regional Trips
	{mph}		{mph}		{hours}		{hours}		{minutes}		{minutes}		Change from 2013 Existing	Change from 2020 Base	Change from 2013 Existing	Change from 2013 Existing
	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB
Overall Corridor - 2020	14 (R)	22 (W/R)	14 (R)	22 (W/R)	4.6 (W/R)	4.9 (W/R)	4.6 (W/R)	4.9 (W/R)	23 (W/R)	26 (W/R)	23 (W/R)	26 (W/R)	4,812 (W)	2.1% (R)	2,113 (W)	420 (W)
													Change from 2040 Base	Change from 2040 Base	Change from 2040 Base	Change from 2040 Base
Overall Corridor - 2040	9 (R)	16 (R)	9 (R)	16 (R)	5.6 (R)	5.8 (R)	5.6 (R)	5.8 (R)	30 (W/R)	36 (R)	30 (W/R)	36 (R)	2,975 (R)	2.1% (R)	2,198 (R)	400 (R)

P4 – Express Lanes Alternative

With express lanes added to I-5 north of Center Drive Interchange to the Gravelly Lake Drive Interchange, I-5 traffic operations are expected to improve through the JBLM area. There will be some slow travel during the peak hour but the extent of the hours of congestion will be reduced, as compared to the No Action Alternative. Figure VII-4 shows the rating of Alternative P4 for each of the performance criteria. Overall, these ratings show:

- **Average I-5 Speeds:** Average 2020 and 2040 PM peak hour speeds along I-5 for SOV trips will continue to be slow in the southbound direction because of capacity limitations to the south of the study area, which will reflect back into the study area. However in the northbound, average 2020 I-5 speeds will improve to over 40 mph during the PM peak hour. HOV speeds on I-5 will also improve in 2040 assuming that the HOV lanes are extended into Thurston County. Average I-5 speeds for Alternative P4 are better than the No Action Alternative.
- **Hours of Congestion:** I-5 congestion is also improved, as compared to the No Action Alternative, with less than four hours expected in 2020 for all modes; while in 2040, SOV traffic can expect slow travel for more than four hours. However, it will still be better than the No Action Alternative.
- **Average Travel Times:** The 3-hour PM peak period average travel times along I-5 for Alternative P4 are between 12 to 17 minutes for SOV drivers and 11 to 14 minutes for HOV drivers in 2020 and 2040. These average times as similar to the 14 to 15 minutes that drivers experience today. These Alternative P4 average travel times are better than the No Action Alternative.
- **Person Throughput:** Regional trips travelling along the I-5 corridor with Alternative P4 improvements in both 2020 and 2040 will increase over the base conditions, as compared to the No Action Alternative.
- **Percent of Demand Served:** Alternative P4 has the capacity to accommodate more of the drivers wanting to use I-5 over a 2-hour PM peak period in both 2020 and 2040 than the No Action Alternative. Between 14 to 32 percent more demand will be accommodated with Alternative P4 improvements.
- **Transit & HOV Trips:** With the addition of the HOV lanes and improved operating speeds, 2020 transit service is expected to increase by nearly 80 percent over today's ridership, and in 2040 by 125 percent over the 2040 No Action Alternative; however, it will represent less than three percent of total trips on I-5. HOV trips are also expected to increase over base conditions.

Overall, Alternative P4 with added express lanes will improve traffic operations and performance. I-5 congestion will be reduced, travel times will decreased and travel speeds increased for all users including SOVs, HOVs, transit riders and freight haulers. There will continue to be congestion during the peak hour but the duration of the

Figure VII-4: Performance Evaluation: Alternative P4 – Express Lanes

Alternative Package: P4 - EXPRESS LANES																																
2020 PM PEAK																																
SEGMENT EVALUATION	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips																
	PM Peak Hour								6-hour PM Peak Period				3-hour PM Peak Period				6-hour PM Peak Period	2-hour PM Peak Period	6-hour PM Peak Period	3-hour PM Peak Period												
	HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode		Regional Trips	2-way On I-5	Regional Trips	Regional Trips																
	(mph)		(mph)		(hours)		(hours)		(minutes)		(minutes)		Change from 2013 Existing	Change from 2020 Base	Change from 2013 Existing	Change from 2013 Existing																
	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB																
Mounds - Steilacoom-DuPont	12	R	59	G	12	R	60	G	3.7	W	0.0	G	3.7	W	0.0	G	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary												
Steilacoom-DuPont - Berkeley	21	R	65	G	18	R	65	G	1.8	G	0.4	G	1.8	G	0.1	G	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary												
Berkeley - Thorne	45	G	51	G	45	W	39	W	0.5	G	1.6	G	0.4	G	1.7	G	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary												
Thorne - Bridgeport	52	G	44	W	51	G	21	W	0.3	G	3.3	W	0.3	G	3.8	W	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary												
2040 PM PEAK																																
SEGMENT EVALUATION	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips																
	PM Peak Hour								6-hour PM Peak Period				3-hour PM Peak Period				6-hour PM Peak Period	2-hour PM Peak Period	6-hour PM Peak Period	3-hour PM Peak Period												
	HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode		Regional Trips	2-way On I-5	Regional Trips	Regional Trips																
	(mph)		(mph)		(hours)		(hours)		(minutes)		(minutes)		Change from 2040 Base	Change from 2040 Base	Change from 2040 Base	Change from 2040 Base																
	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB																
Mounds - Steilacoom-DuPont	46	G	55	G	21	W	33	W	0.5	G	0.6	G	4.1	W	4.5	W	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary												
Steilacoom-DuPont - Berkeley	34	W	63	G	11	R	63	G	3.4	W	2.6	G	3.4	W	2.6	G	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary												
Berkeley - Thorne	41	G	47	G	42	W	40	W	2.3	W	3.3	W	2.1	W	3.3	W	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary												
Thorne - Bridgeport	45	G	43	G	38	W	34	W	2.1	G	3.6	W	2.0	G	4.1	W	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary												
2020 & 2040 PM PEAK																																
CORRIDOR EVALUATION	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips																
	PM Peak Hour								6-hour PM Peak Period				3-hour PM Peak Period				6-hour PM Peak Period	2-hour PM Peak Period	6-hour PM Peak Period	3-hour PM Peak Period												
	HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode		Regional Trips	2-way On I-5	Regional Trips	Regional Trips																
	(mph)		(mph)		(hours)		(hours)		(minutes)		(minutes)		Change from 2013 Existing	Change from 2020 Base	Change from 2013 Existing	Change from 2013 Existing																
	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB																
Overall Corridor - 2020	21	W	56	G	20	W	41	G	3.7	W	3.3	W	3.7	W	3.8	W	14	G	11	G	15	G	13	G	7,339	G	14.3%	G	3,295	G	220	W
Overall Corridor - 2040	40	G	53	G	18	R	42	G	3.4	W	3.6	W	4.1	W	4.5	W	14	G	11	G	17	W	12	G	13,911	G	32.0%	G	7,050	G	500	W

congestion will decrease. This alternative show significant operational improvement over the No Action Alternative.

P4a – Express Lanes Alternative with Local Road Improvements

This alternative with local road improvements added with the express lanes shows similar performance as compared to Alternative P4 with only the express lanes added. For Alternative P4a, I-5 traffic operations are also expected to improve through the JBLM area. There will be some slow travel during the peak hour but the extent of the hours of congestion will be reduced, as compared to the No Action Alternative. Figure VII-5 shows the rating of Alternative P4a for each of the performance criteria. Overall, these ratings show:

- **Average I-5 Speeds:** Average PM peak hour speeds along I-5 for SOV and HOV trips for Alternative P4a are similar to Alternative P4 with slight variations because of traffic shifts. Southbound SOV and HOV speeds in 2020 are slow because of capacity limitations to the south of the study area, which will reflect back into the study area. However in the northbound, average I-5 speeds will improve to over 40 mph during the PM peak hour. HOV speeds on I-5 will also improve in 2040 assuming that the HOV lanes are extended into Thurston County. Average I-5 speeds for Alternative P4a are better than the No Action Alternative.
- **Hours of Congestion:** As with Alternative P4, I-5 congestion along I-5 for Alternative P4a is also improved as compared to the No Action Alternative with less than four hours expected in 2020 for all modes, while in 2040, SOV traffic can expect slow travel for more than four hours. However, it will still be better than the No Action Alternative.
- **Average Travel Times:** The 3-hour PM peak period average travel times along I-5 for Alternative P4a are similar to Alternative P4's 3-hour travel times.
- **Person Throughput:** Regional trips travelling along the I-5 corridor with Alternative P4a improvements in 2020 are the same as Alternative P4, and in 2040 are slightly better than Alternative P4.
- **Percent of Demand Served:** Alternative P4a accommodates a similar percentage of the drivers wanting to use I-5 over a 2-hour PM peak period in both 2020 and 2040 as compared Alternative P4.
- **Transit & HOV Trips:** With the addition of the HOV lanes and local improvements, transit service and HOV usage for Alternative P4a are expected to have similar to increases as compared to Alternative P4.

Overall, the performance of Alternative P4a with added express lanes with local road improvements is similar to Alternative P4. Both show similar traffic operations and performance improvements. I-5 congestion will be reduced, travel times will decreased and travel speeds increased for all users including SOVs, HOVs, transit riders and freight haulers. There will continue to be congestion during the peak hour but the duration of the congestion will decrease. Alternative P4a also shows significant operational improvement over the No Action Alternative.

Figure VII-5: Performance Evaluation: Alternative P4a – Express Lanes with Local Road Improvements

Alternative Package: P4a - EXPRESS LANES with LOCAL ROAD IMPROVEMENTS																				
2020 PM PEAK																				
SEGMENT EVALUATION																				
Location	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips				
	PM Peak Hour								6-hour PM Peak Period				3-hour PM Peak Period				6-hour PM Peak Period	2-hour PM Peak Period	6-hour PM Peak Period	3-hour PM Peak Period
	HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode		Regional Trips	2-way On I-5	Regional Trips	Regional Trips				
	{mph}		{mph}		{hours}		{hours}		{minutes}		{minutes}		Change from 2013 Existing	Change from 2020 Base	Change from 2013 Existing	Change from 2013 Existing				
	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB				
Mounds - Steilacoom-DuPont	11 (R)	59 (G)	12 (R)	60 (G)	4.1 (W)	0.0 (G)	4.1 (W)	0.0 (G)	See Corridor Summary				See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary				
Steilacoom-DuPont - Berkeley	16 (R)	65 (G)	15 (R)	65 (G)	1.9 (G)	0.7 (G)	1.9 (G)	0.5 (G)	See Corridor Summary				See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary				
Berkeley - Thome	50 (G)	51 (G)	51 (G)	44 (G)	0.0 (G)	1.6 (G)	0.0 (G)	1.5 (G)	See Corridor Summary				See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary				
Thome - Bridgeport	54 (G)	40 (W)	52 (G)	21 (W)	0.0 (G)	3.3 (W)	0.0 (G)	3.7 (W)	See Corridor Summary				See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary				
2040 PM PEAK																				
SEGMENT EVALUATION																				
Location	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips				
	PM Peak Hour								6-hour PM Peak Period				3-hour PM Peak Period				6-hour PM Peak Period	2-hour PM Peak Period	6-hour PM Peak Period	3-hour PM Peak Period
	HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode		Regional Trips	2-way On I-5	Regional Trips	Regional Trips				
	{mph}		{mph}		{hours}		{hours}		{minutes}		{minutes}		Change from 2040 Base	Change from 2040 Base	Change from 2040 Base	Change from 2040 Base				
	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB				
Mounds - Steilacoom-DuPont	47 (G)	55 (G)	22 (W)	34 (W)	1.3 (G)	0.4 (G)	4.3 (W)	4.4 (W)	See Corridor Summary				See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary				
Steilacoom-DuPont - Berkeley	33 (W)	63 (G)	10 (R)	63 (G)	3.7 (W)	2.1 (G)	3.7 (W)	1.9 (G)	See Corridor Summary				See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary				
Berkeley - Thome	40 (G)	48 (W)	26 (W)	40 (G)	1.9 (G)	2.8 (G)	1.8 (G)	2.8 (G)	See Corridor Summary				See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary				
Thome - Bridgeport	49 (G)	50 (G)	45 (W)	43 (W)	1.7 (G)	3.3 (W)	1.7 (G)	3.9 (W)	See Corridor Summary				See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary				
2020 & 2040 PM PEAK																				
CORRIDOR EVALUATION																				
Location	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips				
	PM Peak Hour								6-hour PM Peak Period				3-hour PM Peak Period				6-hour PM Peak Period	2-hour PM Peak Period	6-hour PM Peak Period	3-hour PM Peak Period
	HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode		Regional Trips	2-way On I-5	Regional Trips	Regional Trips				
	{mph}		{mph}		{hours}		{hours}		{minutes}		{minutes}		Change from 2013 Existing	Change from 2020 Base	Change from 2013 Existing	Change from 2013 Existing				
	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB				
Overall Corridor - 2020	18 (R)	54 (G)	18 (R)	42 (G)	4.1 (W)	3.3 (W)	4.1 (W)	3.7 (W)	15 (G)	11 (G)	15 (G)	13 (G)	7,388 (G)	14.2% (G)	3,317 (G)	220 (W)				
													Change from 2040 Base	Change from 2040 Base	Change from 2040 Base	Change from 2040 Base				
Overall Corridor - 2040	40 (G)	56 (G)	16 (R)	45 (G)	3.7 (W)	3.3 (W)	4.3 (W)	4.4 (W)	17 (W)	10 (G)	19 (W)	12 (G)	14,158 (G)	32.3% (G)	6,858 (G)	500 (W)				

P5 – HOV and CD Lanes Alternative

With HOV and CD/Auxiliary lanes added to I-5, I-5 traffic operations are expected to improve through the JBLM area. There will be some slow travel during the peak hour but the duration of the hours of congestion will be reduced, as compared to the No Action Alternative. Figure VII-6 shows the rating of Alternative P5 for each of the performance criteria. Overall, these ratings show:

- **Average I-5 Speeds:** Average PM peak hour speeds along I-5 in 2020 and 2040 for SOV trips will continue to be slow in both directions because of capacity limitations to the south of the study area, which will reflect back into the study area and in the northbound transition area were the CD lanes end. HOV speeds on I-5 in 2020 will be slow, Because of congestion in the transition areas, but will improve in 2040 with the assumption that the HOV lanes would be extended into Thurston County. Average I-5 speeds for Alternative P5 are better than the No Action Alternative.
- **Hours of Congestion:** I-5 congestion is also improved as compared to the No Action Alternative with about four hours for SOV trips expected in 2020 and 2040. HOV traffic can expect slow travel for less than four hours in 2020 and about three hours in 2040. These periods of congestion for Alternative P5 are better than the No Action Alternative.
- **Average Travel Times:** The 3-hour PM peak period average travel times along I-5 for Alternative P5 are between 14 to 17 minutes for SOV drivers and 9 to 12 minutes for HOV drivers in 2020 and 2040. These average times as similar to the 14 to 15 minutes that drivers experience today. These Alternative P5 average travel times are better than the No Action Alternative.
- **Person Throughput:** Regional trips travelling along the I-5 corridor with Alternative P5 improvements in both 2020 and 2040 will increase over the base conditions, as compared to the No Action Alternative.
- **Percent of Demand Served:** Alternative P5 has the capacity to accommodate more of the drivers wanting to use I-5 over a 2-hour PM peak period in both 2020 and 2040 than the No Action Alternative. Between 13 to nearly 35 percent more demand will be accommodated with Alternative P5 improvements.
- **Transit & HOV Trips:** With the addition of the HOV lanes, CD/auxiliary lane system and improved operating speeds, 2020 transit service for Alternative P5 is expected to increase by 75 percent over today's ridership, and in 2040 by nearly 80 percent over the 2040 No Action Alternative; however, it will represent less than three percent of total trips on I-5. HOV trips are also expected to increase over base conditions.

Overall, Alternative P5 with added HOV and CD/Auxiliary lanes will improve traffic operations and performance. I-5 congestion will be reduced, travel times will decreased and travel speeds increased for all users including SOVs, HOVs, transit riders and

Figure VII-6: Performance Evaluation: Alternative P5 – HOV and CD Lanes

Alternative Package: P5 - HOV and CD LANES														2020 PM PEAK			
SEGMENT EVALUATION																	
Location	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips	
	PM Peak Hour				6-hour PM Peak Period				3-hour PM Peak Period				6-hour PM Peak Period Regional Trips	2-hour PM Peak Period 2-way On I-5	6-hour PM Peak Period Regional Trips	3-hour PM Peak Period Regional Trips	
	HOV Mode {mph}		SOV Mode {mph}		HOV Mode {hours}		SOV Mode {hours}		HOV Mode {minutes}		SOV Mode {minutes}		Change from 2013 Existing	Change from 2020 Base	Change from 2013 Existing	Change from 2013 Existing	
	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB					
Mounts - Steilacoom-DuPont	20 (W)	18 (R)	20 (W)	17 (R)	3.3 (W)	2.8 (G)	3.6 (W)	2.8 (G)	See Corridor Summary		See Corridor Summary		See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	
Steilacoom-DuPont - Berkeley	35 (W)	64 (G)	31 (W)	63 (G)	2.0 (G)	0.0 (G)	2.1 (G)	0.8 (G)	See Corridor Summary		See Corridor Summary		See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	
Berkeley - Thorne	50 (G)	57 (G)	49 (G)	33 (W)	0.0 (G)	0.3 (G)	0.0 (G)	2.3 (W)	See Corridor Summary		See Corridor Summary		See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	
Thorne - Bridgeport	52 (G)	43 (G)	50 (G)	19 (R)	0.1 (G)	3.5 (W)	0.1 (G)	4.2 (W)	See Corridor Summary		See Corridor Summary		See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	
2040 PM PEAK																	
SEGMENT EVALUATION																	
Location	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips	
	PM Peak Hour				6-hour PM Peak Period				3-hour PM Peak Period				6-hour PM Peak Period Regional Trips	2-hour PM Peak Period 2-way On I-5	6-hour PM Peak Period Regional Trips	3-hour PM Peak Period Regional Trips	
	HOV Mode {mph}		SOV Mode {mph}		HOV Mode {hours}		SOV Mode {hours}		HOV Mode {minutes}		SOV Mode {minutes}		Change from 2040 Base	Change from 2040 Base	Change from 2040 Base	Change from 2040 Base	
	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB					
Mounts - Steilacoom-DuPont	52 (G)	62 (G)	12 (R)	61 (G)	0.6 (G)	0.0 (G)	4.0 (W)	0.0 (G)	See Corridor Summary		See Corridor Summary		See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	
Steilacoom-DuPont - Berkeley	49 (G)	64 (G)	38 (W)	61 (G)	1.0 (G)	0.1 (G)	2.5 (G)	1.7 (G)	See Corridor Summary		See Corridor Summary		See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	
Berkeley - Thorne	49 (G)	54 (G)	46 (G)	26 (W)	0.0 (G)	0.3 (G)	0.0 (G)	2.3 (W)	See Corridor Summary		See Corridor Summary		See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	
Thorne - Bridgeport	35 (W)	36 (W)	29 (W)	18 (R)	2.2 (G)	3.0 (G)	2.2 (G)	3.9 (W)	See Corridor Summary		See Corridor Summary		See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	
2020 & 2040 PM PEAK																	
CORRIDOR EVALUATION																	
Location	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips	
	PM Peak Hour				6-hour PM Peak Period				3-hour PM Peak Period				6-hour PM Peak Period Regional Trips	2-hour PM Peak Period 2-way On I-5	6-hour PM Peak Period Regional Trips	3-hour PM Peak Period Regional Trips	
	HOV Mode {mph}		SOV Mode {mph}		HOV Mode {hours}		SOV Mode {hours}		HOV Mode {minutes}		SOV Mode {minutes}		Change from 2013 Existing	Change from 2020 Base	Change from 2013 Existing	Change from 2013 Existing	
	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB					
Overall Corridor - 2020	32 (W)	34 (W)	30 (W)	26 (W)	3.3 (W)	3.5 (W)	3.6 (W)	4.2 (W)	12 (G)	12 (G)	14 (G)	16 (W)	6,665 (W)	13.0% (G)	3,290 (G)	220 (W)	
Overall Corridor - 2040	45 (G)	53 (G)	23 (W)	36 (W)	2.2 (G)	3.0 (G)	4.0 (W)	3.9 (W)	9 (G)	10 (G)	17 (W)	15 (G)	14,007 (G)	34.7% (G)	6,378 (G)	300 (R)	

freight haulers. There will continue to be congestion during the peak hour but the duration of the congestion will decrease. This alternative shows significant operational improvement over the No Action Alternative.

P5a – HOV and CD Lanes Alternative with Local Road Improvements

This alternative with local road improvements added with the HOV lanes and CD/Auxiliary Lanes system shows similar performance as compared to Alternative P5 with only the HOV lanes and CD/Auxiliary Lanes system added. For Alternative P5a, I-5 traffic operations are also expected to improve through the JBLM area. There will be some slow travel during the peak hour but the extent of the hours of congestion will be reduced, as compared to the No Action Alternative. Figure VII-7 shows the rating of Alternative P5a for each of the performance criteria. Overall, these ratings show:

- **Average I-5 Speeds:** Average PM peak hour speeds along I-5 for SOV and HOV trips for Alternative P5a are similar to Alternative P5 with slight variations because of traffic shifts. Southbound SOV and HOV speeds in 2020 are slow because of capacity limitations to the south of the study area, which will reflect back into the study area. However in the northbound, average I-5 speeds will improve to over 40 mph during the 2040 PM peak hour. HOV speeds on I-5 will also improve in 2040 assuming that the HOV lanes are extended into Thurston County. Average I-5 speeds for Alternative P5a are better than the No Action Alternative.
- **Hours of Congestion:** As with Alternative P5, I-5 congestion along I-5 for Alternative P5a is also improved as compared to the No Action Alternative with less than four hours expected in 2020 for all modes, while in 2040, SOV traffic can expect slow travel for about four hours and HOV congestion is about two hours or less. These periods of congestion area better than the No Action Alternative.
- **Average Travel Times:** The 3-hour PM peak period average travel times along I-5 for Alternative P5a are similar to Alternative P5's 3-hour travel times.
- **Person Throughput:** Regional trips travelling along the I-5 corridor with Alternative P5a improvements in 2020 are slightly higher than Alternative P5, but in 2040 are slightly lower than Alternative P5.
- **Percent of Demand Served:** Alternative P5a accommodates a slightly higher percentage of the drivers wanting to use I-5 over a 2-hour PM peak period in both 2020 and 2040 as compared to Alternative P5.
- **Transit & HOV Trips:** With the addition of the HOV lanes, CD/Auxiliary Lanes system and local improvements, transit service and HOV usage for Alternative P5a are expected to have similar to increases as compared to Alternative P5.

Overall, the performance of Alternative P5a with local road improvements is similar to Alternative P5. Both show similar traffic operations and performance improvements. I-5 congestion will be reduced, travel times decreased and travel speeds increased for all users including SOVs, HOVs, transit riders and freight haulers. There will continue to be congestion during the peak hour but the duration of the congestion will decrease.

Figure VII-7: Performance Evaluation: Alternative P5a – HOV and CD Lanes with Local Road Improvements

Alternative Package: P5a - HOV and CD LANES with LOCAL ROAD IMPROVEMENTS																	
2020 PM PEAK																	
SEGMENT EVALUATION	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips	
	Location	PM Peak Hour				6-hour PM Peak Period				3-hour PM Peak Period							
		HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode					
		{mph}		{mph}		{hours}		{hours}		{minutes}		{minutes}					
		SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB					NB
Mounds - Steilacoom-DuPont	19 R	16 R	19 R	16 R	3.5 W	3.1 W	3.8 W	3.1 W	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary		
Steilacoom-DuPont - Berkeley	31 W	64 G	29 W	63 G	1.9 G	0.0 G	2.4 W	0.0 G									
Berkeley - Thorne	51 G	60 G	50 W	51 G	0.0 G	0.0 G	0.0 G	1.4 G									
Thorne - Bridgeport	54 G	42 W	52 G	21 W	0.0 G	3.3 W	0.0 G	3.8 W									
2040 PM PEAK																	
SEGMENT EVALUATION	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips	
	Location	PM Peak Hour				6-hour PM Peak Period				3-hour PM Peak Period							
		HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode					
		{mph}		{mph}		{hours}		{hours}		{minutes}		{minutes}					
		SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB					NB
Mounds - Steilacoom-DuPont	53 G	62 G	13 R	61 G	0.6 G	0.0 G	4.1 W	0.0 G	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary		
Steilacoom-DuPont - Berkeley	46 W	64 G	29 W	63 G	1.3 G	0.0 G	3.0 W	0.5 G									
Berkeley - Thorne	48 W	59 G	36 W	47 W	0.3 G	0.0 G	1.7 G	1.7 G									
Thorne - Bridgeport	50 W	41 W	45 W	21 W	1.0 G	2.1 W	1.2 G	3.4 W									
2020 & 2040 PM PEAK																	
CORRIDOR EVALUATION	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips	
	Location	PM Peak Hour				6-hour PM Peak Period				3-hour PM Peak Period							
		HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode					
		{mph}		{mph}		{hours}		{hours}		{minutes}		{minutes}					
		SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB					NB
Overall Corridor - 2020	30 W	32 W	29 W	27 W	3.5 W	3.3 W	3.8 W	3.8 W	12 W	12 W	14 W	16 W	6,728 G	14.2% G	3,303 G	220 W	
Overall Corridor - 2040	49 W	56 G	23 W	42 W	1.3 G	2.1 W	4.1 W	3.4 W	9 G	9 G	18 W	13 W	13,589 G	37.0% G	6,214 W	300 R	

P6 – HOV and GP Lanes Alternative

With HOV and GP lanes added to I-5 in Alternative P6, I-5 traffic operations are expected to improve through the JBLM area. There will be some slow travel during the peak hour, mainly in the transition area, but the duration of the hours of congestion will be reduced, as compared to the No Action Alternative. Figure VII-8 shows the rating of Alternative P6 for each of the performance criteria. Overall, these ratings show:

- **Average I-5 Speeds:** Average PM peak hour speeds along I-5 for Alternative P6 in 2020 and 2040 for southbound SOV and HOV trips will continue to be slow because of capacity limitations to the south of the study area, which will reflect backups into the study area and at the transition area from an HOV lane to a GP lane. In the northbound direction, average peak hour speeds in 2020 improve to 46 mph for SOV trips and 58 mph for HOV trips. Because of increased congestion in the transition areas, 2040 SOV and HOV speeds will deteriorate. However, average I-5 speeds for Alternative P6 are better than the No Action Alternative.
- **Hours of Congestion:** For Alternative P6, I-5 congestion is improved, as compared to the No Action Alternative, to about four hours for SOV and HOV trips expected in 2020 because of congestion in the transition areas. By 2040, SOV congestion is expected to increase to around five hours in each direction, while HOV is reduced to around three hours because the HOV lanes are extended in to Thurston County.
- **Average Travel Times:** The 3-hour PM peak period average travel times along I-5 for Alternative P6 are between 11 to 14 minutes for SOV drivers and 9 to 13 minutes for HOV drivers in 2020. These average times are generally better than the 14 to 15 minutes that drivers experience today. However, by 2040 the SOV average 3-hour travel times increase to 19 to 21 minutes, while HOV travel times are between 10 to 11 minutes. These Alternative P6 average travel times are better than the No Action Alternative.
- **Person Throughput:** Regional trips travelling along the I-5 corridor with Alternative P6 improvements in both 2020 and 2040 will increase over the base conditions, as compared to the No Action Alternative.
- **Percent of Demand Served:** Alternative P6 has the capacity to accommodate more of the drivers wanting to use I-5 over a 2-hour PM peak period in both 2020 and 2040 than the No Action Alternative. Between nearly 14 to over 32 percent more demand will be accommodated with Alternative P6 improvements.
- **Transit & HOV Trips:** With the addition of the HOV and GP lanes, and improved operating speeds, 2020 transit service for Alternative P6 is expected to increase by 43 percent over today's ridership, and in 2040 by about 75 percent over the 2040 No Action Alternative; however, it will represent less than three percent of total trips on I-5. HOV trips are also expected to increase over base conditions.

Figure VII-8: Performance Evaluation: Alternative P6 – HOV and GP Lanes

Alternative Package: P6 - HOV AND GP LANES																																					
2020 PM PEAK																																					
SEGMENT EVALUATION	Location	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips																				
		PM Peak Hour				6-hour PM Peak Period				3-hour PM Peak Period																											
		HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode																									
		{mph}		{mph}		{hours}		{hours}		{minutes}		{minutes}																									
	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	Change from 2013 Existing	Change from 2020 Base	Change from 2013 Existing	Change from 2013 Existing																			
	Mounds - Steilacoom-DuPont	10	R	61	G	12	R	60	G	4.2	W	0.0	G	4.2	W	0.0	G	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary														
	Steilacoom-DuPont - Berkeley	43	G	65	G	32	W	65	G	1.5	G	0.0	G	1.8	G	0.1	G																				
	Berkeley - Thorne	45	G	54	G	42	W	49	G	0.0	G	0.7	G	0.3	G	0.8	G																				
	Thorne - Bridgeport	54	G	47	W	53	G	25	W	0.0	G	2.8	W	0.0	G	3.3	W																				
2040 PM PEAK																																					
SEGMENT EVALUATION	Location	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips																				
		PM Peak Hour				6-hour PM Peak Period				3-hour PM Peak Period																											
		HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode																									
		{mph}		{mph}		{hours}		{hours}		{minutes}		{minutes}																									
	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	Change from 2040 Base	Change from 2040 Base	Change from 2040 Base	Change from 2040 Base																			
	Mounds - Steilacoom-DuPont	43	G	61	G	11	R	59	G	2.2	W	0.8	G	5.0	W	1.8	G	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary														
	Steilacoom-DuPont - Berkeley	14	R	59	G	11	R	29	W	2.9	W	2.1	W	3.3	W	3.7	W																				
	Berkeley - Thorne	40	G	40	W	37	W	32	W	0.8	G	3.2	W	0.8	G	4.8	W																				
	Thorne - Bridgeport	41	G	42	W	25	W	30	W	1.6	G	2.6	W	2.1	W	3.3	W																				
2020 & 2040 PM PEAK																																					
CORRIDOR EVALUATION	Location	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips																				
		PM Peak Hour				6-hour PM Peak Period				3-hour PM Peak Period																											
		HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode																									
		{mph}		{mph}		{hours}		{hours}		{minutes}		{minutes}																									
	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	Change from 2013 Existing	Change from 2020 Base	Change from 2013 Existing	Change from 2013 Existing																			
	Overall Corridor - 2020	23	W	58	G	24	W	46	W	4.2	W	2.8	W	4.2	W	3.3	W	13	G	9	G	14	W	11	W	7,013	G	13.9%	G	3,018	W	120	R	Change from 2040 Base	Change from 2040 Base	Change from 2040 Base	Change from 2040 Base
	Overall Corridor - 2040	23	W	52	G	14	R	34	W	2.9	W	3.2	W	5.0	W	4.8	W	11	G	10	W	21	W	19	W	13,957	G	32.6%	W	6,264	W	300	R				

Overall, Alternative P6 with added HOV and GP lanes will improve traffic operations and performance. I-5 congestion will be reduced, travel times will decreased and travel speeds increased for all users including SOVs, HOVs, transit riders and freight haulers. This alternative will continue to be congested during the peak hour but the duration of the congestion will decrease and it shows improvement over the No Action Alternative.

P6a – HOV and GP Lanes Alternative with Local Road Improvements

This alternative with local road improvements added with the HOV and GP lanes shows similar performance as compared to Alternative P6 with only the HOV and GP lanes added. For Alternative P6a, I-5 traffic operations are also expected to improve through the JBLM area. There will be some slow travel during the peak hour but the extent of the hours of congestion will be reduced, as compared to the No Action Alternative. Figure VII-9 shows the rating of Alternative P6a for each of the performance criteria. Overall, these ratings show:

- Average I-5 Speeds:** Average PM peak hour speeds along I-5 for SOV and HOV trips for Alternative P6a are similar to Alternative P6 with slight variations because of traffic shifts. Southbound SOV and HOV speeds in 2020 are slow because of capacity limitations to the south of the study area, which will reflect back into the study area. However in the northbound, average I-5 SOV speeds will improve to over 40 mph during the 2040 PM peak hour. HOV speeds on I-5 will also improve in 2040 assuming that the HOV lanes are extended into Thurston County. Average I-5 speeds for Alternative P6a are better than the No Action Alternative.
- Hours of Congestion:** As with Alternative P6, I-5 congestion along I-5 for Alternative P6a is also improved, as compared to the No Action Alternative with around four hours expected in 2020 for all modes in the southbound direction and less than three and a half hours northbound. In 2040, SOV traffic can expect slow travel for nearly five hours southbound and four hours northbound, while HOV congestion is between two to three hours. These periods of congestion area better than the No Action Alternative.
- Average Travel Times:** The 3-hour PM peak period average travel times along I-5 for Alternative P6a are similar to average travel times for Alternative P6.
- Person Throughput:** Regional trips travelling along the I-5 corridor with Alternative P6a improvements in 2020 and 2040 are similar to Alternative P6 travel.
- Percent of Demand Served:** Alternative P6a accommodates a similar percentage of the drivers wanting to use I-5 over a 2-hour PM peak period in both 2020 and 2040 as compared to Alternative P6.
- Transit & HOV Trips:** With the addition of the HOV and GP lanes, and local improvements, transit service and HOV usage for Alternative P6a show a similar increase, as compared to Alternative P6.

Overall, the performance of Alternative P6a with local improvements is similar to Alternative P6. Both show similar traffic operations and performance improvements. I-5 congestion will be reduced, travel times will decrease and travel speeds increase for all users including SOVs, HOVs, transit riders and freight haulers. There will continue to be congestion during the peak hour but the duration of the congestion will decrease.

Figure VII-9: Performance Evaluation: Alternative P6a – HOV and GP Lanes with Local Road Improvements

Alternative Package: P6a - HOV AND GP LANES with LOCAL ROAD IMPROVEMENTS																																
2020 PM PEAK																																
SEGMENT EVALUATION	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips																
	Location	PM Peak Hour				6-hour PM Peak Period				3-hour PM Peak Period																						
		HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode																				
		{mph}		{mph}		{hours}		{hours}		{minutes}		{minutes}																				
		SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB					NB															
Mounds - Steilacoom-DuPont	10	R	61	G	12	R	60	G	4.2	W	0.0	G	4.3	W	0.0	G	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary										
Steilacoom-DuPont - Berkeley	23	W	65	G	12	R	65	G	1.8	G	0.0	G	2.2	G	0.0	G																
Berkeley - Thome	49	G	50	G	48	G	45	G	0.0	G	0.8	G	0.0	G	1.2	G																
Thome - Bridgeport	54	G	52	G	54	G	23	W	0.0	G	2.6	G	0.0	G	3.5	W																
2040 PM PEAK																																
SEGMENT EVALUATION	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips																
	Location	PM Peak Hour				6-hour PM Peak Period				3-hour PM Peak Period																						
		HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode																				
		{mph}		{mph}		{hours}		{hours}		{minutes}		{minutes}																				
		SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB					NB															
Mounds - Steilacoom-DuPont	46	G	61	G	11	R	60	G	2.8	G	0.0	G	4.8	W	1.1	G	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary										
Steilacoom-DuPont - Berkeley	11	R	62	G	10	R	43	G	2.6	G	1.5	G	3.3	W	3.4	W																
Berkeley - Thome	43	G	40	G	32	W	30	W	0.8	G	2.3	G	1.8	G	3.8	W																
Thome - Bridgeport	52	G	41	G	49	G	24	W	0.9	G	2.3	G	1.2	G	3.5	W																
2020 & 2040 PM PEAK																																
CORRIDOR EVALUATION	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips																
	Location	PM Peak Hour				6-hour PM Peak Period				3-hour PM Peak Period																						
		HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode																				
		{mph}		{mph}		{hours}		{hours}		{minutes}		{minutes}																				
		SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB					NB															
Overall Corridor - 2020	19	R	59	G	16	R	44	G	4.2	W	2.6	G	4.3	W	3.5	W	14	G	9	G	16	W	11	G	6,989	G	13.8%	G	3,040	G	120	R
Overall Corridor - 2040	21	W	53	G	14	R	38	W	2.8	G	2.3	G	4.8	W	3.8	W	11	G	10	G	23	W	17	W	13,880	G	34.3%	G	6,183	G	300	R

P7 – HOV Lanes Alternative

With only HOV lanes added to I-5 in Alternative P7, I-5 traffic operations are expected to improve through the JBLM area in 2020, but deteriorate before 2040. There will be some slow travel during the peak hour, mainly in the transition area in 2020. By 2040 speeds will decrease and longer periods of congestion will occur. Overall, Alternative P7 shows improvement, as compared to the No Action Alternative. Figure VII-10 shows the rating of Alternative P7 for each of the performance criteria. Overall, these ratings show:

- Average I-5 Speeds:** Average PM peak hour speeds along I-5 for Alternative P7 in 2020 and 2040 for southbound SOV and HOV trips will continue to be slow because of capacity limitations to the south of the study area which will reflect backups into the study area and at the transition area from an HOV lane to a GP lane. In the northbound direction, average peak hour speeds in 2020 improve to 36 mph for SOV trips and 53 mph for HOV trips. Because of increased congestion in the transition areas, 2040 SOV speeds will deteriorate, while HOV speeds remain above 40 mph assuming that the HOV lanes are extended into Thurston County. Overall, average I-5 speeds for Alternative P7 are better than the No Action Alternative.
- Hours of Congestion:** For Alternative P7, I-5 congestion is improved, as compared to the No Action Alternative, to about four hours for SOV and HOV trips expected in 2020 because of congestion in the transition areas. By 2040, SOV congestion is expected to increase to near six hours northbound and HOV congestion to about five hours, because of the conversion of a GP lane to an HOV lane north of Thorne Lane. Southbound hours of congestion through the study area are metered by congestion north of the study area.
- Average Travel Times:** The 3-hour PM peak period average travel times along I-5 for Alternative P7 are between 15 to 19 minutes for SOV drivers and 10 to 13 minutes for HOV drivers in 2020. The HOV average times are better than the 14 to 15 minutes that drivers experience today, while the SOV times are longer. By 2040, the SOV average 3-hour travel times have a wider range from 14 to 36 minutes, while HOV travel times are between 9 to 11 minutes.
- Person Throughput:** Regional trips travelling along the I-5 corridor with Alternative P7 improvements in both 2020 and 2040 will increase over the base conditions, as compared to the No Action Alternative.
- Percent of Demand Served:** Alternative P7 has the capacity to accommodate more of the drivers wanting to use I-5 over a 2-hour PM peak period in both 2020 and 2040 than the No Action Alternative.
- Transit & HOV Trips:** With the addition of the HOV lanes, 2020 transit ridership for Alternative P7 is expected to increase by around 80 percent over today's ridership level, while in 2040 ridership increases by about 175 percent over the 2040 No Action Alternative because of the time difference in the HOV lane versus the GP lanes. However, it will represent around three percent of total trips on I-5. HOV trips are also expected to increase over base conditions.

Figure VII-10: Performance Evaluation: Alternative P7 – HOV Lanes

Alternative Package: P7 - HOV LANES																																
2020 PM PEAK																																
SEGMENT EVALUATION	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips																
	Location	PM Peak Hour		SOV Mode		6-hour PM Peak Period		SOV Mode		3-hour PM Peak Period		SOV Mode																				
		HOV Mode (mph)		SOV Mode (mph)		HOV Mode (hours)		SOV Mode (hours)		HOV Mode (minutes)		SOV Mode (minutes)																				
		SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB					NB															
Mounds - Steilacoom-DuPont	11	R	53	G	10	R	52	G	4.0	W	0.8	G	4.1	W	0.8	G	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary												
Steilacoom-DuPont - Berkeley	31	W	64	G	11	R	42	G	1.5	G	0.4	G	2.4	G	2.8	W																
Berkeley - Thorne	40	G	52	G	32	W	35	W	0.6	G	0.1	G	1.3	G	3.5	W																
Thorne - Bridgeport	52	G	42	G	42	G	23	W	0.0	G	3.5	W	0.5	G	4.0	W																
2040 PM PEAK																																
SEGMENT EVALUATION	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips																
	Location	PM Peak Hour		SOV Mode		6-hour PM Peak Period		SOV Mode		3-hour PM Peak Period		SOV Mode																				
		HOV Mode (mph)		SOV Mode (mph)		HOV Mode (hours)		SOV Mode (hours)		HOV Mode (minutes)		SOV Mode (minutes)																				
		SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB					NB															
Mounds - Steilacoom-DuPont	52	G	43	G	32	W	9	R	0.3	G	2.7	G	2.8	G	4.3	W	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary												
Steilacoom-DuPont - Berkeley	51	G	59	G	41	G	17	R	0.0	G	0.5	G	2.4	G	5.7	R																
Berkeley - Thorne	30	W	44	G	18	R	18	R	0.7	G	0.6	G	2.5	G	5.8	R																
Thorne - Bridgeport	36	W	37	W	13	R	20	W	1.2	G	4.7	W	2.3	G	5.0	W																
2020 & 2040 PM PEAK																																
CORRIDOR EVALUATION	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips																
	Location	PM Peak Hour		SOV Mode		6-hour PM Peak Period		SOV Mode		3-hour PM Peak Period		SOV Mode																				
		HOV Mode (mph)		SOV Mode (mph)		HOV Mode (hours)		SOV Mode (hours)		HOV Mode (minutes)		SOV Mode (minutes)																				
		SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB					NB															
Overall Corridor - 2020	22	W	53	G	14	R	36	W	4.0	W	3.5	W	4.1	W	4.0	G	13	G	10	G	19	W	15	G	6,498	G	12.5%	G	3,458	G	220	W
Overall Corridor - 2040	41	G	46	G	24	W	14	R	1.2	G	4.7	W	2.8	G	5.8	R	9	G	11	G	14	G	36	R	10,040	G	26.3%	G	6,948	G	700	W

Overall, Alternative P7 with added HOV lanes will improve traffic operations and performance in 2020 and reduce I-5 congestion, reduce travel times, and increase travel speeds for all users. However, by 2040 with only the HOV lane added, traffic operations will again deteriorate, especially in the southbound direction.

P7a – HOV and GP Lanes Alternative with Local Road Improvements and Enhanced Transit

This alternative with local road improvements and enhanced transit service added to the HOV lanes (Package P7a) shows similar performance as compared to Alternative P7 with only the HOV lanes added. For Alternative P7a, 2020 I-5 traffic operations are also expected to improve through the JBLM area, but by 2040 its overall performance will deteriorate. There will be some slow travel during the peak hour but the duration of congestion will be reduced in 2020, but similar to the No Action Alternative level in 2040. Figure VII-11 shows the rating of Alternative P7a for each of the performance criteria. Overall, these ratings show:

- **Average I-5 Speeds:** Average PM peak hour speeds along I-5 for SOV and HOV trips for Alternative P7a are similar to Alternative P7 with slight variations because of traffic shifts.
- **Hours of Congestion:** As with Alternative P7, I-5 congestion along I-5 for Alternative P7a is also improved, as compared to the No Action Alternative with three to four hours of congestion expected in 2020 for all modes. In 2040, SOV traffic can expect slow travel for nearly six hours northbound and over three hours southbound, while HOV congestion is less than one hour southbound and almost five hours northbound because of the conversion of a GP lane to and HOV lane.
- **Average Travel Times:** The 3-hour PM peak period average travel times along I-5 for Alternative P7a are similar to average travel times for Alternative P7.
- **Person Throughput:** Regional trips travelling along the I-5 corridor with Alternative P7a improvements in 2020 are similar to Alternative P7 travel. However, in 2040 P7a attracted a higher increased in regional trips than Alternative P7, mainly because of improved transit service.
- **Percent of Demand Served:** Alternative P7a accommodates slightly higher percentage of the drivers wanting to use I-5 over a 2-hour PM peak period in both 2020 and 2040, as compared to Alternative P7.
- **Transit & HOV Trips:** With the addition of the HOV lanes, local road improvements, and enhanced transit service, transit ridership increase from 200 to 350 percent over the base conditions because of the enhanced transit service and high speed difference between GP and HOV lanes. However, transit ridership on I-5 is about 4.5 to 5.2 percent of total I-5 users in the PM peak period for Alternative P7a. HOV usage is slightly lower for Alternative P7a, as compared to Alternative P7.

Overall, the performance of Alternative P7a with local road improvements and enhanced transit is similar to Alternative P7. Both show similar traffic operations and performance improvements. I-5 congestion will be reduced, travel times will decreased and travel speeds increased for all users including SOVs, HOVs, transit riders and freight haulers in 2020. By 2040, both show deterioration in performance.

Figure VII-11: Performance Evaluation: Alternative P7a – HOV Lanes with Local Road Improvements and Enhanced Transit

Alternative Package: P7a - HOV LANES, LOCAL ROAD IMPROVEMENTS with ENHANCED TRANSIT																																
2020 PM PEAK																																
SEGMENT EVALUATION	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips																
	Location	PM Peak Hour				6-hour PM Peak Period				3-hour PM Peak Period																						
		HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode																				
		{mph}		{mph}		{hours}		{hours}		{minutes}		{minutes}																				
		SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB					NB															
Change from 2013 Existing												Change from 2013 Existing	Change from 2013 Existing	Change from 2013 Existing																		
Mounds - Steilacoom-DuPont	11	R	55	G	10	R	54	G	4.0	W	0.1	G	4.0	W	0.1	G	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary												
Steilacoom-DuPont - Berkeley	26	W	64	G	11	R	52	G	1.5	G	0.0	G	2.3	W	2.1	W																
Berkeley - Thorne	49	G	48	W	46	W	32	W	0.0	G	0.9	G	0.0	G	2.4	W																
Thorne - Bridgeport	54	G	40	W	52	G	21	W	0.0	G	3.1	W	0.0	G	3.7	W																
2040 PM PEAK																																
SEGMENT EVALUATION	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips																
	Location	PM Peak Hour				6-hour PM Peak Period				3-hour PM Peak Period																						
		HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode																				
		{mph}		{mph}		{hours}		{hours}		{minutes}		{minutes}																				
		SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB					NB															
Change from 2040 Base												Change from 2040 Base	Change from 2040 Base	Change from 2040 Base																		
Mounds - Steilacoom-DuPont	50	G	45	W	26	W	10	R	0.5	G	1.9	G	3.4	W	4.2	W	See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary												
Steilacoom-DuPont - Berkeley	43	G	58	G	20	W	18	R	0.4	G	1.3	G	3.4	W	5.7	R																
Berkeley - Thorne	42	G	42	W	26	W	16	R	0.1	G	1.6	G	1.9	G	5.7	R																
Thorne - Bridgeport	51	G	35	W	41	W	19	R	0.4	G	4.9	W	1.6	G	5.5	R																
2020 & 2040 PM PEAK																																
CORRIDOR EVALUATION	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips																
	Location	PM Peak Hour				6-hour PM Peak Period				3-hour PM Peak Period																						
		HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode																				
		{mph}		{mph}		{hours}		{hours}		{minutes}		{minutes}																				
		SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB					NB															
Change from 2013 Existing												Change from 2013 Existing	Change from 2013 Existing	Change from 2013 Existing																		
Overall Corridor - 2020	22	W	53	G	15	R	37	W	4.0	W	3.1	W	4.0	W	3.7	W	13	G	10	G	18	W	14	G	6,334	G	14.0%	G	3,290	G	620	G
Change from 2040 Base												Change from 2040 Base	Change from 2040 Base	Change from 2040 Base																		
Overall Corridor - 2040	46	G	46	W	25	W	15	R	0.5	G	4.9	W	3.4	W	5.7	R	9	G	11	W	16	W	34	R	11,056	G	30.6%	W	6,617	G	1,400	G

P7b – HOV and GP Lanes Alternative with Local Road Improvements

This alternative with only local road improvements added to the HOV lanes (Package P7b) shows similar performance as compared to Alternative P7 with only the HOV lanes added. For Alternative P7b, 2020 I-5 traffic operations are also expected to improve through the JBLM area, but by 2040 its overall performance will deteriorate. There will be some slow travel during the peak hour but the duration of congestion will be reduced in 2020, but approach the No Action Alternative level in 2040. Figure VII-12 shows the rating of Alternative P7b for each of the performance criteria. Overall, these ratings show:

- **Average I-5 Speeds:** Average PM peak hour speeds along I-5 for SOV and HOV trips for Alternative P7b are similar to Alternative P7 with slight variations because of traffic shifts.
- **Hours of Congestion:** As with Alternative P7, I-5 congestion along I-5 for Alternative P7b is also improved, as compared to the No Action Alternative with three to four hours of congestion expected in 2020 for all modes. In 2040, SOV traffic can expect slow travel for nearly six hours northbound and almost four hours southbound, while HOV congestion is less than one hour southbound and almost five hours northbound because of the conversion of a GP lane to and HOV lane.
- **Average Travel Times:** The 3-hour PM peak period average travel times along I-5 for Alternative P7ba are similar to average travel times for Alternative P7.
- **Person Throughput:** Regional trips travelling along the I-5 corridor with Alternative P7b improvements in 2020 are similar to Alternative P7 travel. However, in 2040 P7b attracted a higher increased in regional traps than Alternative P7.
- **Percent of Demand Served:** Alternative P7b accommodates slightly higher percentage of the drivers wanting to use I-5 over a 2-hour PM peak period in both 2020 and 2040, as compared to Alternative P7.
- **Transit & HOV Trips:** With the addition of the HOV lanes and local road improvements, transit ridership increases for Alternative P7b are similar to ridership levels for Alternative P7. HOV usage is slightly lower for Alternative P7b, as compared to Alternative P7.

Overall, the performance of Alternative P7b with local road improvements is similar to Alternative P7. Both show similar traffic operations and performance improvements. I-5 congestion will be reduced, travel times will decreased and travel speeds increased for all users including SOVs, HOVs, transit riders and freight haulers in 2020. By 2040, both show deterioration in performance.

Figure VII-12: Performance Evaluation: Alternative P7b – HOV Lanes with Local Road Improvements

Alternative Package: P7b - HOV LANES & LOCAL ROAD IMPROVEMENTS																	
2020 PM PEAK																	
SEGMENT EVALUATION																	
Location	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips	
	PM Peak Hour				6-hour PM Peak Period				3-hour PM Peak Period				6-hour PM Peak Period	2-hour PM Peak Period	6-hour PM Peak Period	3-hour PM Peak Period	
	HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode		Regional Trips	2-way On I-5	Regional Trips	Regional Trips	
	(mph)	(mph)	(mph)	(mph)	(hours)	(hours)	(hours)	(hours)	(minutes)	(minutes)	(minutes)	(minutes)	Change from 2013 Existing	Change from 2020 Base	Change from 2013 Existing	Change from 2013 Existing	
SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB
Mounts - Steilacoom-DuPont	11 R	53 G	10 R	52 G	3.8 W	0.5 G	3.8 W	0.5 G	See Corridor Summary				See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	
Steilacoom-DuPont - Berkeley	12 R	64 G	11 R	54 G	1.8 G	0.2 G	2.7 W	2.1 W	See Corridor Summary				See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	
Berkeley - Thome	47 W	52 G	42 W	31 W	0.3 G	0.7 G	1.1 G	2.6 W	See Corridor Summary				See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	
Thome - Bridgeport	54 G	45 W	52 G	21 W	0.0 G	3.0 W	0.0 G	3.8 W	See Corridor Summary				See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	
2040 PM PEAK																	
SEGMENT EVALUATION																	
Location	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips	
	PM Peak Hour				6-hour PM Peak Period				3-hour PM Peak Period				6-hour PM Peak Period	2-hour PM Peak Period	6-hour PM Peak Period	3-hour PM Peak Period	
	HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode		Regional Trips	2-way On I-5	Regional Trips	Regional Trips	
	(mph)	(mph)	(mph)	(mph)	(hours)	(hours)	(hours)	(hours)	(minutes)	(minutes)	(minutes)	(minutes)	Change from 2040 Base	Change from 2040 Base	Change from 2040 Base	Change from 2040 Base	
SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB
Mounts - Steilacoom-DuPont	50 W	44 W	27 W	10 R	0.7 G	2.2 W	3.6 W	4.4 W	See Corridor Summary				See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	
Steilacoom-DuPont - Berkeley	44 W	55 G	18 R	18 R	0.3 G	0.9 G	3.7 W	5.6 R	See Corridor Summary				See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	
Berkeley - Thome	39 W	39 W	17 R	15 R	0.1 G	1.3 G	2.3 W	5.8 R	See Corridor Summary				See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	
Thome - Bridgeport	46 W	33 W	25 W	19 R	0.8 G	4.7 W	2.2 W	5.5 R	See Corridor Summary				See Corridor Summary	See Corridor Summary	See Corridor Summary	See Corridor Summary	
2020 & 2040 PM PEAK																	
CORRIDOR EVALUATION																	
Location	Average I-5 Speeds				Hours Of Congestion				Average Travel Time				Person Throughput	Percent of Demand Served	HOV Trips	Transit Trips	
	PM Peak Hour				6-hour PM Peak Period				3-hour PM Peak Period				6-hour PM Peak Period	2-hour PM Peak Period	6-hour PM Peak Period	3-hour PM Peak Period	
	HOV Mode		SOV Mode		HOV Mode		SOV Mode		HOV Mode		SOV Mode		Regional Trips	2-way On I-5	Regional Trips	Regional Trips	
	(mph)	(mph)	(mph)	(mph)	(hours)	(hours)	(hours)	(hours)	(minutes)	(minutes)	(minutes)	(minutes)	Change from 2013 Existing	Change from 2013 Existing	Change from 2013 Existing	Change from 2013 Existing	
SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB
Overall Corridor - 2020	15 R	54 G	14 R	37 W	3.8 W	3.0 W	3.8 W	3.8 W	14 W	9 G	21 W	14 W	6,434 W	13.7% G	3,343 G	220 W	
													Change from 2040 Base	SB	Change from 2040 Base	Change from 2040 Base	
Overall Corridor - 2040	45 W	43 W	21 W	15 R	0.8 G	4.7 W	3.7 W	5.8 R	9 G	11 W	17 W	35 R	10,864 W	27.8% W	6,746 G	700 W	

Performance Scoring by Alternative Packages and Criteria

The performance scoring of the package alternatives followed the procedures, criteria and weightings, outlined in Chapter V. The performance criteria and associated weights are:

- Average SOV and HOV speeds 10 points
- SOV and HOV hours of congestion 15 points
- Average SOV and HOV travel times 20 points
- Regional person throughput 30 points
- Percent of person demand served 15 points
- Potential regional person trip in on transit/HOV 10 points

Each of these package alternatives was compared and point factors applied to determine their performance scores, using 2020 data and 2040 data separately. The maximum performance score is 100 points.

The results of the 2020 performance scores are illustrated in Figure VII-13. Alternatives P1, P2 and P3 had scores of less than 50 points. Key criteria lowering the performance scores for these alternative packages were low travel time ratings and low percent of demand served ratings, as compared to the other alternatives. The other nine alternative packages had similar scores, ranging from 76.0 to 83.1 points.

As shown in Figure VII-13, the best performing alternatives with only I-5 improvements in 2020 were Alternative P4 with a score of 83.1 points, followed closely by Alternatives P6 with a score of 81.2 points. The addition of the local improvements to any of the I-5 improvement scenarios showed little change (less than four points) in performance scores. Of the I-5 improvement scenarios, Alternative P7 had a lower score of 76.0 points, however, with transit and local improvements (Alternative P7a) increased the score to 79.9 points.

Figure VII-14 shown the 2040 performance scores by alternative packages. Again Alternatives P1, P2 and P3 had the lowest scores with less than 25 points. The other nine alternative packages had similar scores ranging from 68.1 to 84.9.

The best performing alternatives with only I-5 improvements in 2040 were Alternative P5 with a score of 83.8, followed by Alternatives P4 with a score of 79.3. The addition of the local improvements to any of the I-5 improvement scenarios again showed little change in 2040 performance scoring. Again Alternative P7 had the lowest score of 76.0 points of the I-5 improvement scenarios.

Figure VII-13: Comparison of 2020 Performance Scored by Alternative Packages

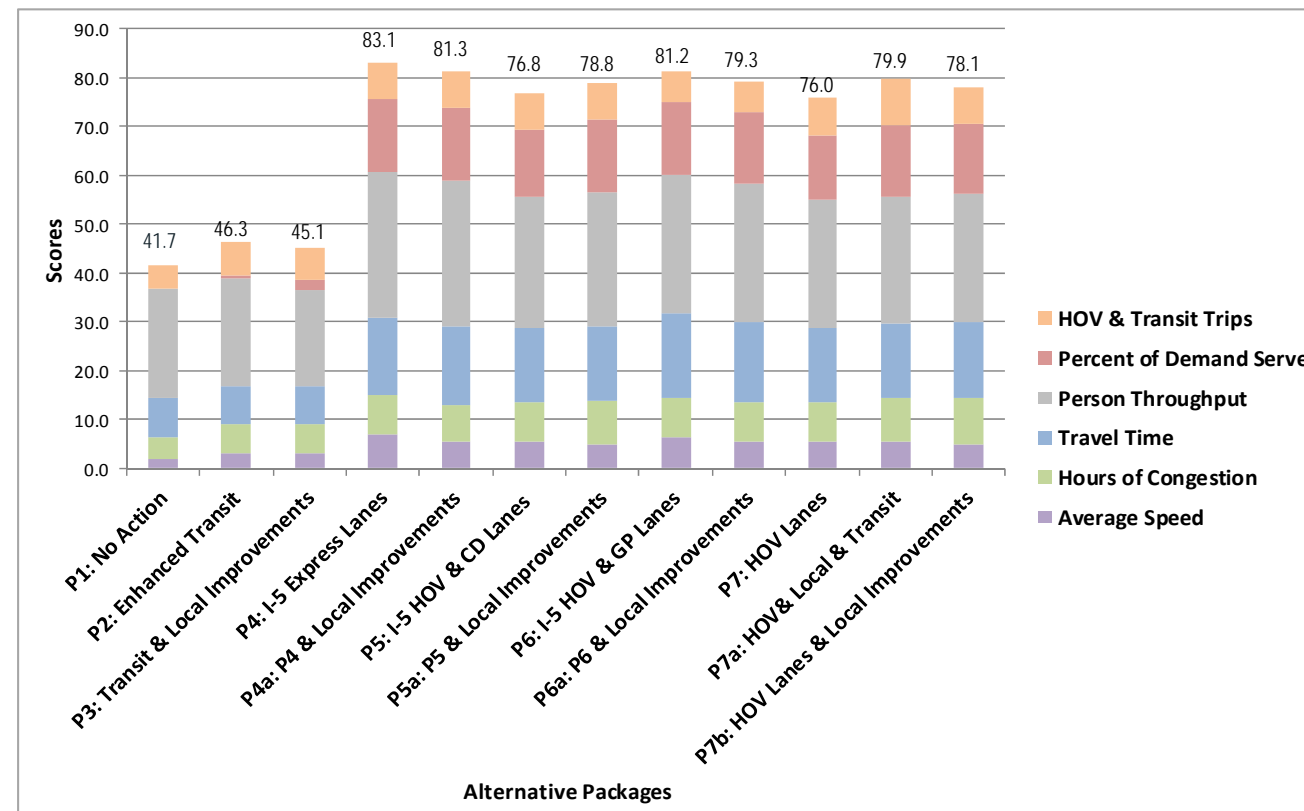
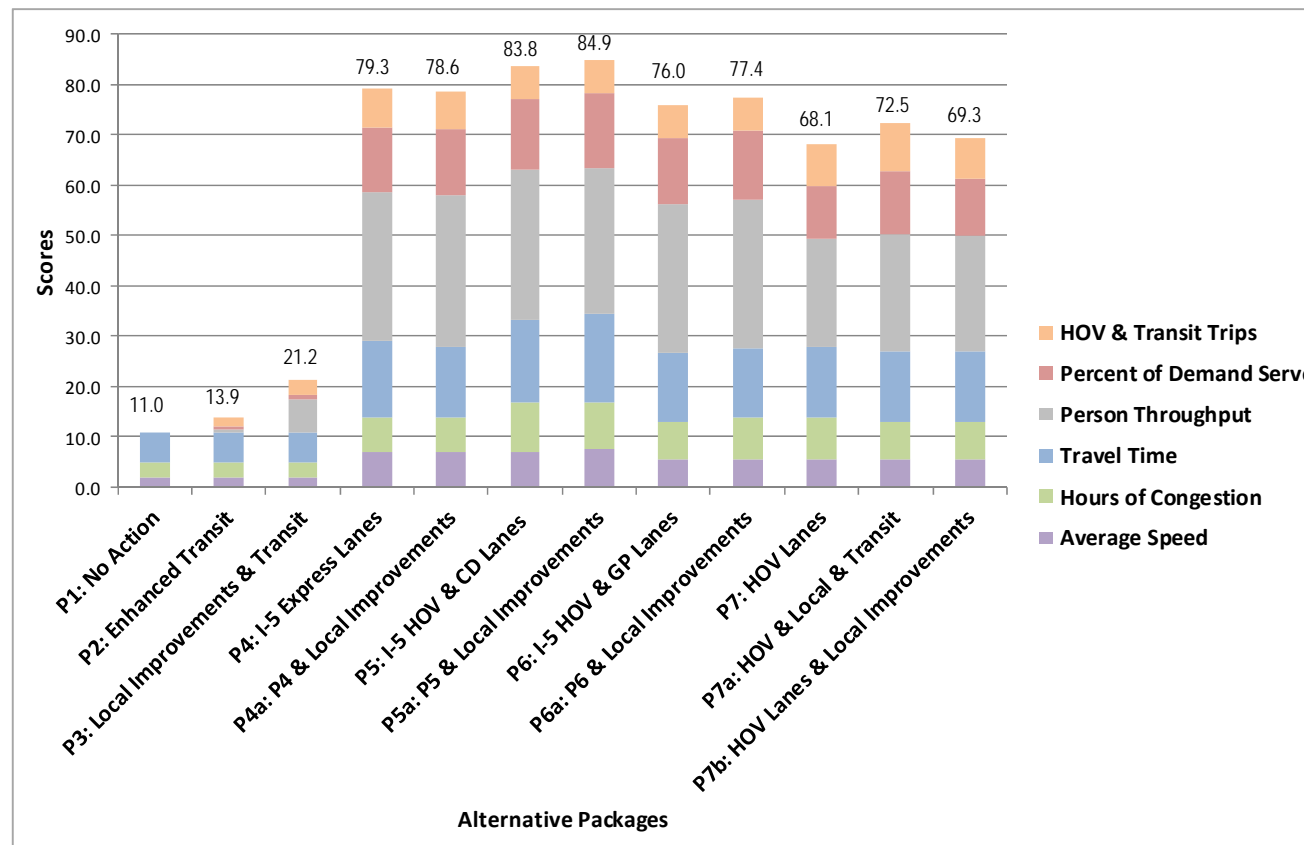


Figure VII-14: Comparison of 2040 Performance Scored by Alternative Packages



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VIII: Environmental Scan Summary – Phase 2

The third category of qualitative evaluation for the Phase 2B multimodal alternatives focuses on potential environmental impacts and is based on the results of a preliminary environmental scan conducted as part of this project phase. The Phase 2 preliminary environmental scan supplements the scan conducted for Phase 1 and is documented in the *I-5 JBLM Vicinity IJR and Environmental Documentation, Phase 1 – Corridor Plan Feasibility Study*, dated January 2014. The Phase 2 environmental scan identifies environmental resources and environmentally sensitive areas, providing input on whether local road improvement options evaluated in this Phase would have environmental challenges that could eliminate an option from further consideration. The preliminary environmental scan includes the following local improvement options:

- B-3: Gravelly Lake Drive to Thorne Lane Connector
- C-7: South A Road extension
- C-8: Joint Base Connector Phase 2
- C-15a: New Arterial (frontage road) – Mounts Road to Gravelly Lake Drive on new alignment east of and adjacent to I-5
- C-15b: New Arterial – Mounts Road to Madigan using existing roads
- C-9: Fairview Road (extends Joint Base Connector further north)

The environmental scan includes the following disciplines:

- Wetlands and streams;
- Federally listed species and state priority habitats and species;
- Groundwater, surface water, and floodplain;
- Hazardous materials;
- Cultural and historical resources;
- Noise;
- Section 4(f) and 6(f); and
- Social and environmental justice.

The Phase 2 scan is based on the review of readily available data and field survey information. Existing documentation includes geographic information system (GIS) data, environmental reports, surveys, and maps from sources such as City of Lakewood, Pierce County, Joint Base Lewis McChord (JBLM), Washington State Department of Transportation (WSDOT), and federal agencies such as U.S. Fish and Wildlife Service, the Federal Emergency Management Agency (FEMA), and the U.S. Environmental Protection Agency (EPA). This data was reviewed and used to summarize the project area existing environmental conditions. A field visit was performed on November 7, 2014 for the wetland and stream reconnaissance, the federal and state-listed species and priority habitats scan, and the hazardous materials. Project impacts associated with the local improvement options were then evaluated for each environmental discipline.

Results of Alternatives Evaluation

Table VIII-1 presents the results of the qualitative evaluation of potential environmental impacts associated with the No Action Alternative and each of the eleven Build Alternatives. This table illustrates the step-by-step process used to consider each of the factors evaluated under this criterion and highlights the scores that were awarded. This table should be read as follows:

1. **Relative Score:** The first step in assessing potential environmental impacts associated with each packaged alternative involves assigning a relative score that illustrates an “order-of-magnitude” relationship between the highest scoring alternatives and the lowest, and every alternative in between. Relative scores range from 1.0 (representing the least potential impacts) to 0.0 (representing the highest potential impacts). Using the relative scoring method, the two alternatives (P1 and P2) are awarded a relative score of 1.0. Alternative P7 was scored the next highest because of its reduced footprint followed by Alternative P6 and then Alternative P4 (improvements along I-5 and four key interchanges) which would have a slightly higher potential impact (in relative terms) than Alternatives P1 and P2. The other options were assumed to have a higher potential for impacts.
2. **Total Weighted Score:** As noted in Chapter V under the discussion of evaluation methodology, all performance and impact scores were weighted to reflect the relative importance of each in determining an overall score for each alternative. The maximum total weighted score possible for the Environmental Criterion is 4.0. The weighted score is calculated by multiplying the relative score of an alternative by 6.0 (i.e., $0.55 * 4.0 = 2.2$).

Table VIII-1: Scoring of Environmental Factors by Alternative

Alternatives	Relative Score	Total Weighted Score
P1: No Action	1.0	4.0
P2: Enhanced Transit	1.0	4.0
P3: Local Improvements & Transit	0.2	0.8
P4: I-5 Express Lanes	0.7	2.8
P4a: P4 & Local Improvements	0.5	2.0
P5: I-5 HOV & CD Lanes	0.6	2.4
P5a: P5 & Local Improvements	0.4	1.6
P6: I-5 HOV & GP Lanes	0.75	3.0
P6a: P6 & Local Improvements	0.55	2.2
P7: HOV Lanes only	0.8	3.2
P7a: HOV Lanes & Local & Transit	0.6	2.4
P7b: HOV Lanes & Local Improvements	0.6	2.4

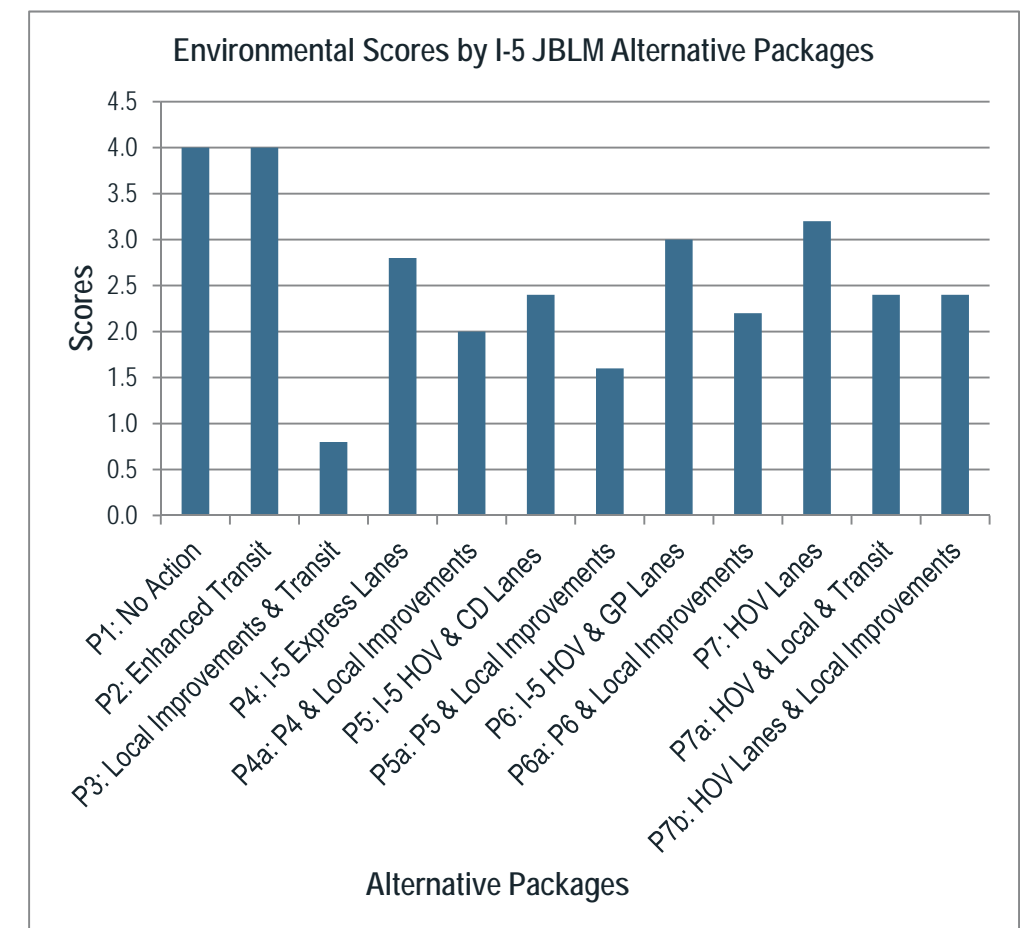
Of all the Build Alternatives, as indicated in the Table VIII-1, Alternative P2 has the best environmental score, as the alternative focuses solely on adding express bus service within an existing highway corridor. No freeway flyer stops, new transit centers or bus maintenance facilities are included in this alternative.

Alternative P7 has the second best environmental score (3.2 out of a possible 4.0). This alternative involves adding a single HOV lane in each direction through the study area and reconfiguring the interchanges of Thorne Lane, Berkeley Street and Steilacoom-DuPont Road. This relatively high score is due to the perception that the HOV lanes would be built entirely within existing freeway right-of-way (with added right-of-way needed at the interchanges).

Alternative P6 scored the third highest among the Build Alternatives with a score of 3.0. This alternative includes adding one HOV and one GP lane in each direction on I-5. One alternative that includes improvements to I-5 (Alternative P4) would score slightly lower than Alternative P6.

All of the Build Alternatives that include local road improvement options (i.e. Alternatives P4a, P5a, P6a, P7a and P7b), all scored in the lowest group, largely due to the impacts of the three local road improvements. Alternative P5 also scored relatively low, as it includes the widest cross-section of any freeway alternative.

Figure VIII-1: Environmental Scores by Alternative



Existing Environmental Conditions

A description of the existing environmental conditions in the areas that would be affected by the local road options is presented below by discipline.

Wetlands, Streams, and Wildlife

Wetland and Streams: The Phase 2 wetland and stream reconnaissance identified approximately six potential wetlands and two potential streams within the vicinity of the proposed local improvements (Figure VIII-2 at the end of this section). The wetlands and streams were not given a preliminary categorization. Wetlands associated with Murray Creek near the Berkley Street interchange and wetlands and stream associated with the Thorne Lane

Interchange were previously identified in the first environmental scan. Potential impacts to these natural resources are greatest at the Thorne Lane Interchange, at the Murray Creek stream crossings (one on Option C-15a and one on Option C-7), and potentially where



the C-8 alignment parallels the Murray Creek wetlands. As part of the preparation of project-related National Environmental Policy Act (NEPA) documents, wetland delineations and categorizations will need to be performed to advance the permitting process. Mitigation will need to be identified to offset any impacts to wetlands and streams.

Wildlife and Habitat: No species surveys were completed for this summary and all information is based on readily available maps and GIS files provided by the Washington State Department of Fish and Wildlife (WDFW) Priority Habitats and Species, the Washington Department of Natural Resources (WDNR) Natural Heritage Program, and JBLM GIS Department. Federally listed species, state priority species and habitats, and other high quality habitats are mapped within the vicinity of the local improvements (Figure VIII-2). The federally listed species include Taylor's checkerspot butterfly, the streak horned lark, Roy prairie pocket gopher, marbled murrelet, and western gray squirrel (WDFW, 2014 and WSDOT, 2014). The WDFW priority species and habitats include great blue heron rookeries, bald eagle nests, roosting concentrations of big-brown bats, oak stands, and purple martin nesting and breeding areas (WDFW, 2014 and U.S. Army and U.S. Air Force, [n.d.], 2014). Rare vascular plants mapped by the Washington Natural Heritage Program, open space/biodiversity areas identified by WDFW, and "high quality ecosystems" identified by the WDNR Natural Heritage Program are also found in the vicinity of the proposed local improvements (WDFW, 2014 and WDNR, 2013).

The proposed local improvement option with the most potential significant impacts to wildlife and habitat is C-8, which overlaps with western gray squirrel nesting areas, Taylor's checkerspot occurrences, purple martin nesting and breeding, high quality ecosystems, and oak stands (Figure VIII-2). Both Options C-15a and C15-b overlap with a small area of western gray squirrel nesting. Option C-15a would impact oak stands and an open space/biodiversity area. Option C-15b would impact mapped rare vascular plants and oak stands. As part of the preparation of the project NEPA documents, species surveys would be completed for those species with the potential to occur within the proposed project area. As part of the NEPA review process, a biological assessment will be completed for Endangered Species Act review.

Groundwater, Surface Water, and Floodplains

The potential local improvement options are located within an area underlain by the Chambers-Clover Creek Aquifer Recharge Area and the Central Pierce County Aquifer, which is designated as a sole source aquifer (EPA, 1995). Thousands of groundwater wells are located within the project vicinity. All of the proposed local improvements are located within time of travel radii ranging from 10 years to 6 months. Based on the GIS data provided by the Washington Department of Health (WDOH) and approximated local improvement option impact footprints, one water supply well located near the C-15a and C-15b alignments and one well near the C-8 alignment would require relocation or replacement based on the conceptual alignment footprints (WDOH, 2013). If the local improvement footprints change or if the WDOH well locations are inaccurate, additional water supply wells may be impacted.

Stormwater design would be developed after a project alignment is selected. It is assumed that the project will be designed and operated to current WSDOT highway runoff manual standards and, therefore, impacts to water quality and quantity from surface water runoff would be minor.

In the areas of the proposed local improvement options, FEMA identifies floodplains along Murray Creek and in the area of the Thorne Lane wetlands. Segments of Options C-7 and C-8 overlap with or cross the Murray Creek 100-year floodplain (FEMA, 2014). Pierce County GIS data identifies areas of 0.2 percent annual chance of flooding within the C-8 alignment (Pierce County Planning and Land Services [Pierce County PALS], 2011). In the vicinity of the Thorne Lane interchange, the wetlands are mapped as part of the 500-year flood hazard areas by FEMA and are shown to have a 0.2 percent annual chance of flooding on the Pierce County GIS data. Option C-15a crosses this area at the Thorne Lane Interchange and floodplain impacts would also occur because of anticipated wetland fills for the relocated interchange.

Hazardous Materials

Federal and state databases were researched to identify properties with records of environmental enforcement; presence of underground storage tanks; and the generation, transportation, and storage of hazardous materials. An environmental database research service, Environmental Data Resources, Inc. (EDR), provided information for 85 listed sites located within one mile of the Phase 2 project corridors

(EDR, 2014). JBLM also provided a GIS data compilation of 70 sites listed on JBLM's databases, including groundwater wells and restoration/remediation sites on the JBLM site.

Based on data reviews and field observations, 13 of the listed sites have a high potential for impacts if the alignments being considered were constructed (Figure VIII-3). These sites include landfills/historic dumping areas, a substation, a gas station, a railroad corridor, and three National Priority List (NPL) superfund sites: the Fort Lewis Logistics Center, Lakewood/Ponders Corner, and American Lake Garden Tract. Any contamination encountered during the project would need to be treated and disposed of appropriately. In the next phase of the project, an environmental site assessment would need to be completed to identify and evaluate the risk associated with all potential or known contaminated sites in the proximity of the proposed improvements.



Cultural and Historical Resources

Known sites of cultural resources that are located along the local road improvement option alignments under consideration were reviewed [ATCRC], 2014). A 200-foot buffer around the Phase 2 conceptual Area of Potential Effect (APE) encompasses five archaeological sites and six historic properties (Figure VIII-4). The more comprehensive cultural resources scan conducted for Phase 1 discusses historic properties that would be affected by project undertakings. These historic properties include historic homes, homestead sites, a relict railroad station, and sites related to historic periods at Fort Lewis. Historic structures that were identified during this assessment were not evaluated for nomination to the National Register of Historic Places (NRHP). Sites that might be impacted by the local improvements under consideration will need to complete the evaluation for NRHP nomination prior to project impacts.

Local improvement Options C-8, C-15a, and C-15b would have potential significant impacts on cultural resources. Option C-8 would likely have the potential to alter the integrity of three archaeological sites, one of which is considered highly significant for its contribution to local and national history. Both C-15a and b would likely alter the integrity of NRHP-listed Fort Lewis Garrison Historic District and 40+ associated historic properties. C-15a would also likely impact the integrity of one additional NRHP-listed structure located outside the district, two unevaluated archaeological sites, and four unevaluated historic-era properties and would indirectly impact historic memorial oak trees on Interstate 5 (I-5). Improvement Options B-3 and C-7 could

directly impact historic structures that have not been assessed for NRHP nomination, and Option B-3 could also indirectly impact one archaeological site and one historic structure.



Noise Quality

An environmental noise scan was performed for the Phase 2 evaluation that reviewed the potential impacts from noise on noise-sensitive land uses in the project area (Figure VIII-5). The project is considered a Type 1 project according to the WSDOT Noise Policy and, therefore, would require future additional noise analysis. Noise impacts are expected within all of the local road improvement options except Options C-7 and C-8. Options C-15a and C-15b would likely have the greatest impacts on noise-sensitive land use; noise-sensitive receptors in these locations include residences, the Family Resource Center, Lewis Park, and Evergreen Elementary School. Since noise is dependent on traffic volumes and the distance of the roadway to the receiver, each local road option has similar impacts to adjacent noise-sensitive properties. Where housing and businesses are located within the local road options, impacts would need to be mitigated. Noise abatement would likely take the form of noise barriers. In the next phase of the I-5 JBLM Congestion Relief Study, a noise analysis will be completed, sensitive receptors better identified, and impacts defined to determine applicable noise abatement recommendations.

Section 4(f), 6(f)

The Department of Transportation Act of 1966 included a special provision – Section 4(f) – which stipulates that the Federal Highway Administration (FHWA) and other U.S. Department of Transportation agencies cannot use land from publicly owned parks, recreational areas, wildlife and waterfowl refuges, or public and private historical sites unless the following conditions apply:

- There is no feasible and prudent alternative to the use of land
- The action includes all possible planning to minimize harm to the property resulting from use

A summary of historical sites that have been identified in the vicinity of the local improvement options is described above in the Cultural and Historical Resources section (Figure VIII-4). Also reviewed were public facilities in the vicinity of the proposed local improvement options such as museums, parks, and golf courses to

assess whether they would be subject to Section 4(f) regulations (Figure VIII-6). Such facilities exist on JBLM. A Section 4(f) policy paper on the FHWA website provides guidance for these types of facilities on military lands (FHWA, 2014) and states that Section 4(f) would not apply to parks and recreation areas that are not open to the general public. However, the FHWA “strongly encourages the preservation of such parks and recreation areas even though they may not be open to the general public or are not publicly owned and therefore are not protected by Section 4(f).” Therefore, the only known 4(f) property in the vicinity of the proposed local improvements and identified as an historical site is Lewis Park at the JBLM Main Gate. Identified impacts to 4(f) lands associated with the proposed local improvement options would occur at Lewis Park with Option C-15a and the historical sites impacts described above in the cultural resources section.



Section 6(f) of the Land and Water Conservation Funds Act applies to all projects that impact recreational lands purchased or improved with land and water conservation funds. The Secretary of the Interior must approve any conversion of property acquired or developed with assistance under this act to other than public, outdoor recreation use. There are no 6(f) properties identified in the vicinity of the proposed local improvement options.

Social and Environmental Justice

The review of demographic and low income data from the Cities of Lakewood and DuPont, and JBLM were reviewed. Environmental Justice requires that all people, regardless of race, culture, or income be treated equally with respect to the implementation and enforcement of environmental laws and policies. Low income and minority populations are found within the project area. Construction activities would result in temporary noise level increases and air quality impacts from dust and equipment emissions. If implemented, options C-15a, C-15b, and B-3 would result in direct project displacements of JBLM and private housing (Figure VIII-6). If Options C-15a and C15-b are selected for evaluation in the next phase of NEPA review, a further in-depth assessment by specialists would be required to determine the impacts of this

displacement. Option B-3 may also result in the displacement of private housing and would impact a private golf course. Social issues related to impacting the private golf course, as well as impacts to other businesses or local amenities (such as public transportation) would need to be identified during the next NEPA phase.

Summary Possible Environmental Impacts for the Local Road Improvement Options

The following section discusses the possible environmental impacts associated with each local road improvement option. At this conceptual level of design and analysis, only general impacts are assessed. More detailed assessments will be completed during a later phase of the project.

Option B-3: Gravelly Lake Drive to Thorne Lane Connector

Option B-3 would parallel I-5 and the Sound Transit railroad tracks on the west side of the interstate, connecting North Thorne Lane SW to Gravelly Lake Drive SW. No wetland, stream, or wildlife impacts are anticipated with this option. The proximity of Option B-3 to the Sound Transit railroad tracks could result in project impacts. It is not uncommon for railroad rights-of-way to be contaminated with herbicides, petroleum hydrocarbons, creosote, and/or polynuclear aromatic hydrocarbons. These hazardous materials may be encountered during project construction excavation activities. Option B-3 is not expected to impact groundwater, surface water, or floodplains in the area. However, Option B-3 may directly impact three historic structures, and indirectly impact one archaeological site and one historic structure. This option would follow the edge of the Tacoma Country and Golf Club, a private golf course. Noise impacts are likely at the golf course. In addition, the fairway and amenities directly adjacent to Option B-3 would be impacted from the footprint of the proposed road, which might threaten the functionality of the course. Option B-3 would also result in direct displacement of private housing along Forest Glen Lane SW.

Option C-7: South A Road Extension

Option C-7 is an extension of Option C-15b and would run from Jackson Avenue to Rainier Drive. This option would require a crossing at Murray Creek and would, therefore, result in stream and wetland impacts and would impact the Murray Creek 100-year floodplain. Option C-7 would directly impact two historic structures. No noise-sensitive land uses were identified and no noise impacts are expected. This scenario crosses the following JBLM-listed sites: Industrial Waste Water Treatment Plant (WWTP)/Landfill #6 and Former Cannibalization Yard (Figure VIII-3). Based on a conversation with JBLM staff, residual petroleum contamination is located at the Industrial WWTP/Landfill #6 site (Myers, 2014). Residual petroleum and metals contamination may also be located in the vicinity of the Former Cannibalization Yard, which is a former vehicle/equipment yard. Hazardous materials may be encountered during project construction excavation activities in these locations. Option C-7 also extends onto the JBLM Logistics Center NPL site. Depending on proposed excavation depths, trichloroethylene (TCE)-contaminated groundwater may be encountered.

Option C-8: Joint Base Connector Phase 2

Option C-8 connects Jackson Avenue to East Lincoln Road, paralleling portions of Murray Creek. This option would likely result in impacts to wetlands associated with Murray Creek, as well as the Murray Creek 100-year floodplain and areas of 0.2 percent annual chance of flooding. Option C-8 could result in potential significant impacts to federally listed species as it bisects western gray squirrel nesting areas and Taylor's checkerspot areas of occurrence. This option could also impact other important species and habitat such as purple martin nesting and breeding areas, designated high quality ecosystems, oak stands, and areas known to contain rare vascular plants. Option C-8 would cross the following JBLM-listed sites: Dud Area and the JBLM Logistics Center NPL site. The Dud Area is identified by the Washington Department of Ecology (Ecology) as "US Army Fort Lewis I-5 Corridor" and is listed as a Confirmed and Suspected Contaminated Site with known petroleum and metals contamination. Based on a conversation with JBLM staff, no contamination is known to be present in the Dud Area (Myers, 2014). It is unknown whether petroleum or metals contamination would be encountered at this location during construction. Depending on proposed excavation depths, TCE-contaminated groundwater associated with the Logistics Center NPL site may also be encountered. Option C-8 could have a moderate impact on groundwater resources as one well is near the Option C-8 alignment could require relocation or replacement. Additionally, actions in Option C-8 could alter the integrity of three archaeological sites, although these sites have not been evaluated for nomination to the NRHP. One of these sites is extensive and is considered highly significant for its contribution to local and national history. Any undertaking in the vicinity of this site would be preceded by an intensive cultural resources survey and tribal consultation process. No noise-sensitive lands uses were identified and no noise impacts are anticipated along the OptionC-8 alignment.

Option C-9: Fairview Road

Option C-9 extends from the northeast end of Option C-8 and runs north to Colonel Joe Jackson Boulevard. No wetland, stream, wildlife, floodplain, or groundwater impacts are anticipated with this option. This option is also unlikely to alter the integrity of historic properties; and no cultural resources are recorded along its proposed alignment. Noise impacts could occur from this option at a building which has an outdoor play area and a golf course. Hazardous materials associated with the JBLM-listed sites Base Landfill #12 and Burial Pit #10 may be encountered during Option C-9 project construction excavation. JBLM indicated that the Landfill #12 soil cap is approximately 2 feet deep, that the landfill has known TCE contamination, and that it is part of a series of landfills located on the Whispering Firs golf course. Based on EPA's summary of the American Lake Garden Tract NPL site, tetrachloroethene and dichloroethylene-contaminated groundwater associated with the NPL site originates from the landfills on the golf course site. Burial Pit #10 is reportedly a landfill for debris associated with a burned hangar. JBLM staff advised that there may be barrels buried in this location; however, no barrels have been encountered during JBLM soil explorations. The soil cap on Burial Pit #10 is reportedly one to two feet deep.

Option C-15a: New Arterial – Mounts Road to Gravelly Lake Drive on New Alignment

Option C-15a runs parallel to the southeast side of I-5, from approximately Nisqually Road SW to McChord Drive SW. Option C-15a would cross Murray Creek, which would result in impacts to Murray Creek and impacts to wetlands and the 100-year floodplain associated with Murray Creek. There would also be impacts at the Thorne Lane interchange to 500-year flood hazard areas that have a 0.2 percent annual chance of flooding. This option would impact a small area of western gray squirrel nesting, oak stands, and an open space/biodiversity area. This option would also have a large impact on historical resources. Option C-15a would likely alter the integrity of NRHP-listed Fort Lewis Garrison Historic District and 47 associated historic properties. Option C-15a would also alter the integrity of one additional NRHP-listed structure located outside the district, two unevaluated archaeological sites, and four unevaluated historic-era properties and would indirectly impact historic memorial oak trees along highway I-5. Noise impacts from Option C-15a are likely at noise-sensitive outdoor activities such as residences in several different JBLM neighborhoods, the Family Resource Center, Lewis Park, and Evergreen Elementary School. Additionally, Option C-15a would result in potential significant displacement of JBLM housing in several different JBLM neighborhoods.



Option C-15a crosses the following JBLM-listed sites: Landfill #3, Landfill #9, and the pump-and-treat system adjacent to I-5 that is associated with the JBLM Logistics Center NPL site (Figure VIII-3). JBLM reported that the soil cap on Landfill #9 is reportedly four to six feet deep, and that the depth of the soil cap on Landfill #3 is not known (Myers, 2014). Further investigation would be required to determine the type of contamination that may be present at the landfill sites. Option C-15a would also impact the pump-and-treat system associated with the Logistics Center NPL site. Replacing these well systems would be expensive and TCE-contaminated soil and/or groundwater may be encountered during excavation. Option C-15a would also be located adjacent to an existing electrical substation (Figure VIII-3), which could result in

discovering polychlorinated biphenyls contaminated soil in the vicinity of this substation.

Option C-15b: New Arterial – Mounts Road to Madigan using Existing Roads

Option C-15b parallels the southeast side of I-5, from approximately Nisqually Road SW to Jackson Avenue. This option overlaps with a small western gray squirrel nesting area and would impact areas known to contain rare vascular plants and oak stands. No wetland or floodplain impacts are anticipated. Option C-15b would impact at least one groundwater well that would need to be relocated or replaced. The option would also likely alter the integrity of NRHP-listed Fort Lewis Garrison Historic District and 41 associated historic properties. Noise impacts from Option C-15b are likely at noise-sensitive outdoor activities, at residences in several JBLM neighborhoods, and at the Family Resource Center. Option C-15b would also result in direct displacement of JBLM housing in several different neighborhoods.

Option C-15b would cross the following JBLM-listed sites: Landfill #3, Landfill #9, and the JBLM Logistics Center NPL site (Figure VIII-2). The soil cap on Landfill #9 is reportedly four to six feet deep; JBLM staff indicated that the depth of the soil cap on Landfill #3 is not known (Myers, 2014). Further investigation would be required to determine the type of contamination that may be present at the landfill sites. Depending on proposed excavation depths, TCE-contaminated groundwater associated with the Logistics Center NPL site may also be encountered. Option C-15b would also be located adjacent to an existing gasoline station. The gasoline station has a "no further action" status on Ecology's Confirmed and Suspected Contaminated Sites List. However, residual gasoline contamination may be encountered during project construction.



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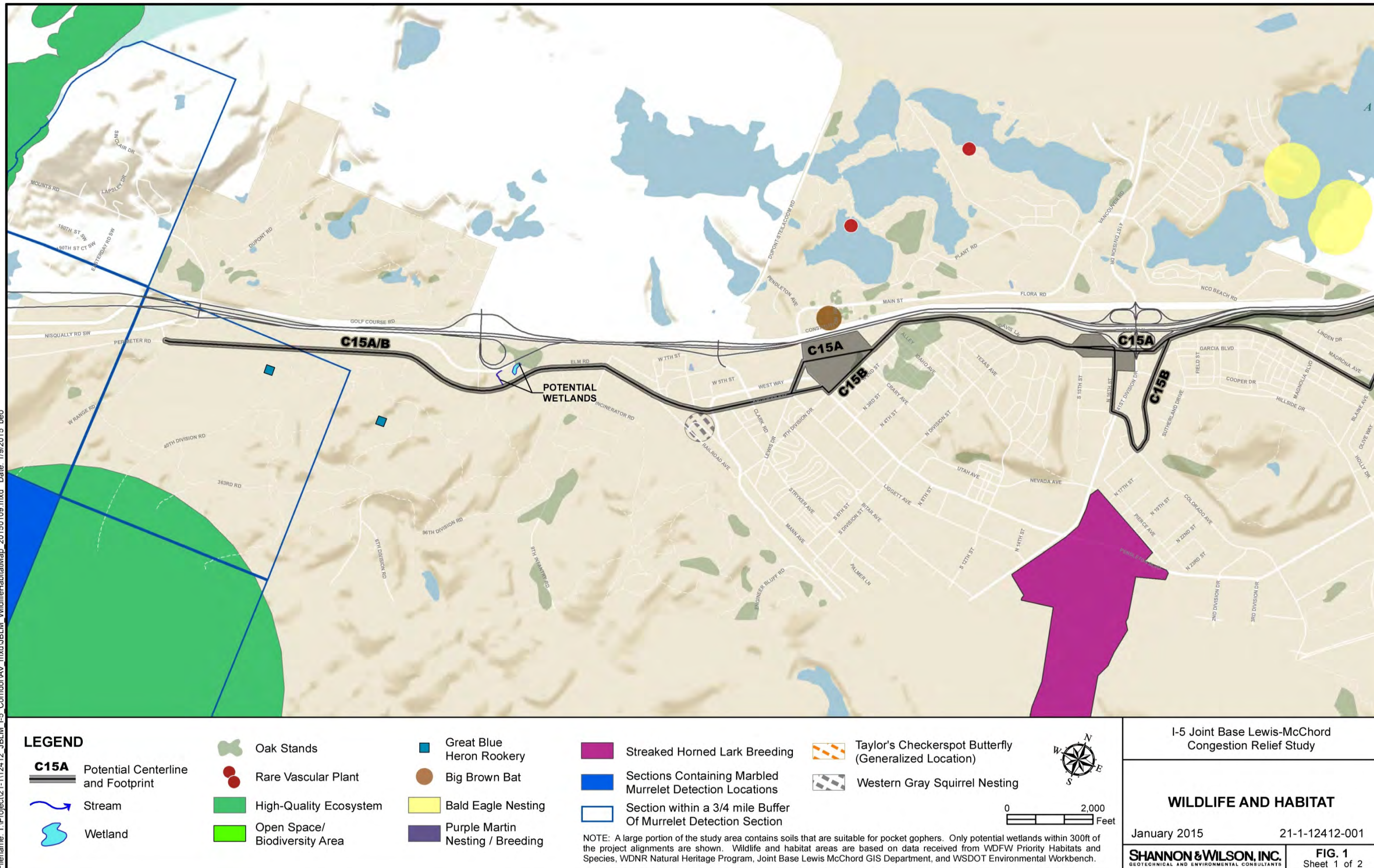
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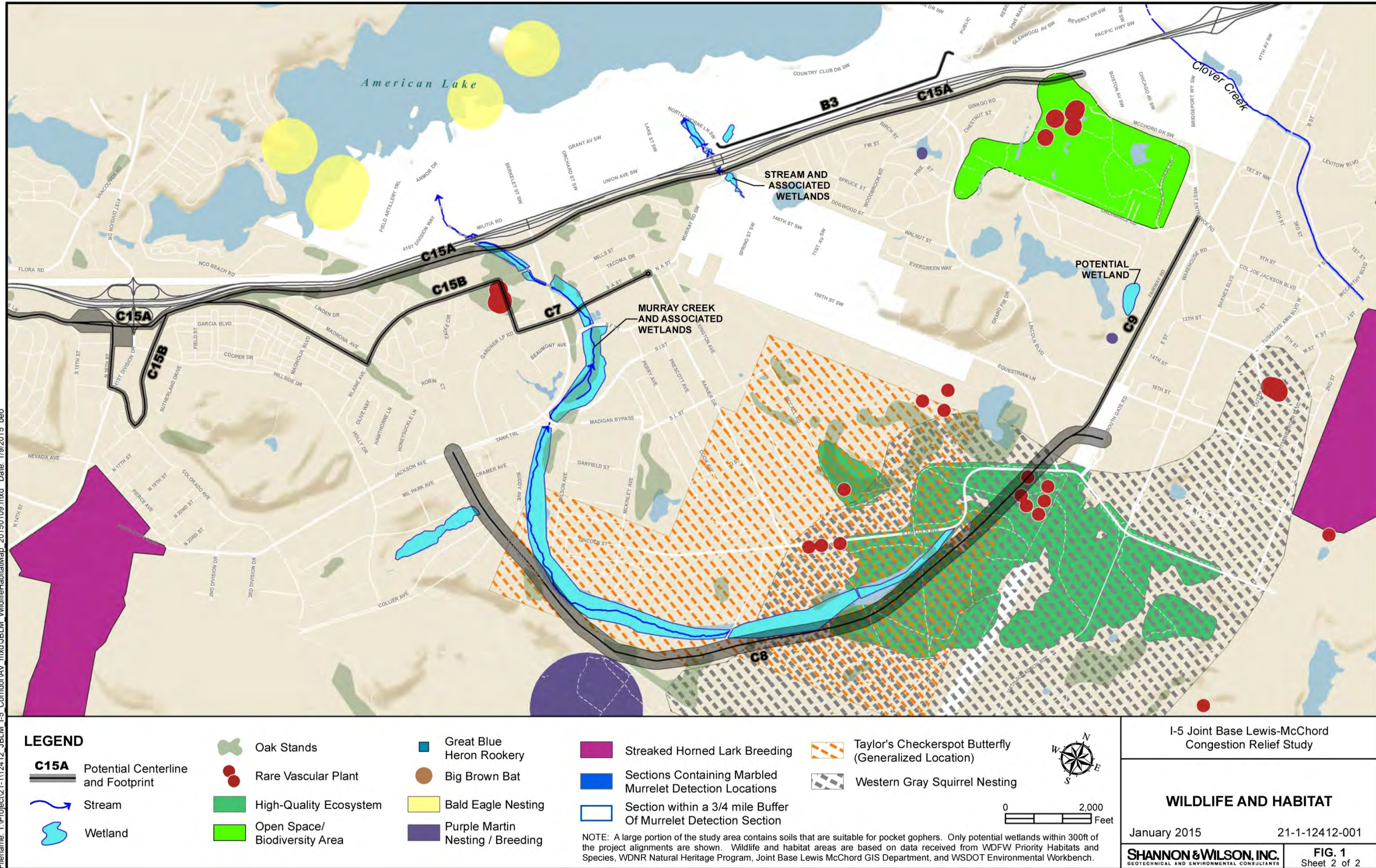


Figure VIII-2: Wildlife and Habitat (Sheet 1 of 2)



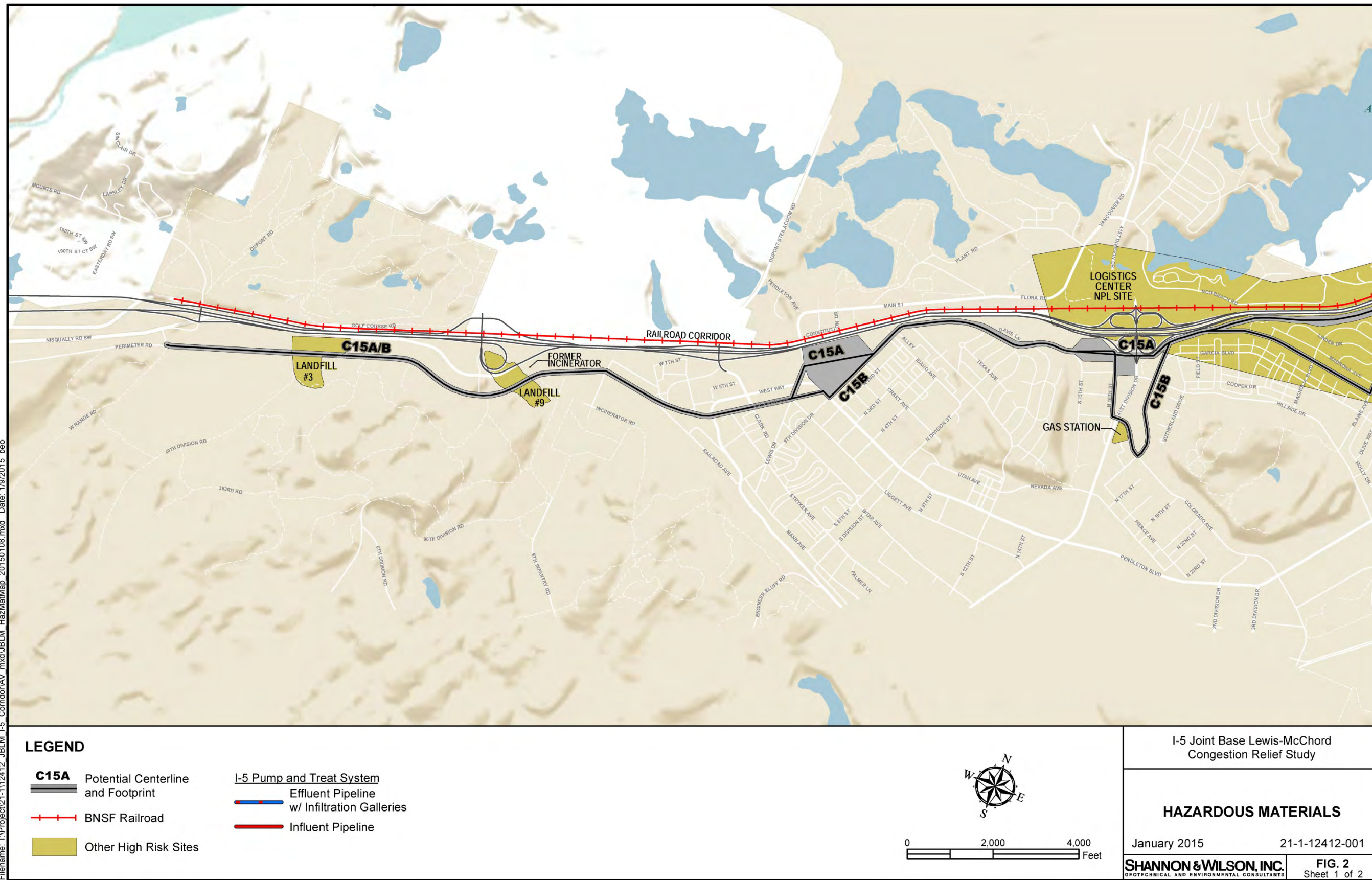
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Figure VIII-2: Wildlife and Habitat (Sheet 2 of 2)



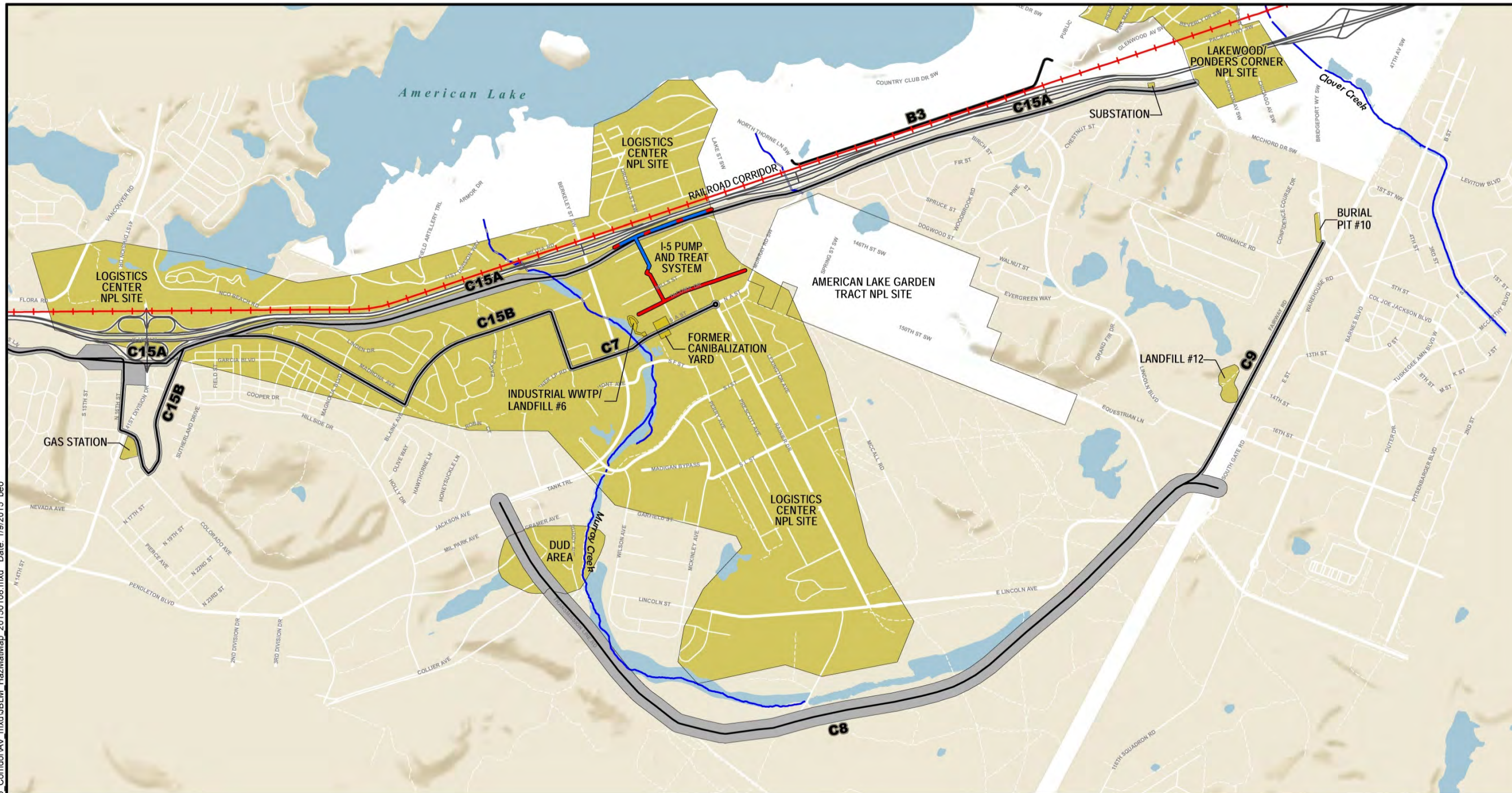
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Figure VIII-3: Hazardous Materials (Sheet 1 of 2)








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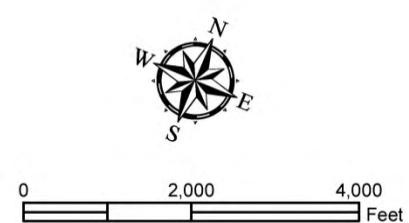
Figure VIII-3: Hazardous Materials (Sheet 2 of 2)



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LEGEND

 C15A Potential Centerline and Footprint	 I-5 Pump and Treat System Effluent Pipeline w/ Infiltration Galleries
 BNSF Railroad	 Influent Pipeline
 Other High Risk Sites	



0 2,000 4,000 Feet

I-5 Joint Base Lewis-McChord Congestion Relief Study

HAZARDOUS MATERIALS

January 2015 21-1-12412-001

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS **FIG. 2** Sheet 2 of 2

Figure VIII-4: Cultural Resources

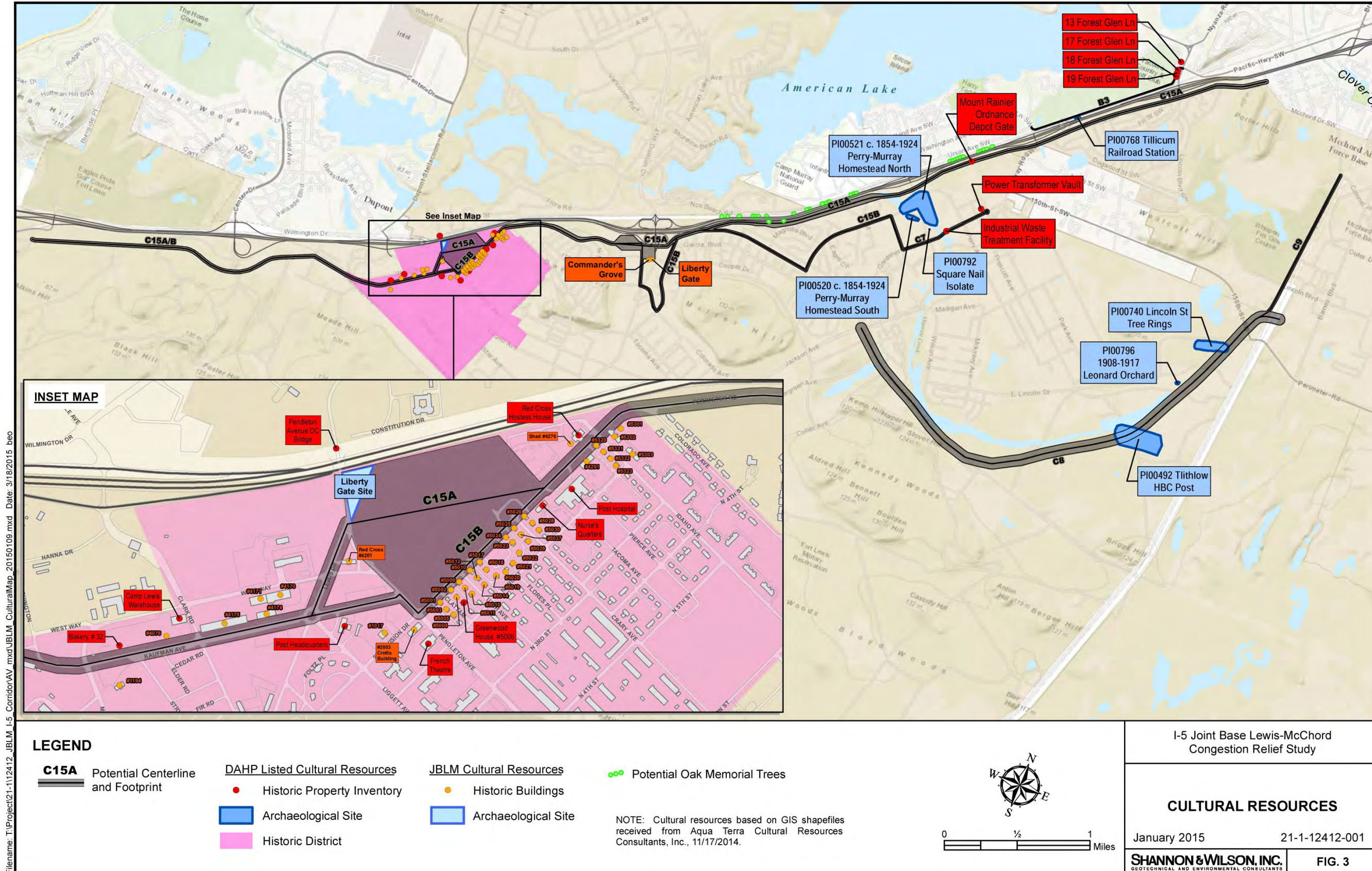
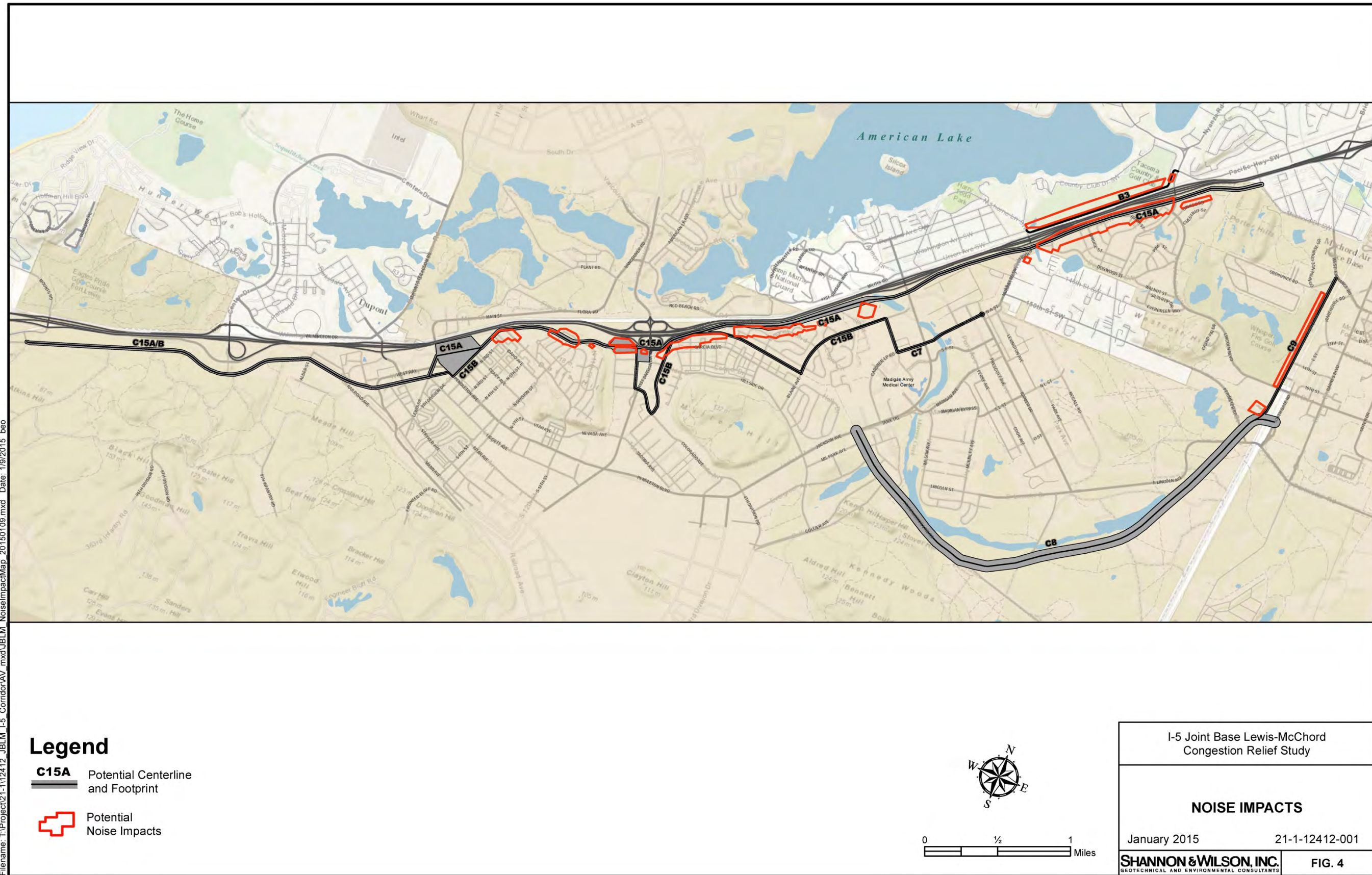
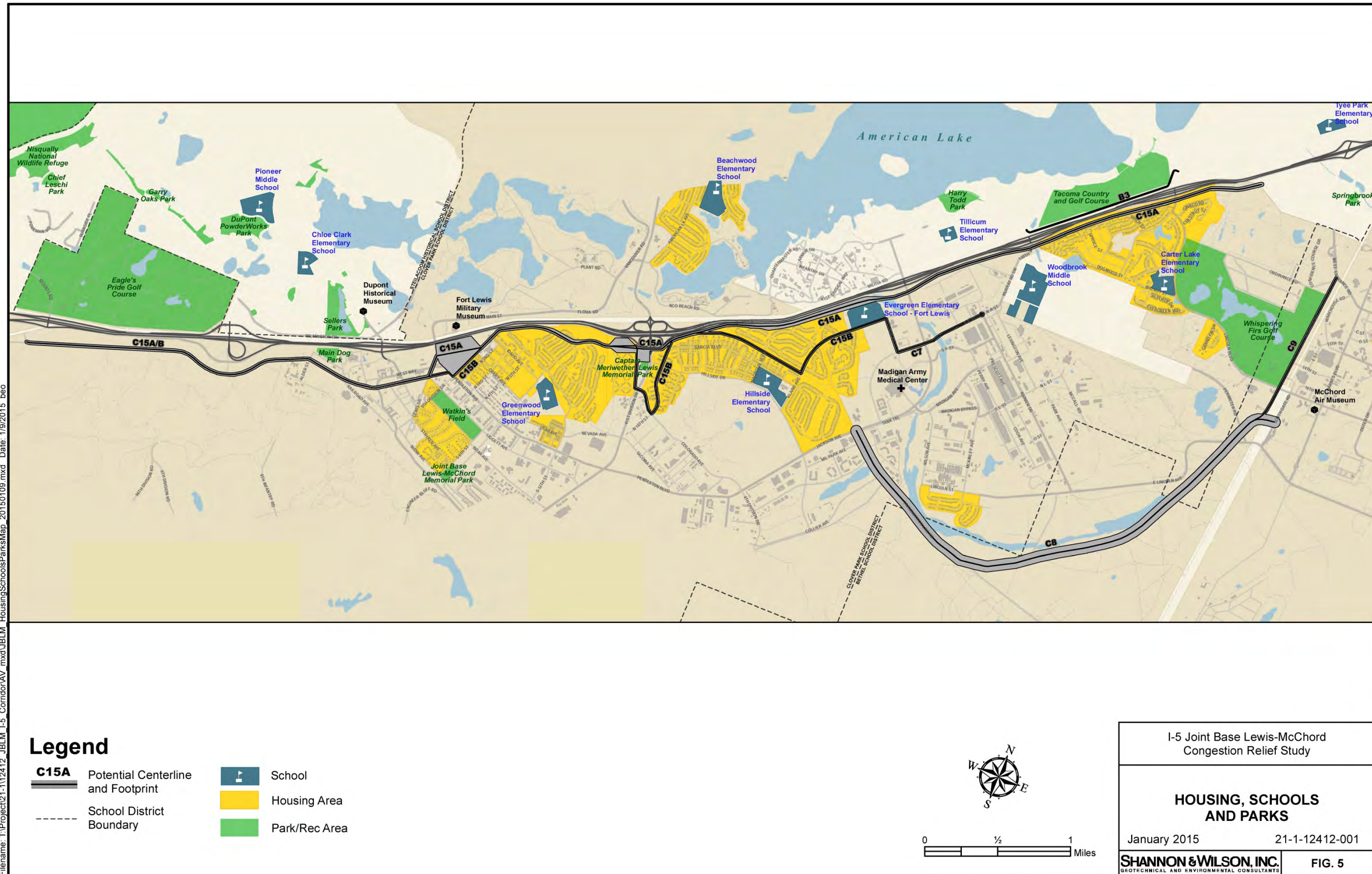


Figure VIII-5: Noise Impacts



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Figure VIII-6: Housing, Schools and Parks



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IX: Implementation and Staging

The second category of qualitative evaluation for the Phase 2B multimodal alternatives focuses on implementation characteristics. This assessment is consistent with Least Cost Planning. The outcome of Least Cost Planning is a recommended set of multimodal strategies that are cost-effective and still meet the goals and objectives set early in the planning process.

Practical Design is an approach to making project decisions that focuses on the need for the project and looks for the cost-effective solutions. It engages local stakeholders at the earliest stages of defining scope to ensure their input is included at the right stage of project design. Key features include:

- Maximum results within limited funding
- Tailored solutions for the project’s purpose and need
- Phased solutions that address more critical and current needs, each phase having independent utility

Performance related to least cost and practical design considerations was measured qualitatively using an estimation of three factors. These factors were identified as important to assess the implementation characteristics that distinguish each alternative in comparison to the No Action Alternative. These factors included:

- Ability to phase or stage construction
- Need for additional right-of-way
- Order-of-magnitude costs (largely capital but some consideration was given to transit operating costs over the long term)

Results of 2040 Evaluation of Alternatives

Table IX-1 presents the results of the qualitative evaluation of implementation issues for the No Action Alternative and each of the eleven Build Alternatives. This table shows the results of the step-by-step process used to consider the three factors under the Implementation and Staging criterion. The following describes the process used in this evaluation:

1. **Assigned Points:** The three evaluation factors for this criterion were first scored separately. The evaluation committee assigned a score of ‘0’ to ‘10’ to each alternative. A score of ten represents the highest value and 0 represents the lowest. For example, as indicated in the table, Alternative P1 – No Action Alternative scored a full ten points under all three categories. As compared to the Build Alternatives, Alternative P1 includes only previously funded improvements which would not involve new phasing, right-of-way acquisition, or costs beyond what is already programmed, and was assigned a value of 10. The other alternatives were then assigned a value of 0 to 10 by the evaluation team based on the alternative’s degree of difficulty of staging, apparent need for new right-of-way, order of magnitude of cost. The points assigned were then totaled for each alternative.

Table IX-1: Scoring of Implementation Criterion by Alternative

Alternative	Points Scored by Each Alternative			Total Points	Relative Score	Total Weighted Score
	Phasing/ Staging	Right-of-Way	Order-of-Magnitude Cost			
P1: No Action	10	10	10	30	1.00	6.0
P2: Enhanced Transit	10	10	9	29	0.97	5.8
P3: Local Improvements & Transit	9	2	4	15	0.50	3.0
P4: I-5 Express Lanes	4	7	6	17	0.57	3.4
P4a: P4 & Local Improvements	2	5	4	11	0.37	2.2
P5: I-5 HOV & CD Lanes	4	6	4	14	0.47	2.8
P5a: P5 & Local Improvements	2	4	3	9	0.30	1.8
P6: I-5 HOV & GP Lanes	4	7	6	17	0.57	3.4
P6a: P6 & Local Improvements	2	5	4	11	0.37	2.2
P7: HOV Lanes only	7	7	8	22	0.73	4.4
P7a: HOV Lanes & Local & Transit	6	5	3	14	0.47	2.8
P7b: HOV Lanes & Local Improvements	6	5	6	17	0.57	3.4

2. **Relative Score:** The next step involved converting Total Points to a Relative Score that illustrates the relationship of each alternative’s score to the highest scoring alternative. This was done by dividing each alternative’s score by the highest score. In the table P1 had the highest score of 30 points, so each of the Total Points was divided by 30. For example, P3 had 15 Total Points, so dividing 15 by 30 results in a relative score of 0.50.
3. **Total Weighted Score:** As noted in Chapter V under the discussion of evaluation methodology, all performance and impact scores were weighted to reflect the relative importance of each in determining an overall score for each alternative. Within that process, the maximum total weighted score possible for the Implementation and Staging Criterion was determined to be 6.0. Therefore, the Total Weighted Score for each alternative was calculated by multiplying the Relative Score of that alternative by 6.0. For example, Alternative P3 has a Relative Score of 0.5 which is then multiplied by 6 yields a Total Weighted Score of 3.0.

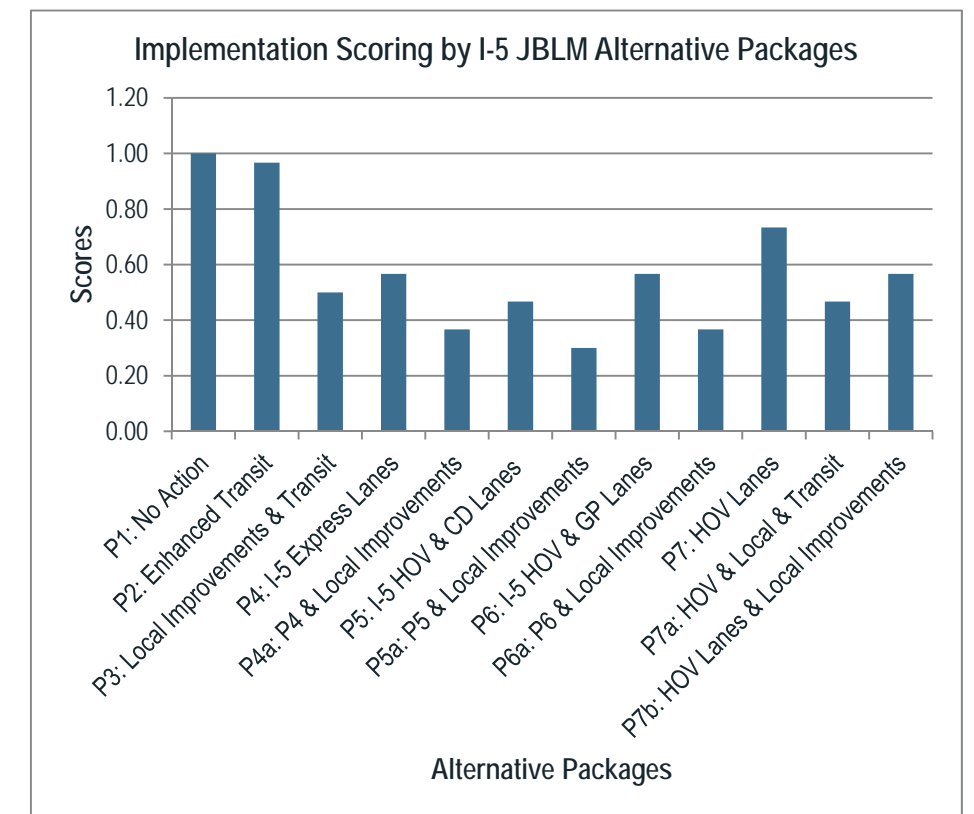
As indicated in the table, Alternative P2, which simply added enhanced transit service along the corridor using existing facilities, has the highest implementation and weighting score. Alternative P7, which would involve adding HOV lanes through the study area and reconfiguring the interchanges at Thorne Lane, Berkeley Street and Steilacoom-DuPont Road, has the second highest implementation score.

Alternatives P4, P6 and P7b would score the third highest among the Build Alternatives with a score of 3.4 each. Each of these alternatives scored lower than Alternative P7 due to the added costs and complexities of widening I-5 and/or building the three recommended road improvements.

Alternatives P4a, P5a and P6a, all scored in the lowest group, largely due to the added costs of the three local road improvements when these were included with the freeway improvements inherent in each alternative.

The total weighted implementation and staging scores are illustrated graphically in Figure IX-1.

Figure IX-1: Implementation and Weighting Scores by Alternative



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X: Alternatives Evaluation & Recommendations

This chapter presents a summary of the alternatives evaluation and a description of the recommended alternatives to be carried forward for further analysis and design as part of the NEPA process for the *I-5 JBLM Congestion Relief Study*. These recommendations are based on the analysis, findings, and conclusions of the alternative evaluation, as documented in the preceding chapters. The alternative evaluation process identified the most promising course of action to address congestion and improve mobility along the I-5 corridor in the vicinity of JBLM. Also included in this chapter is a recommended staged implementation of improvements.

Alternatives Evaluation

The previous three chapters presented the performance evaluation, the environmental scan assessment, and the implementation and staging assessment. This chapter combines these evaluations to develop total alternative scores. As illustrated in Figure X-1, each alternative's score is determined by multiplying the performance results times the sum of the environmental scan score plus the implementation and staging score. This results in an Alternative Score (maximum 1,000 points) that is used to determine the most promising alternatives.

Separate 2020 and 2040 evaluations of the alternative packages were conducted to determine which alternative packages showed the most promise in addressing the I-5 congestion, both near-term and long-term.

2020 Evaluation of Alternative Packages

The 2020 evaluation of the alternative packages is listed in Table X-1 and shown graphically in Figure X-2. Based on this analysis, Alternative P7 – HOV Lanes has the highest combined score of performance, environmental impacts, and implementation considerations for 2020. Alternative P7 performs well because it has improved 2020 traffic operational benefits, with low right-of-way requirements, low environmental impacts, and easier implementation staging. Alternative P6 and P4 have the next best scores, respectively. The alternatives with local road improvements have lower scores because of their low environmental ratings. Alternative P3 – Local Improvements with Enhanced Transit and Alternative P5a have the lowest alternative score due to minimal operational benefit over the No Action Alternative and significant environmental impacts.

Table X-1: 2020 Alternative Scores by Alternative Packages

SUMMARY OF 2020 EVALUATION OF ALTERNATIVES					
Alternatives Packages	Operational Performance Totals		Implementation / Impact Totals		Alternative Scores
P1: No Action	41.7	x	10.0	=	417
P2: Enhanced Transit	46.3	x	9.8	=	454
P3: Local Improvements & Transit	45.1	x	3.8	=	171
P4: I-5 Express Lanes	83.1	x	6.2	=	515
P4a: P4 & Local Improvements	81.3	x	4.2	=	342
P5: I-5 HOV & CD Lanes	76.8	x	5.2	=	399
P5a: P5 & Local Improvements	78.8	x	3.4	=	268
P6: I-5 HOV & GP Lanes	81.2	x	6.4	=	520
P6a: P6 & Local Improvements	79.3	x	4.4	=	349
P7: HOV Lanes	76.0	x	7.6	=	578
P7a: HOV & Local & Transit	79.9	x	5.2	=	415
P7b: HOV Lanes & Local Improvements	78.1	x	5.8	=	453

Figure X-1: Evaluation of Alternative Packages Process

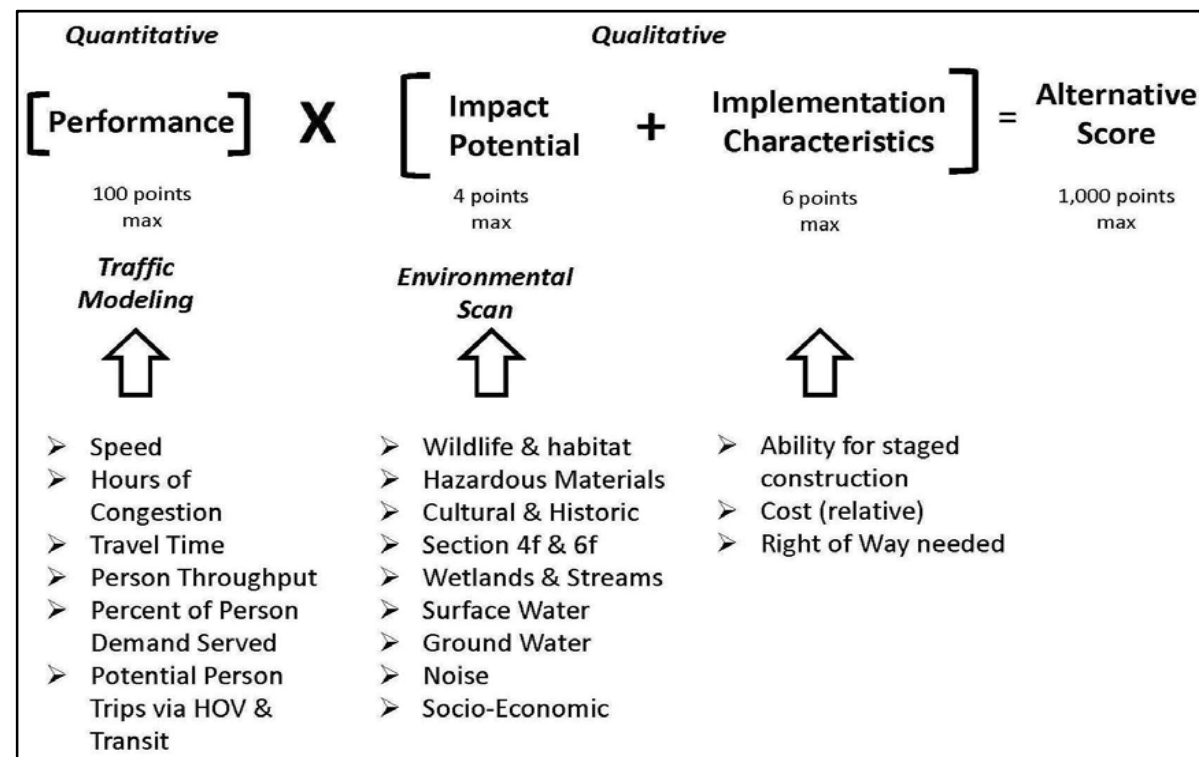
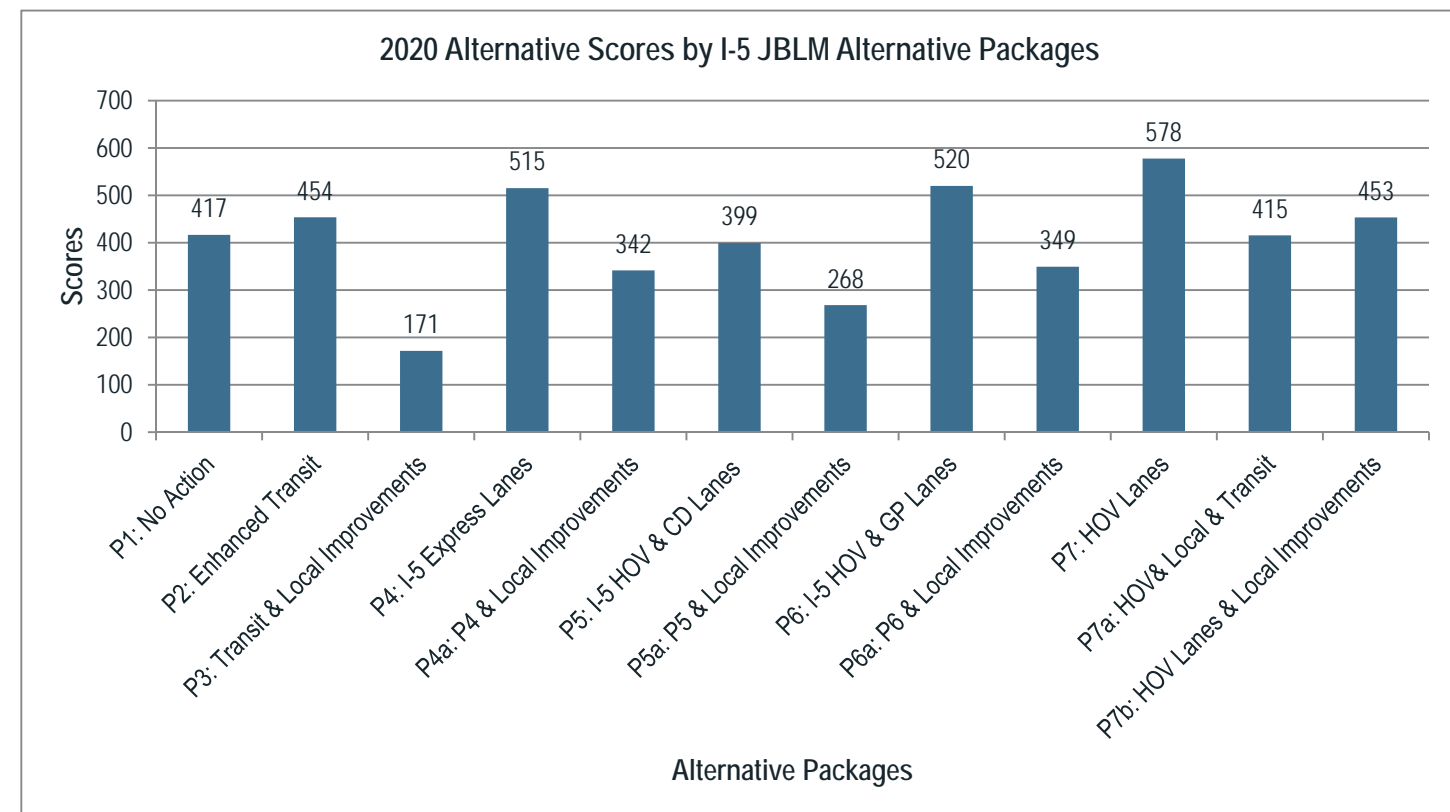


Figure X-2: 2020 Alternative Scores



2040 Evaluation of Alternative Packages

The 2040 evaluation of the alternative packages is listed in Table X-2 and graphically shown in Figure X-3. In comparing the 2020 and 2040 alternative scores, the 2040 overall scores are lower than the 2020 scores due to the lower performance scores in 2040.

Based on this analysis, Alternative P7 – HOV Lanes has the highest combined score of performance, environmental impacts and implementation considerations for 2040. Its lower operational performance is offset by lower environmental impacts and implementation staging. Alternatives P4 and P6 have the next best scores, respectively. Alternative P5, with the highest 2040 operational performance, falls short because of its low environmental and implementation scores. The alternatives with local improvements have lower scores because of their low environmental ratings due to their potential impacts to sensitive habitat.

Recommended Short List of Alternatives

The following is a summary of recommended alternatives to be carried forward for further analysis and design as part of the NEPA process for the I-5 JBLM Congestion Relief Study. These recommendations are based on the findings of the analyses and conclusions documented in the preceding chapter that identified the most promising course of action to address congestion and improve mobility along I-5 in the vicinity of JBLM.

Phase 1 Build (2020 Opening Year Target) Improvement Package

Based on the alternatives evaluation, Alternative P7 was recommended for further study as a Phase 1 Build strategy that provides notable improvements to congestion and mobility along I-5 through the JBLM area in comparison to existing conditions. Alternative P7 has the best overall score when potential environmental impacts and implementation characteristics are considered. This alternative is also expected to provide good traffic operational performance in the opening year (target 2020) peak travel periods.

The Phase 1 Build Alternative is planned to include the following key elements:

- **Mainline widening** would add a fourth lane northbound from the vicinity of Mounts Road to Thorne Lane. In the southbound direction, a fourth lane would be added from the vicinity of Thorne through the Steilacoom-DuPont Road Interchange. This added lane in each direction would be designated for HOV use. The extent of the HOV lane north of Thorne lane will be analyzed during the NEPA process. Figure X-4 illustrates the expected freeway cross-section with this improvement.

Table X-2: 2040 Alternatives Scores by Alternative Packages

SUMMARY OF 2040 EVALUATION OF ALTERNATIVES					
Alternative Packages	Operational Performance Totals		Implementation / Impact Totals		Alternative Scores
P1: No Action	11.0	X	10.0	=	110
P2: Enhanced Transit	13.9	X	9.8	=	136
P3: Local Improvements & Transit	21.2	X	3.8	=	81
P4: I-5 Express Lanes	79.3	X	6.2	=	491
P4a: P4 & Local Improvements	78.6	X	4.2	=	330
P5: I-5 HOV & CD Lanes	83.8	X	5.2	=	436
P5a: P5 & Local Improvements	84.9	X	3.4	=	289
P6: I-5 HOV & GP Lanes	76.0	X	6.4	=	487
P6a: P6 & Local Improvements	77.4	X	4.4	=	341
P7: HOV Lanes	68.1	X	7.6	=	518
P7a: HOV & Local & Transit	72.5	X	5.2	=	377
P7b: HOV Lanes & Local Improvements	69.3	X	5.8	=	402

Figure X-3: 2040 Alternative Scores by Alternative Packages

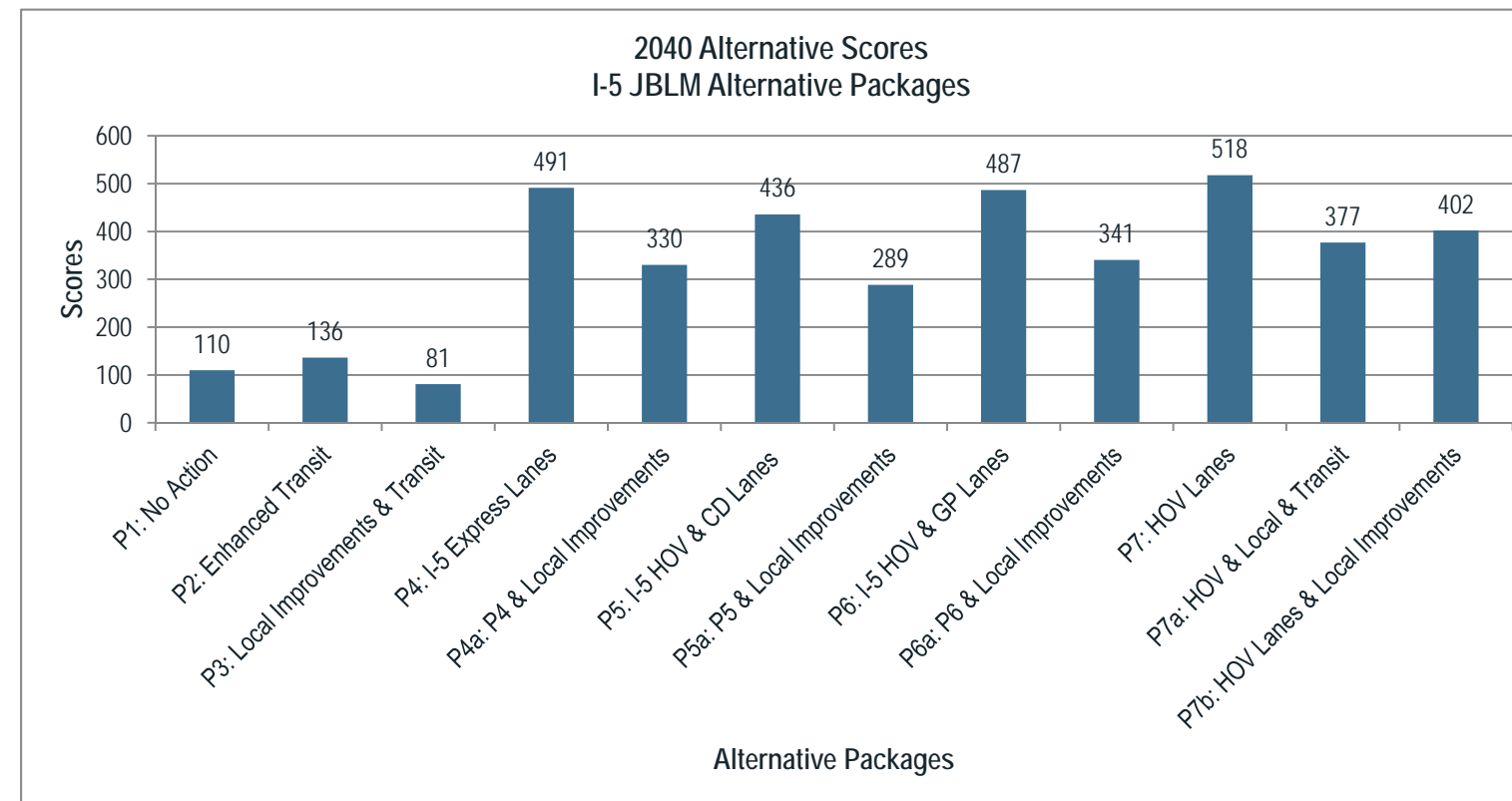
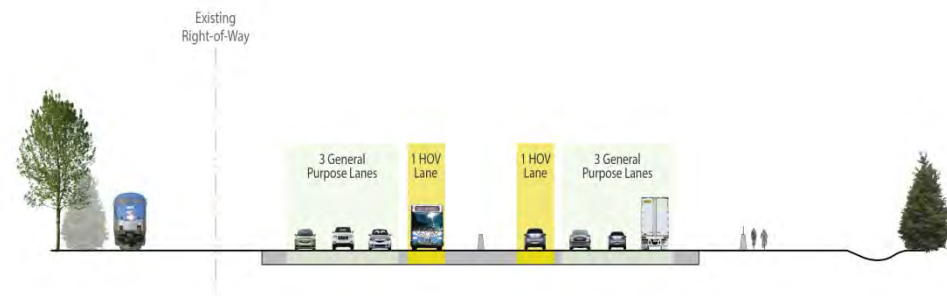


Figure X-4: 2020 Improvements, Phase 1 Build Alternative



- **Interchange reconfigurations** are included at the Thorne Lane, Berkeley Street, and Steilacoom-DuPont Road that will:
 - Accommodate I-5 mainline widening
 - Improve traffic operations and carrying capacity to the interchanges and their vicinity to better accommodate community growth and JBLM activity
 - Grade-separate interchange-related traffic from the existing Sound Transit rail line which will also carry future AMTRAK service

Specific interchange configurations at each location will be identified and analyzed as part of the NEPA process.

- **Bicycle/pedestrian path** is added along the I-5 corridor through the project area to provide a non-motorized connection with JBLM and local communities. The location of and connection points to this bicycle/pedestrian path will be further addressed during preliminary design as part of the NEPA process.
- **Gravelly Lake Drive – Thorne Lane Connector** is added to reduce short trips on I-5 between the Tillicum neighborhood and Lakewood. It will be parallel to I-5 between Gravelly Lake Drive and Thorne Lane. The specific design and location of this new connector will be further studied and evaluated during the NEPA process.

The 2040 long-term improvement for Alternative P4 would include the following key elements:

- **Mainline widening** to add a fifth lane in each direction between Center Drive and Gravelly Lake Drive. This lane would be designated as a managed facility from south of the Steilacoom-DuPont Road interchange to north of the Gravelly Lake Drive interchange. Figure X-5 illustrates the general limits of this improvement. The express lanes concept will be developed to be flexible, evolving over time to best address demand and changing technology. These lanes could potentially be similar to the existing managed lanes on SR 167 (High Occupancy Toll or HOT lanes), or they could be for HOVs, trucks only or even smart cars.

Figure X-5: Express Lanes Improvement Concept



Figure XI-6 presents a typical Alternative P4 cross-section with this improvement.

- **Interchange reconfiguration** would be necessary at the Main Gate interchange with possible improvements at Center Drive and Gravelly Lake Drive.

Phased Implementation

While Alternative Package P7 is recommended for Phase 1 Build implementation, this option will have a limited functional life expectancy over the long-term. Due to the long lead time involved in planning, permitting and engineering for a freeway improvement and the potential need for added right-of-way, it is important to consider at this time, the nature of improvements that can best meet demand through the entire 20-year planning period. Accordingly, Alternative P7 was recommended for short- to medium-term implementation, while Alternative P4 was recommended for long-term implementation.

The further evaluation to be conducted during the NEPA process is expected to include:

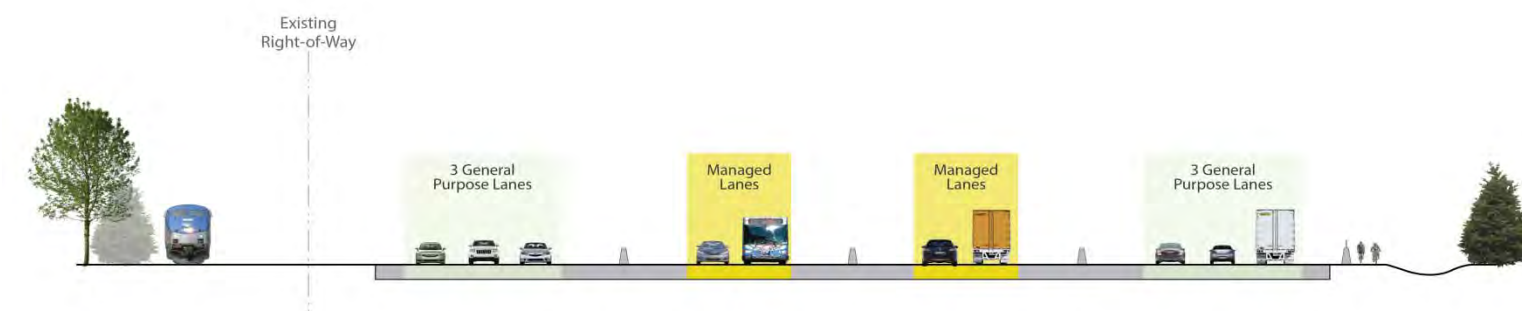
- Identification of potential environmental impacts associated with the Phase 1 Build alternative.
- A more in-depth analysis of operational and safety benefits to the freeway mainline, ramps, weaving/merge/diverge areas, and interchange intersections for Alternative P7, with a higher level assessment to be conducted for Alternative P4. The operational life expectancy of Alternative P7 will be identified.
- Preliminary engineering design to determine the physical footprint that will be needed to meet both operational and safety parameters, and design requirements of both Alternative P7 and Alternative P4.

Consistent with WSDOT's Least Cost Planning approach, the initial implementation of Alternative P7 is expected to minimize the costs and impacts associated with the I-5 improvements to address existing deficiencies. This will result in a set of improvements that maximize the use of the existing infrastructure, utilize financial resources in the most effective fashion, and minimize modifications that would need to be made when future stage improvements are implemented.

Future Phase Improvement Package

Alternative P4 is recommended for further study as the long-range strategy to improve congestion and mobility in the corridor. Alternative P4 is the second best overall scoring alternative during the 2040 PM peak period, and offers substantially improved traffic performance in the long-term. As noted above, Alternative P7 would provide good performance for a period of time and then additional improvements would be needed to maintain reasonable traffic operations. Alternative P4 would serve as the basis to preserve the right-of-way needed to accommodate expected future travel demand.

Figure X-6: Phase 2 Build - Future Improvement, Alternative P4



The proposed staged implementation of recommended improvements is illustrated in Figure X-7 and could include the following:

1. Phase 1 Build Alternative

- I-5 Mainline – Add one HOV lane in each direction between Thorne Lane and Steilacoom-DuPont Road
- Interchanges - Reconfigure the interchanges at Steilacoom-DuPont Road, Berkeley Street and Thorne Lane to accommodate 8-lanes on I-5 and railroad grade-separation
- Bicycle/Pedestrian facility along the I-5 corridor.
- Gravelly Lake Drive to Thorne Lane connector for local traffic.

2. Phase 2 Build Alternative

- I-5 Mainline - Based on the design and right-of-way requirements associated with Alternative P4, develop conceptual plan to provide for a fifth travel lane in each direction along the I-5 mainline, as described above for express/managed use only.
- Interchanges - Reconfigure the interchange at Main Gate to accommodate the full 10-lane section.

Corridor Preservation and Future Flexibility

In moving forward with improvements to I-5 through the JBLM study area, it is important that an adequate corridor be preserved to accommodate recommended long-term improvements. The presence of the Sound Transit railway alignment on the west side of the freeway limits the feasibility of any future widening in that direction. Accordingly, any improvements to the I-5 interchanges or enhancements of the I-5 mainline will be made to the east and will impact JBLM property, the primary landowner adjacent to I-5.

During the course of the Alternatives Analysis, several meetings were held between the study team and JBLM staff to identify the issues associated with expansion of the existing I-5 freeway easement. There will not only need to be negotiations between WSDOT and JBLM, but also with the leaseholder for JBLM housing and associated land located adjacent to the freeway. Ultimately, it is the Department of the Army who will make the final decision regarding the granting of additional I-5 easement. All of these processes are lengthy and will require the preparation and processing of appropriate applications, reports, and documentation.

Widening to accommodate the improvements in the Phase 1 Build alternative will require some additional right-of-way (easement), particularly in the vicinity of the three interchanges that would be relocated.

The Phase 2 Build alternative will require yet additional new easement. JBLM has indicated that WSDOT should make its full, long-term easement needs known at the same time the Phase 1 Build alternative's easements are acquired. This will allow JBLM to incorporate the expected long term easement needs into the JBLM Master

Plan, reducing the potential that further land use or environmental conflicts will be introduced into the easement area during the interim years.

Until the preferred scenario for improvements to I-5 has been identified and approved through NEPA, the formal process for expanding the easement cannot be undertaken. However, initial discussions have begun to memorialize joint interest in improving I-5, and general agreement regarding the need for future expansion of the existing easement on I-5. These discussions will continue into and beyond the NEPA effort.

Figure X-7: I-5 Improvements, Staged Implementation Approach

