List of Appendices

A. ENVIRONMENTAL ASSESSMENT

B. POPULATION, SOCIO-ECONOMIC, DEMOGRAPHIC PROFILE

C. COMMUNITY ENGAGEMENT PLAN

D. COMMUNITY ENGAGEMENT SUMMARY

E. TRAFFIC OPERATIONS AND SAFETY ASSESSMENT

F. ITS AND TECHNOLOGY OPTIONS DEVELOPMENT STRATEGY

G. METHODS AND ASSUMPTIONS

APPENDIX A ENVIRONMENTAL ASSESSMENT

I-5 SKAGIT TRANSPORTATION STUDY, PHASE I

Washington State Department of Transportation

Prepared by:
DCG/Watershed

Prepared for:
Washington State Department of Transportation Northwest Region
Mount Baker Area Multimodal Transportation Planning Office

Washington State Department of Transportation

Table of Contents

ENVIRONMENTAL CORRIDOR ASSESSMENT

INTRODUCTION

The Washington State Department of Transportation Northwest Region Mount Baker Area is initiating the Interstate 5 (I-5) Skagit Transportation Study. This study will gather multimodal transportation and socioeconomic data, incorporate environmental factors, and analyze current and future transportation conditions to determine how I-5 in Skagit county can better meet regional mobility and safety needs. This study is being conducted for planning purposes.

This study builds on the findings of the 2021 Technical Report: Interstate 5 Existing Conditions Analysis Mount Vernon / Burlington. The previous study revealed that some corridor segments are not performing within expectations. The traffic operations analysis, safety analysis and merge threshold analysis revealed that there are some segments on the corridor that experience higher vehicle density and poor levels of service for traffic, ramp operations and crashes. This study will build off the 2021 study analysis to show what segments of the corridor are working well, areas that are not preforming within expectations and future 2045 conditions.

An overall objective of the study also includes improving information sharing and engagement with the community to minimize duplication of efforts between planning, the environmental review and project delivery processes. Additionally, the overall study will incorporate the new legislative directive to include Planning and Environmental Linkages (PEL) processes, if needed to fulfill requirements under the National Environmental Policy Act (NEPA) process.

PROJECT BACKGROUND

In 2021, WSDOT and the Skagit Council of Governments initiated a baseline analysis of I-5 in the Mount Vernon and Burlington urban areas with the goal of determining if I-5 is meeting regional transportation performance objectives and examining the steps and measures that could be taken to address unmet performance expectations. Using the information and findings from the technical analysis, WSDOT, along with its planning partners have moved to the next stage of the transportation study to address the safety and congestion issues identified in the 2021 Existing Conditions Analysis.

PROJECT AREA

The study area spans the 9-mile-long corridor that runs through the urban areas of Mount Vernon and Burlington in Skagit County. The focus area of the corridor is the segment along I-5 from Old 99 Highway (exit 224) to Cook Road (exit 232), as shown in Exhibit 1. The major commercial areas within the two cities in the study area are near the Skagit River bridge.

Exhibit 2 Study Area – Old Highway 99 South to Cook Road

There are eight interchanges in the study area; four provide access to state highways that intersect with I-5. State highways included in the urban area include State Routes (SR) 536, 538, 20 and 11. There are only two north-south bridges across the Skagit River; the Skagit River Bridge (now formally known as the I-5 Trooper Sean M. O'Connell Jr. Memorial Bridge) and the Riverside Bridge, a local bridge that serves the communities of Burlington and Mount Vernon. In Mount Vernon, the SR 536 Division Street Bridge serves east and west Mount Vernon and is an alternative route to Anacortes/San Juan Ferry and Whidbey Island.

ENVIRONMENTAL SCREENING

The environmental screening during Phase I is meant to be exploratory, documenting environmental restraints in the study area. The factors examined in this study were chosen based on the criteria set forth in WSDOT's Environmental Guidance for Planning Studies and Environmental Manual Chapter 200: Environmental Considerations in Transportation Planning. These factors include:

- Climate Vulnerability Impacts
- Chronic Environmental Deficiencies
- Fish Passage Barriers
- Habitat Connectivity Priorities
- Noise Wall Retrofit Priorities
- Stormwater Retrofit and BMP Priorities
- Hazardous materials contamination sites
- Wetland, Stream, and Mitigation Sites
- Historic Bridges

The planning-level environmental review focused on human and natural environmental assets that have the potential to influence the scope of future investments or need to be protected. This assessment does not examine the full range of environmental and social issues that are addressed during the analysis of alternatives or site-specific project development.

CLIMATE VULNERABILITY IMPACTS

The qualitative assessment of climate impacts in this study area found it to be an area of moderate/high vulnerability. The figures below are from the *'CIVA – Climate Vulnerability Assessment'* data layers. These layers are projections based on existing conditions. The base scenario projects moderate climate vulnerability impacts within the study area (Exhibit 2). Moderate climate vulnerability is denoted by assets that could experience temporary operational failures at one or more locations. The high scenario projects high climate vulnerability impacts within the study area (Exhibit 3). High climate vulnerability impacts are defined as assets with a high likelihood of vulnerability.

Additionally, the entirety of the study area, except for a portion of Mount Vernon, is mapped within the Federal Emergency Management Agency (FEMA) 100-year floodplain (Exhibit 4). It is projected that climate change will increase the frequency of 100-year flood events on the Skagit River[1]. Flooding puts stress on bridge structures from increased flow, erosion, and the conveyance of large debris that may damage transportation infrastructure. This suggests that the high scenario is becoming more likely and should be considered when planning for climate vulnerability impacts.

[1] Lee, Se-Yeun, A.F. Hamlet, 2011: *Skagit River Basin Climate Science Report, a summary report prepared for Skagit County and the Envision Skagit Project by the Department of Civil and Environmental Engineering and The Climate Impacts Group at the University of Washington.*

State Routes 11, 20, and 536, connected as part of the transportation network in the area, are identified as high potential for increased climate impacts. State Route 530 is projected to be at a low level of vulnerability and could experience reduced capacity though impacts are expected to be minor. Planning route resiliency within this network, especially near the Skagit River and in low-lying coastal areas subject to inundation from sea-level rise, is the best way to address climate vulnerability impacts.

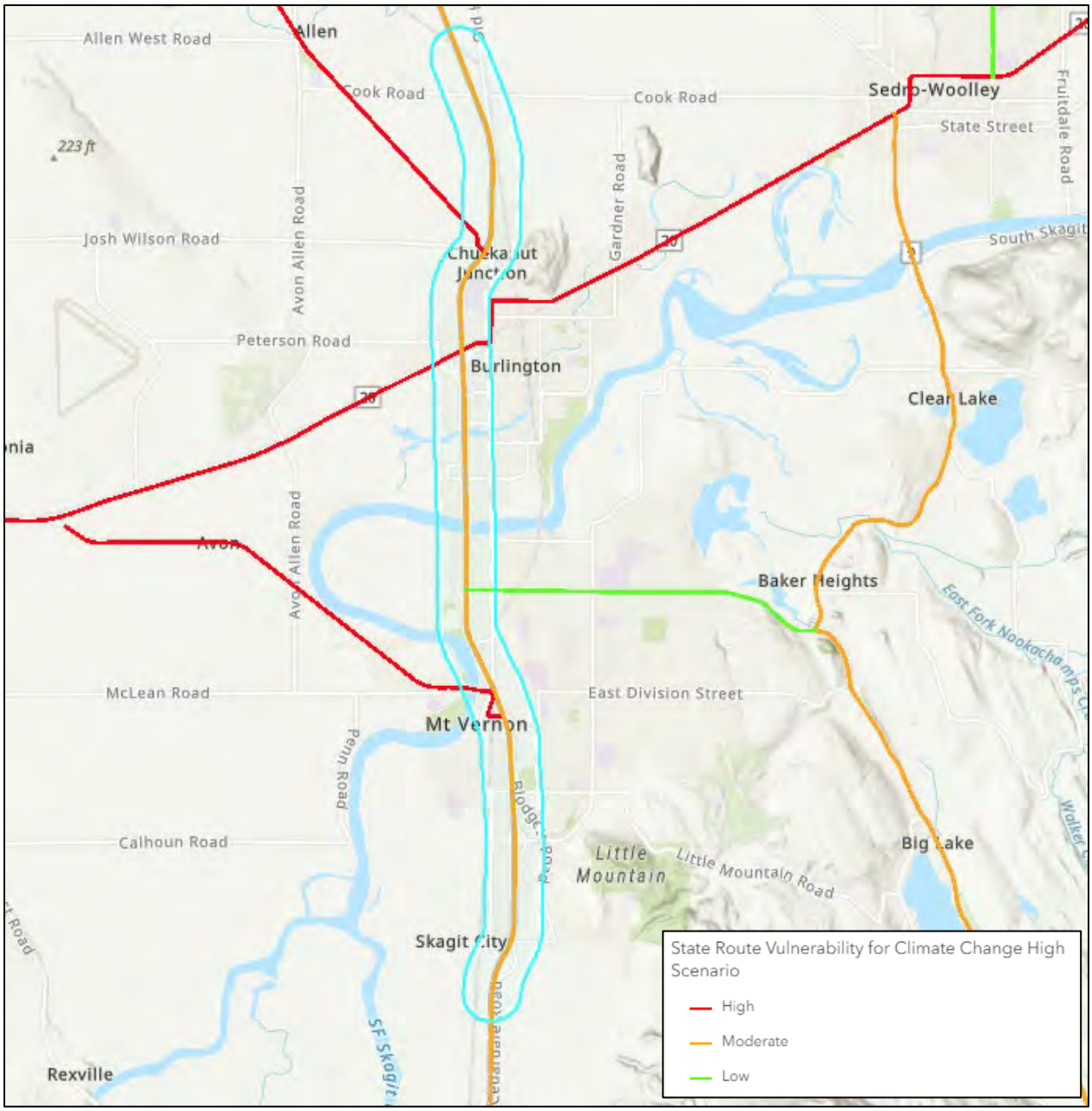


Exhibit 3 Climate Vulnerability Impacts – Base Scenario

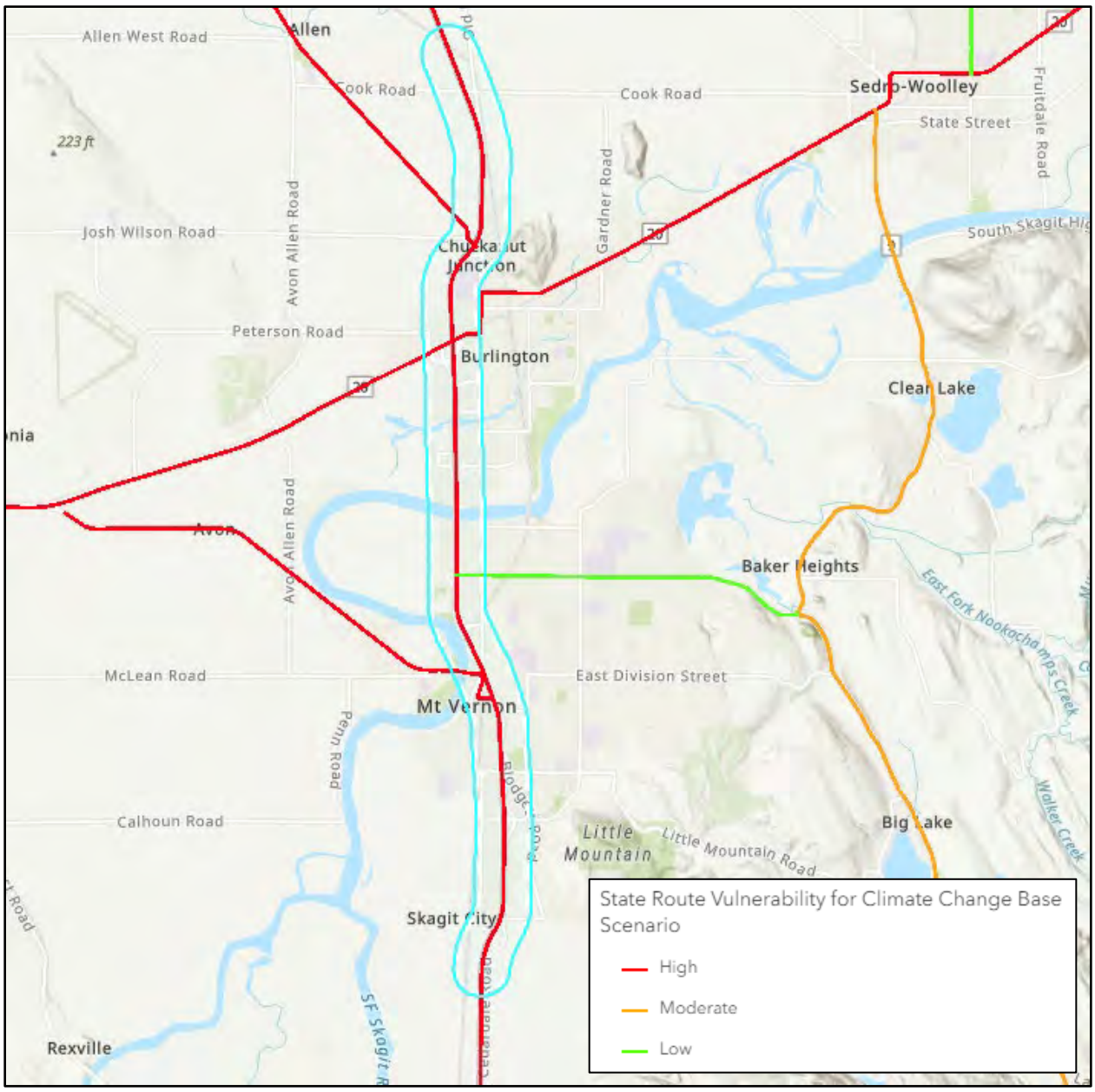


Exhibit 4 Climate Vulnerability Impacts - High Scenario

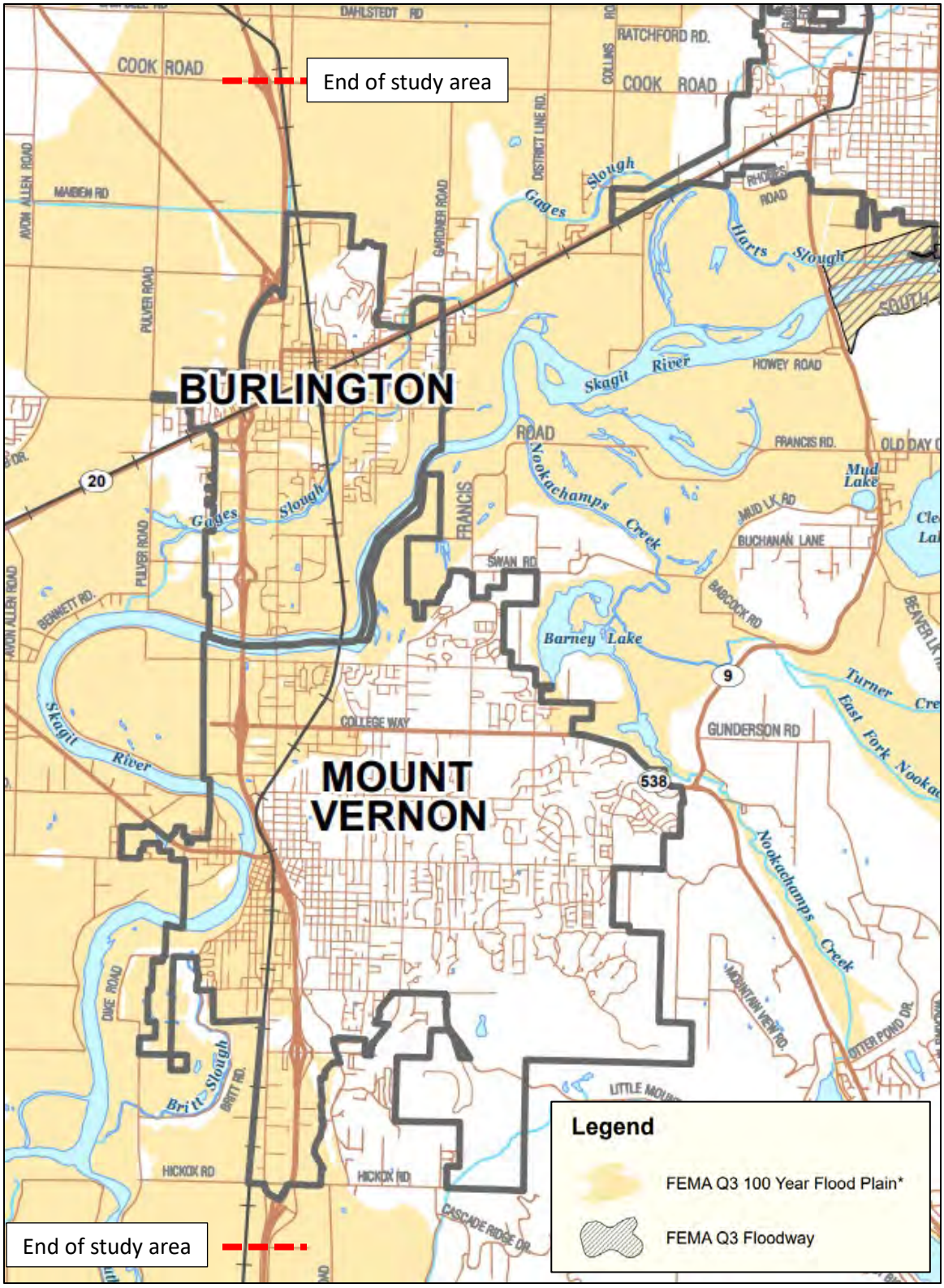


Exhibit 5 FEMA Q3 100-year Floodplain, detail.
https://skagitcounty.net/GIS/Documents/Flood/FEMA%20Q3%20100%20Year%20Floodplain%20Map.pdf

A Chronic Environmental Deficiency (CED) is a location along the state highway system where recent, frequent, and chronic maintenance to WSDOT infrastructure from changing hydrologic conditions is causing impacts to fish or fish habitat. CED projects are constructed to improve maintenance and environmental conditions of these locations. A search of the *WSDOT - Chronic Environmental Deficiency* GIS layer shows no CED priorities identified within the study area (accessed June 9, 2023).

FISH PASSAGE BARRIERS

The WSDOT Fish Passage Barrier Removal Program coordinates with Washington Department of Fish and Wildlife (WDFW) and Tribal governments to inventory culverts on fish bearing streams within the jurisdiction of WSDOT and assess how well those structures are allowing fish passage.

As of May 11, 2023, ten fish bearing road crossings have been documented within the I-5 Corridor study area (Exhibit 5). Two of the ten culverts are documented fish passage barriers subject to injunction (U.S. v. WA, 2013[2]). These culverts are located on Martha Washington and Maddox Creek in Mount Vernon jurisdiction. Both have delivery plans set for the 2021-2023 biennium and are identified as in the design phase. Kulshan Creek flows subsurface beneath I-5 and through Lion's Park where it converges with the Skagit River. Fish passage associated with this crossing is identified as unknown. A survey comment states that "This site is attached to and part of site NC119, a culvert and fishway owned by City of Mount Vernon." The seven remaining culvert crossings are identified as fish passable.

To ensure WSDOT's fish passage inventory within the culvert case area remains current, non-barrier culverts relevant to the injunction are evaluated once every ten years. In addition, WDFW re-surveys stretches of road in large transportation projects to make sure all fish bearing road crossings have been identified and assessed for fish passage within the project limits. As the I-5 corridor project advances, coordinate with the WSDOT Environmental Services Office's Fish Passage Program to have the fish passage inventory updated to include potential fish barriers at road crossings.

A table of inventoried fish passages can be found in Appendix 2.

[2] Federal Court Injunction. 2013. United States, et al vs. Washington, et al No. C70-9213 Subproceeding No. 01-1 dated March 29, 2013.

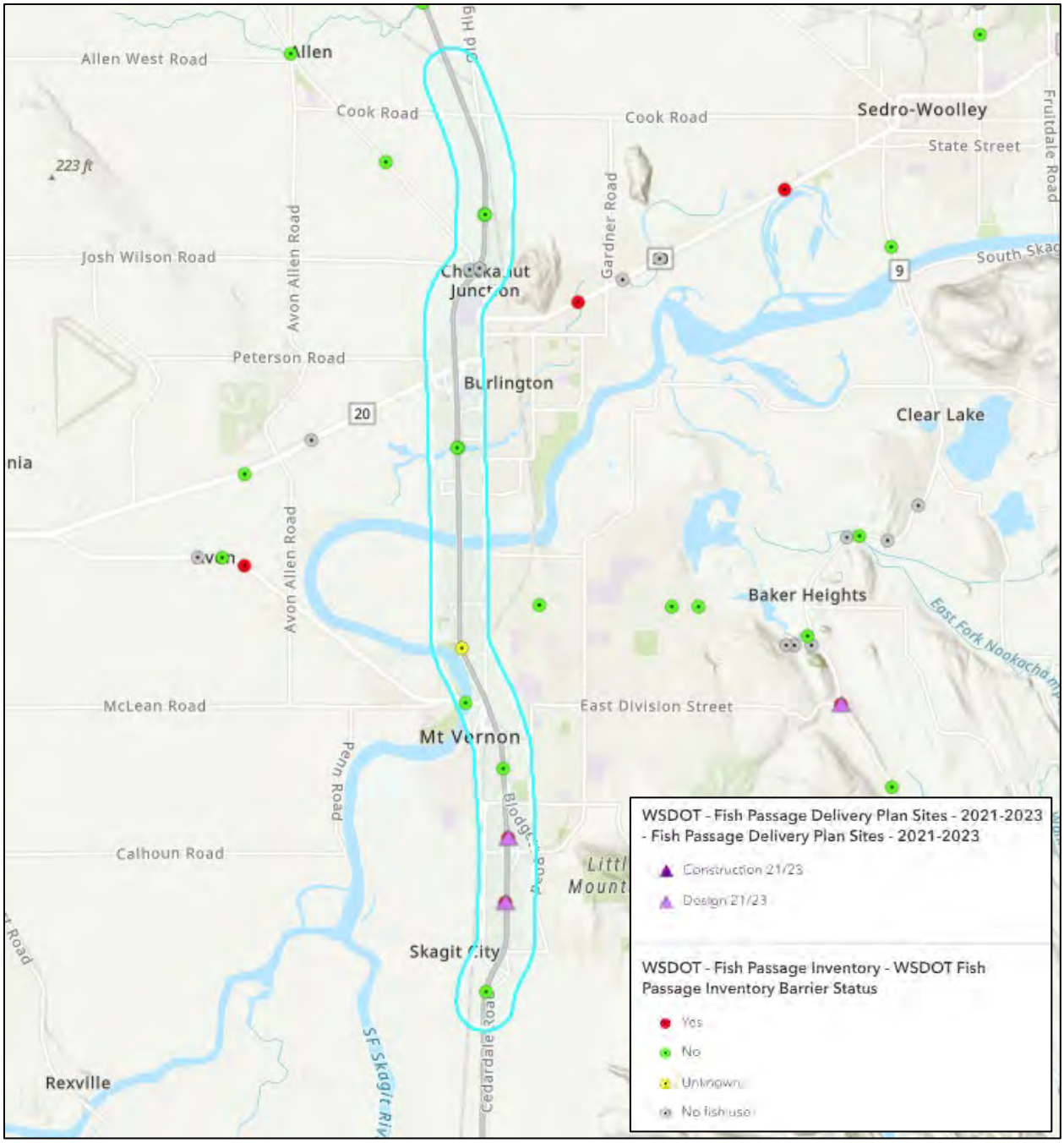


Exhibit 6 Fish Passage Inventory and Plan Sites

HABITAT CONNECTIVITY PRIORITIES

Habitat connectivity is crucial in maintaining the migration patterns, food sourcing, and structure of our local ecosystem. Development poses the risk of habitat fragmentation and loss. The study area was evaluated for habitat connectivity priorities using the *WSDOT – Habitat Connectivity Investment Priorities*, *Pollinator Habitat Rank*, and *Urban Gateway Habitat Rank* GIS layers. The WSDOT layers reflect a highway segment's overlap with the ranges of select Endangered or Threatened wildlife[3] and its proximity to connected networks of habitat identified by the Washington Habitat Connectivity Working Group (WHCWG)[4]. This data was examined in tandem with the WDFW *Salvage Permit (Public Read)* GIS layer to explore areas of frequent overlap between wildlife and vehicles in conjunction with the high-level data provided by WHCWG.

This corridor is identified as medium and low priority for investing in habitat connectivity improvements (Exhibit 6). Medium priority areas extend from the southern end of the study area to just north of the State Route 536 crossing over the Skagit River and from Gages Slough to the junction of Interstate 5 and State Route 11. An examination of Roadkill Salvage Permits granted within the study area shows three permitted salvages of deer within City of Mount Vernon jurisdiction (Exhibit 6). Two salvage permits occurred in medium investment priority areas, and one salvage permit was granted in a low investment priority area. A table of information regarding the Roadkill Salvage Permits can be found in Appendix 3.

The corridor ranks low to medium for pollinator habitat risk (Exhibit 7). Low habitat risk is associated with the developed city centers of Burlington and Mount Vernon and adjacent infrastructure. Medium habitat risk is identified adjacent to agricultural and natural areas including the Skagit River and Gages Slough. The only area identified as high pollinator habitat risk is the section of West Division Street/State Route 536 that crosses the Skagit River. The study area does not have a ranking for monarch butterfly habitat.

The study area has two areas identified as high-ranking urban gateway habitat and three areas identified as low-ranking urban gateway habitat (Exhibit 8). Four of the five ranked areas occur in Mount Vernon. The rest of the study area is unranked. Urban Gateway Habitat Ranks identify high value areas for creating, preserving, or enhancing pollinator habitat on WSDOT owned lands along the state highway system that are within urban and urbanizing areas and where natural pollinator habitat is present nearby. Once restored, these highway segments can be used to educate the traveling public about pollinators and will then serve as corridors for pollinators moving between natural habitats and urban gardens.

[3] Focal species used for this analysis include sharp-tailed grouse, greater sage-grouse, American badger, black-tailed jackrabbit, white-tailed jackrabbit, mule deer, bighorn sheep, western gray squirrel, American black bear, elk, northern flying squirrel, western toad, American marten, Canada lynx, mountain goat, wolverine

[4] Washington Wildlife Habitat Connectivity Working Group (WHCWG). 2010. *Washington Connected Landscapes Project: Statewide Analysis*. Washington Departments of Fish and Wildlife, and Transportation, Olympia.

Sensitive wildlife, fish, plants, and their habitat require special consideration during project planning. Many federal, state, and local regulations apply to projects that may affect natural resources. Some considerations include timing restrictions to avoid or minimize project effects to species, and anticipated time to complete Endangered Species Act (ESA) consultation. Based on the location and preliminary nature of the project, many environmental issues can be anticipated. During scoping, the Environmental Coordinator and Project Biologist may be able to determine the presence of sensitive fish, wildlife, and vegetation and whether the project will be covered by a United States Fish and Wildlife Service/National Marine Fisheries Service ESA programmatic consultation or will require an individual consultation.

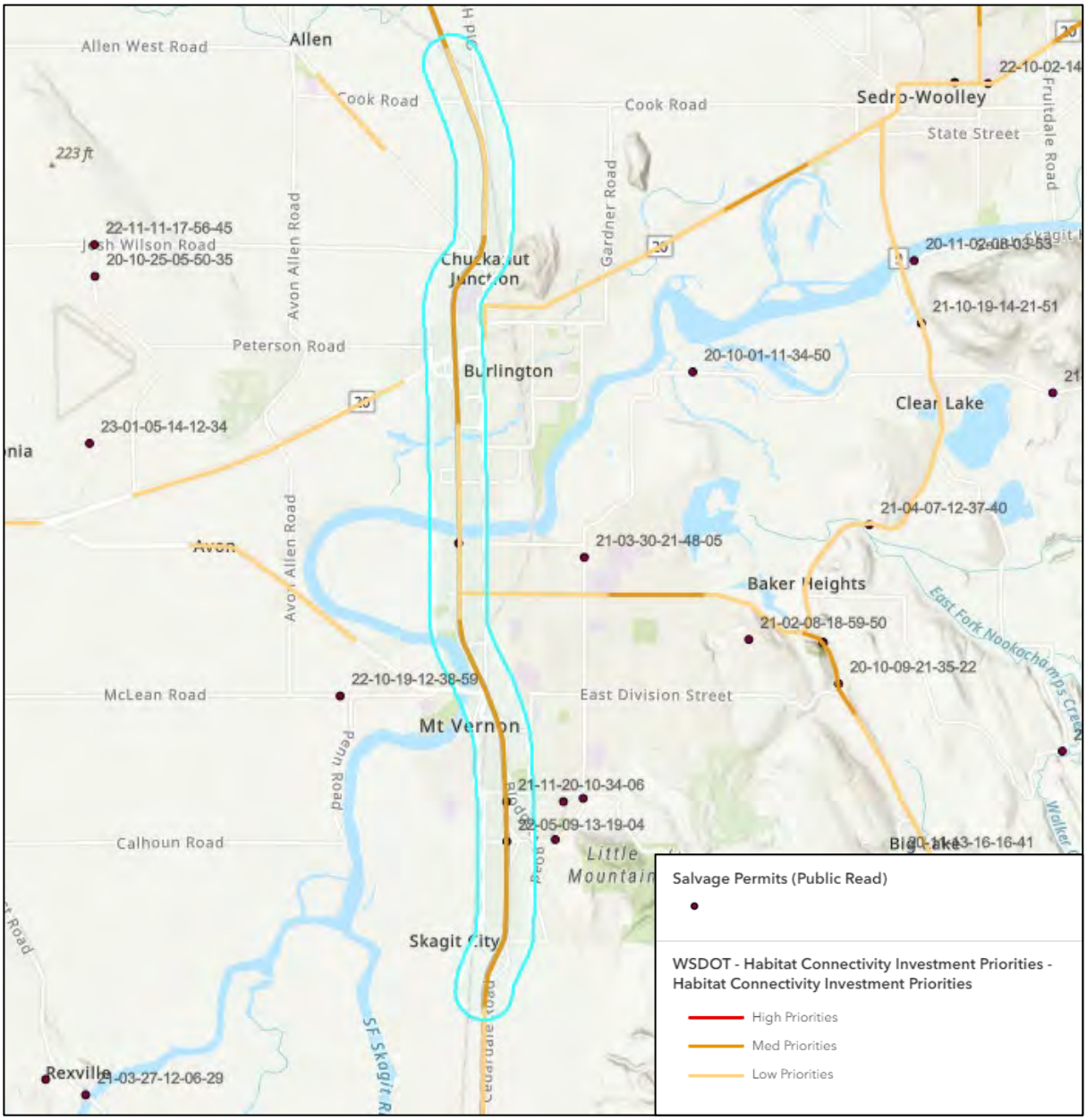


Exhibit 7 Habitat Connectivity Investment Priorities and Salvage Permits

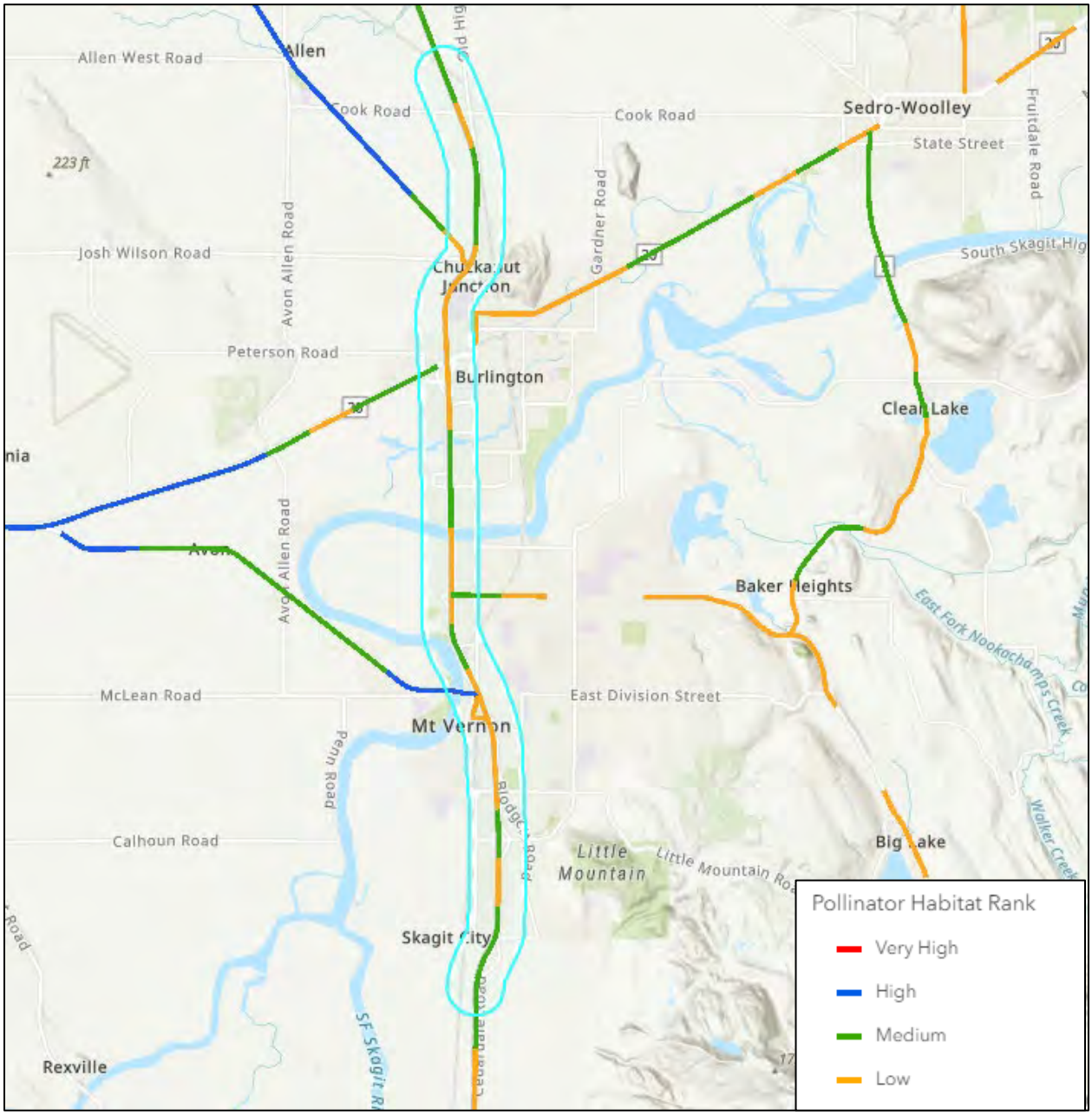


Exhibit 8 Pollinator Habitat Rankings

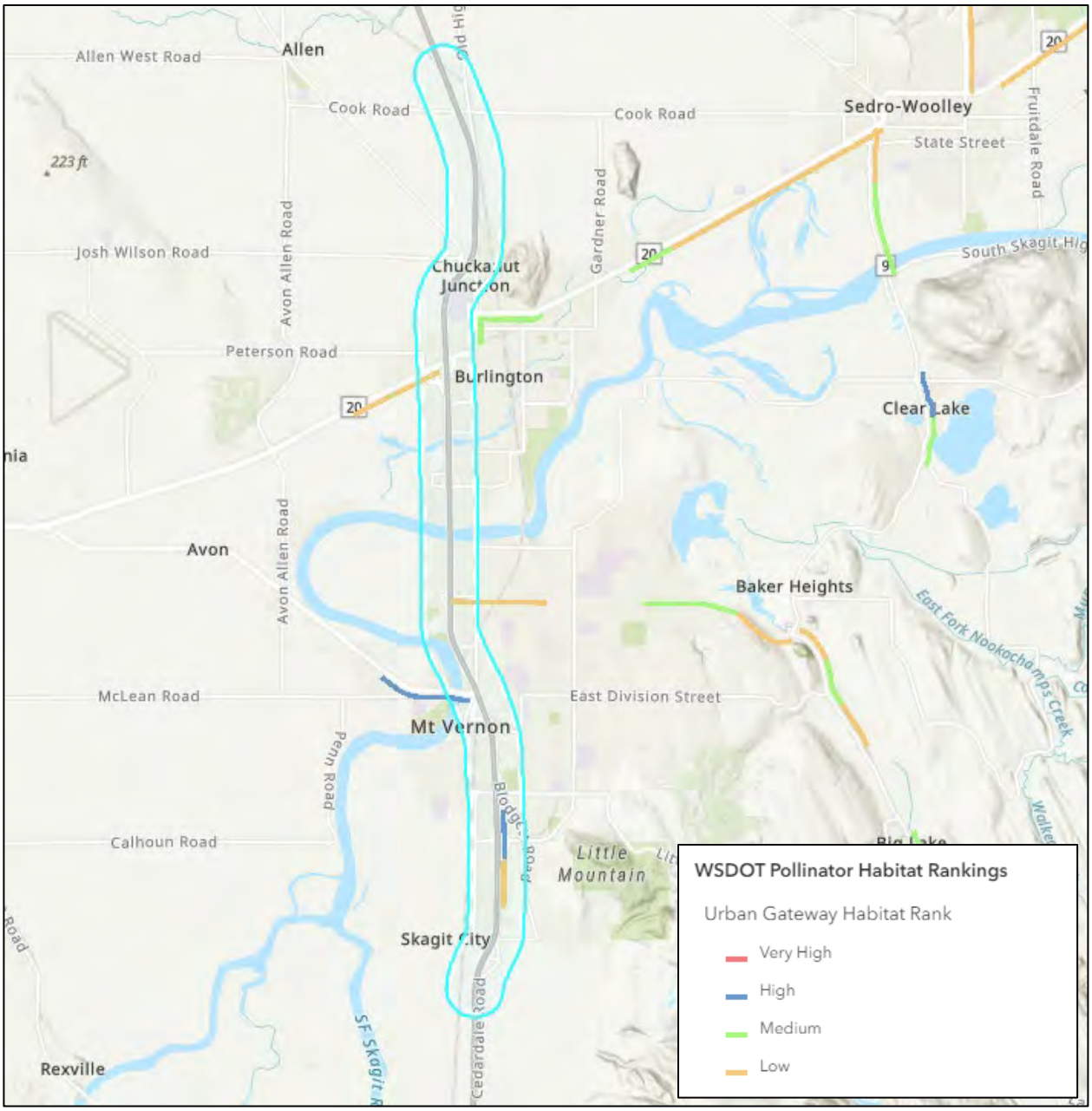


Exhibit 9 Urban Gateway Habitat Rank

NOISE WALL RETROFIT PRIORITIES

This corridor includes one retrofit noise wall location in the vicinity of West View Elementary School in Burlington (Exhibit 9). This retrofit included a 546-foot long, 14.75-foot-tall northbound extension and was identified as fixed in 2009 on the *WSDOT – Noise Walls* GIS layer.

Based on an aerial assessment of surrounding land uses the likelihood of new noise walls within this corridor is moderate to high. High noise levels from construction and higher traffic have an estimated high risk of requiring noise walls in areas of high housing density, schools, and habitat corridors. In areas of lower housing density and agriculture we estimate a moderate risk of the need for noise walls based on potential noise levels and impacts.

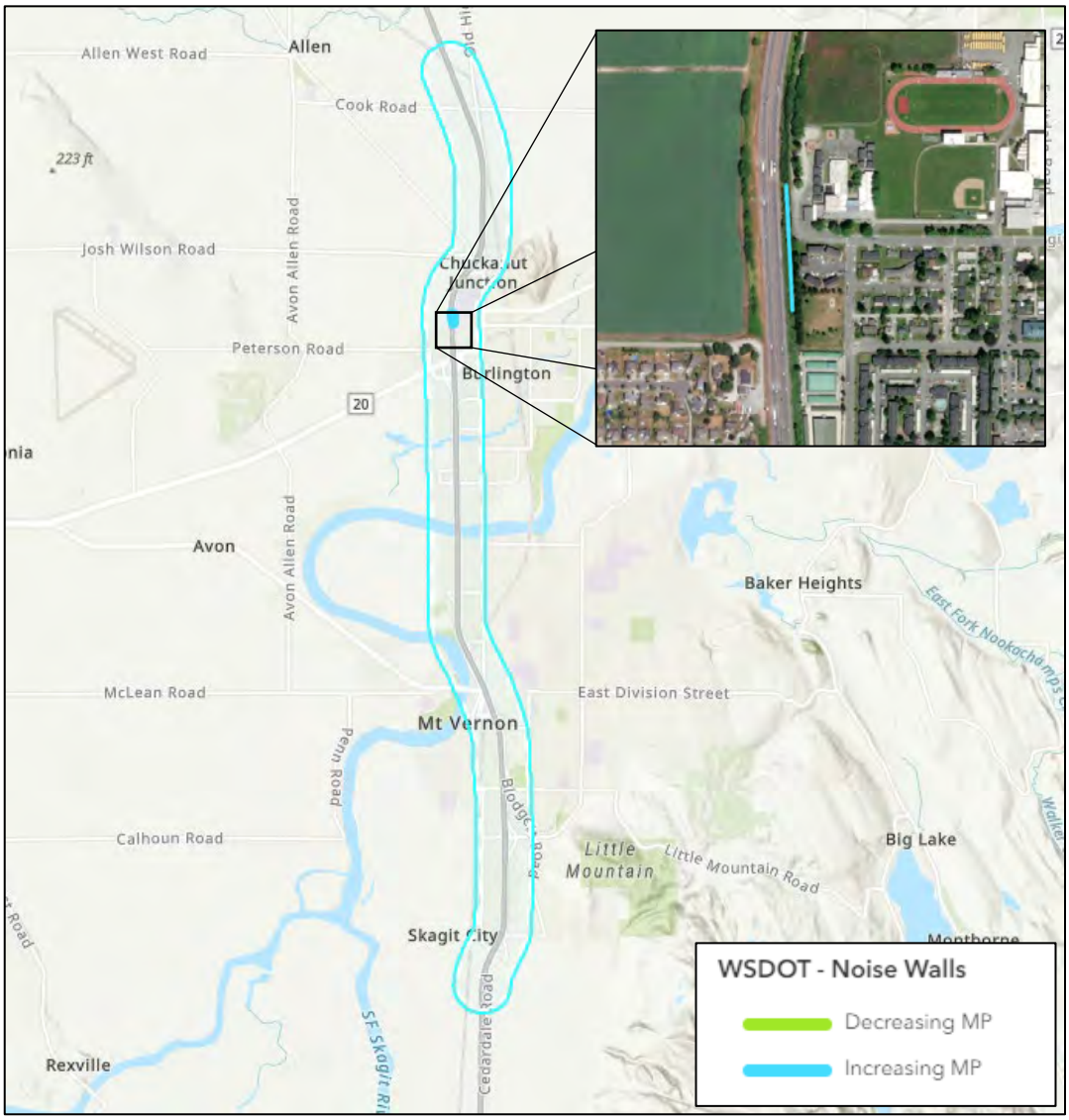


Exhibit 10 Noise Walls with Detail of West View Elementary Noise Wall

STORMWATER RETROFIT & BMP PRIORITIES

There are four approved Total Maximum Daily Loads (TMDLs) within the study area – Samish Bay Bacteria TMDL, Padilla Bay Bacteria TMDL, Lower Skagit Basin Bacteria TMDL, and Lower Skagit River Tributaries Temperature TMDL (Exhibit 10). In addition to the four approved TMDLs, one TMDL in the study area – the South Skagit Bay Watershed Project – is in development. 303(d) listed waters in the study area include Joe Leary Slough, the Skagit River, and Big Ditch/Maddox Creek. It is expected that nearly all mapped stormwater discharge points in the study area will require compliance with TMDL actions.

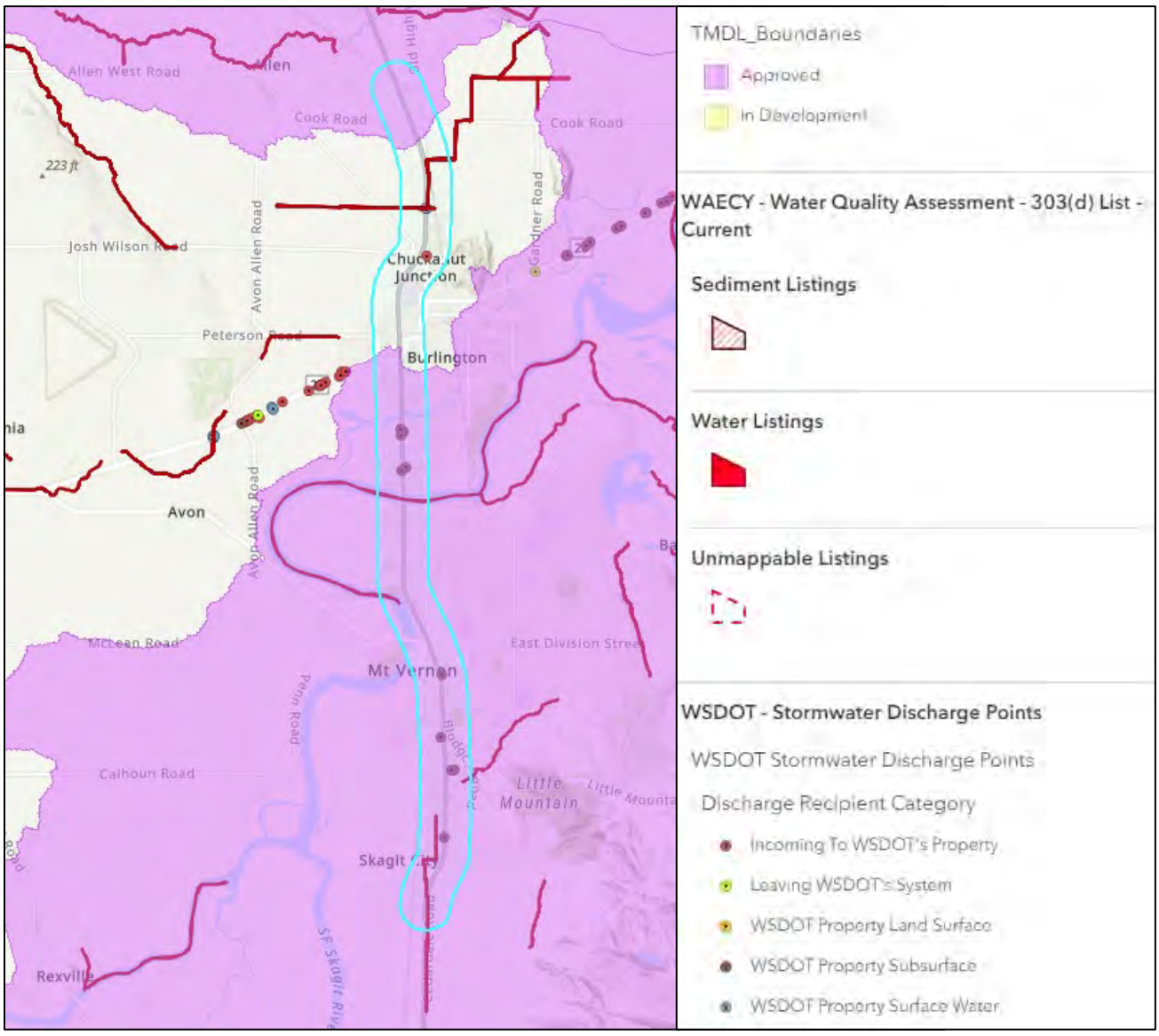


Exhibit 11 TMDLs, 303(d) listed waters, and Stormwater Discharge Points

WETLANDS, STREAMS, AND MITIGATION SITES

There are 52 potential wetlands, eight streams, and zero WSDOT mitigation sites within the study area (Exhibit 11-15). WSDOT manages wetland mitigation sites as environmental assets when impacts to wetlands, streams, and the associated buffers require the agency to mitigate Clean Water Act regulations. Any development proposal may require additional mitigation if wetlands or streams are impacted.

Wetland and Stream Inventory information can be found in Appendix 1.

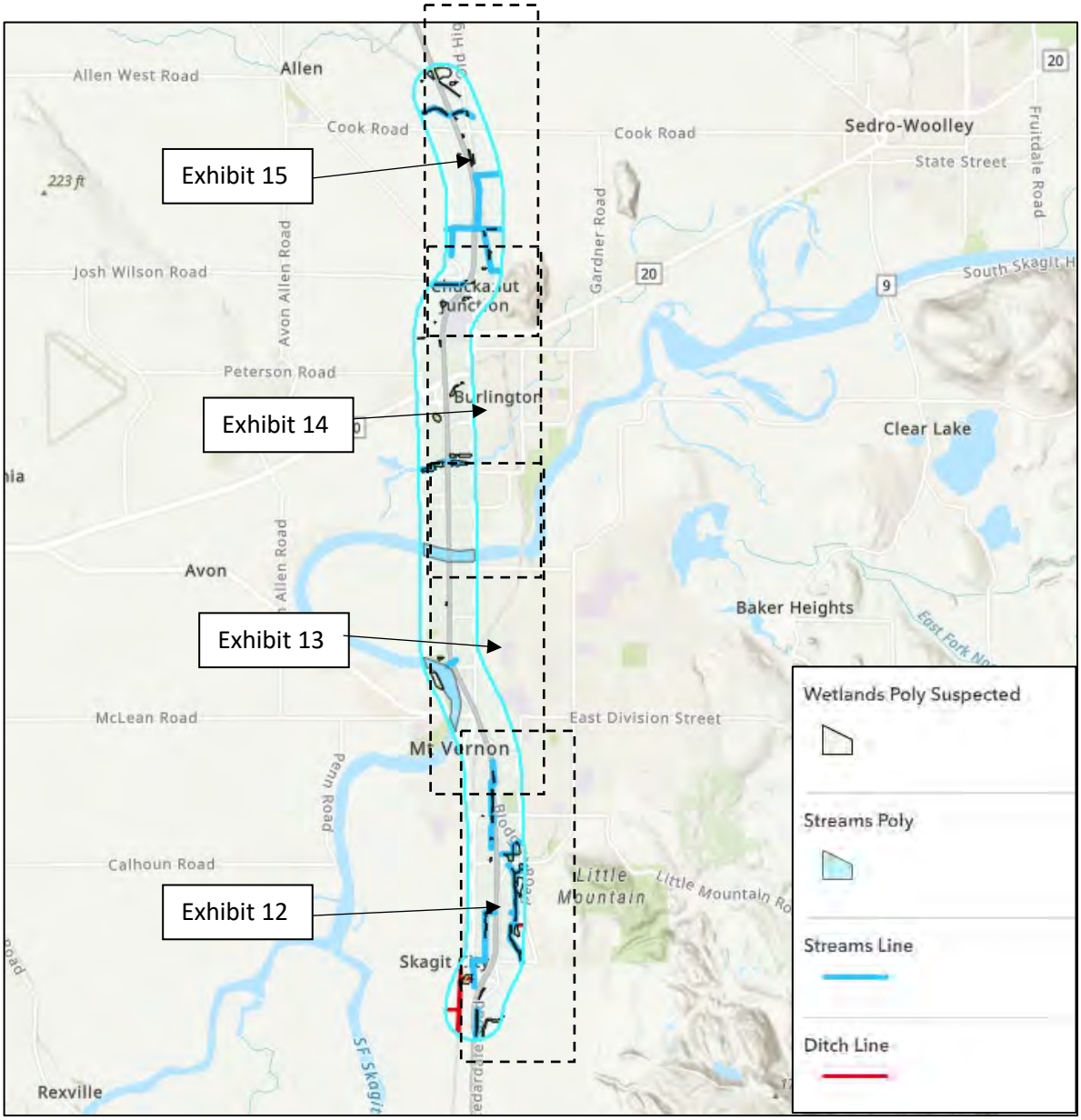


Exhibit 12 Wetland and Stream Inventory

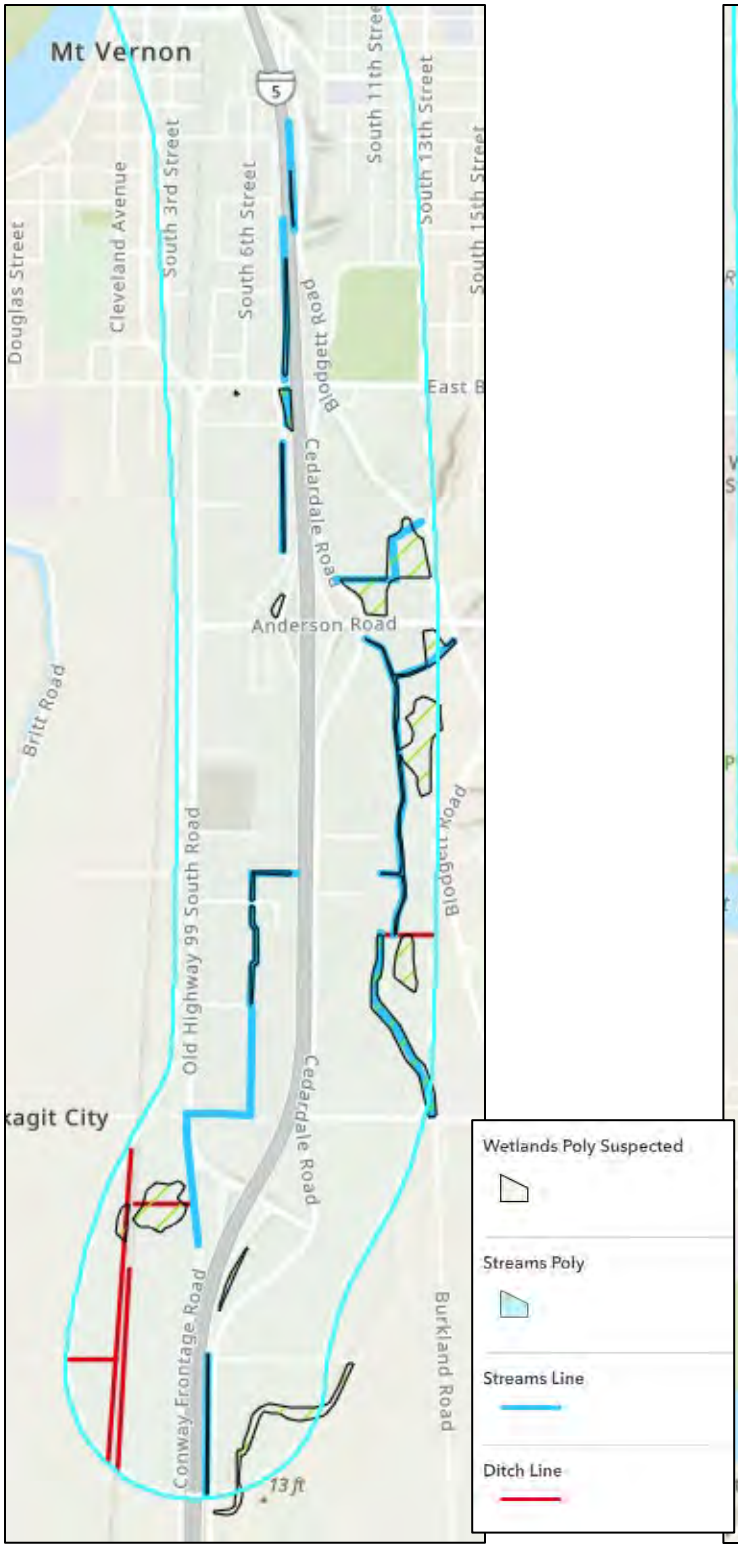


Exhibit 14 Wetlands and Streams - South Skagit

Exhibit 13 Wetlands and Streams - Mount Vernon

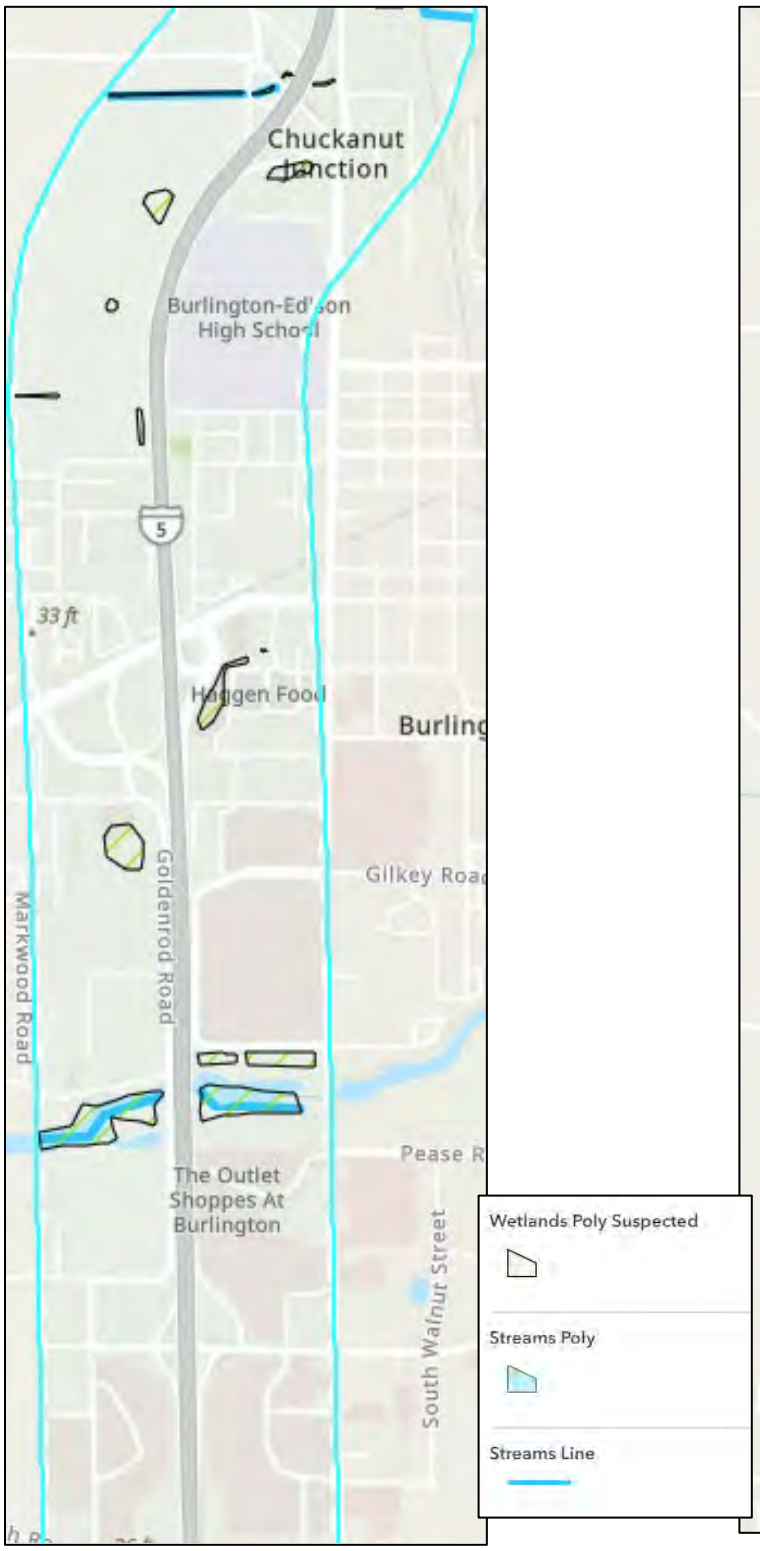


Exhibit 14 Wetlands and Streams – Burlington

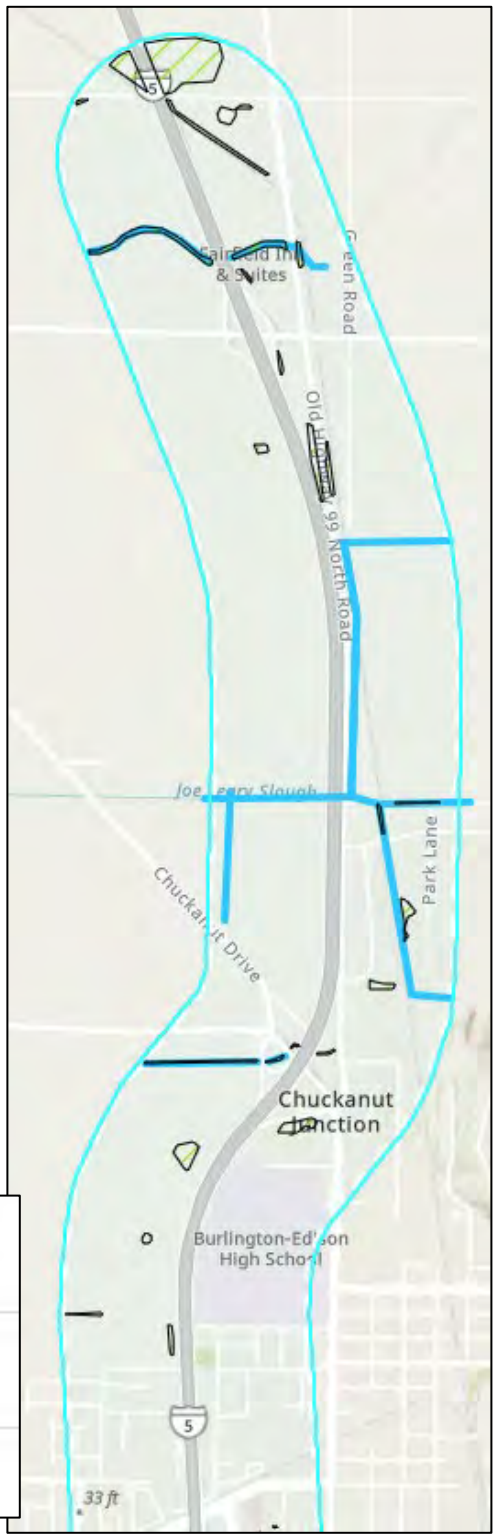


Exhibit 15 Wetlands and Streams - North Skagit

HISTORIC BRIDGES

In accordance with the National Historic Preservation Act of 1966 (NHPA) WSDOT is required to inventory and assess the eligibility of historic bridges for listing in the National Register of Historic Places (NRHP). The Program Comment for Common Post-1945 Concrete and Steel Bridges issued by the Advisory Council on Historic Preservation (ACHP) in 2012 eliminates the historic review requirements under Section 106 of the NHPA for common (mass produced) post-1945 concrete and steel bridges and culverts. The intent of the Program Comment is to streamline the review process for those structures lacking distinction, have not previously been listed or determined eligible for listing on the National Register and are not located in or adjacent to historic districts. The list[5] generated by the Program Comments identifies common post-1945 concrete and steel bridges and culverts of exceptional quality that remain subject to Section 106 review.

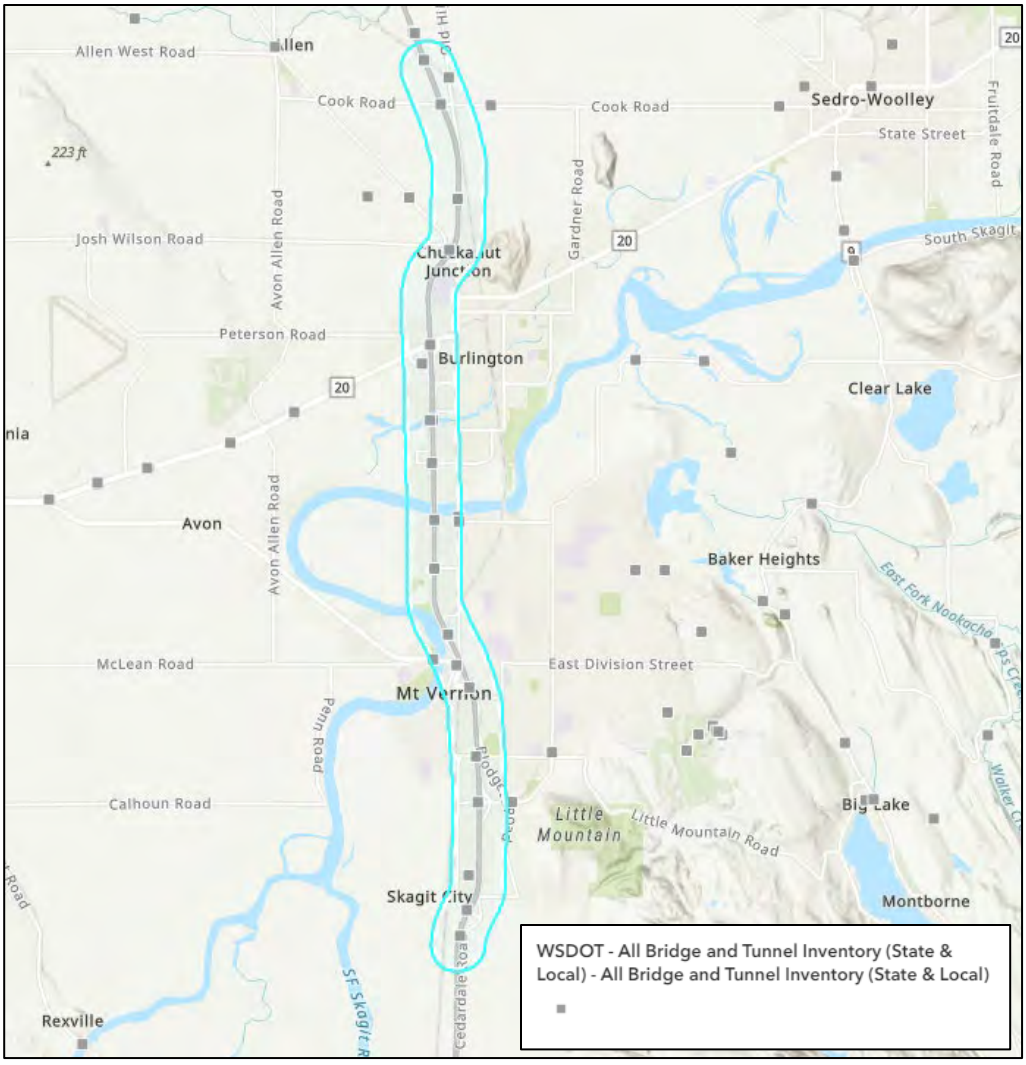


Exhibit 16 WSDOT - Bridges and Tunnels

[5] Bridge Program Comment Excepted Bridges List

Of the 26 bridges and culverts identified in the study area (Exhibit 16), none are listed by the Program Comments, nor do they meet the definitions for nationally significant bridges subject to Section 106 review based on criteria established in the Program Comment, above. There may be historic bridges, primarily within Mount Vernon or Burlington's jurisdiction, not previously reviewed for NRHP eligibility within the study area.

HAZARDOUS MATERIAL CONTAMINATION SITES

Hazardous material contamination sites were identified in the study area using guidance from the Washington State Department of Ecology's Toxic Cleanup database. Four types of sites are identified and are represented in Exhibit 17. There are 48 sites identified in the study area. Four sites are awaiting cleanup, cleanup has started on 18 sites and 26 sites have completed their cleanup. Currently there are no sites where cleanup monitoring is taking place. This information will be used during Phase II and each site may undergo further analysis depending on their location and identified strategy or alternatives identified during Phase II.

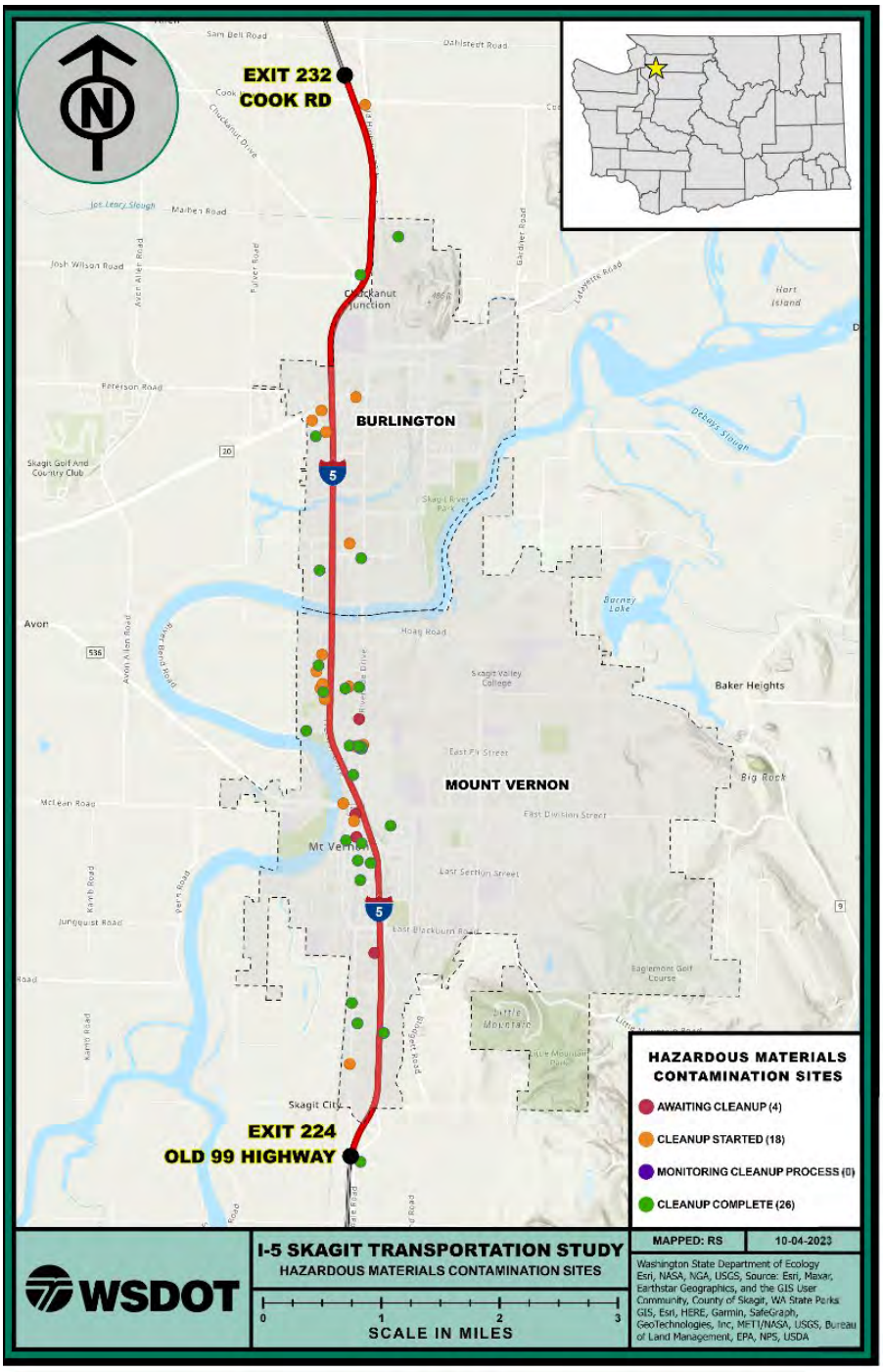


Exhibit 17 Hazardous Materials Contamination Sites

APPENDIX 1: WETLAND AND STREAM INVENTORIES

Wetland ID	Jurisdiction	Comment
1	Skagit	Mapped as a Skagit River Wetland (PHS). Mapped as freshwater forested/shrub wetland (PSSC).
2	Skagit	Visible aerial saturation on 2019 Skagit aerial map. Verify wetland.
3	Skagit	Freshwater forested/shrub wetland (PSSC) mapped in this vicinity (NWI).
4	Skagit	Mapped as freshwater emergent wetland (PEM1C).
5	Mount Vernon	Mapped freshwater emergent wetland (PEM1C) on NWI and PHS.
6	Mount Vernon	Mapped as freshwater emergent wetland (PEM1C) on NWI. Potentially has a connection to Stream 1 to the north. Visible stream/ditch in aerial photos.
7	Mount Vernon	Skagit River Wetlands mapped (PHS). Freshwater forested/shrub wetland (PFOC and PSSC) mapped on NWI. Verify size of wetland, may extend north and west with Stream 1.
8	Mount Vernon	Riverine. Associated with Stream 1.
9	Mount Vernon	Mapped freshwater emergent wetland (PEM1C).
10	Mount Vernon	Skagit River wetlands mapped (PHS). Freshwater forested/shrub wetland (PSSC) mapped on NWI. Visible saturation on aerials could be stormwater features or separate wetlands.
11	Mount Vernon	Mapped freshwater emergent wetland (PEM1C).
12	Mount Vernon	Freshwater forested/shrub wetland (PSSA and PFOA) mapped on NWI.
13	Burlington	Gages Slough. NWI mapped wetland (PFOC, PSSC, PABF, R5UBH)
14	Burlington	Gages Slough. NWI mapped wetland (PSSC, PABF, R5UBH)
15	Burlington	NWI mapped wetland (PSSC)
16	Burlington	NWI mapped wetland (PFOC)
17	Skagit	NWI mapped wetland (PEM1Ad)
18	Skagit	NWI mapped wetland (PEM1C)
19	Skagit	NWI mapped wetland (PEM1C)
20	Skagit	NWI mapped wetland (PEM1Cx)
21	Skagit	NWI mapped wetland (PEM1Cx)
22	Skagit	NWI mapped wetland (PEM1Cx)
23	Skagit	NWI mapped wetland (PEM1Cx)

24	Skagit	NWI mapped wetland (PEM1Cx)
25	Mount Vernon	Observed 5/3. Riverine assoc. w/ Stream 1
26	Skagit	NWI mapped wetland (PEM1Cx). Joe Leary Slough.
27	Skagit	NWI mapped wetland (PSSC)
28	Skagit	NWI mapped wetland (PEM1C)
29	Skagit	Not mapped. Based on aerial imagery.
30	Skagit	PHS mapped wetland (Samish Wetlands). NWI PEM1Ad
31	Skagit	NWI mapped wetland (PEM1C)
32	Skagit	NWI mapped wetland (PFOA)
33	Skagit	NWI mapped wetland (PEM1C)
34	Mount Vernon	Observed 5/3. Riverine assoc. w/ Stream 1
35	Mount Vernon	Observed 5/3. Depressional. Saturated Only. No storage.
36	Mount Vernon	Observed 5/3 in Lion's Park. Depressional. No outlet. 3+ ft of storage. High diversity.
37	Mount Vernon	Observed 5/3. Depressional. Saturated Only. No storage. No outlet. RCG only.
38	Burlington	Observed 5/3. Depression, seasonal ponding, grasses, blackberry, alder. No outlet.
39	Burlington	Observed 5/3. Stormwater feature likely created from wetland conditions.
40	Burlington	Observed 5/3. Stormwater feature likely created from wetland conditions.
41	Burlington	Observed 5/3. Depressional. Seasonally flooded. Emergent.
42	Burlington	Observed 5/3. Depressional. No outlet. Permanently and seasonally flooded. 3+ft storage.
43	Burlington	Observed 5/3. Depressional. Emergent and scrub-shrub. Permanently and seasonally flooded.
44	Skagit	Observed 5/24. Depressional. Seasonally ponded. Low diversity
45	Skagit	Observed 5/24. Depressional. Seasonally ponded. Low diversity. No outlet.
46	Skagit	Observed 5/24. Depressional swale. Seasonally ponded. Low diversity. No outlet.
47	Skagit	Observed 5/24. Depressional. Birdcage outlet about 12 feet above bottom of depression. Seasonally ponded.
48	Skagit	Observed 5/24. Depressional. No outlet. Low storage. Seasonally ponded.

49	Skagit	Observed 5/24. Depressional/flats. Ag field. Low storage. Seasonal inundation.
50	Mount Vernon	Riverine. Associated with Stream 1.
51	Burlington	Riverine. Associated with Joe Leary Slough.
52	Burlington	Riverine. Associated with Joe Leary Slough.

Stream	Stream Name (if applicable)	Water Type	Jurisdiction	Comments
1	Stream 1	Type F	Skagit	Mapped as a Type F stream (DNR and PHS) with documented coho, cutthroat, and resident coastal cutthroat. Freshwater Forested/Shrub Wetland (PSSCx) on NWI.
1	Stream 1	Type F	Mount Vernon	Mapped as a Type F stream (DNR and PHS) with documented coho, cutthroat, and resident coastal cutthroat. Riverine habitat (R5UBFx) on NWI.
2	Stream 2	Type F	Mount Vernon	Mapped Type F Stream (DNR), continues off-site to the northeast. Coho, steelhead, and resident coastal cutthroat mapped (PHS). Riverine habitat (R5UBH) mapped on NWI.
3	Skagit River	Type S	Mount Vernon	DNR maps Skagit River as a Shoreline of the State (Type S). Steelhead, coho, Chinook, resident coastal cutthroat, pink salmon, bull trout, dolly varden, chum salmon, rainbow trout, and sockeye mapped (PHS). Riverine habitat mapped (R2UBH and R2USC).
3	Skagit River	Type S	Burlington	DNR maps Skagit River as a Shoreline of the State (Type S). Steelhead, coho, Chinook, resident coastal cutthroat, pink salmon, bull trout, dolly varden, chum salmon, rainbow trout, and sockeye mapped (PHS). Riverine habitat mapped (R2UBH and R2USC).
4	Gages Slough	Type S	Burlington	DNR maps Gages Slough as Shoreline of the State (Type S). No fish species in PHS. SWIFD maps gradient accessible for coho, pink odd year, Fall Chinook, fall chum, and winter steelhead. NWI maps R5UBH.

5	Stream 5	Type N	Skagit	DNR mapped as Type N ditch/canal. SWIFD maps as gradient accessible to Fall Chinook.
6	Joe Leary Slough	Type F	Skagit	DNR maps as Type F within the main channel and Type N ditch/canal in side channels. SWIFD maps fish accessible to fall chum, winter steelhead, pink odd year, coho, Fall Chinook.
7	Stream 7	Type F	Skagit	DNR maps as Type F. SWIFD maps fish accessible within a lower reach of the Type F water including fall chum, winter steelhead, pink odd year, coho, Fall Chinook.
8	Stream 8	Type N	Skagit	DNR Type U fork of Stream 5 inside off ramp.

APPENDIX 2: FISH PASSAGE INVENTORY TABLE

Site Number	Stream Name	Lat	Long	Crossing	Barrier Status	Species	Source	Review Date	Comments
991492	unnamed	48.38	-122.34	I-5	no	CO, RT, SRCT	WDFW	9/30/2015	Two additional 0.91m CST RND overflow pipes extending the length of crossing. Main culvert has several large grated drains entering mid-line, ditch and median drainage from I-5
991725	Maddox Creek	48.39	-122.33	I-5	yes	CO, RT, SH, SRCT	WDFW	2/7/2018	Known as Big Ditch downstream of the crossing. Original habitat survey in 2002 was updated in 2013 as part of Mt Vernon city inventory. Coho documented spawning.
CR122	Martha Washington Creek	48.4	-122.33	I-5	yes	CO, RT, SRCT	WDFW	3/19/2013	Juvenile coho present above site. Water had slight oil sheen on it.
CR126	Martha Washington Creek	48.41	-122.33	I-5	no	CO, RT, SH, SRCT	WDFW	6/5/2013	Cross freeway drain. High levels of traffic and narrow shoulder, limiting the ability to conduct a level B analysis.
920304	Skagit River	48.42	-122.34	SR 536	no	BT, CH, CK, CO, PK, RT, SH, SK, SRCT	WDFW	1/28/2013	none
932350	Kulshan Creek	48.43	-122.34	I-5	unknown	CO, RT, SH, SRCT	WDFW	11/27/2012	This site is attached to and part of site NC119, a culvert and fishway owned by City of Mount Vernon. Stream is locally known as "Kulshan Creek", not to be confused with Nooksak R. trib.
936003	Gages Slough	48.46	-122.34	I-5	no	BT, CH, CO, PK,	WDFW	8/2/2022	none

						RT, SH, SRCT			
932500	Gages Slough	48.46	-122.34	I-5	no	CK, CO, RT, SH, SRCT	WDFW	8/2/2022	none
995226	unnamed	48.49	-122.34	I-5	N/A	none	WDFW	2/25/2003	Grass choked channel ends ~30m US of site.
995261	unnamed	48.49	-122.34	I-5;SB Ext 231	N/A	none	WDFW	3/5/2003	Dry ditched channel in ramp median leads to ditched channel in ag field.
PA58	Joe Leary Slough	48.49	-122.34	I-5 SB	no	CH, CK, CO, PK, RT, SH, SRCT	Skagit System CoOp	9/16/1999	none
PA59	Joe Leary Slough	48.49	-122.34	I-5 SB	no	CH, CK, CO, PK, RT, SH, SRCT	Skagit System CoOp	9/16/1999	none

APPENDIX 3: ROADKILL SALVAGE PERMITS

Species	Sex	Lat	Long	Date
Deer	M	48.39942	-122.33057	5/9/2022
Deer (Blacktail)	F	48.40524	-122.33061	11/20/2021
Deer	F	48.44315	-122.34126	5/28/2022

APPENDIX B POPULATION, SOCIO-ECONOMIC & DEMOGRAPHIC PROFILE

I-5 SKAGIT TRANSPORTATION STUDY, PHASE I

Washington State Department of Transportation

Prepared by:
Transpo Group USA, Inc.

Prepared for:
Washington State Department of Transportation Northwest Region
Mount Baker Area Multimodal Transportation Planning Office

Table of Contents

POPULATION, SOCIO-ECONOMIC & DEMOGRAPHICS

INTRODUCTION

The Washington State Department of Transportation Northwest Region Mount Baker Area is initiating the Interstate 5 (I-5) Skagit Transportation Study. This study will gather multimodal transportation and socioeconomic data, incorporate environmental factors, conduct equitable community engagement, and analyze current (2022) and future (2045) transportation conditions to determine how I-5 in Skagit County can better meet regional mobility and safety needs.

This study builds on the findings of the 2021 Technical Report: Interstate 5 Existing Conditions Analysis Mount Vernon / Burlington. The previous study revealed that some corridor segments are not performing within expectations. The traffic operations analysis, safety analysis and merge threshold analysis revealed that there are some segments on the corridor that experience higher vehicle density and poor levels of service for traffic, ramp operations and crashes.

WSDOT will implement a public outreach and engagement process to inform the identification of near and mid-term strategy alternatives. The project team is committed to involving the community in the study to ensure their needs, experiences and vision are reflected in the outcomes.

A Community Engagement Plan and a Population, Socio-Economic, & Demographic Profile have been prepared to guide the project development process for the I-5 Skagit Transportation Study. This Profile has been prepared following the WSDOT guidance for Environmental Justice & Title VI and relies on the most current and relevant data sources available. The Profile is consistent with, and will further inform, the evaluation of alternatives and Community Engagement Plan in Phase 2, to support the successful completion of the study.

This profile is a living document and will be updated with new information, as available.

PROJECT BACKGROUND

In 2021, WSDOT and the Skagit Council of Governments initiated a baseline analysis of I-5 in the Mount Vernon and Burlington urban areas with the goal of determining if I-5 is meeting regional transportation performance objectives and examining the steps and measures that could be taken to address unmet performance expectations. Using the information and findings from the technical analysis, WSDOT, along with its planning partners have moved to the next stage of the transportation study to address the safety and congestion needs identified in the 2021 Existing Conditions Analysis.

Exhibit 1 Project Area Exit 224 to 232

PROJECT AREA

The study area spans the 9-mile-long corridor that runs through the urban areas of Mount Vernon and Burlington in Skagit County. The focus area of the corridor is the segment along I-5 from Old 99 Highway (exit 224) to Cook Road (exit 232), as shown in Exhibit 1.

The major commercial areas within the two cities in the study area are near the Skagit River bridge. The study is evaluating current and future conditions to identify near and mid-term strategies and solution alternatives to multimodal safety and operational needs.

REGULATIONS, STUDIES, AND COORDINATION

DEVELOPMENT OF THE POPULATION, SOCIO-ECONOMIC, AND DEMOGRAPHIC PROFILE

This Phase 1 population, socio-economic, and demographic profile adheres to the regulatory requirements of the National Environmental Policy Act (NEPA) and State Environmental Policy Act (SEPA) for review and consideration of the natural and human built environment. Additionally, the follow regulations address for public access to information, involvement, and engagement in public decision-making.

- Title VI of the Civil Rights Act of 1964
- Americans with Disabilities Act (ADA) and the Age Discrimination Act
- Presidential Executive Order 13166 (Limited English Proficiency)

HOW WILL THE PUBLIC BE INVOLVED?

The Community Engagement Plan describes the schedule and procedures for communicating, engaging, and involving members of the public throughout the study area, including historically under-served populations, non-English speakers, and people who may be difficult to reach. Inclusive efforts to involve the public include, but are not limited to:

- A WSDOT I-5 Skagit Transportation Study project web page was created
- WSDOT is providing communication and materials for ADA access and Limited English Proficiency in Spanish language.
- An online survey was performed in the 2021 Baseline Study and another online survey is being conducted for Phase 1 of this 2023 I-5 Skagit Transportation Study.
- WSDOT and consultants identified an initial list of individuals to serve as stakeholders for a wide variety of community agencies, organizations, service providers, tribes, and local governments.
- On June 7, 2023, WSDOT and consultants hosted an online virtual Stakeholder Meeting.

ENVIRONMENTAL JUSTICE

The Skagit I-5 Study incorporates environmental justice principles according to current WSDOT guidance for planning studies and will also consider the evolving direction regarding the 2021 Healthy Environment for All (HEAL) Act. Phase 1 of the study will collect population, socio-economic, and demographic data, as well as data regarding health disparities of the people served by and impacted by Interstate 5 who live within the study area.

Phase 1 environmental justice data sources are listed at Environmental guidance - Environmental justice & Title VI | WSDOT (wa.gov) and include:

- EJ Screen produced by the U.S. Environmental Protection Agency (EPA)
- Washington Tracking Network - Washington State Department of Health (DOH)
- 2022 SCOG Coordinated Public Transit - Human Service Transportation Plan (HST)

The U.S. Census is also a source of information at the census tract level for Phase 1 and web site links for U.S. Census data sources are provided at the bottom of Table 1.

ENVIRONMENTAL JUSTICE STUDY AREA DATA

WSDOT provides specific guidance for defining an Environmental Justice Study Area required by the National and State Environmental Policy Act (NEPA/SEPA). Several thematic GIS maps have been created to highlight the I-5 study area (See below). Each map depicts the geographic distribution of population, socio-economic, demographic, or health disparity clusters and patterns within and around the study area according to census tracts. A general discussion of the thematic findings is provided with the maps below and will be used to identify potential outreach opportunities to stakeholder groups and to further develop the Phase 2 Environmental Justice Analysis (EJA).

The comparative data in Table 1 and all the GIS maps in the pages below, are sourced from the U.S. Census Bureau and it should be noted that census tracts can sometimes represent relatively large geographic areas and may not provide information in fine detail, especially in urban areas. In addition, all Census-sourced data is reported with margins of error to openly acknowledge that there is an accepted level of imprecision associated with the data. Phase 1 community engagement, surveys, and stakeholder interviews will provide additional local population, socio-economic, and demographic information. This will help to identify strategies to work with local residents, organizations, and agencies in Phase 2 and will focus efforts to examine U.S. Census data at the more refined block level, where available.

OBSERVATIONS OF THE DEMOGRAPHIC DATA

Table 1 includes U.S. Census population, socio-economic, and demographic data for the cities of Mount Vernon and Burlington in comparison to data for Skagit County and Washington state.

Listed below are some select observations from the data.

1) The cities of Mount Vernon and Burlington have much higher percentages of the following populations than Skagit County or Washington state:
    - Hispanic or Latino residents
    - Spanish language spoken at home
    - Non-English languages spoken at home
    - Residents living in poverty, and
    - Residents living with disabilities
2) Mount Vernon, Burlington, and Skagit County all have much higher percentages of residents living without health care coverage than Washington state.
3) Skagit County has a much higher percentage of residents over 65 years old than Mount Vernon, Burlington, and Washington state.
4) The City of Burlington has a much higher percentage of resident military veterans than Mount Vernon, Skagit County, or Washington state.
5) The City of Mount Vernon has a much higher percentage of residents under 18 years old than Burlington, Skagit County, or Washington.

I-5 STUDY AREA LAND USE-TRANSPORTATION CONTEXT

Interstate 5 is a critical transportation link connecting Skagit County to Whatcom and Snohomish counties, and ultimately Canada and Mexico, and I-5 is the primary north-south crossing of the Skagit River. While I-5 provides a critical north-south link, it also a limited access facility that bisects the cities of Burlington and Mount Vernon and creates a major mobility barrier to east-west travel for all modes of transportation including walking, bicycling, riding transit, and driving vehicles, including freight and farm equipment.

In addition to I-5, State Routes 11, 20, 536, and 538 are major east-west connections that bisect Burlington, Mount Vernon, and Skagit County. These state highways are also critical links in the regional transportation system but can also pose mobility barriers to north-south travel, especially for people walking, biking, and rolling. Consistent with WSDOT's Complete Streets policies, capital improvements over $500,000 require consideration for multimodal features (sidewalks, bikeways, flashing mid-block crosswalks, bus pull-outs, traffic signals, roundabouts).

Generally, the presence of these major state highway transportation routes through these urban areas has influenced local land use development, the types of commercial and retail services that are available along them, and the type of trip-making that occurs. In commercial areas, these major routes are typically characterized by retail, restaurants, services, and offices. In residential areas, these major routes are typically characterized by lower income housing populated by higher percentages of non-white people with limited English language proficiency.

Population, socio-economic, and demographic conditions are changing in the Skagit Valley and the COVID-19 global pandemic has had significant impact on the commercial retail economies in the region. Population growth in the cities of Mount Vernon and Burlington, as well as the urban growth areas in Skagit County is happening relatively quickly with vehicle traffic congestion increasing at all of the interchanges within the I-5 Study Area. Some non-motorized transportation connections exist, but more are needed between residential areas and popular destinations, such as employment, education, recreation, shopping, and medical services on both sides of I-5, which could relieve pressure on the interchanges and the mainline.

The Skagit region is expected to grow by 46,000 residents to a total county population of 177,000 by 2045. Countywide planning policies direct that 80% (36,800) of these new residents be accommodated in cities, towns, and Urban Growth Areas (UGA). Skagit County, Mount Vernon, Burlington, Sedro-Woolley, Anacortes, and La Conner are all working on Comprehensive Plan updates that are due in 2025. Each of these cities, as well as Skagit County, has an opportunity to accommodate this future growth by increasing land use density and efficiency to house more people on less land by promoting, encouraging, and incentivizing redevelopment of vacant land, under-utilized parcels, and surface parking lots with mixed-use multi-story buildings on local complete street multimodal transportation corridors served by Skagit Transit. This study and these local planning efforts provide opportunities to better integrate land use and transportation planning to allow less reliance on I-5 for local trips.

COMPARISON OF POPULATION, SOCIO-ECONOMIC, & DEMOGRAPHIC DATA FOR CITY, COUNTY, STATE

Table 1. Population, Socio-Economic, and Demographic Data for I-5 Skagit Transportation Study Area

Categories	Mount Vernon		Burlington		Skagit County		Washington
Total Resident Population	35,500		9,800		131,179		7,785,786
Hispanic or Latino Residents	33.7%		31.0%		19.5%		13.60%
Spanish Spoken at Home	26.6%		21.7%		18.5%		10.6%
Non-English Spoken at Home	30.8%		25.7%		16.5%		20.8%
Education - Bachelor's Degree or Higher	25.4%		22.6%		28.6%		39.0%
Housing Units	13,457		3,645		57,126		3,202,241
Owner-Occupied Housing	62.6%		50.0%		70.5%		64.0%
Median Gross Rent / Month	$1,114		$1,331		$1,217		$1,484
Area Employment Rate	58.1%		58.2%		58.3%		59.1%
Median Household Income	$62,706		$58,345		$75,308		$84,247
Residents Living in Poverty	16.5%		14.3%		11.6%		9.9%
Residents with Disability	14.2%		17.3%		9.80%		13.1%
Residents without Health Care Coverage	9.5%		9.9%		8.90%		6.4%
Residents Under 18 Years Old	26.1%		22.9%		21.30%		21.7%
Median Age of Residents (Years)	33.9		36.2		41.6		38.2
Residents Over 65 Years Old	16.8%		17.1%		21.80%		16.2%
Resident Military Veterans	7.7%		12.1%		8.0%		8.2%
Information Sources:	**U.S. Census Bureau; Web sites listed below**						
Mount Vernon =	https://data.census.gov/profile/Mount_Vernon_city;_Washington?g=160XX00US5347560						
Burlington =	https://data.census.gov/profile/Burlington_city;_Washington?g=160XX00US5308920						
Skagit County =	https://www.census.gov/quickfacts/skagitcountywashington						
Washington =	https://www.census.gov/quickfacts/fact/table/WA/PST045222						

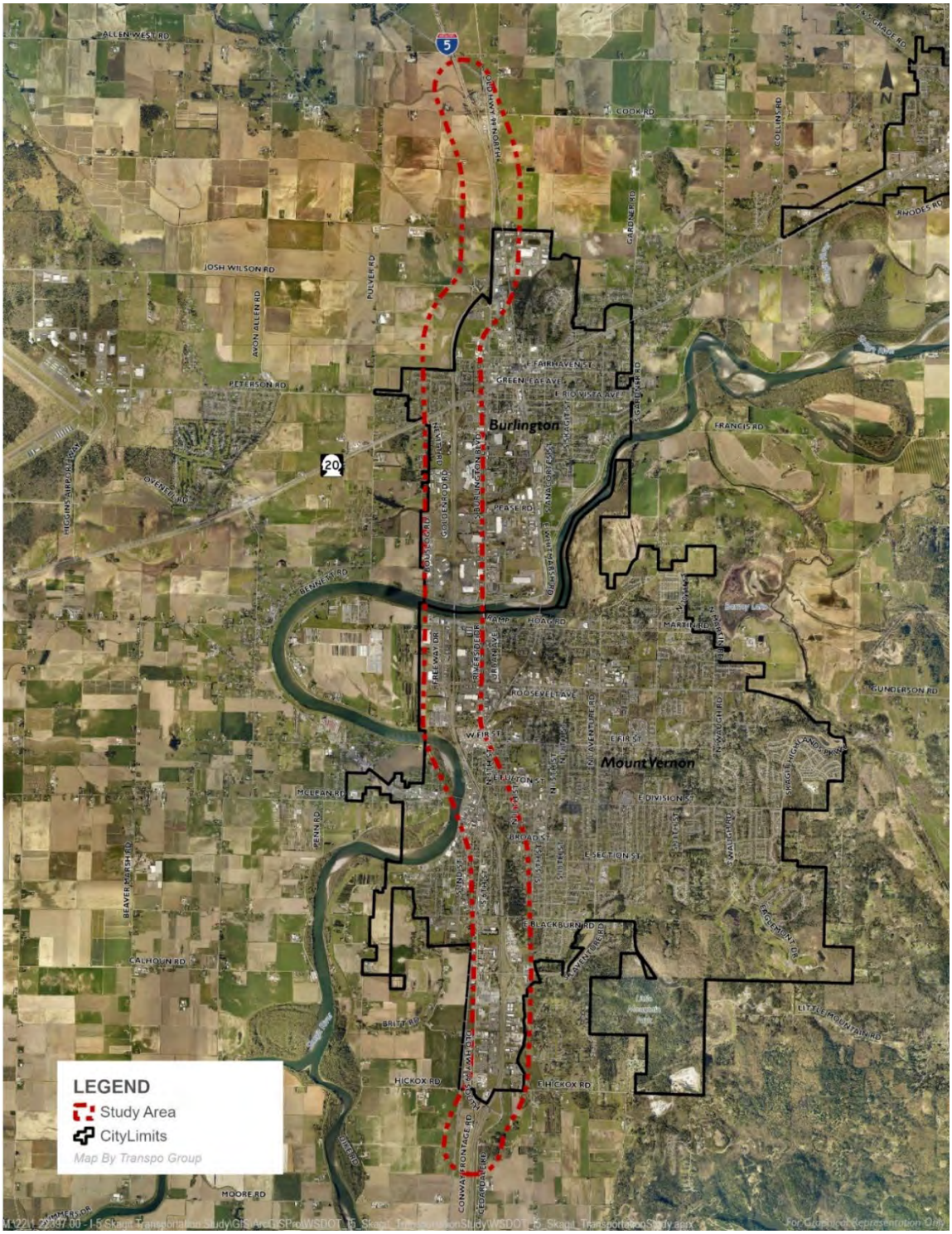


Exhibit 2 Aerial Photo of I-5 Study Area in Skagit County

As shown in Exhibit 2, urban development and higher densities are primarily on the east side of I-5. Exhibit 3 illustrates the census tracts that are within the study area.

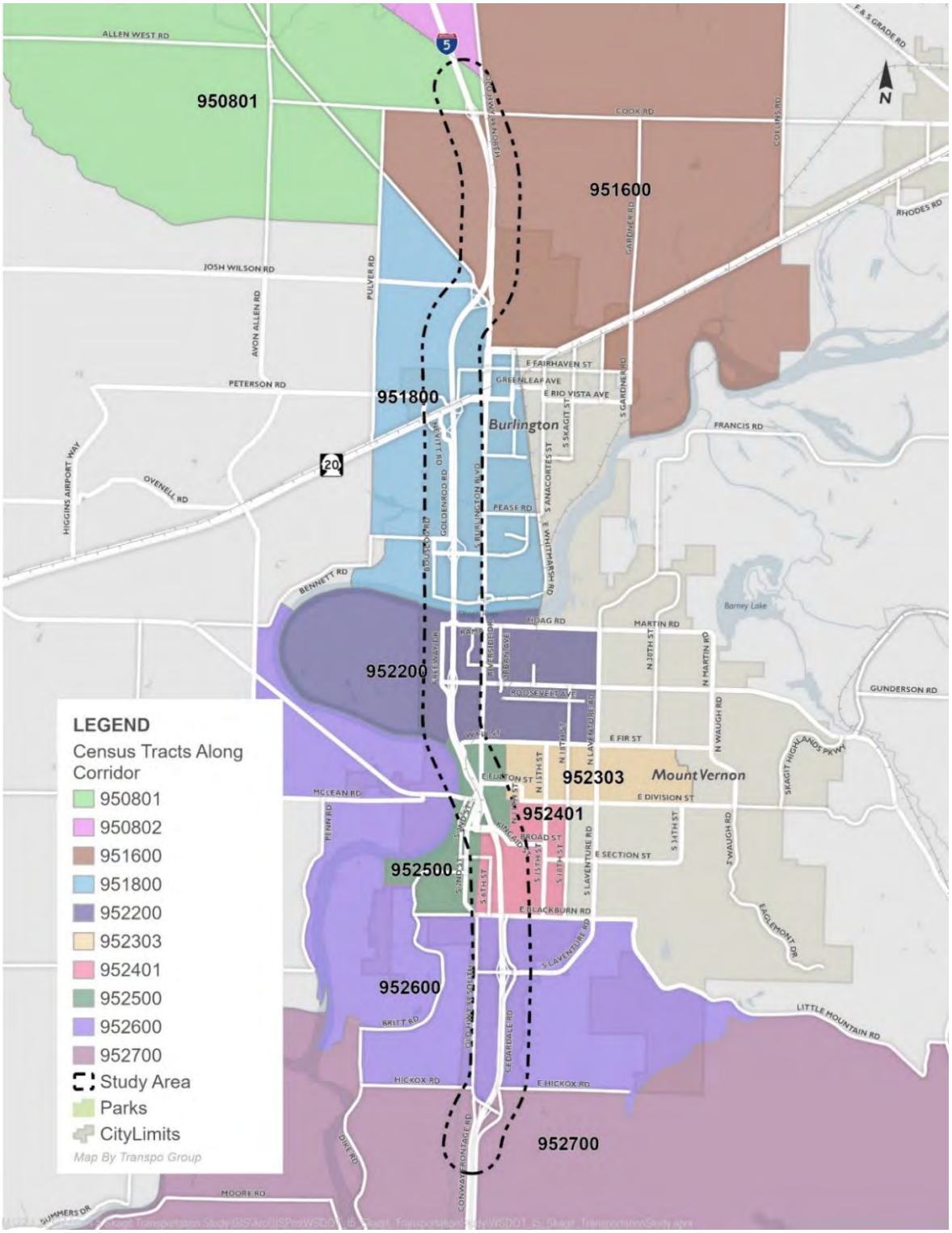


Exhibit 3 U.S. Census Tracts Identified Along I-5 Corridor Study Area

Note: Census tracts represent large geographic areas and do not provide information in fine detail

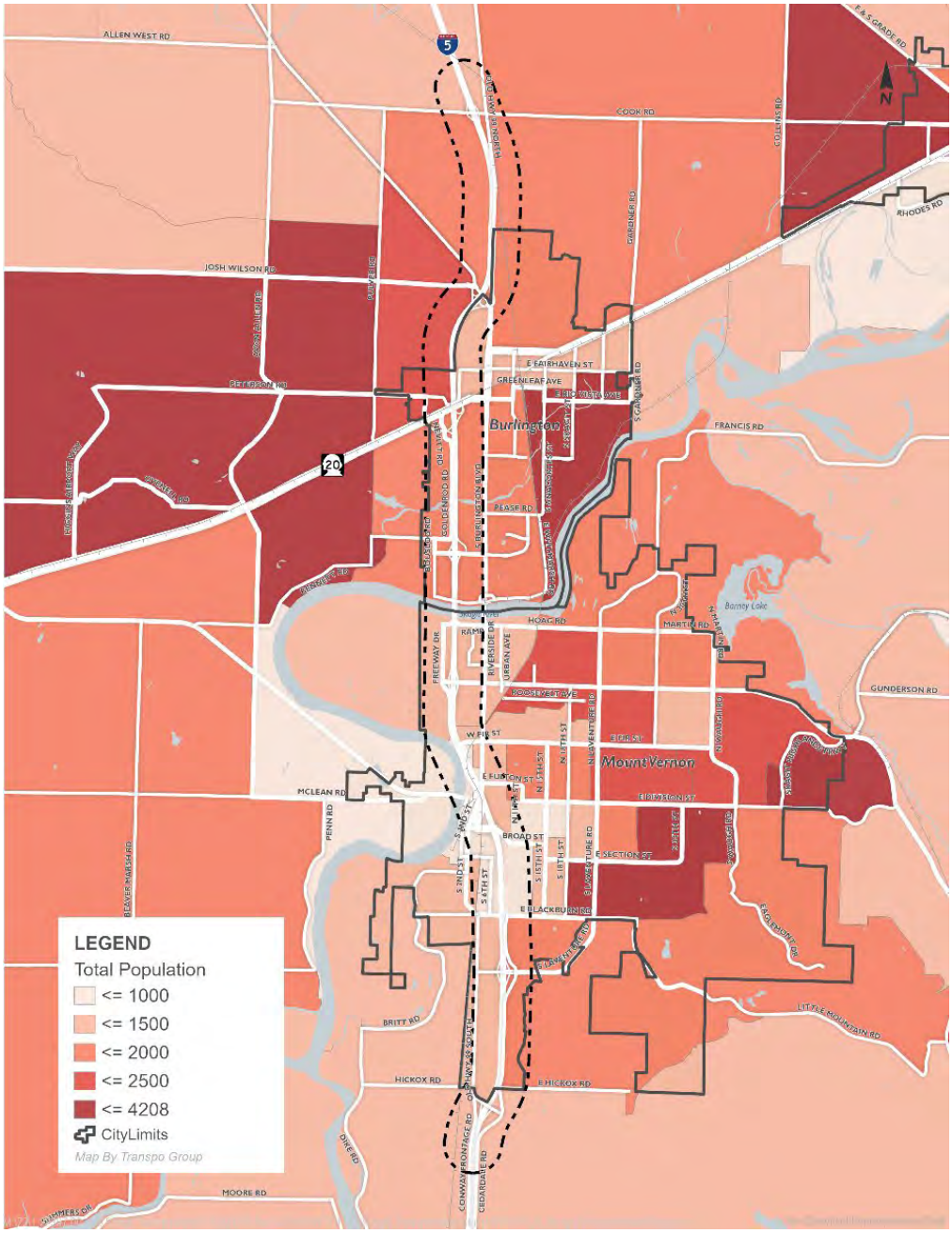


Exhibit 4 Total Population – Geographic Distribution by Census Tract

Note: Census tracts represent large geographic areas and do not provide information in fine detail

As shown in Exhibit 4, the population surrounding the study area is unevenly distributed with higher numbers of people living in older neighborhoods generally away from the I-5 corridor. In Mount Vernon, higher numbers of people live on the east hillside of the city and in the north shopping area east of the railroad tracts. In Burlington, higher numbers of people live on the east side of the BNSF railroad tracks between SR 20 and along the north bank of the Skagit River as well as the northeast and northwest corners of the I-5/SR 20 interchange.

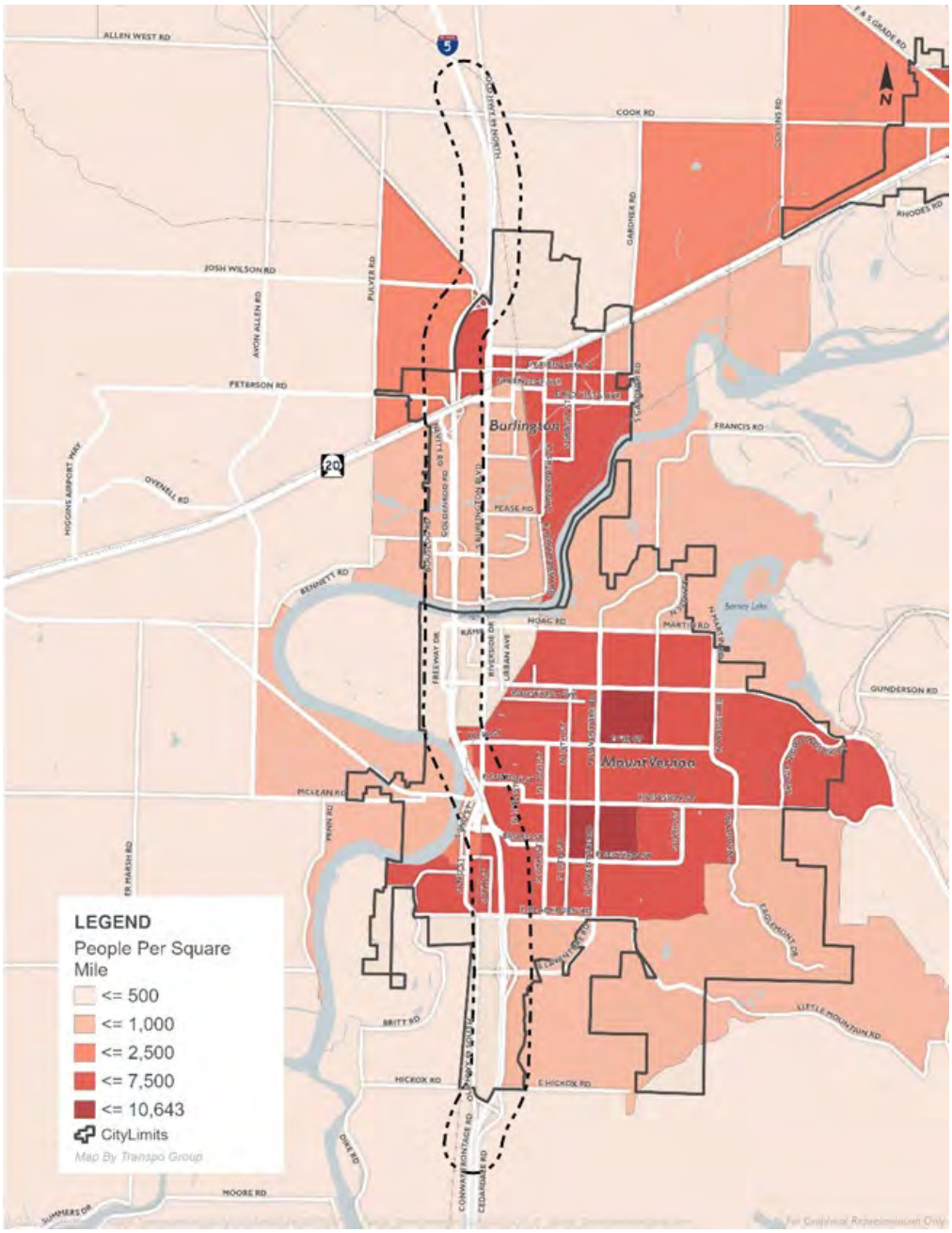


Exhibit 5 Persons Per Square Mile

Note: Census tracts represent large geographic areas and do not provide information in fine detail

Exhibit 5 illustrates locations of higher density residential development relative to the number of people living within square miles. The Mount Vernon and Burlington urban areas have higher population densities, especially along the east side of I-5 and along SR 20.

Exhibit 6 Elementary Schools Within and Surrounding Study Area

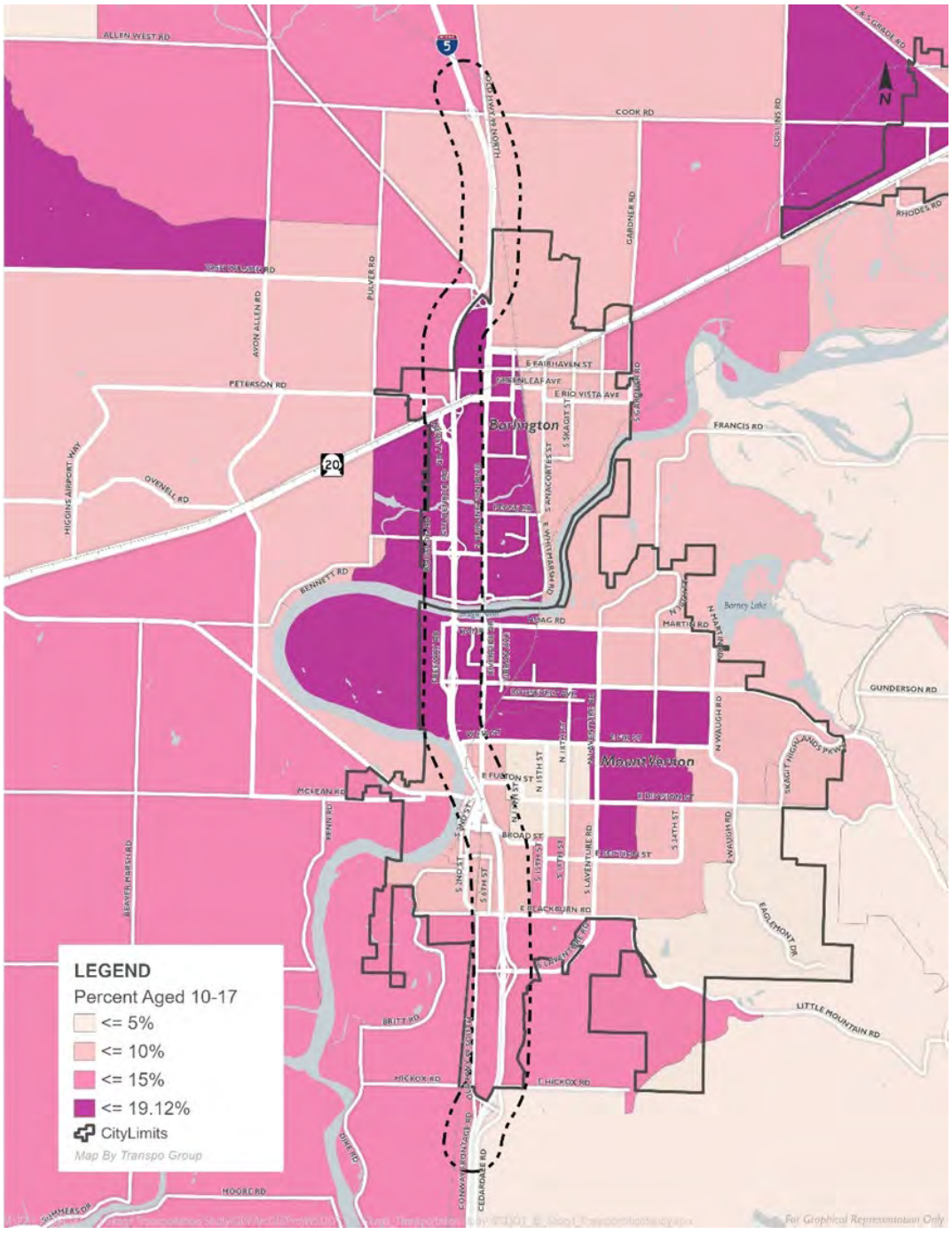


Exhibit 7 Youth Ages 10-17

Note: Census tracts represent large geographic areas and do not provide information in fine detail

As shown in Exhibit 7, there appear to be higher concentrations of youth ages 10-17 inside of the urban areas, which corresponds to the distribution of elementary schools shown in Exhibit 6.

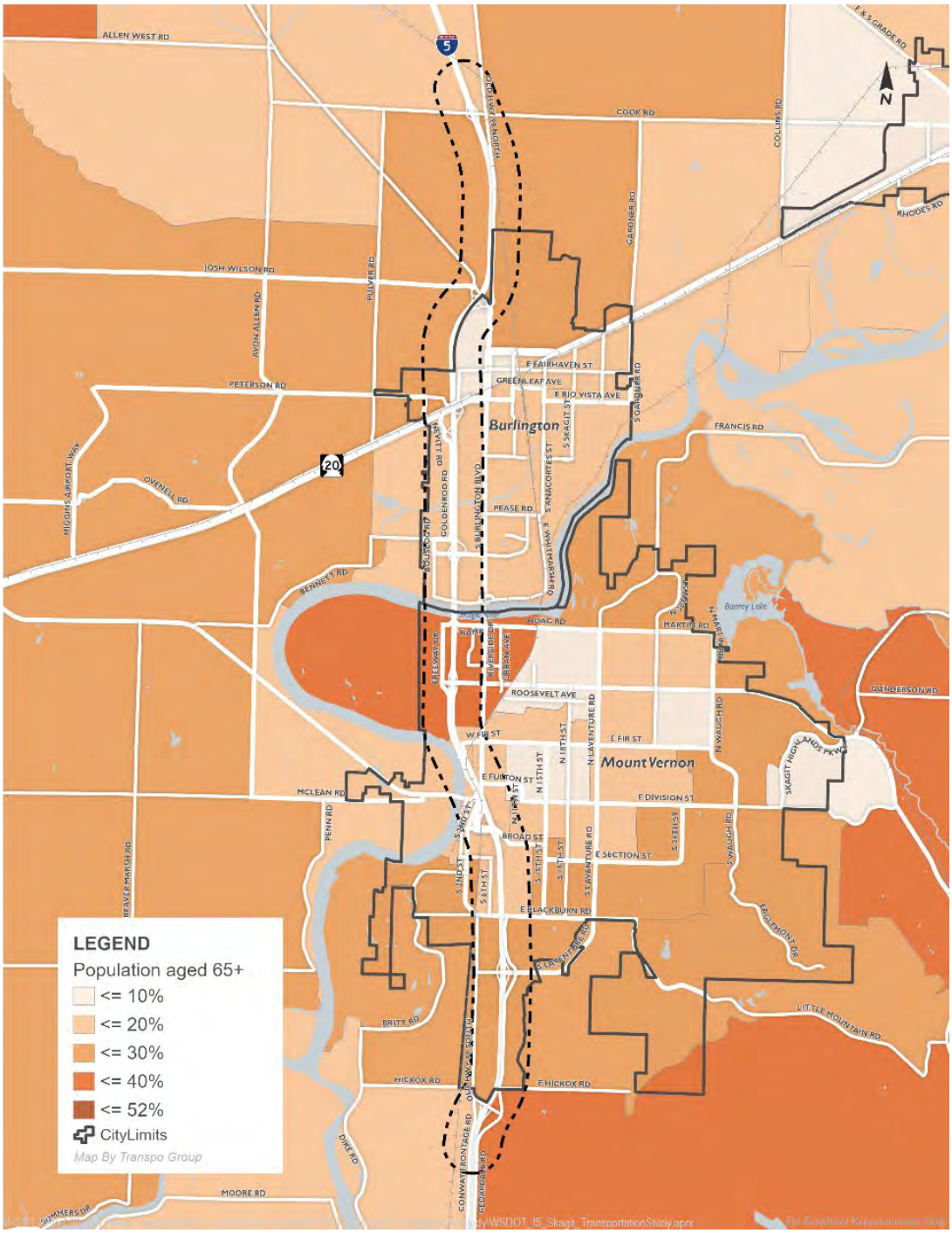


Exhibit 8 Senior Citizens – Age 65+

Note: Census tracts represent large geographic areas and do not provide information in fine detail

As shown in Exhibit 8, with the exception of West Mount Vernon, there appear to be higher concentrations of senior citizens at the outer edges of the urban areas.

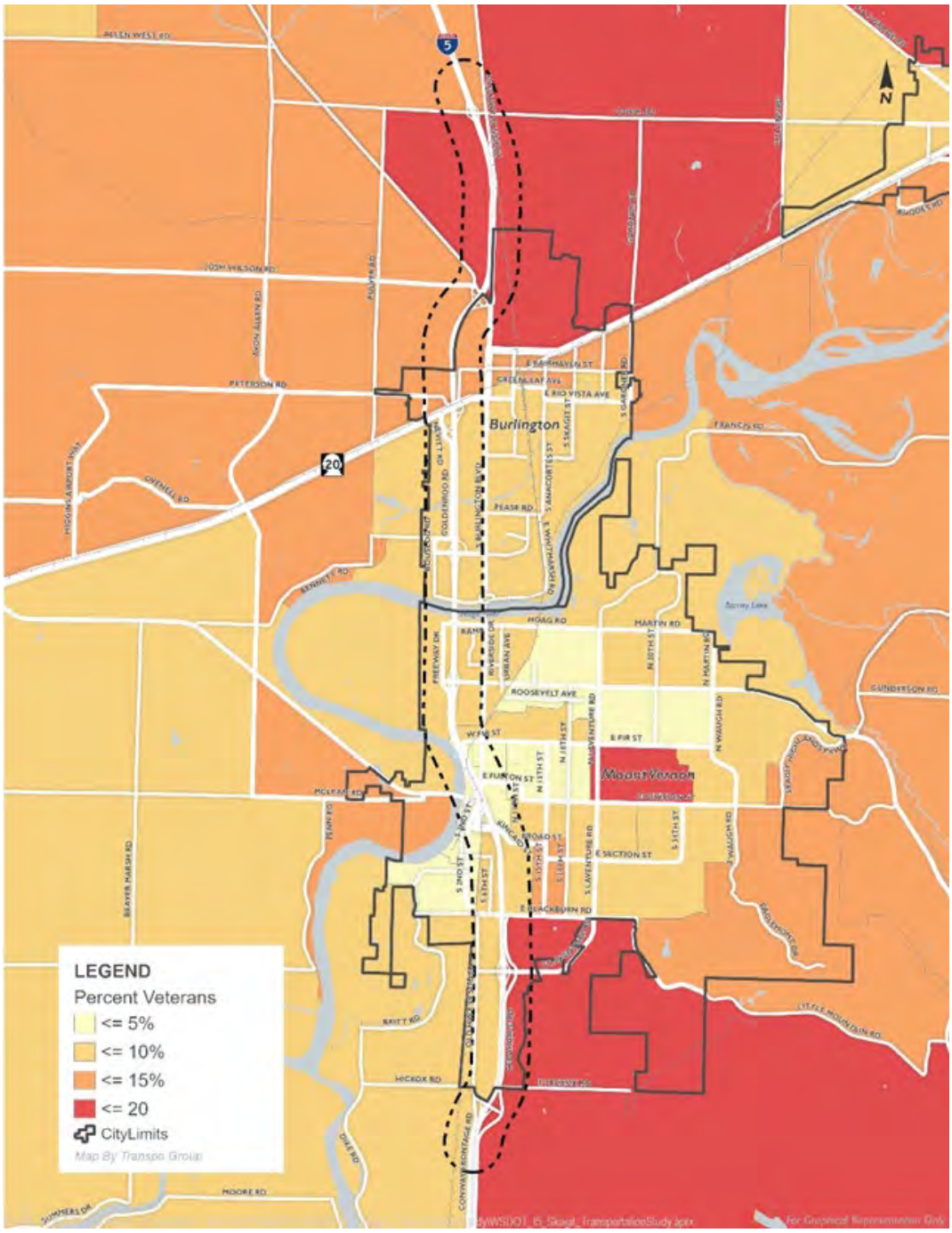


Exhibit 9 Percent with Veteran Status

Note: Census tracts represent large geographic areas and do not provide information in fine detail

As shown in Exhibit 9, it appears that there is a high concentration of war veterans living near the hospital and other medical facilities, but otherwise, there are higher concentrations of war veterans living at the edges of the urban areas.

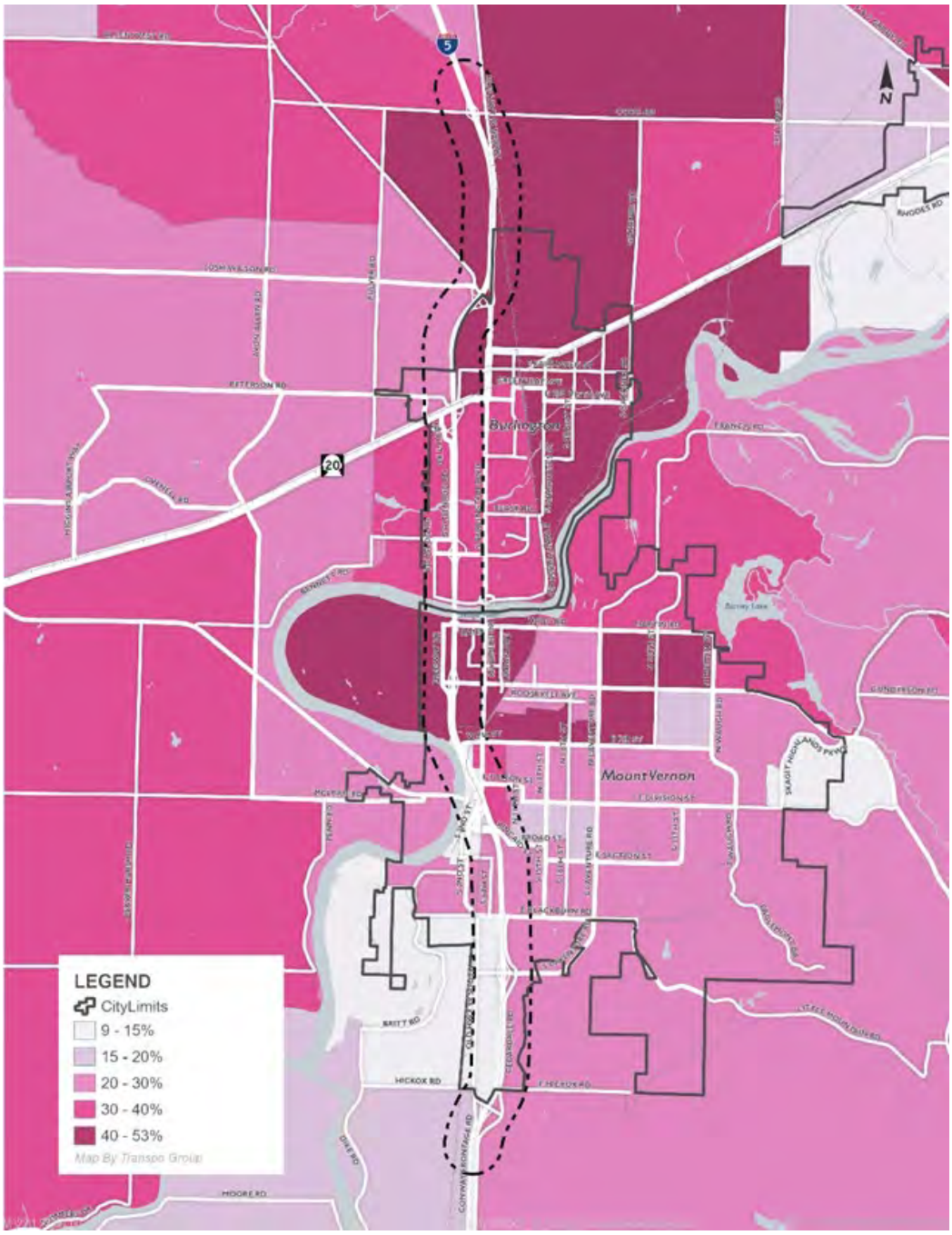


Exhibit 10 Percent with Disability

Note: Census tracts represent large geographic areas and do not provide information in fine detail

In Exhibit 10, it appears that there are higher concentrations of people living with disabilities along the Skagit River within the northern and western portions of the urban areas, and east of Mount Vernon in Skagit County.

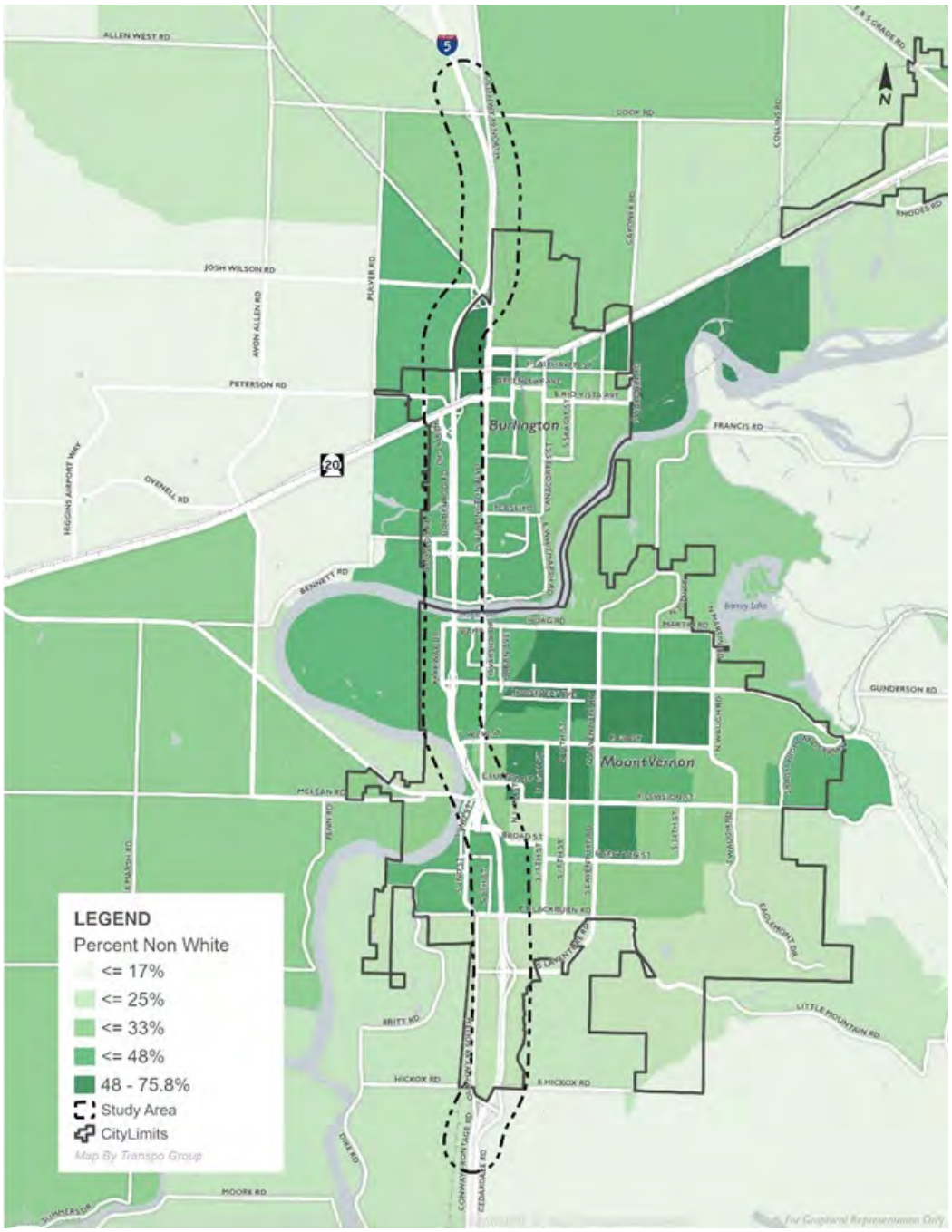


Exhibit 11 Percent Non-White Population

Note: Census tracts represent large geographic areas and do not provide information in fine detail

Exhibit 11 appears to show that non-white populations are living in higher concentrations both within and at the edges of the urban areas, as well as along state highways and the Skagit River. Outside of the urban areas, non-white populations are less concentrated and appear to be living in agricultural areas of Skagit County.

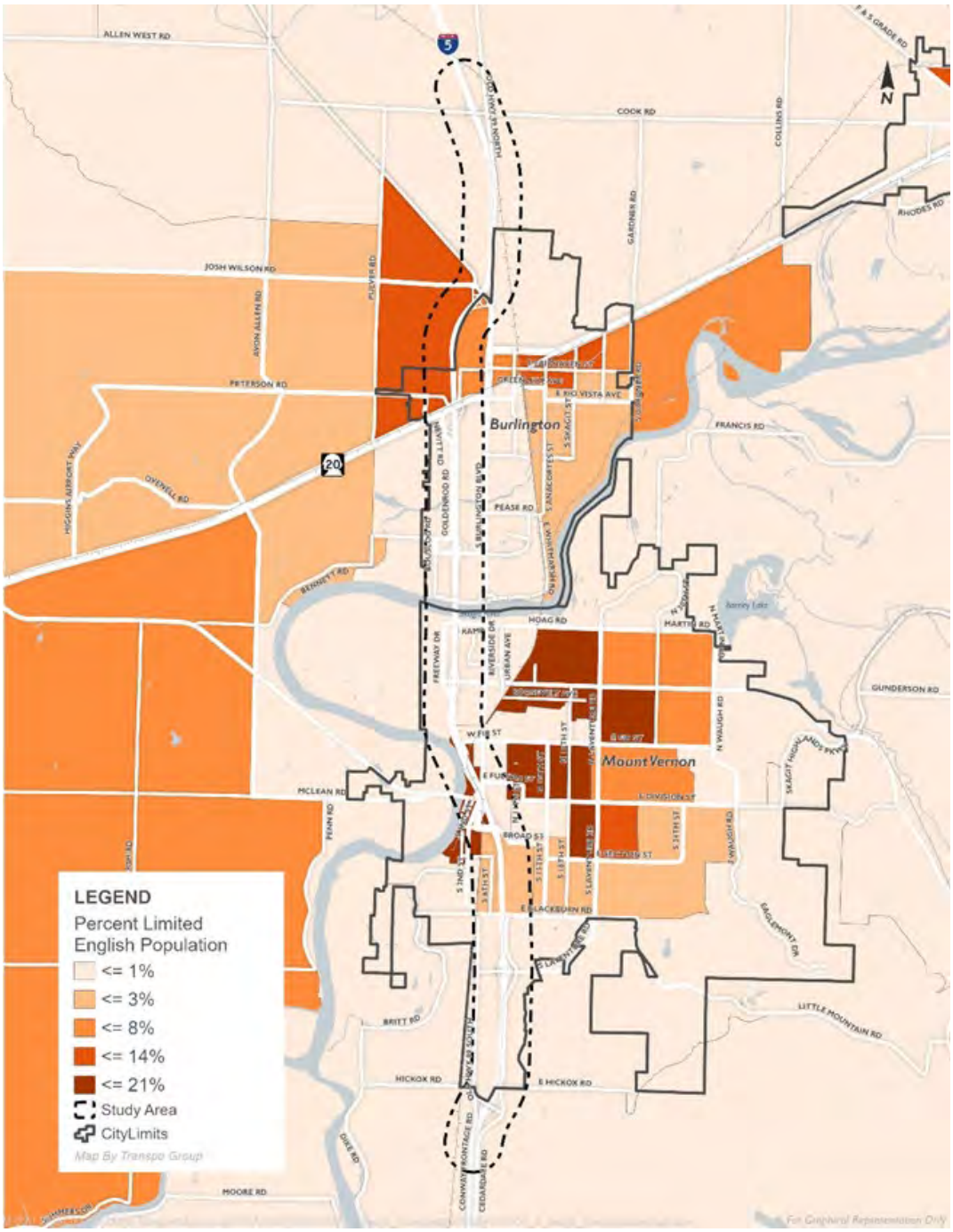


Exhibit 12 Percent Limited English Language Proficiency

Note: Census tracts represent large geographic areas and do not provide information in fine detail

Exhibit 12 shows that there are significant concentrations of non-English speakers within the Mount Vernon urban area, northern portions of the Burlington urban area, and in agricultural areas in Skagit County west of Mount Vernon and northwest of the I-5/SR20.

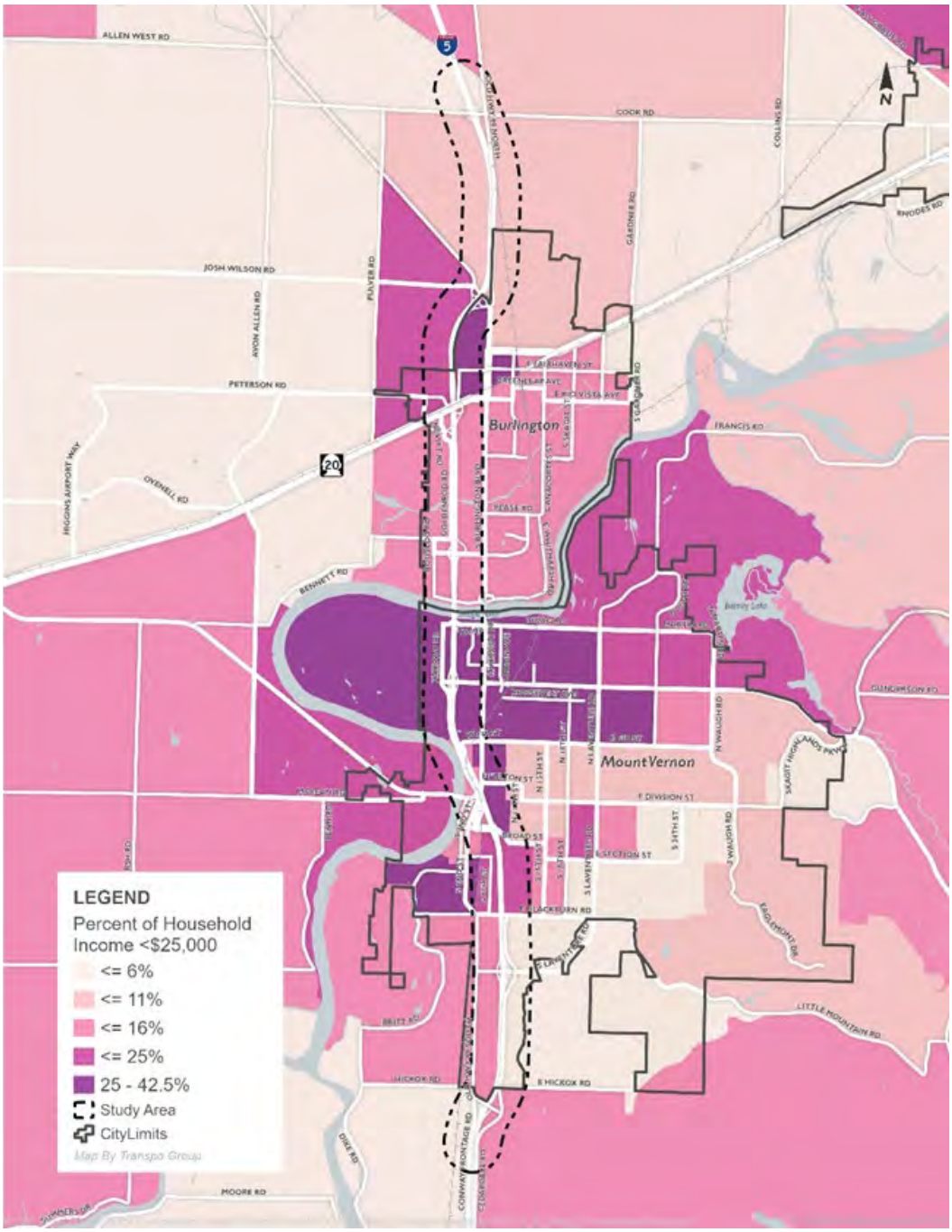


Exhibit 13 Percent Low-Income Households

Note: Census tracts represent large geographic areas and do not provide information in fine detail

Exhibit 13 shows higher percentages of low-income households in north and west Mount Vernon as well as northwest Burlington. There are also higher percentages of low-income households surrounding the I-5/SR 20 interchange and in agricultural areas in Skagit County and south and west of Mount Vernon.

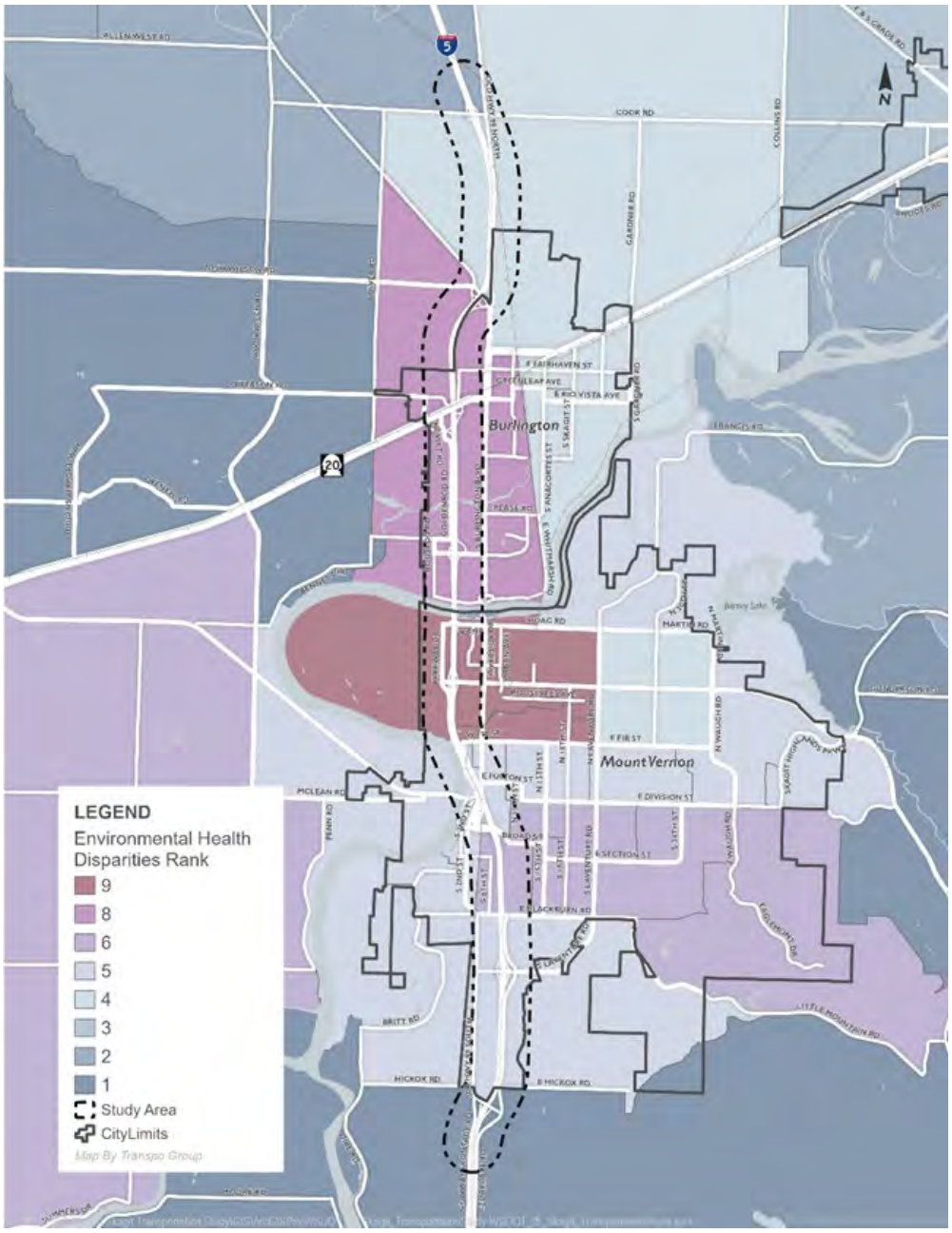


Exhibit 14 Environmental Health Disparities

Note: Census tracts represent large geographic areas and do not provide information in fine detail

Exhibit 14 shows that populated areas experiencing the highest levels of environmental health disparities are in northwest Burlington surrounding the I-5/SR 20 interchange and northwest Mount Vernon along I-5. There are also high levels of health disparities south of Division Street in Mount Vernon. It should be noted that the distribution of non-white, non-English-speaking, and low-income households appears to reveal a high correlation between these variables and exposure to environmental health disparities, such as noise, exhaust, and light pollution.

HOW THE DATA WILL BE UTILIZED

PHASE 1. COMMUNICATIONS, ENGAGEMENT, INVOLVEMENT

The population, socio-economic and demographic data will help to inform the communications plan as well as the public engagement with stakeholders and outreach plans within the study area. As outlined in the General Observations section, the data for several factors appears to align and indicate opportunities for outreach, engagement, and involvement with historically under-represented populations, as well as population experiencing environmental health disparities.

Spanish language speakers make up the largest non-English speaking group and communications and literature will be translated and provided to these non-English speaking populations. Communications materials and outreach will be developed to communicate with populations having limited English language proficiencies living within the study area. This will encourage and provide the opportunity for individuals from these populations to attend local engagement events and to become involved as stakeholders throughout the study process.

PHASE 2. ENVIRONMENTAL JUSTICE ANALYSIS

Based on the 20-year forecasts for growth and associated increases in travel demand within the study area, the population, socio-economic, and demographic data will be further developed in areas identified near potential improvement strategies or alternatives. As strategies and alternatives are identified, WSDOT and consultants will work with local jurisdictions and agencies to provide a finer level of population, socio-economic, and demographic detail along City streets and County roads.

APPENDIX A: DATA COLLECTION METHOD

COLLECTING POPULATION, SOCIO-ECONOMIC, & DEMOGRAPHIC DATA

This population, socio-economic, demographic profile follows the instructions for Collecting Demographic Data as specified by WSDOT.

The EPA EJScreen ACS Summary Report provides the following statistics within the study area as reported from the Exhibits below.

1. Total population in study area = 42,145
2. Minority percentage in study area = 41% (calculated by adding all Hispanic and non-white pop numbers together/total pop)
3. Population by race (From 2-mile buffer EJS report on study area):

Total Hispanic Pop	14,101
Total Non-Hispanic Pop	28,044
White Alone	24,794
Black Alone	345
American Indian Alone	571
Non-Hispanic Asian Alone	937
Pacific Islander Alone	22
Other Race Alone	101
Two or More Races Alone	1,274

4. Office of Superintendent of Public Instruction (OSPI) school report cards
   a. Lincoln Elementary School, Mount Vernon (closed after 2018-19 school year)
   b. West View Elementary School - Percentage for West View: 78%
      - Minority pop is calculated by adding Hispanic population and non-white, non-Hispanic population numbers together.
5. Income
   a. Household income (From 2-mile buffer EJS report on study area)
      i. < $15,000 – 1,355
      ii. $15,000 - $25,000 – 1,521
      iii. Total = 2876
      iv. Percentage of households in this income range = **18.4%**
   b. West View Elementary income metrics:
      i. Low Income Students: **70.6 %** (288 of 408)

EJSCREEN ACS Summary Report

Location: User-specified polygonal location
Ring (buffer): 1.5-miles radius
Description:

Summary of ACS Estimates	2016 - 2020
Population	42,145
Population Density (per sq. mile)	1,057
People of Color Population	17,351
% People of Color Population	41%
Households	15,615
Housing Units	16,366
Housing Units Built Before 1950	2,782
Per Capita Income	31,816
Land Area (sq. miles) (Source: SF1)	39.87
% Land Area	96%
Water Area (sq. miles) (Source: SF1)	1.72
% Water Area	4%

	2016 - 2020 ACS Estimates	Percent	MOE (±)
Population by Race			
Total	42,145	100%	838
Population Reporting One Race	40,236	95%	1,846
White	30,493	72%	629
Black	396	1%	83
American Indian	633	2%	120
Asian	960	2%	107
Pacific Islander	31	0%	33
Some Other Race	7,722	18%	874
Population Reporting Two or More Races	1,908	5%	280
Total Hispanic Population	14,101	33%	809
Total Non-Hispanic Population	28,044		
White Alone	24,794	59%	550
Black Alone	345	1%	83
American Indian Alone	571	1%	93
Non-Hispanic Asian Alone	937	2%	107
Pacific Islander Alone	22	0%	33
Other Race Alone	101	0%	40
Two or More Races Alone	1,274	3%	163
Population by Sex			
Male	20,594	49%	502
Female	21,551	51%	424
Population by Age			
Age 0-4	2,658	6%	190
Age 0-17	10,569	25%	297
Age 18+	31,576	75%	475
Age 65+	7,277	17%	241

Exhibit A.1. EPA EJScreen Summary Report

EJSCREEN ACS Summary Report

Location: User-specified polygonal location
Ring (buffer): 1.5-miles radius
Description:

	2016 - 2020 ACS Estimates	Percent	MOE (±)
Population 25+ by Educational Attainment			
Total	27,697	100%	473
Less than 9th Grade	2,330	8%	144
9th - 12th Grade, No Diploma	1,672	6%	117
High School Graduate	7,862	28%	331
Some College, No Degree	6,968	25%	255
Associate Degree	3,022	11%	184
Bachelor's Degree or more	5,841	21%	233
Population Age 5+ Years by Ability to Speak English			
Total	39,487	100%	724
Speak only English	27,911	71%	438
Non-English at Home[1+2+3+4]	11,576	29%	473
[1]Speak English "very well"	6,868	17%	367
[2]Speak English "well"	1,435	4%	142
[3]Speak English "not well"	2,128	5%	225
[4]Speak English "not at all"	1,144	3%	209
[3+4]Speak English "less than well"	3,272	8%	247
[2+3+4]Speak English "less than very well"	4,708	12%	257
Linguistically Isolated Households*			
Total	858	100%	108
Speak Spanish	689	80%	106
Speak Other Indo-European Languages	145	17%	55
Speak Asian-Pacific Island Languages	24	3%	20
Speak Other Languages	0	0%	13
Households by Household Income			
Household Income Base	15,615	100%	240
< $15,000	1,355	9%	105
$15,000 - $25,000	1,521	10%	163
$25,000 - $50,000	3,812	24%	218
$50,000 - $75,000	2,976	19%	175
$75,000 +	5,952	38%	216
Occupied Housing Units by Tenure			
Total	15,615	100%	240
Owner Occupied	9,008	58%	249
Renter Occupied	6,607	42%	192
Employed Population Age 16+ Years			
Total	32,816	100%	502
In Labor Force	20,225	62%	422
Civilian Unemployed in Labor Force	1,203	4%	167
Not In Labor Force	12,591	38%	429

Exhibit A.2. EPA EJScreen Summary Report

EJSCREEN ACS Summary Report

Location: User-specified polygonal location
Ring (buffer): 1.5-miles radius
Description:

	2016 - 2020 ACS Estimates	Percent	MOE (±)
Population by Language Spoken at Home			
Total (persons age 5 and above)	35,343	100%	668
English	24,858	70%	570
Spanish	9,187	26%	510
French, Haitian, or Cajun	139	0%	64
German or other West Germanic	40	0%	26
Russian, Polish, or Other Slavic	221	1%	163
Other Indo-European	127	0%	64
Korean	2	0%	18
Chinese (including Mandarin, Cantonese)	38	0%	19
Vietnamese	27	0%	24
Tagalog (including Filipino)	228	1%	77
Other Asian and Pacific Island	140	0%	52
Arabic	25	0%	22
Other and Unspecified	313	1%	169
Total Non-English	10,486	30%	868

Exhibit A.3. EPA EJScreen Summary Report

APPENDIX D COMMUNITY ENGAGEMENT PLAN

I-5 SKAGIT TRANSPORTATION STUDY, PHASE I

Washington State Department of Transportation

Prepared by: Stepherson & Associates

Prepared for:
Washington State Department of Transportation Northwest Region
Mount Baker Area Multimodal Transportation Planning Office

Washington State Department of Transportation

Table of Contents

COMMUNITY ENGAGEMENT PLAN

INTRODUCTION

The Washington State Department of Transportation Northwest Region Mount Baker Area is initiating the Interstate 5 Skagit Transportation Study. This study will gather multimodal transportation and socioeconomic data, incorporate environmental factors, and analyze current and future transportation conditions to determine how I-5 in Skagit county can better meet regional mobility and safety needs. WSDOT will implement a public outreach and engagement process to inform the identification of near and mid-term strategy alternatives. The project team is committed to involving the community in the study to ensure their needs, experiences and vision are reflected in the outcomes.

Community engagement will occur in two phases. During Phase I, WSDOT will work with the community to review and validate the Existing Conditions Analysis conducted in 2021 and solicit input to inform the evaluation of future mobility issues. Phase II will build on the initial engagement conducted during Phase I. Further collaboration with the community will support identifying strategies and evaluating solution alternatives to address multimodal safety and operational needs.

This plan serves as an internal guide to engagement efforts for the I-5 Skagit Transportation Study, outlining outreach goals and strategies, key messages and communication tools and techniques that will be used to involve the community in this process.

This plan is a living document and will be updated by the project team to reflect new or emerging information and needs.

PROJECT BACKGROUND

In 2021, WSDOT and the Skagit Council of Governments initiated a baseline analysis of I-5 in the Mount Vernon and Burlington urban areas with the goal of determining if I-5 is meeting regional transportation performance objectives and examining the steps and measures that could be taken to address unmet performance expectations. Using the information and findings from the technical analysis, WSDOT, along with its planning partners have moved to the next stage of the transportation study to address the safety and congestion needs identified in the 2021 Existing Conditions Analysis.

The study area spans the 9-mile-long corridor that runs through the urban areas of Mount Vernon and Burlington in Skagit county. The focus area of the corridor is the segment along I-5 from Old 99 Highway (exit 224) to Cook Road (exit 232). The major commercial areas within the two cities in the study area are near the Skagit River bridge. The interchanges at SR 538/College Way (exit 227) and George Hopper Road (exit 229) both feed into these major commercial areas and may impact mobility and safety along this portion of the corridor. The study will identify near and mid-term strategies and solution alternatives to multimodal safety and operational needs.

Exhibit 1 Project Area

PROJECT AREA

The study focuses on I-5 in Skagit county between Old Highway 99 at mile post 222.5 and Cook Road at mile post 233, as shown in Exhibit 1.

PREVIOUS STUDIES

This study builds on the findings of the 2021 Technical Report: Interstate 5 Existing Conditions Analysis Mount Vernon / Burlington. This previous analysis revealed that some corridor segments are not performing within expectations. The traffic operations analysis, safety analysis and merge threshold analysis revealed that there are some segments on the corridor that experience higher vehicle density and poor levels of service for traffic, ramp operations and crashes.

KEY MESSAGES

The key messages below will be communicated across all interactions such that WSDOT and its consultant team speak with one clear and consistent voice.

STUDY OVERVIEW

- WSDOT is continuing the study of I-5 in Skagit county to understand current and potential future transportation conditions to develop recommendations for improvements to accommodate current and future transportation needs.

STUDY PURPOSE

- WSDOT NW Region Mount Baker Area is initiating the next stage of the I-5 Skagit Transportation Study. The study will gather and analyze multimodal transportation and socioeconomic data, incorporate environmental factors and analyze future transportation conditions in conjunction with a public outreach and engagement process to identify near and mid-term strategy alternatives.
- This effort is a multi-jurisdictional transportation planning effort to address safety and congestion needs identified during the 2021 Existing Baseline Conditions Analysis on the interstate with SCOG The effort is led by WSDOT NW Region Mount Baker Area in consultation with Tribes, local, state and federal stakeholders.
- The 2021 I-5 Existing Conditions Analysis revealed that some corridor segments in the study area were not performing within expectations. The traffic operations analysis, safety analysis and merge threshold analysis revealed that some segments of the corridor are experiencing higher vehicle density, crashes and poor levels of service on the mainline and at several on and off ramp locations.
- The Highway Safety Manual Analysis revealed that while most of the corridor is performing better than the average freeway in Washington, two areas stood out as performing worse than the average freeway: southbound I-5 from the SR 20 interchange to the SR 538 interchange.

STUDY BACKGROUND

- I-5 in Skagit county is part of a 48,000-lane mile system of interconnected controlled or limited access highways that forms part of the National Highway System. The study area is about 9-miles in length with an estimated urban area population in Mount Vernon and Burlington of 49,500 in 2019-2020 according to the Washington State Office of Financial Management.
- I-5 is a four-lane divided interstate which consists of 12-foot driving lanes and an 8-foot shoulder, apart from the Skagit River Bridge where the shoulders narrow to 3 feet.

Bicycles are permitted on a portion of the interstate but restricted between the SR 528/College Way interchange (exit 227) and George Hopper Road interchange (exit 229). Additionally, many local streets in the urban area permit bicycle use.

- The posted speed limit varies between 60 MPH and 70 MPH in the study area.
- There are eight interchanges within the corridor with a total of 30 ramps that provide access on- and off I-5 to local communities. All interchanges are separated by one or more miles with four interchanges that carry traffic to four other state routes. These routes include SR 536, SR 538, SR 20 and SR 11. In Burlington, there is one pedestrian and bicycle east-west crossing under I-5, and four east-west street corridors over or under I-5 in Mount Vernon.
- The Skagit River runs between Mount Vernon and Burlington. There are only two north-south vehicular bridges across the Skagit River: the Skagit River Bridge and the Riverside Bridge, a local bridge that serves the communities of Burlington and Mount Vernon. In Mount Vernon, the SR 536 Division Street Bridge serves east and west Mount Vernon and is an alternate route to the Anacortes/San Juan ferry and Whidbey Island. In the study area there are eight interchanges with associated north and south bound ramps on I-5. These ramps are essential for providing reasonable access and mobility to the community and for regional activities.

COMMUNITY ENGAGEMENT

- Stakeholder and community engagement are essential components of transportation planning in Washington State.
- As part of the study analysis equitable communication and stakeholder engagement strategies will seek to solicit, understand and respond to the concerns of the community.
- Community engagement is a central piece of the I-5 Skagit Transportation Study. The project team is committed to including community members in this process, with an emphasis on reaching and involving people who have been historically underrepresented in planning processes. The engagement activities outlined in this plan support an effort to meet community members where they are and empower the public to make their voices heard and be a part of the process.
- Priority audiences include environmental justice communities, such as low income and minority communities. These groups are particularly important to engage, as they may face unique challenges and have insights that are critical to developing equitable solutions.
- WSDOT will utilize a suite of engagement tools to inform the study, such as stakeholder interviews, targeted business outreach, online surveys, public open houses and workshops, fact sheets and mailers. The community's collective experiences, challenges and goals will be considered alongside the technical analysis. Together, they will be used to validate the findings from the 2021 Existing Conditions Analysis, develop alternatives that address these challenges, and identify solutions that meet the needs of WSDOT, partner agencies and the community.

ENGAGEMENT GOALS AND OBJECTIVES

The following goals and objectives support WSDOT's overall goals for community engagement as outlined in the Community Engagement Plan 2016. It is essential that WSDOT work closely with the community to understand their needs, concerns and ideas throughout the duration of the study.

Goal: Validate the findings from the community engagement performed during the 2021 Existing Conditions Analysis

Objectives:

- Compare community feedback shared during Phase I with 2021 Existing Conditions Analysis.

Goal: Identify community needs in the study area, including the needs of residents, businesses, and other stakeholders

Objectives:

- Gather information from various sources such as community surveys, interviews and outreach events to gain a thorough understanding of needs within the community.
- Engage with key stakeholders in the community, including local community-based organizations, businesses and community leaders to gain their input and support in addressing the identified needs.

Goal: Engage the community throughout the process to ensure that community needs are met and to build understanding and support for potential improvements

Objectives:

- Build awareness by ensuring project-area stakeholders and project partners understand the scope of the study, schedule and opportunities to participate, provide input and influence final decisions.
- Ensure all project decisions are reported back to the greater community and key project stakeholders.
- Establish communication channels such as public events, social media platforms and online surveys to keep the public informed about the progress of the project.
- Incorporate community feedback into the decision-making process, ensuring that community concerns and priorities are adequately addressed in recommendations.

Goal: Identify potential solutions to address issues and meet community needs in the study area

Objectives:

- Solicit input from the community to inform the development and analysis of potential solutions.
- Incorporate the community's feedback and vision into the final set of recommendations.

COMMUNITY ENGAGEMENT STRATEGIES: PHASE I

KEY AUDIENCES

The following stakeholders will be involved in this study. A detailed list of specific organizations and individuals is included Appendix 1.

General public

The general public is invited to participate in this project through an online survey and other engagement activities throughout the study. They are not expected to participate in project workshops. A detailed list of external audiences can be found in Appendix 1.

Community groups

Community groups will include local associations, business organizations and non-profit organizations that represent the diverse interests within the community. These groups will provide valuable insights into the concerns and priorities of the broader community, as well as channels to connect the community to project information and engagement opportunities.

Priority audiences

Priority audiences include environmental justice communities, including people in the study area who represent overburdened, vulnerable, or traditionally underserved communities, as well as minority, low-income, and non-English speaking. These groups are particularly important to engage, as they may face unique challenges and have insights that are critical to developing equitable solutions. Methods for equitable engagement for these priority audiences are detailed below.

Advisory Committee

WSDOT will convene an Advisory Committee to support the study. Participants will participate in workshops to provide feedback on key findings that will inform analysis and key decisions throughout the study. Advisory Committee members may include:

- Skagit Council of Governments
- Skagit Transit
- City of Mount Vernon (planning/public works)
- City of Burlington (planning/public works)
- City of La Conner
- City of Anacortes
- Skagit County
- Port of Skagit County
- Community Action's Latino Advisory Committee
- Skagit Health District
- Skagit County Farm Bureau
- Economic Development Alliance of Skagit County
- Tribes (open positions)
- Samish Indian Nation
- Sauk-Suiattle Indian Tribe
- Swinomish Indian Tribal Community
- Upper Skagit Indian Tribe
- Additional groups from stakeholder interviews, as interested

The project team will extend invitations to community-based organizations and social service providers that participate in stakeholder interviews to join the Advisory Committee.

EQUITABLE ENGAGEMENT APPROACH

This section outlines the recommendations and key tactics the project team will use to ensure an inclusive, transparent and accessible engagement effort consistent with Section 508 of the Rehabilitation Act and the Healthy Environment for All Act, as well as to advance WSDOT's community engagement guiding principles.

WSDOT is committed to conducting an inclusive process by breaking down barriers to participation for all members of the community. At each stage of the process, WSDOT will collaborate with communities to ensure that those who may be most affected by the study's outcomes are aware of the process and have accessible opportunities to express their vision, priorities and concerns.

It is critical to consider communities that could experience the most significant impacts due to the study's outcomes and any subsequent decisions or actions, as well as those that have been disproportionately impacted by past transportation and land use planning decisions. Planning efforts should pinpoint communities or other groups that have been historically excluded from or underrepresented in WSDOT decision-making.

In the context of this study, it is recommended to have an intentional focus on engaging:

- People who live adjacent to existing major highways or roadways who experience adverse impacts from traffic congestion, air pollution and unsafe traffic conditions.
- Future populations affected or impacted by new developments and changes in land use.
- People who do not use vehicles to travel within the study area, who lack secure and accessible transportation modes, including people with disabilities and/or physical mobility challenges.
- People who speak a language other than English who may have been historically excluded from WSDOT decision-making processes.

WSDOT will offer translation services to ensure opportunities for in-language engagement. When promoting engagement opportunities, WSDOT will provide materials in languages spoken by more than 5 percent of people within the study area, as well as instructions on how to request additional translation and interpretation in all languages.

Project planning

- Meet with key stakeholder groups early to understand concerns, community interests and best methods for engagement. This will be an iterative effort and will be achieved largely through stakeholder interviews.

Project materials

- Use simple, easy-to-understand language when communicating project information. Use visuals and graphics where possible.
- Ensure printed materials are available at nearby community centers and libraries, among other important community gathering places, to help maximize reach to those without online access or who might not have received them otherwise.

- Translate project materials and other essential project information languages spoken by more than 5 percent of people in the study area. Translate project information into other languages including ASL upon request.
- Use alt-text to describe or summarize visual elements as is WSDOT standard.

Project-hosted events

- Provide ASL interpretation or closed captioning (if virtual), as requested.
- Ensure promotional materials and project information and other event-related items are translated to increase participation.
- Make it clear that people of all abilities are welcome at each event.
- Host events at venues that are accessible and flexible in design (beyond ADA-compliant), welcoming and near major transit routes and identified community hubs.
- Conduct events and other engagement activities during different times of the day to address variable work schedules and childcare needs.
- When possible, share event materials in advance so attendees and translators have an opportunity to review materials and come prepared to ask questions.
- Record virtual public meetings to post on the project website.

Audiences

- People who live and work in the study area.
- People who travel through the study area.
- People in the study area who represent overburdened, vulnerable, or traditionally underserved communities, including minority, low-income, and non-English speaking.
- People whose communities in the study area have been disproportionately burdened by negative impacts to the environment and safety.
- Farmers and farm workers who live and/or work in the study area.
- Transit/transportation interest groups or other community-based organizations that serve or are based in the study area.

While many engagement tactics will have a broad reach, the project team will also take an intentional approach to connect with certain priority audiences within the study area, such as people from historically underserved communities or people who are living with low incomes, speak limited English or have a disability.

STRATEGIES, TACTICS AND TOOLS

These key tactics will ensure an inclusive, transparent, and accessible engagement effort consistent with the HEAL Act. The table below summarizes engagement approaches, including details on the actions, tools, evaluation criteria, audiences and timelines for each strategy.

	PHASE I (SPRING/SUMMER 2023)					
	Audience: General public, priority communities	**Audience: Community-based organizations, general public priority communities**	**Audience: General public, priority communities**	**Audience: CBOs; priority communities**	**Audience: General public**	**Audience: Advisory Committee**
STRATEGIES	***Distribute awareness-building project materials to the community*** The team will develop and distribute a range of materials throughout the community to connect people with project resources and	***Send targeted emails and phone calls to partners and community groups*** WSDOT and the consultant team will proactively reach out to key partners and community groups to build an informed audience and connect people with opportunities to engage in this process.	***Table at community gathering places*** Tabling at community gathering places, such as grocery stores and farmers markets will support engaging with people in the study area who represent overburdened, vulnerable, or traditionally underserved communities, including minority, low-income, and non-English speaking.	***Conduct interviews with stakeholders and community groups*** Interviews will establish an understanding of existing conditions and concerns, as well as identify considerations to support developing potential solutions.	***Conduct a survey to gather input on existing issues, concerns and ideas*** Survey results will help inform the development and analysis of potential strategies and solutions.	***Send targeted emails and phone calls to identify Advisory Committee members*** WSDOT will proactively reach out to key partners and community groups to build participation in the Advisory Committee.
TACTICS	• Design, translate and print materials • Determine mailing area and send mailer • Distribute materials to key community locations • Use NW Region and general WSDOT social media to share digital materials, as needed	• Develop a contact list • Draft emails and phone scripts • Send emails and make phone calls • Track responses and follow-ups	• Identify popular community gathering locations • Coordinate with site managers • Compile materials for tabling • Engage and interact with the public at events	• Identify key stakeholders and community groups • Develop an interview guide and questions • Schedule and conduct interviews • Record and analyze interview responses	• Develop survey questions and format • Choose an online survey platform • Promote the survey through various channels • Analyze survey responses and summarize findings	• Identify Advisory Committee members • Reach out to members to build awareness • Work with Advisory Committee members to organize workshop • Host Advisory Committee workshop
TOOLS	• Mailer • Flyer • Poster • Social media posts	• Contact list • Email template • Phone script • Project materials • Tracking spreadsheet	• Table setup • Project materials • Sign-up sheets	• Stakeholder contact list • Email template • Interview guide • Project materials • Tracking spreadsheet • Stakeholder interview summary	• Online survey • Promotional materials • Survey summary	• Contact list • Email template • Workshop materials
EVALUATION	• Number of events attended • Number of people engaged	• Number of contacts reached • Response rate • Level of interest and engagement	• Number of events attended • Number of people engaged	• Number of interviews conducted • Representation of interviewees • Quality of insights and feedback collected	• Number of completed surveys • Demographics and representation of survey respondents • Quality and diversity of feedback collected	• Representation on Advisory Committee • Level of interest and engagement • Participation in Advisory Committee workshop

Additional equitable engagement strategies for Phase II will be identified at the start of the next phase and will be informed by how the community engaged into the process during Phase I. Engagement strategies employed during Phase II will seek to broaden the audience established during Phase I and continue making progress towards achieving WSDOT's community engagement goals.

COMMUNITY ENGAGEMENT SCHEDULE

The below timeline of communication and outreach activities are for Phase I: Needs Assessment. During Phase I, the project team will review existing challenges documented in the 2021 I-5 Existing Conditions Baseline Analysis and evaluate future mobility issues. The first phase will include analysis of future travel demands, together with socioeconomic and environmental data. A communication and public engagement plan will be prepared. The Advisory Committee will provide guidance and share information to support the effort. Phase I findings will be used to inform the work in Phase II.

	Phase I Timeline							
Tasks	Jan	Feb	Mar	Apr	May	June	July	Aug
Community engagement plan								
EJ engagement strategies								
Advisory Committee organization								
Advisory Committee workshop and summary								
Stakeholder interviews								
Online survey and summary								
Project website								
Community engagement report								
Phase II engagement kick-off (TBD)								

PHASE II ENGAGEMENT STRATEGIES AND TIMELINE

Following the completion of Phase I, WSDOT will begin Phase II: Strategies and Solution Identification and Evaluation. Phase II will involve further collaboration with the Advisory Committee and the community to identify strategies and evaluate solution alternatives to address traffic safety and operational needs and other issues identified during Phase I.

Community engagement during Phase II may include focus groups, public meetings, additional online surveys and updated project materials. Phase II will identify operations and demand management solution alternatives using a practical solutions approach to achieve multimodal integration of the regional transportation network. Solutions may occur on both the interstate system and/or the local systems. The recommended solution alternatives packages identified will be evaluated to determine their feasibility and benefit and costs to improve I-5 and the regional transportation network.

KEY TEAM MEMBERS

The table below includes key WSDOT, partner and consultant staff that will support the I-5 Skagit Transportation Study.

Role	Name
WSDOT	
ARA NW Region Mount Baker Area	Chris Damitio
Project Manager	John Shambaugh
Planning and Engineering Services Manager	Todd Carlson
Engineering Manager Mount Baker Area	Shane Spahr
Communications Manager	R B McKeon
Communications Support	Madison Sehlke
Public Transportation	Marianna Hanefeld
Transportation Safety Engineering	Jared Cassidy
Traffic Engineering Support	Mike Koidal
Traffic Engineering Support	Shane Sullivan
Environmental Support	Cameron Kukes
Environmental Support	Lisa Sakata
Transpo Group	
Project Manager	Jon Pascal
Transportation Planning Lead	Chris Comeau
Transportation Analysis Lead	Brent Turley
ITS/Technology Technical Lead	Mark Jensen
Stepherson & Associates Communications (S&A)	
Outreach and Engagement Lead	Harrison Price
Outreach and Engagement Support	Artie Nelson
Outreach and Engagement Support	Jack Irwin
The Watershed Company	
Environmental Analysis Lead	Kenny Booth
Environmental Analysis Support	Justin Kay
Partner Groups	
Skagit Council of Governments, Executive Director	Kevin Murphy

Appendix 1: Key Stakeholders

WSDOT will involve the following stakeholders in the I-5 Skagit Transportation Study. This list will be updated throughout the study to reflect current and to-be-engaged audiences.

Stakeholders	Key interests	Engagement strategies
Corridor travelers	Safely and efficiently using I-5 for travel.	• Conduct a survey to gather input on existing issues, concerns and ideas • Distribute awareness-building project materials to the community
Skagit county freight/trucking schools • North Cross Commercial Driving School, LLC. • Taylor Made TDS. Inc. • Skagit City Trucking School, LLC.	Safely and effectively using I-5 to teach students how to operate freight/trucking vehicles.	• Distribute awareness-building project materials to the community • Send targeted emails and phone calls to partners and community groups • Table at community gathering places • Conduct interviews with stakeholders and community groups • Conduct a survey to gather input on existing issues, concerns and ideas
Skagit Council of Governments	Effectively connecting Skagit county government leaders to build up the region and plan for future growth. Impact from construction may impact the ability of Skagit county to grow	• Send targeted emails and phone calls to identified Advisory Committee members • Send targeted emails and phone calls to partners and community groups
Economic Development Alliance of Skagit County	Creating a prosperous, sustainable and equitable community through business attraction, retention and expansion while maintaining Skagit county's natural beauty and quality of life.	• Send targeted emails and phone calls to identified Advisory Committee members • Send targeted emails and phone calls to partners and community groups

		• Conduct interviews with stakeholders and community groups
Port of Skagit County	Ensuring that freight can be moved effectively and efficiently to and from the port. Road conditions and traffic may impact the ability to move freight	• Send targeted emails and phone calls to identified Advisory Committee members • Send targeted emails and phone calls to partners and community groups • Conduct interviews with stakeholders and community groups
Chambers of Commerce: • Burlington Chamber of Commerce • Mount Vernon Chamber of Commerce	Promote the development of local economies and relationship businesses and the communities they are a part of.	• Send targeted emails and phone calls to identified Advisory Committee members • Send targeted emails and phone calls to partners and community groups • Conduct interviews with stakeholders and community groups
Major local employers • Fred Meyer • KarMART • Hexcel • Skagit Regional Health • Draper Valley Farms • Walmart • PACCAR Technical Center • Mount Vernon City Hall • Sierra Pacific Industries • Safeway • Skagit Gardens Inc. • Brown Line LLC • Lab Corp • Skagit Bank • Lowe's • Haggen's	Provided key goods and services to consumers while simultaneously employing members of the community.	• Conduct a survey to gather input on existing issues, concerns and ideas • Distribute awareness-building project materials to the community • Send targeted emails and phone calls to partners and community groups

• Mira Vista Care Center • Skagit Publishing • Headcount Life Care Center of Mount Vernon • Skagit Valley Food Co-Op		
Local elected officials: • Mount Vernon City Council • Mayor Jill Boudreau • Burlington City Council • Mayor Steve Sexton • Skagit County Commissioners • La Conner Town Council • Mayor Ramon Hayes • Anacortes City Council • Mayor Matthew Miller	Effectively serve constituents and ensure that the needs of their communities are being met.	• Send targeted emails and phone calls to identified Advisory Committee members • Send targeted emails and phone calls to partners and community groups • Conduct interviews with stakeholders and community groups
Skagit Transit	Providing residents of Skagit county with reliable transportation options throughout the area.	• Conduct interviews with stakeholders and community groups • Send targeted emails and phone calls to identified Advisory Committee members
Catholic Community Services	Support those in need of assistance and promote their self-sufficiency.	• Distribute awareness-building project materials to the community • Send targeted emails and phone calls to partners and community groups • Table at community gathering places • Conduct interviews with stakeholders and community groups • Conduct a survey to gather input on existing issues, concerns, and ideas

Community Action's Latino Advisory Committee	Ensure that the interests of Skagit county's Hispanic population are represented equitability throughout the project's duration.	• Conduct interviews with stakeholders and community groups

Local tribes:
• Swinomish
• Upper Skagit
• Suak-Siuattle
• Samish
• Lummi Nation
• Nooksack
• Stillaguamish
	Ensure that the interests of tribal members are equitably represented throughout the project's lifetime.	• Distribute awareness-building project materials to the community
		  • Send targeted emails and phone calls to partners and community groups
		  • Table at community gathering places
		  • Conduct interviews with stakeholders and community groups
		  • Conduct a survey to gather input on existing issues, concerns, and ideas
		  • Send targeted emails and phone calls to identified Advisory Committee members

Local schools • Allen Elementary • Bay View School • Edison School • Lucille Umbarger • West View School • Burlington-Edison High School • Mount Vernon High School • LaVenture Middle School • Mount Baker Middle School • Centennial Elementary School • Harriet Rowley Elementary School • Little Mountain Elementary School	Ensuring that both students and faculty can safely and efficiently travel to and from schools.	• Distribute awareness-building project materials to the schools • Send targeted emails and phone calls to partners and community groups • Table at community gathering places • Conduct interviews with stakeholders and community groups • Conduct a survey to gather input on existing issues, concerns, and ideas • Distribute project materials via Peach Jar and school listservs

• Jefferson Elementary School • Washington Elementary School • Northwest Career and Technical Academy • Salish Sea Deaf School • Skagit Academy • Aspire Academy • Mount Vernon Virtual Learning • Skagit Community College • Mount Vernon Christian School • Skagit Adventist Academy • Immaculate Conception Regional School • Emerson Academy • Learning Ladder Child Development Center • Foothills Christian School • Burlington Little School • Summersun Montessori School • Hill Creek Christian • Greenwood Tree Cooperative School		
BNSF • Burlington • Mount Vernon	Safely and efficiently moving freight throughout the Skagit county area and beyond.	• Conduct interviews with stakeholders and community groups • Send targeted emails and phone calls to identified Advisory Committee members
Skagit Valley Tulip Festival Executive Director	Ensure that festival attendees can safely and efficiently travel to and from the event.	• Distribute awareness-building project materials to the community

		• Send targeted emails and phone calls to partners and community groups • Table at community gathering places
Skagit County Farm Bureau	Ensure that the social and economic interests of ranch and farm families in Skagit county are represented.	• Conduct interviews with stakeholders and community groups • Send targeted emails and phone calls to identified Advisory Committee members
Local emergency services • Burlington Fire Department • Mount Vernon Fire Department • Skagit County EMS • Skagit County DEM • Burlington Police Department • Mount Vernon Police Department • Washington State Patrol	Effectively and efficiently using I-5 as a route to provide emergency services to residents of Burlington, Mount Vernon and Skagit county.	• Send targeted emails and phone calls to partners and community groups • Conduct interviews with stakeholders and community groups • Conduct a survey to gather input on existing issues, concerns, and ideas • Send targeted emails and phone calls to identified Advisory Committee members

WSDOT and the project team will be available to share project information and updates at briefings and meetings with additional stakeholder groups beyond those listed above.

Appendix 2: Demographics and Socioeconomic Data

This section provides a summary of demographic data in the study area. The study area covers a 2-mile buffer around I-5 between exit 223 and exit 233 (see map below). Data is sourced from the 2016-2020 ACS Report and may be updated throughout the project as new data becomes available. This information will be analyzed and used to inform the project's outreach and engagement approaches.

LANGUAGE NEEDS

	Total	Percent
Total Population (persons age 5 and above)	39,604	100%
English	27,260	69%
Spanish	10,904	28%
French, Haitian, or Cajun	139	0%
German or other West Germanic	49	0%
Russian, Polish, or Other Slavic	287	1%
Other Indo-European Languages	154	0%
Korean	3	0%
Chinese (including Mandarin, Cantonese)	45	0%
Vietnamese	32	0%
Tagalog (including Filipino)	240	1%
Other Asian and Pacific Island	151	0%
Arabic	29	0%
Other and Unspecified	313	1%
Linguistically Isolated Households*	890	100%
Speak Spanish	715	80%
Speak Other Indo-European Languages	151	17%
Speak Asian-Pacific Languages	24	3%
Speak Other Languages	0	0%

**Households in which no one 14 and over speaks English "very well" or speaks English only.*

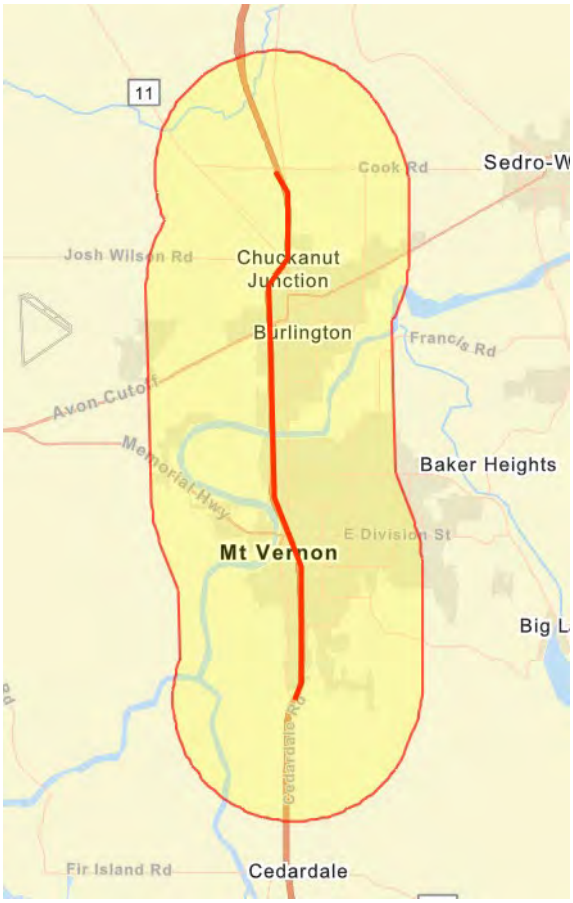
STUDY AREA DEMOGRAPHICS*

	Total	Percent
Population by Race	46,080	100%
Population Reporting One Race	44,031	96%
White Alone	33,345	72%
Black Alone	429	1%
American Indian Alone	665	1%
Asian Alone	1,019	2%
Pacific Islander Alone	32	0%
Some Other Race	8,541	19%
Population Reporting Two or More Races	2,049	4%
Total Hispanic Population	15,818	34%
Total Non-Hispanic Population	30,262	66%
White Alone	26,817	58%
Black Alone	374	1%

American Indian Alone	581	1%
Non-Hispanic Asian Alone	996	2%
Pacific Islander Alone	23	0%
Other Race Alone	102	0%
Two or More Races Alone	1,369	3%
Population by Age	46,080	100%
Age 0-4	2,983	6%
Age 0-17	11,624	25%
Age 18+	34,456	75%
Age 65+	7,915	17%
Households by Income	46,080	100%
< $15,000	1,429	9%
$15,000 - $25,000	1,557	9%
$25,000 - $50,000	4,021	24%
$50,000 – $75,000	3,211	19%
$75,000+	6,566	39%

**Additional demographic and socioeconomic data will be compiled as part of the final study report.*

STUDY AREA



APPENDIX D COMMUNITY ENGAGEMENT SUMMARY

I-5 SKAGIT TRANSPORTATION STUDY, PHASE I

Washington State Department of Transportation

Prepared by: Stepherson & Associates

Prepared for:
Washington State Department of Transportation Northwest Region
Mount Baker Area Multimodal Transportation Planning Office

Washington State Department of Transportation

Table of Contents

COMMUNITY ENGAGEMENT OVERVIEW

This report summarizes the Washington State Department of Transportation's approach to community engagement including activities and feedback collected during Phase I of the Interstate 5 Skagit Transportation Study.

The I-5 Skagit Transportation Study project team engaged the community through a range of communication platforms and solicited input to inform the study process. Engagement emphasized the inclusion of historically underrepresented communities in the planning process and sought to meet community members where they are, to learn about how transportation impacts them and empowering them to have a voice on transportation and the decision-making process.

ENGAGEMENT GOALS

Goals for engagement during Phase I of the I-5 Skagit Transportation Study included:
Validate the findings from the community engagement performed during the 2021 Existing Conditions Analysis.

- ✓ Identify community needs in the study area, including the needs of residents, businesses and other stakeholders.
- ✓ Engage the community throughout the process to ensure that community needs are heard and to build understanding and support for potential improvements.
- ✓ Identify potential solutions to address issues and meet community needs in the study area.

ENGAGEMENT TIMELINE

The below table outlines awareness building tools and engagement tactics that were implemented during Phase I of the I-5 Skagit Transportation Study.

Date(s)	Engagement Tools and Tactics
Building Awareness	
June 6 – Present	Project website, fact sheet (English and Spanish)
May 26, June 2, June 6, June 20	Emails to partners and community groups
June 13, June 16	Social media posts (English and Spanish)
Collecting Input	
June 9, June 14	Stakeholder interviews
June 7	Advisory Committee workshop
June 23	In-person outreach at local community sites
June 8 – June 26	Community online survey (English and Spanish)

EQUITABLE ENGAGEMENT APPROACH

WSDOT is committed to conducting an inclusive process by breaking down barriers to participation for all members of the community. At each stage of the process, WSDOT will collaborate with communities to ensure that those who may be most affected by the study's outcomes are aware of the process and have accessible opportunities to express their vision, priorities and concerns.

To facilitate broader awareness of the project, we translated our fact sheet and survey into Spanish, which was the top language other than English identified through the 2016-2020 American Community Survey. Throughout our Phase 1 engagement, we confirmed that English and Spanish were the most common languages spoken at home throughout Skagit Valley. We will continue prioritizing in- language materials and engagement opportunities throughout subsequent engagement phases.

While a broadly distributed online survey is a common way to quickly get feedback from many people, survey respondents are typically English-speaking and wealthier. To widen our survey's reach beyond typical respondents, we launched the survey through emailing the links to community partners we have engaged with to date and asked them to help us distribute the survey through their community.

It is critical to consider communities that could experience the most significant impacts due to the study's outcomes and any subsequent decisions or actions, as well as those that have been disproportionately impacted by past transportation and land use planning decisions.

In the context of this study, we focused on reaching out to:

- People who live adjacent to I-5 or local roads that may experience adverse impacts from traffic congestion, air pollution and unsafe traffic conditions.
- Future populations affected or impacted by new developments and changes in land use.
- People who do not use vehicles to travel within the study area, who lack secure and accessible transportation modes, including people with disabilities and/or physical mobility challenges.
- People who speak a language other than English who may have been historically excluded from WSDOT decision-making processes.

KEY THEMES

The community shared the following key themes across engagement opportunities during Phase I of the I-5 Skagit Transportation Study, with congestion and safety remaining a common concern for the public as also reflected in the 2021 Existing Conditions Community Survey.

1. **Improving Alternative Transportation Options**: Another important theme was the desire for improved alternative transportation options. Respondents expressed a need for better public transportation services, including faster and better-connected bus routes. Additionally, there was a stated desire for improved cycling infrastructure and safer pedestrian crossings.

2. **Mitigating traffic congestion**: Traffic congestion was a recurring challenge mentioned by the community. It was often attributed to insufficient interchange capacity, lack of alternative routes to cross I-5, and frequent crashes that cause backups.
3. **Enhancing safety measures**: Safety concerns were prevalent among participants, with mentions of accidents and reckless driving.
4. **Enhancing infrastructure and road design**: One key theme that emerged across responses was the need for infrastructure improvements in and around Mount Vernon and Burlington on I-5 and the local transportation network. Participants highlighted issues such as insufficient lane capacity, short on/off ramps, and poorly timed traffic lights.

COMMUNITY ENGAGEMENT: BUILDING AWARENESS

WSDOT hosted a combination of virtual and in-person engagement activities to reach as many people within the study area as possible, which means meeting people where they are. The activities conducted below were done to build awareness about the study and connect the community to opportunities to provide feedback.

Outreach at local community sites: Understanding that a limited number of people follow WSDOT on social media and that the number of people we reach can via email is limited, the team staffed a table at three locations in Skagit County to meet people where they are, build awareness and connect people to opportunities to get involved. The team tabled at the following locations for approximately 2 hours each on June 23, 2023:

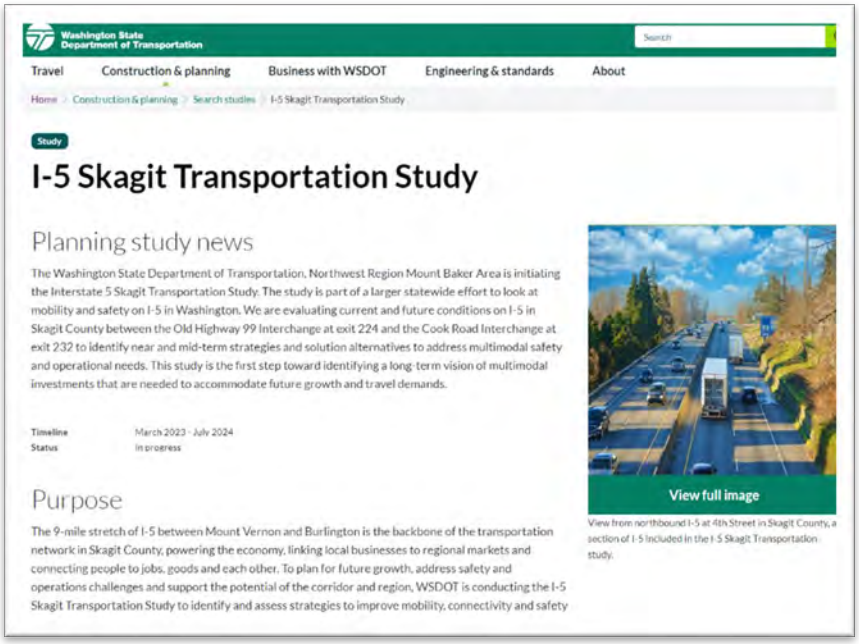
- Skagit Station
- Skagit Valley Food Coop
- Burlington Fred Meyer

Emails: The project team emailed community members to share the latest project information and promote opportunities for connection. The emails included a brief description about the study, how public feedback will help inform the study process, opportunities for community members to provide input and ways stay informed on project updates.

- Skagit Regional Health
- Draper Valley Farms
- PACCAR Technical Center
- Mount Vernon City Hall
- Sierra Pacific Industries
- Skagit Gardens Inc.
- Banner Bank
- Mira Vista Care Center
- Skagit Publishing
- Skagit Valley Food Co-Op
- Burlington-Edison School District
- LaVenture Middle School
- Northwest Career and Technical Academy
- Mount Vernon Virtual Learning
- Skagit Valley College
- Mount Vernon Christian School
- Skagit Adventist Academy
- Immaculate Conception Regional School
- Learning Ladder Child Development Center
- Foothills Christian School
- Burlington Little School
- Summersun Montessori School
- Hill Creek Christian
- Skagit Valley Tulip Festival
- Burlington FD
- Mount Vernon FD
- Skagit County EMS
- Skagit County DEM
- Burlington PD
- Mount Vernon PD
- Washington State Patrol

Social media posts: The project team coordinated with the WSDOT social media team to share an update on the study and build awareness about the survey. The following Tweets were posted in both English and Spanish. About 20,000 people have viewed both tweets.

Project Website: Serving as a central landing page for the community, the project website included planning study news, background information and resources, and connections to engagement opportunities in both English and Spanish.



COMMUNITY ENGAGEMENT: COLLECTING INPUT

WSDOT used the following tactics to continue two-way conversations with the community to inform the Study.

Stakeholder Interviews: The project team held virtual interviews with members of local government agencies and community-based organizations within the study area to build relationships, understand the needs of communities they serve or represent and gather input on engagement strategies for future phases of the study. Interviews were based on stakeholder's location within the study area, diversity of communities served and ability to share information internally and to other organizations in the community. The three stakeholders interviewed were:

Date	Organization / Group
6/9/23	Mount Vernon Chamber of Commerce
6/14/23	Mount Vernon School District
6/14/23	Skagit Transit

While some groups did not respond to our multiple outreach attempts, we still provided information such as the link to the English and Spanish version of the online survey and fact sheet. Those groups include:

- Community Action's Latino Advisory Committee
- Catholic Community Services
- Skagit County Farm Bureau
- Burlington Chamber of Commerce
- Friends of Skagit County
- Burlington-Edison School District
- North Cross Commercial Driving School, LLC
- Taylor Made TDS Inc
- Skagit City Trucking School LLC

Summary of Stakeholder Interviews

Interviewees provided additional context about the communities they serve and shared feedback about how and why people travel along the I-5 corridor, barriers to traveling within the study area, actions they take to avoid those barriers and strategies to engage the community in future phases of the study. Key themes emerged in the following areas:

Travel behavior

- All participants use both I-5 and local roads to travel throughout the study area.
- Participants shared that many people primarily use local roads if only traveling a short distance, such as to visit local businesses, since travel time would be similar if traveling via I-5.
- People mostly use I-5 if traveling to/from locations further north or south of the study area, or to make east-west connections to outlying communities in Skagit or Island County.

I-5 challenges and concerns

- Traffic congestion on I-5 between Old Highway 99 (exit 224) and Cook Road (exit 232) was highlighted as a major challenge. Respondents mentioned that I-5 experiences capacity issues, especially in the late afternoon, leading to slowdowns and traffic jams.
- There were concerns raised about the capacity of certain interchanges along I-5, specifically:
    - Cook Road exit often has traffic backing up onto the shoulder of I-5.
    - Kincade Street interchange (east) has an awkward layout causing many northbound travelers to avoid it.
- The presence of railroad crossings near interchanges was also identified as a barrier, affecting traffic flow not only on the roads connected to the interchanges but on I-5 itself. The railroad crossing near Skagit Station delays the time it takes buses to reach the I-5 overpass.

Local roads challenges and concerns

- There is less severe congestion on local roads compared to I-5 but they can experience congestion during peak times.

- One participant shared that local road congestion tends to be more severe in Burlington than Mount Vernon, especially along Burlington Blvd.
- Modifications to local bus service to meet population growth (such as adding or upgrading bus stops) are difficult due to the expense.

Alternate routes

- One participant stated that many travelers do not go far out of their way not to use I-5.
- Alternate routes that are used, includes:
    - Old Highway 99 and Riverside Drive were mentioned as two major routes.
    - The road on the west side of I-5 that connects to the road that crosses underneath I-5.
    - Many use Riverside Drive out of Mount Vernon to avoid railroad crossing.

Travel impacts

- One participant stated that many cannot cut it close with their schedules due to the travel challenges they experience within the study corridor.
- The impact of congestion on I-5 and local roads, combined with delays at railroad crossings, is a real issue for people in Mount Vernon and Burlington.
- Major events, such as the Tulip Festival, contribute to congestion which often dictates the routes people use.
- Challenges when going through the I-5 corridor make travelling less safe. Travel in Skagit County is so dependent on personal vehicles and the cost of vehicles can mean that people with disabilities and/or low-income communities have a harder time getting around.

What works well

- There are local routes parallel to I-5 so if backups occur, travelers can divert off I-5.
- For transit agencies, a lot of right-of-way exist, making ideas such as flyover stops a possibility.
- At certain times of the day, I-5 is wide open making it easier to get from point A to point B.
- I-5 provides convenience and opportunity in a rural community.
- I-5 allows people to get from Mount Vernon to Burlington in less than 10 minutes.
- Without the interstate, many people would have limited options to travel further outside the County.

Engagement and communications

- Universal language is key in signage. When thinking about inclusive practices, what works for the least will work for the most.
- Hire interpreters and get everything translated into Spanish.
- Participants recommended that WSDOT meet with the following groups:
    - Latinx Advisory Committee (LAC) of Skagit County

- Catholic Community Services
- Economic Development Alliance of Skagit County (EDASC)
- Mount Vernon Downtown Association

Advisory Committee Workshop: The project team hosted a virtual workshop with the Advisory Committee supporting the study. The committee comprises of members from various groups that were identified during the 2021 Existing Conditions Analysis engagement phase including local government agencies, community-based organizations, social service providers, Tribes and businesses. Additional potential members were identified during the current needs assessment phase of the study. The study team gathered input on the Advisory Committee's needs, interests and issues as it relates to the study. Workshop attendees were from the following groups:

- Skagit Council of Governments
- Skagit Transit
- City of Mount Vernon
- City of Anacortes
- Skagit County
- Skagit County Veteran Services

In-Person Outreach: WSDOT tabled and conducted outreach at three key locations within the study area to get the word out about the I-5 Skagit Transportation Study, including the opportunity for the public to take an online survey and share feedback with the project team. The team tabled at the following locations for approximately 2 hours each on June 23, 2023:

- Skagit Station
- Skagit Valley Food Co-op
- Burlington Fred Meyer

Online Survey: During Phase I of the I-5 Skagit Transportation Study, WSDOT solicited input via a public community survey to understand challenges experienced on the regional transportation system in the Mount Vernon and Burlington area. The survey focused on travel patterns on local roads, I-5, preferred modes of travel, and barriers and opportunities experienced when traveling in or through Mount Vernon and Burlington.

The survey ran from June 8 through June 26, 2023. A Spanish version of the survey ran from June 15 through June 26, 2023. A total of 1,144 people participated in the survey. WSDOT published the survey on the project website and shared the survey via Twitter and targeted emails to stakeholders. Additionally, the project team hosted pop-up events on June 23 at Skagit Station, Skagit Valley Food Co-op and Burlington Fred Meyer.

Survey Responses and Analysis

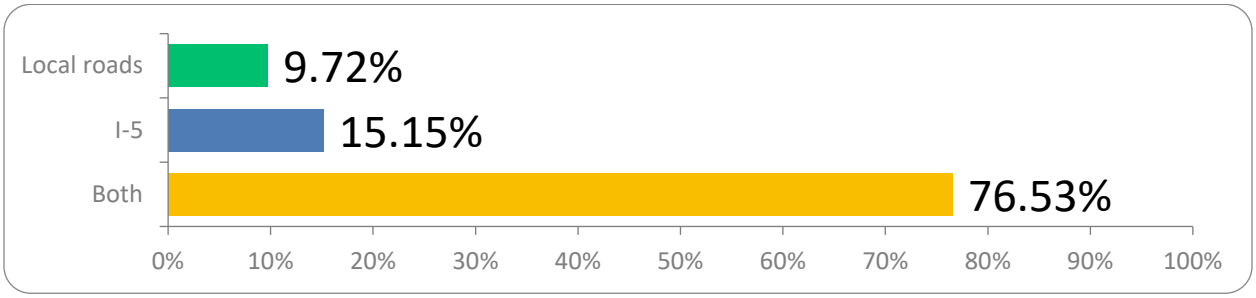
Community input outlined and summarized below will support WSDOT's understanding of how the community uses I-5 and local roads to move throughout the study area and Skagit County and inform the development of solution alternatives in Phase II.

Responses from the community help to achieve a few of the main goals of the study, including:

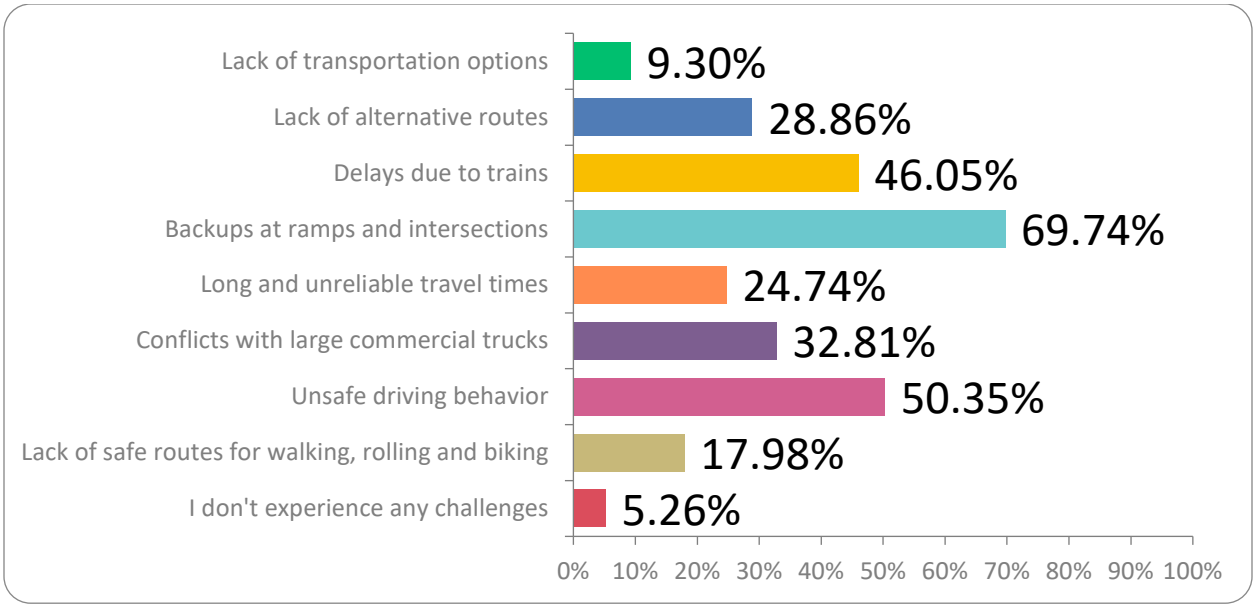
- Validate the findings from the community engagement performed during the 2021 Existing Conditions Analysis.
    - The community responses show that traffic congestion and safety continue to remain a major concern for those traveling throughout the study area.
    - Methods of travel remain roughly the same, with a vast majority of people using personal vehicles to travel.
    - Other travel information such as most used interchanges and primary purpose for travel also match the findings from the 2021 existing conditions analysis survey.
- Identify community needs in the study area, including the needs of residents, businesses, and other stakeholders.
    - Survey respondents shared improvements they would like to see within the study corridor for a better overall travel experience including:
        - Improved road conditions (i.e. infrastructure and road maintenance)
        - More and well-connected public transit services
        - Additional routes that support more North/south, east/west connections, especially over the Skagit River.

Below is a summary of responses to each survey question.

1. When you travel in or through Mount Vernon and Burlington, do you primarily use local roads, I-5 or both?



2. What challenges do you experience when traveling in or through Mount Vernon and Burlington? (Select all that apply)



Summary of "Other" responses:

- **Traffic congestion**: The most prevalent theme shared was traffic congestion, which included slow-moving traffic, backups and frequent slowdowns on major routes such as the Skagit River Bridge and I-5. This congestion was often attributed to insufficient capacity, lack of general-purpose lanes and backups caused by accidents.
- **Infrastructure issues**: Many respondents mentioned issues related to infrastructure, such as insufficient lane capacity, short on/off ramps and poorly timed traffic lights. These factors are seen as contributing factors to congestion, unsafe conditions and difficulty merging onto the freeway.

- Safety concerns: Safety was a recurring theme, including accidents, reckless driving, speeding, tailgating and inconsiderate driving behaviors. Respondents also mentioned the need for improved emergency response access and the potential risks associated with accidents on the Skagit River Bridge.
- Public transportation and rail services: Some respondents expressed a desire for improved public transportation options, including more frequent Amtrak services and increased freight rail transport to relieve truck traffic. Inadequate passenger rail and transit frequency were mentioned as challenges.
- Road maintenance and quality: Several respondents cited concerns about poorly maintained roads, bumpy surfaces and potholes, which impact vehicle handling and safety.

3. Please tell us more about these challenges.

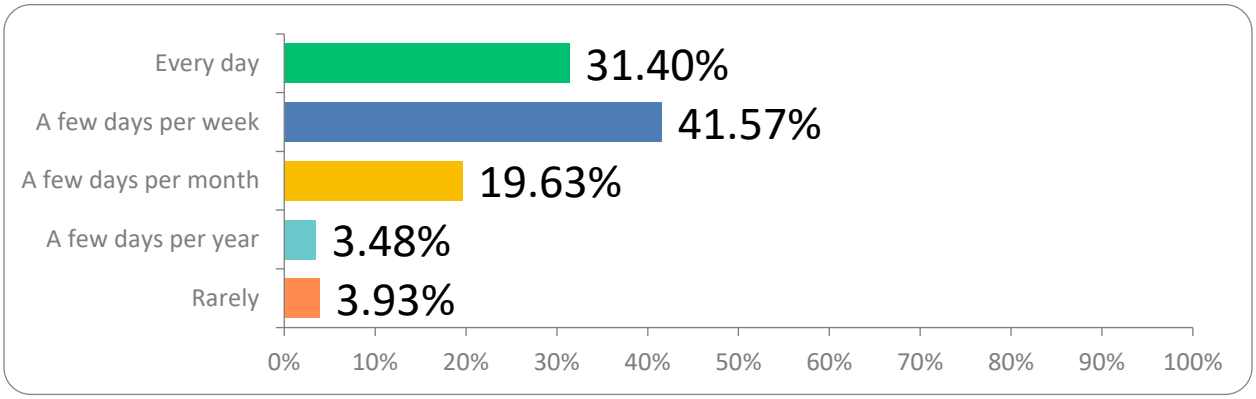
Summary of narrative responses:
Respondents shared a range of frustrations and challenges with the traffic conditions in Mount Vernon and Burlington. They mentioned various issues such as congestion, backups, unsafe driving behaviors, inadequate infrastructure and delays caused by trains. The limited number of lanes, short ramps and merging difficulties were frequently highlighted as causes of traffic problems. Additionally, the proximity of exits and entrances, coupled with heavy truck traffic, exacerbated the congestion and safety concerns. People also expressed concerns about the condition of the roads, insufficient cycling and pedestrian infrastructure and the lack of convenient public transportation options. Overall, the respondents emphasized the need for improvements in road design, traffic management and alternative transportation options to alleviate the challenges they face. Key themes included:

- **Congestion and backups**: Respondents frequently mentioned congestion and traffic backups as major challenges, particularly during peak travel times. The bottlenecks, especially around the Skagit River Bridge and the Cook Road exit, were highlighted as problematic areas.
- **Unsafe driving behaviors**: Many respondents expressed concerns about unsafe driving behaviors, including speeding, reckless lane changes, failure to signal and distracted driving. These behaviors were seen as contributing to the overall traffic issues and increasing the risk of accidents.
- **Inadequate infrastructure**: Several respondents pointed out the inadequacy of the current infrastructure, such as narrow lanes and insufficient on- and off-ramp lengths. They emphasized the need for road expansions, additional lanes and better designed on/off ramps to improve traffic flow and safety.
- **Train delays**: The presence of trains and their impact on traffic flow was a recurring concern. Respondents mentioned long waits at train crossings, especially at Cook Road, which contributed to backups and congestion. The lack of consistent train schedules and their unpredictability added to frustrations.
- **Insufficient alternative transportation options**: Some respondents mentioned the inconvenience of public transportation, citing inconvenient schedules and lengthy travel

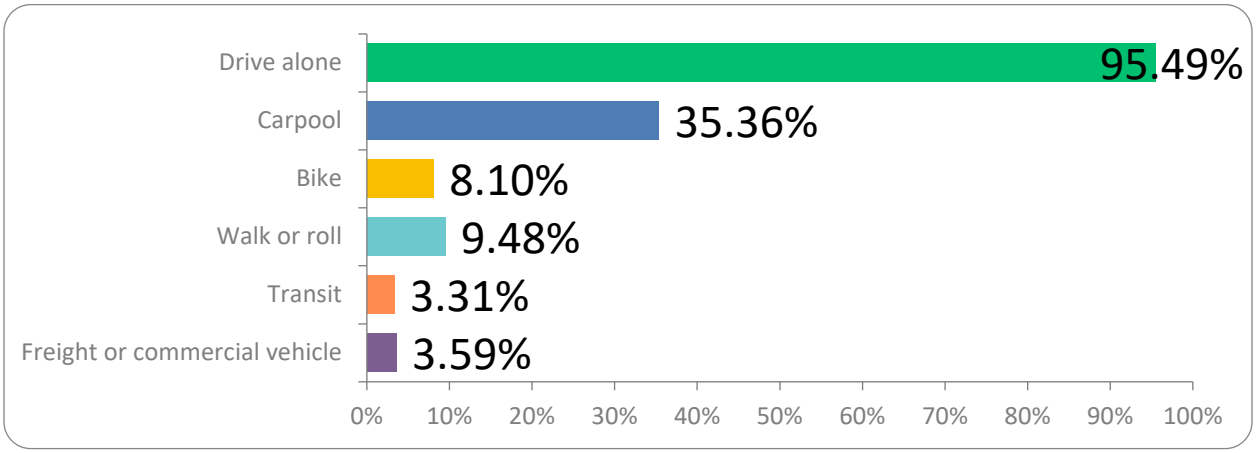
times. They expressed a desire for better bus services, improved cycling infrastructure and safer pedestrian crossings as alternatives to reduce reliance on cars.

- **Road conditions**: The poor condition of the roads, especially uneven surfaces, was mentioned as a safety concern for drivers, cyclists and pedestrians. The need for road repairs and better maintenance was emphasized by some respondents.

4. How often do you experience these challenges?



5. Which modes of transportation do you use to travel in or through Mount Vernon and Burlington? (Please select all that apply)

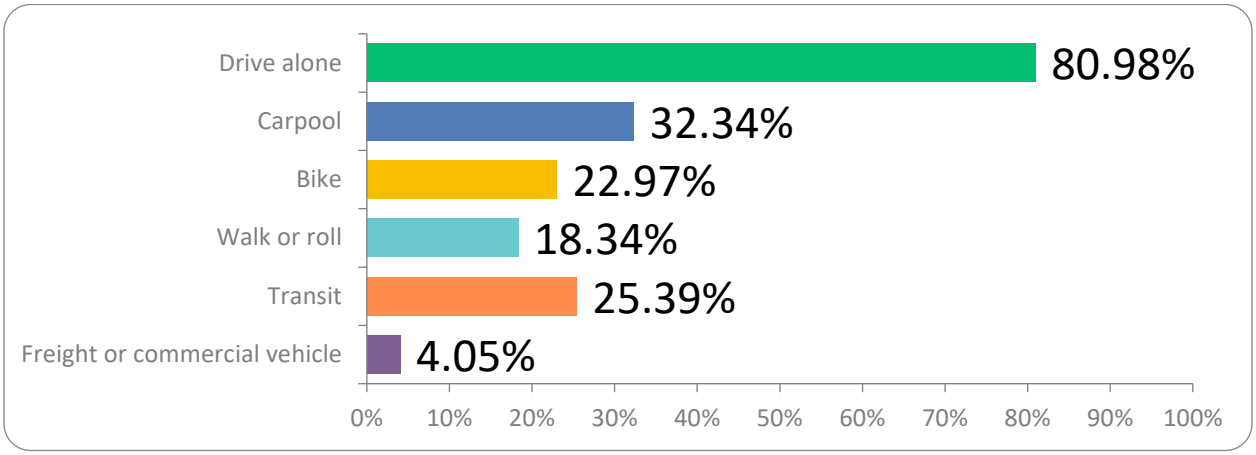


Summary of "Other" responses:
Respondents mentioned various alternative modes of travel in and around Mount Vernon and Burlington. Some preferred driving alone, especially for work purposes or due to safety concerns on the roads for pedestrians and cyclists. Others mentioned using trains, carpooling occasionally, or utilizing Amtrak service. Public transit options were not favored due to long travel times, transfers and perceived safety issues. Overall, respondents emphasized a mix of solo driving, carpooling with family members and occasional use of alternative modes for specific purposes.

6. Why do you choose to use these modes to travel in and through Mount Vernon and Burlington?

Summary of narrative responses:
Driving is the predominant mode of transportation for most participants. The responses gathered indicate that people choose to drive for a variety of reasons. Convenience and flexibility emerged as key factors, with individuals appreciating the ability to make multiple stops, carry groceries and other goods and efficiently run errands using their own vehicles. Limited alternative options also play a significant role, as the absence or limitations of public transportation, inadequate bike infrastructure and long commute times make driving the most practical choice for many. Work-related reasons, such as commuting to different locations or providing field service, were also cited as primary factors for driving. Safety concerns regarding other modes of transportation, particularly walking or biking, were mentioned by some respondents, who felt more secure and comfortable driving. The familiarity and habit of driving, as well as the time efficiency it offers, were also mentioned as reasons for choosing to drive. Living in rural areas with limited public transit, specific destination requirements and the desire for freedom and independence were other recurring themes in the responses.

7. Which modes of transportation would you like to be able to use to travel in or through Mount Vernon and Burlington? (Please select all that apply)



Summary of "Other" responses:
Respondents had varied opinions and preferences regarding alternative modes of travel in and around Mount Vernon and Burlington. Some expressed a strong desire for a train connection, particularly from Bellingham to Mount Vernon, with stops at various locations such as Seattle, Everett and other cities. Others mentioned the need for better bus services, light rail systems and the development of electric bicycle routes. The priority given to cars and the associated dangers were criticized by some, while others mentioned their preference for driving. Several respondents mentioned the importance of pedestrian infrastructure, such as sidewalks and shuttle services to and from transit centers, as well as the need for more efficient and safe alternative transportation options. There were also suggestions for increased Amtrak service, detouring freight to reduce congestion and the desire for rapid transit systems like streetcars.

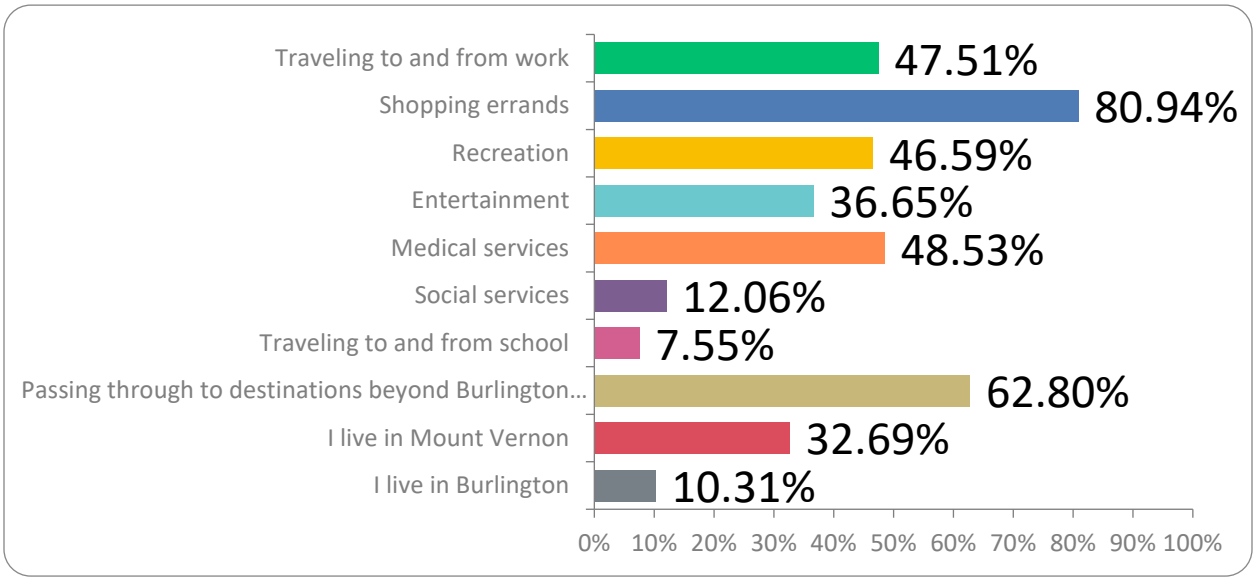
8. Why would you like to be able to use these modes to travel in and through Mount Vernon and Burlington?

Summary of narrative responses:
Responses to this question reflect a diverse range of perspectives and needs. While many individuals currently rely on driving alone due to convenience, flexibility and the lack of viable alternatives, there was also a significant portion of the respondents that expressed a desire for improved transportation options, such as faster and safer buses, expanded routes and more bike trails. Concerns about traffic congestion, the spread-out development of the Skagit County area and perceived safety issues with public transportation were also mentioned as factors influencing the preference for driving alone. However, there is a clear interest in reducing carbon footprint, increasing access to transportation for low-income residents and creating a more sustainable and efficient transportation system in the region. Key themes included:

- **Convenience and flexibility**: Many respondents prioritize the convenience and flexibility provided by driving alone, as it allows them to follow their own schedules, make multiple stops and easily transport goods, which may not be feasible with other modes of transportation.
- **Need for improved public transit**: A significant number of individuals expressed a desire for improved public transit options, including faster, safer and more comprehensive bus services. They believe that reliable and efficient public transportation would provide an alternative to driving alone and help alleviate traffic congestion.
- **Safety concerns**: Some respondents mentioned safety concerns with public transportation, citing issues such as homeless populations, drug-related problems and perceived dangers associated with certain routes. These concerns contribute to their preference for driving alone.
- **Environmental considerations**: Several respondents mentioned the desire to reduce their carbon footprint and contribute to environmental sustainability by using alternative modes of transportation, such as biking, walking, or taking public transit. They see this as a way to combat the car-centric culture and promote a more sustainable transportation system.
- **Accessibility and equity**: Accessibility was mentioned as a factor influencing the preference for driving alone, particularly in areas with limited transportation options. However, there were also respondents who highlighted the importance of providing transportation options for low-income residents and ensuring that public transit is accessible to all members of the community.

Overall, the responses reveal a complex landscape of transportation preferences and needs in and around Mount Vernon and Burlington. While convenience and safety concerns currently drive the preference for driving alone, there is a growing interest in improving public transit options, reducing traffic congestion, promoting sustainability, and enhancing accessibility for all residents.

9. What are your primary reasons for traveling in or through Mount Vernon and Burlington? (Select all that apply)



Summary of "Other" responses:
People travel in and through Mount Vernon and Burlington for a wide range of reasons beyond the options provided above. Some individuals live in neighboring areas like Sedro-Woolley, Anacortes, or La Conner and commute to work or attend church services in Mount Vernon or Burlington. Respondents also travel for business meetings, job site transportation, or to get their cars serviced in the area. Agriculture-related activities and businesses draw people to Mount Vernon. Family visits, socializing and recreational trips to the Cascade Mountains are other common reasons for travelling in and through the study area. Additionally, accessing essential services, such as banking, postal services and medical appointments, often requires traveling to Mount Vernon or Burlington. The limited options for bridges across the Skagit River, population growth and the concentration of city events also contribute to travel in the area.

10. How does I-5 impact your trips when traveling in or through Mount Vernon and Burlington? (500-character limit)

Summary of narrative responses:

- **Traffic congestion**: Many respondents mentioned experiencing heavy traffic congestion along the I-5 corridor in Mount Vernon and Burlington. This congestion often leads to delays, particularly during peak travel times, causing frustration and longer travel times. Respondents expressed concern about the lack of viable alternative routes when I-5 is congested or experiencing accidents. The absence of convenient detour options exacerbates the impact of traffic congestion, leading to even more significant delays.
- **Safety concerns**: Safety emerged as a significant theme, with respondents highlighting the higher risk of accidents and collisions along I-5 in and around Mount Vernon and Burlington. The combination of congestion, heavy truck traffic and merging lanes can create dangerous conditions, making drivers feel uneasy and potentially increasing the likelihood of accidents.

11. Which local roads do you use to avoid traveling on I-5? (500-character limit)

Summary of narrative responses:

Many respondents mentioned utilizing Highway 99 as an alternative to I-5. Several participants noted that Highway 99 offered a less congested and more scenic drive, making it an appealing option for their daily commute or leisure trips.

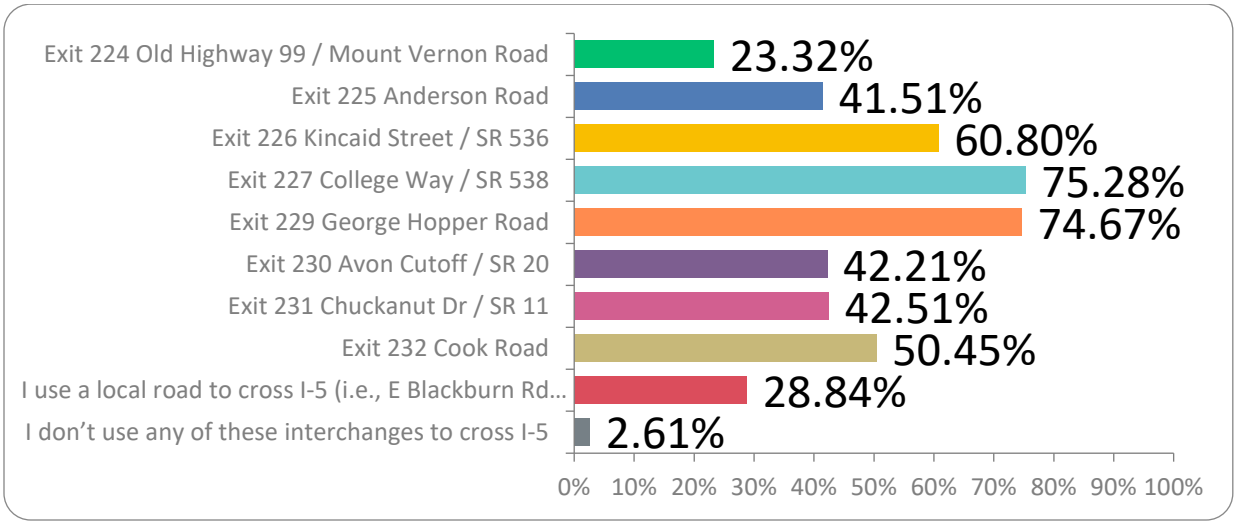
Another frequently mentioned alternative was utilizing local streets within Mount Vernon and Burlington to bypass heavily congested areas or to access specific neighborhoods or commercial areas conveniently.

Additionally, some respondents mentioned utilizing state or county highways as alternatives to I-5. These alternative routes were chosen based on factors such as reduced traffic, improved road conditions, or to reach specific areas outside the main urban centers.

A notable trend was the reliance on navigation apps or GPS systems to identify and navigate alternate routes. Many respondents mentioned using popular apps like Google Maps or Waze to help them identify the best detours or avoid congested areas effectively. This reliance on technology highlights the role of digital navigation tools in guiding drivers towards efficient local road alternatives.

Overall, the responses indicate a diverse range of local road choices to avoid traveling on I-5, with Highway 99, local streets and other state or county highways being the most commonly mentioned options. Factors such as proximity, traffic conditions, scenic routes and destination played a significant role in participants' decision-making process, often coupled with the assistance of navigation apps to ensure a smooth and efficient journey.

12. Which interchanges do you use to cross I-5 between Mount Vernon and Burlington? (Select all that apply)



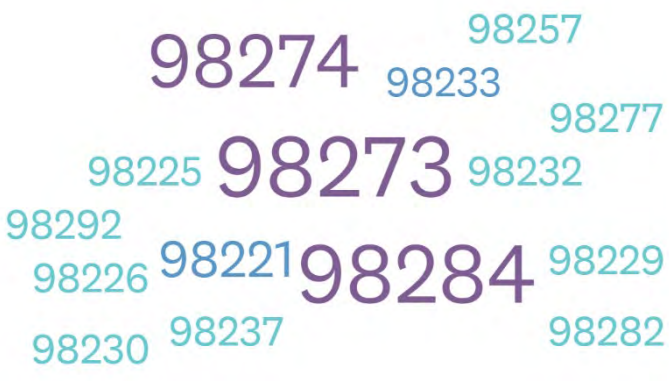
13. What are the primary challenges you face at these interchange(s)? (500-character limit)

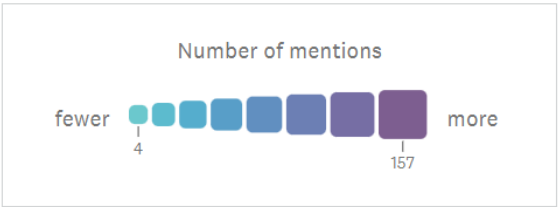
Summary of narrative responses:
The primary challenges faced at interchanges in the study area included traffic congestion, poor infrastructure, safety hazards and a lack of public transportation options. These issues increase the risk of accidents and contribute to overall inefficiency in the transportation system. Key themes included:

- **Traffic congestion**: Many respondents highlighted traffic congestion as a significant challenge. They mentioned long queues, delays and bottlenecks at interchanges, resulting in frustration and delays.
- **Poor infrastructure**: Many respondents expressed concerns about the inadequate infrastructure at interchanges. They cited issues such as insufficient lanes, outdated designs and lack of proper signage, leading to confusion, accidents and inefficient traffic flow.
- **Safety hazards**: Safety emerged as another prominent challenge. Respondents pointed out the absence of pedestrian crossings, inadequate lighting and unsafe merging lanes, posing risks for both drivers and pedestrians. These hazards contribute to accidents and raise concerns about the overall safety of the interchanges.
- **Lack of public transportation options**: A recurring theme was the absence or limited availability of public transportation options at these interchanges. Respondents mentioned the inconvenience of not having access to buses, trains, or other forms of public transportation, which forces more people to rely on private vehicles, exacerbating traffic congestion.

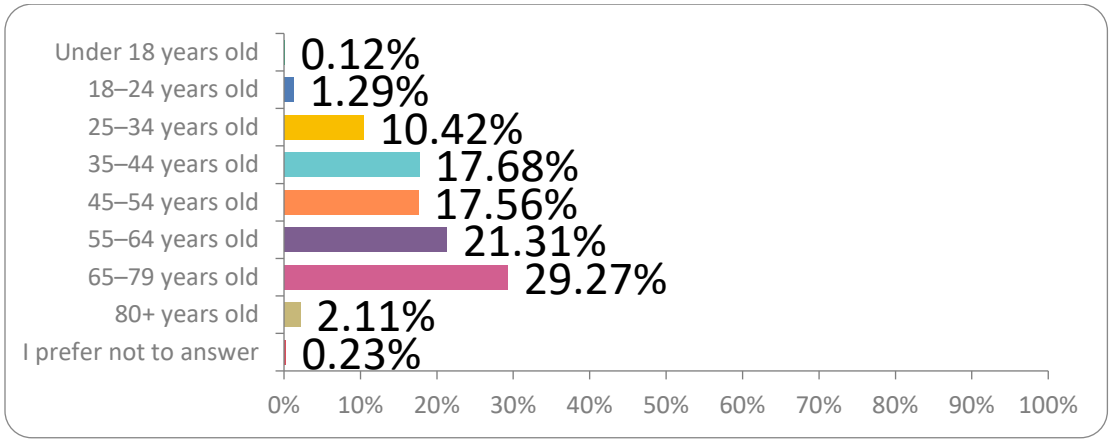
Demographics

15. What is your ZIP code?

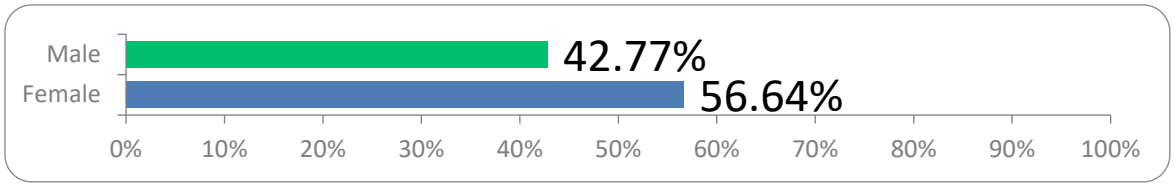




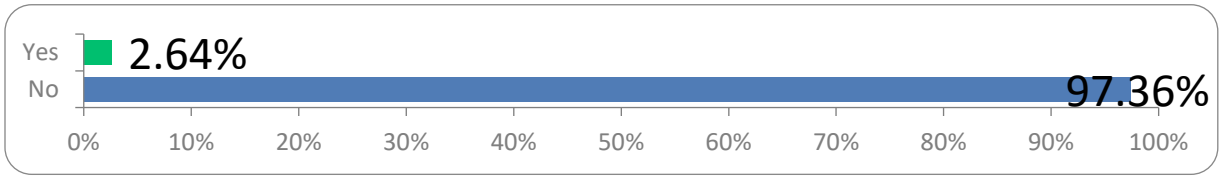
16. What is your age?



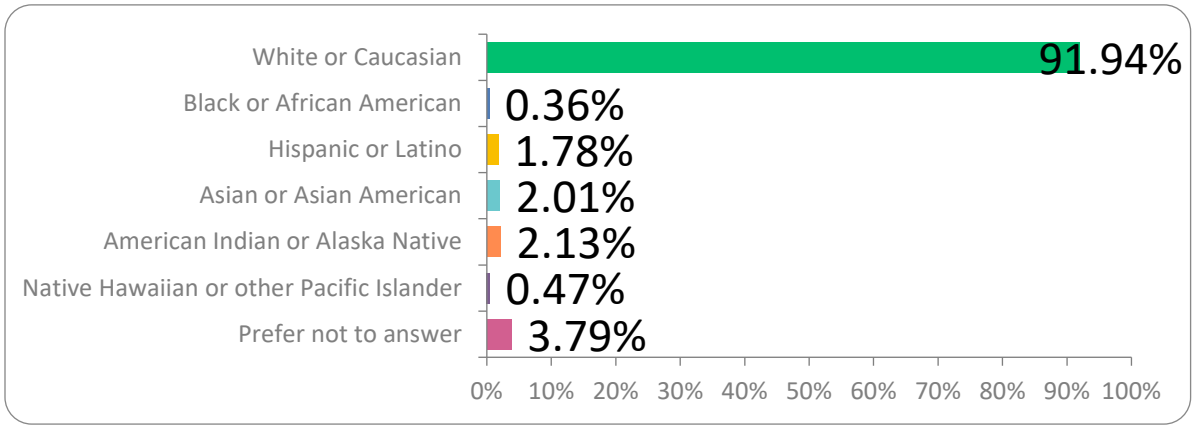
17. How do you identify?



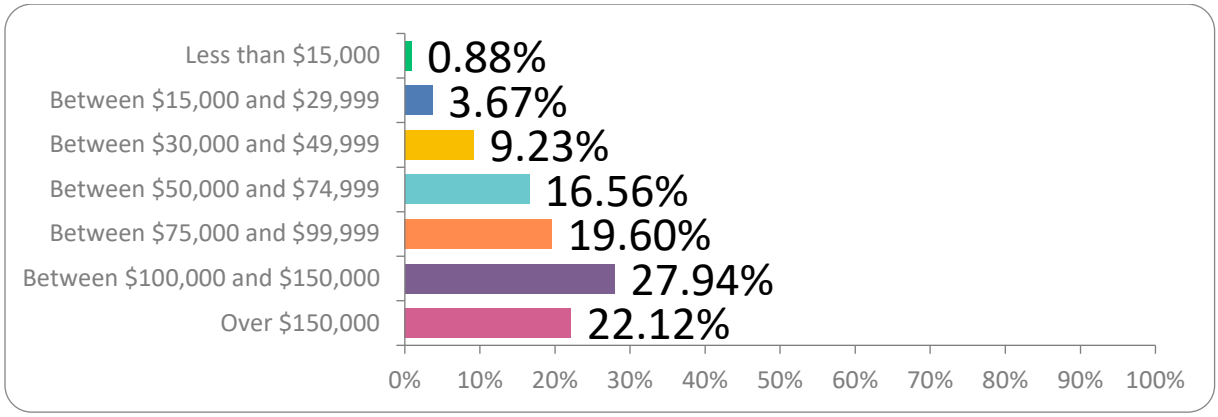
18. Ethnicity - Are you Hispanic?



19. Race - How would you describe yourself? (Select all that apply)



20. What is your approximate average household income?



APPENDIX E TRAFFIC OPERATIONS AND SAFETY ASSESSMENT

I-5 SKAGIT TRANSPORTATION STUDY, PHASE I

Washington State Department of Transportation

Prepared by:
Transpo Group USA, Inc.

Prepared for:
Washington State Department of Transportation Northwest Region
Mount Baker Area Multimodal Transportation Planning Office

Washington State Department of Transportation

Table of Contents

FREEWAY OPERATIONS AND ASSESSMENT

INTRODUCTION

The Washington State Department of Transportation (WSDOT) Northwest Region Mount Baker Area is initiating the Interstate 5 (I-5) Skagit Transportation Study in coordination with the Skagit Council of Governments (SCOG). This study will gather multimodal transportation and socioeconomic data, review key environmental factors, and analyze current and future transportation conditions to determine how I-5 in Skagit County can better meet regional mobility and safety needs. The study will align with the roles and responsibilities addressed in the joint agreement (GCB 1363) between WSDOT, SCOG and Skagit Transit.

This study builds on the findings of the 2021 Technical Report: Interstate 5 Existing Conditions Analysis Mount Vernon / Burlington. The previous study revealed that some corridor segments are not performing within expectations. The traffic operations analysis, safety analysis and merge threshold analysis revealed that there are some segments on the corridor that experience higher vehicle density than desired and poor levels of service for traffic, ramp operations and crashes. This study will build off the 2021 study analysis to show what segments of the corridor are working well, areas that are not preforming within expectations and future 2045 conditions.

An overall objective of the study also includes improving information sharing and engagement with the community to minimize duplication of efforts between planning, the environmental review and project delivery processes. Additionally, the study will incorporate the new legislative directive to include Planning and Environmental Linkages (PEL) processes as needed to fulfill requirements under the National Environmental Policy Act (NEPA) process.

PROJECT BACKGROUND

In 2021, WSDOT in coordination with SCOG initiated a baseline analysis of I-5 in the Mount Vernon and Burlington urban areas with the goal of determining if I-5 is meeting regional transportation performance objectives. Using the information and findings from the technical analysis, WSDOT, along with its planning partners have moved to the next stage of the transportation study to address the safety and congestion issues identified in the 2021 Existing Conditions Analysis.

PROJECT AREA

The study area spans the 9-mile-long corridor that runs through the urban areas of Mount Vernon and Burlington in Skagit county. The focus area of the corridor is the segment along I-5 from Old 99 Highway (Exit 224) to Cook Road (Exit 232) as shown in Exhibit 1. The major commercial areas within the two cities in the study area are near the Skagit River bridge.

Exhibit 1 Project Area

There are eight interchanges in the study area; four provide access to state highways that intersect with I-5. State highways included in the urban area include State Routes (SR) 536, 538, 20 and 11. There are only two north-south bridges across the Skagit River; the Skagit River Bridge (now formally known as the I-5 Trooper Sean M. O'Connell Jr. Memorial Bridge) and the Riverside Bridge, a local bridge that serves the communities of Burlington and Mount Vernon. In Mount Vernon, the SR 536 Division Street Bridge serves east and west Mount Vernon and is an alternative route to Anacortes/San Juan Ferry and Whidbey Island.

DEVELOPMENT OF TRAVEL FORECASTS

The 2045 traffic operations and safety analyses use the tools and inputs that were developed for the 2021 Existing Conditions Analysis, except that traffic volumes are forecast to 2045 conditions using the updated 2022 traffic volumes. The following describes the travel forecast methodology.

EXISTING 2022 TRAFFIC VOLUMES

The existing 2022 traffic volumes were used as the foundation for developing the travel forecasts. As part of the 2021 Existing Conditions Analysis, PM peak period traffic volumes for the I-5 mainline and ramp facilities were developed. The data included seasonal adjustments, adjustments to reflect non-pandemic conditions, and spot adjustments to create balanced volumes through the corridor representing typical weekday conditions. Based on similar adjustments as before, but using

updated 2022 traffic counts, a set of revised existing 2022 traffic volumes were developed by WSDOT. The study uses the updated existing 2022 volumes in the forecasting process.

Design volumes used in the analysis are based on a combination of Permanent Traffic Recorder (PTR) hourly volumes and 24-hour volume counts taken on all ramp terminals in late January and early February of 2021.

The PTR located at milepost 226.96 lies between the Kincaid St and College Way interchanges. Hourly volumes from January 2015 through February 2021 were obtained via the WSDOT Transportation Data, GIS & Modeling office.

This hourly volume was post-processed to obtain Annual Average Daily Traffic (AADT) and K-30 values for pre-pandemic years (2015 to 2019) using the methodology outlined in the current version of the FHWA Traffic Monitoring Guide and FHWA Traffic Data Computation Method Guide. These values were then used to estimate the yearly growth rates and K-30 factors for pandemic years (2020 and 2021), resulting in final non-pandemic volume estimates for AADT and Design Hour Volume (DHV) for the 2021 analysis year.

Using the estimated AADT and DHV, composite seasonality and design hour factors were calculated for all days in 2021 and subsequently applied to the corresponding 24-hour counts obtained at the ramp terminals.

Final corridor volumes used in the analysis were determined using a combination of the adjusted ramp volumes, adjusted PTR volume, and ramp balancing.

2045 TRAVEL FORECASTS

The traffic volume forecasts are based on the Skagit Council of Governments travel demand model (SCOG Model). The SCOG Model currently has a base year of 2018 and a future horizon year of 2045. The 2045 model includes the population and land use growth anticipated in the region by 2045 (see page 14 for additional model information). The SCOG Model traffic assignment is a PM peak one-hour period assignment between 4:00 p.m. and 6:00 p.m. on a typical weekday. Because the model is a peak-hour model, it does not include forecasts for other hours of the day.

The forecast methodology used the “difference method” to forecast future traffic volumes. For each I-5 segment and ramp, the difference in 2045 and 2018 model volume was calculated to reflect volume growth between 2018 and 2045. This growth was then adjusted using the straight-line interpolation methodology to reflect growth between 2022 and 2045. This one-hour growth volume was combined with the corresponding one-hour 2022 existing traffic volumes to create the total 2045 forecast traffic volumes.

Where 15-minute volumes are available, the existing 2022 distribution pattern of volumes across the 3:00 p.m. to 7:00 p.m. timeframe for existing volumes was used to develop the future 2045 15-minute volumes over the same time period. The 15-minute forecasts were calculated using traffic count data provided by WSDOT and the one-hour forecast discussed above. WSDOT VISSIM Protocol (September 2014, Section 3.3.3) discusses time-varying volume profile estimation methods. The 15-minute counts, provided by WSDOT, were used to develop time profiles to expand the 2045 1-hour post-processed volume forecast to 15-

minute forecasts between 3:00 p.m. to 7:00 p.m. for both mainline and ramps. The time-varying volume profile estimation method followed these steps:

- Estimated a peak period origin-destination matrix for the study area using the travel demand model.
- Developed 15-minute volume profiles for the study area links from the WSDOT traffic data recorders.
- Applied the percentage of the origin-destination matrix developed for the peak period to calibrate the 15-minute volume profiles developed for the non-peak hours; the formula used was (existing 15-minute volume) / (existing peak hour count) x (future adjusted).

PM peak hour traffic volume forecasts along the I-5 mainline segments show between a 0.4 to 1.0 percent annual growth rate from existing 2022 traffic volumes depending on direction and segment. This is much smaller than overall growth in vehicle trips within the county due to capacity constraints along the I-5 corridor during peak travel conditions (see page 14 for more discussion).

ASSESSMENT OF FUTURE I-5 MAINLINE AND RAMP PERFORMANCE

The assessment of corridor traffic operations is generally consistent with the prior 2021 analysis. The primary focus of the 2045 conditions performance metrics was freeway segment level of service. Other ramp related metrics (merge-lane volume threshold) were updated as well for comparison with the 2021 analysis. Consistent with the 2021 analysis, mainline and ramp performance metrics focus on the PM peak period during typical weekday conditions. Additional corridor operations analysis may need to be considered in Phase 2 of this study. For example, the impact of railway operations could be addressed with respect to I-5 mainline and ramp performance.

FREEWAY SEGMENT LEVEL OF SERVICE

The purpose of this metric is to understand how each freeway segment is operating or its level of service (LOS). LOS is defined as a letter grade A through F by the *Highway Capacity Manual* (HCM) 6th Edition for freeway segments using traffic density, or passenger cars per mile per lane, as the defining metric. LOS A represents low density, free-flow conditions whereas LOS F represents high density, very congested conditions. The LOS standard for this section of I-5 is LOS D since it is designated as a Highway of Statewide Significance. Northbound and southbound operations are represented on pages 24 and 25.

Consistent with the 2021 Existing Conditions Analysis, the future 2045 freeway LOS was calculated from the *Highway Capacity Software Version 7* (HCS7) using the Freeway Facilities Analysis HCM methods. These methods are better suited to understand traffic operations where LOS F may be present for one or more 15-minute periods, because it takes into account potential queuing impacts during oversaturated conditions.

Northbound Operations

As shown in Exhibits 2 and 3 (and included as an attachment), a heat map (a large table or matrix that shows good and bad conditions at-a-glance based on color-coded values) was

created of freeway density and LOS conditions for the northbound direction of I-5, in 15-minute periods between 3:00 p.m. and 7:00 p.m. Exhibit 2 represents 2021 conditions and Exhibit 3 represents 2045 conditions.

For 2045 northbound conditions on I-5, LOS F conditions (shown in black) are expected in five different 15-minute periods in the area generally between Anderson Road (Exit 225) and George Hopper Road (Exit 229). This compares to 2021 conditions where only two 15-minute periods between Kincaid Street (Exit 226) and George Hopper Road (Exit 229) were at LOS F. Like 2021 conditions, the most congested area is associated with the Skagit River Bridge. Compared to 2021 conditions, LOS E conditions (shown in red) have also expanded to other time periods and other freeway segments, though mostly south of the Skagit River Bridge.

Southbound Operations

As shown in Exhibits 4 and 5 (and included as an attachment), a heat map was created of freeway density and LOS conditions for the southbound direction of I-5, in 15-minute periods between 3:00 p.m. and 7:00 p.m. Exhibit 4 represents 2021 conditions and Exhibit 5 represents 2045 conditions.

For 2045 southbound conditions on I-5, LOS F conditions (shown in black) are expected in four different 15-minute periods in the area generally between George Hopper Road (Exit 229) and College Way (Exit 227). This compares to 2021 conditions where zero 15-minute periods were at LOS F. Like 2021 conditions the most congested area is associated with the Skagit River Bridge. Compared to 2021 conditions, LOS E conditions (shown in red) have also expanded to other time periods and other freeway segments, mostly south of the Skagit River Bridge, though this change is not at the same scale as northbound operations.

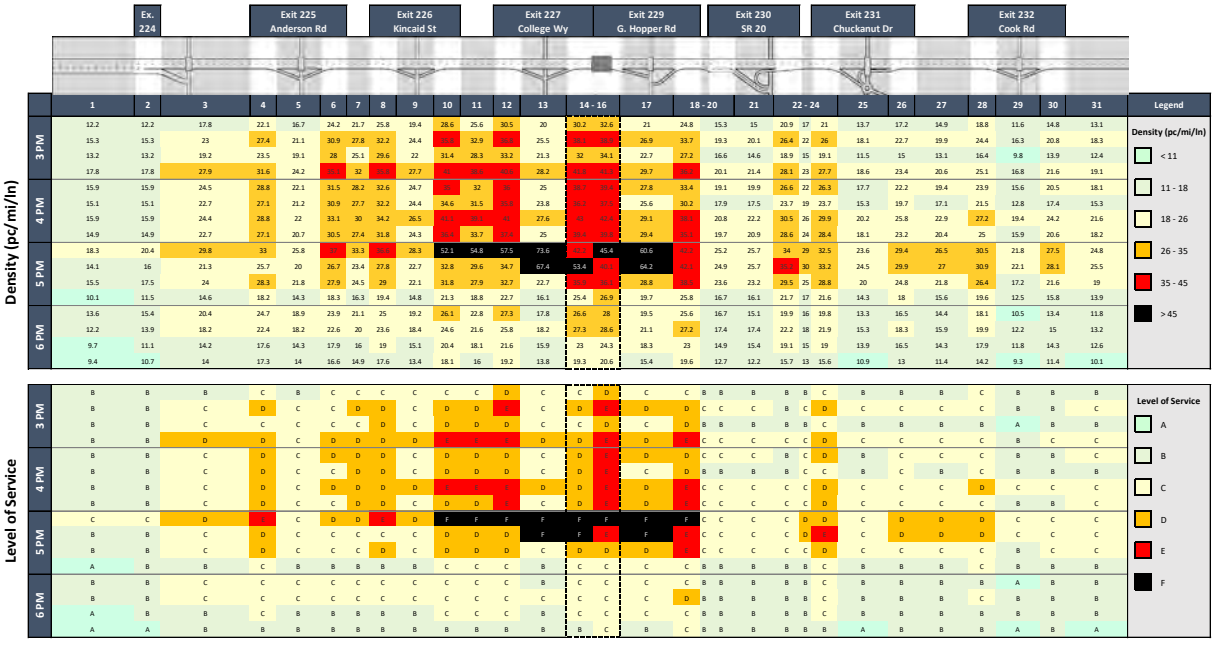


Exhibit 2 2021 Northbound I-5 Mainline Density and LOS

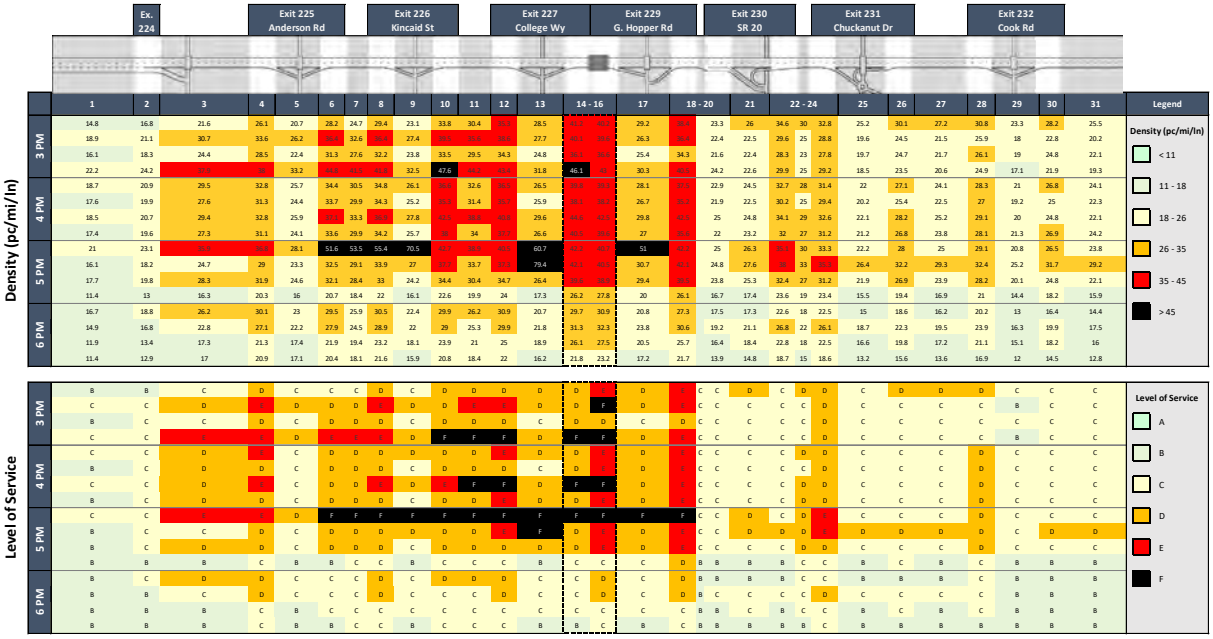


Exhibit 3 2045 Northbound I-5 Mainline Density and LOS

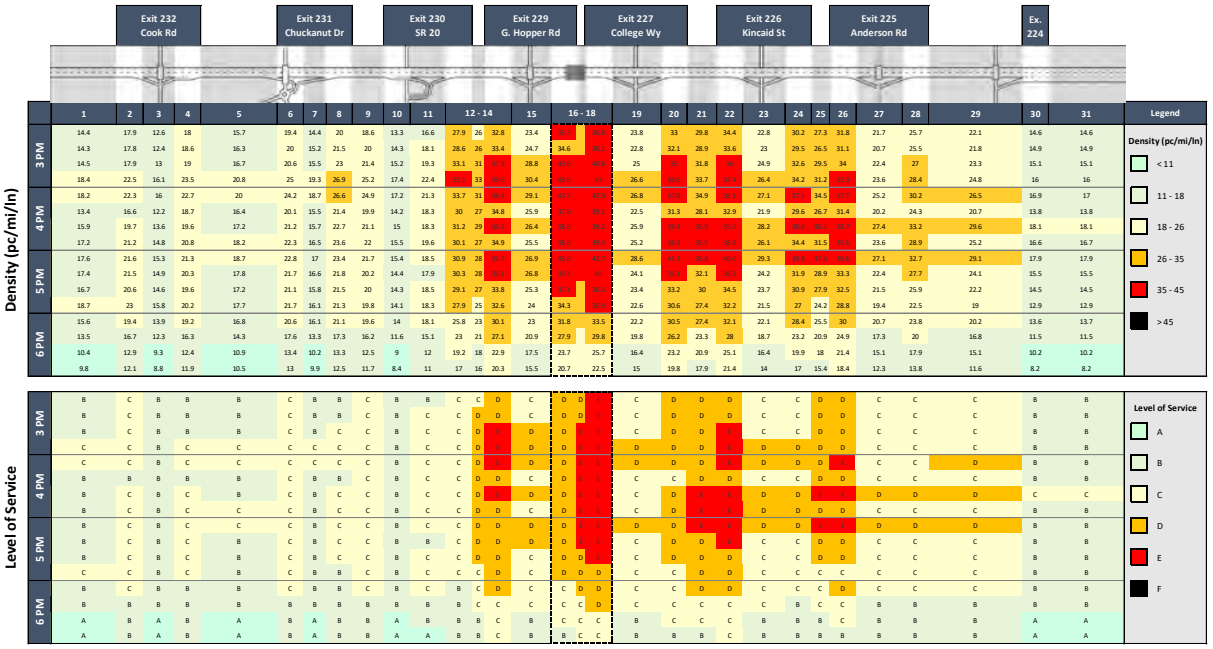


Exhibit 4 2021 Southbound I-5 Mainline Density and LOS

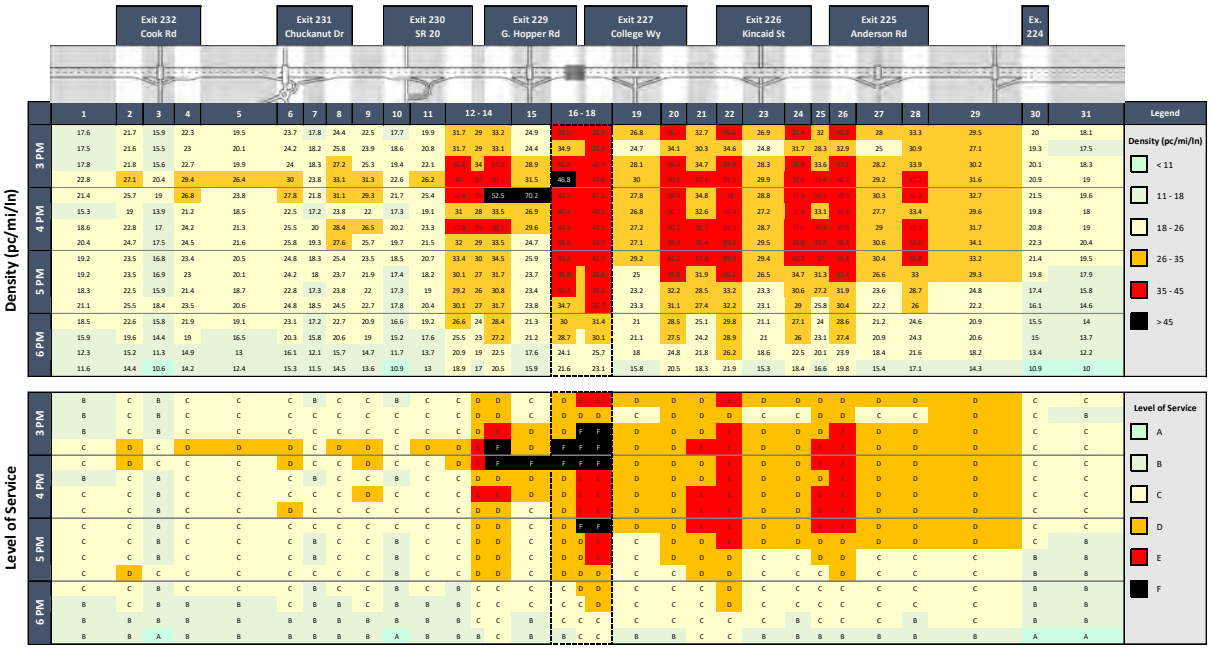


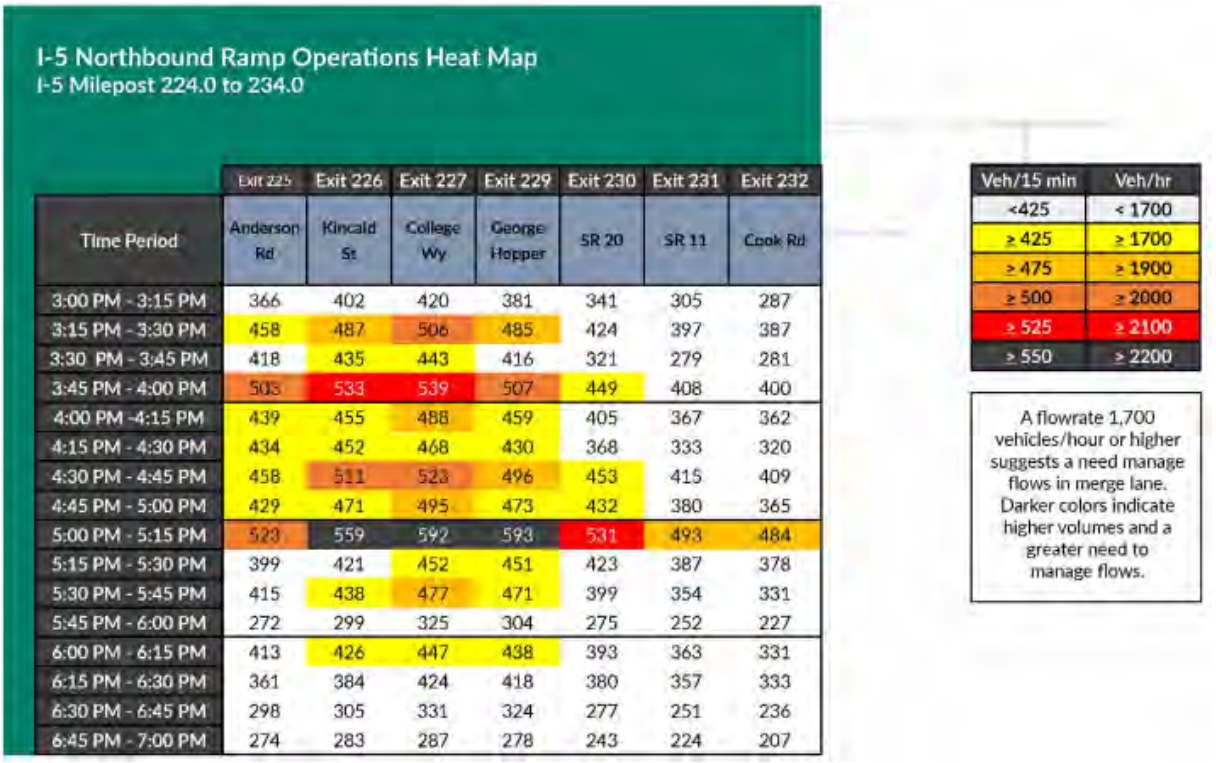
Exhibit 5 2045 Southbound I-5 Mainline Density and LOS

MERGE-LANE VOLUME THRESHOLD

This metric is used to assist in determining traffic flow conditions at the merge point onto the freeway mainline. On-ramp volumes are added to right-lane volumes on the I-5 mainline for each 15-minute period. As stated in the 2021 Existing Conditions Analysis, a combined volume that meets or exceeds 1,700 vehicles per lane per hour indicates when a potential conflict may exist with mainline traffic operation conditions.

Northbound Operations

As shown in Exhibit 6, a heat map was created of on-ramp merge volume conditions for the northbound direction of I-5, in 15-minute periods between 3:00 p.m. and 7:00 p.m. The locations and times that are at or above the 1,700 vehicles-per-hour threshold are shown in colored sections. The darker the colors, the higher the merge lane volumes and the greater the need to manage traffic flow in the merge lane.



I-5 Northbound Ramp Operations Heat Map
I-5 Milepost 224.0 to 234.0

Time Period	Exit 225 Anderson Rd	Exit 226 Kincaid St	Exit 227 College Wy	Exit 229 George Hopper	Exit 230 SR 20	Exit 231 SR 11	Exit 232 Cook Rd
3:00 PM - 3:15 PM	366	402	420	381	341	305	287
3:15 PM - 3:30 PM	458	487	506	485	424	397	387
3:30 PM - 3:45 PM	418	435	443	416	321	279	281
3:45 PM - 4:00 PM	503	533	539	507	449	408	400
4:00 PM -4:15 PM	439	455	488	459	405	367	362
4:15 PM - 4:30 PM	434	452	468	430	368	333	320
4:30 PM - 4:45 PM	458	511	523	496	453	415	409
4:45 PM - 5:00 PM	429	471	495	473	432	380	365
5:00 PM - 5:15 PM	523	559	592	593	531	493	484
5:15 PM - 5:30 PM	399	421	452	451	423	387	378
5:30 PM - 5:45 PM	415	438	477	471	399	354	331
5:45 PM - 6:00 PM	272	299	325	304	275	252	227
6:00 PM - 6:15 PM	413	426	447	438	393	363	331
6:15 PM - 6:30 PM	361	384	424	418	380	357	333
6:30 PM - 6:45 PM	298	305	331	324	277	251	236
6:45 PM - 7:00 PM	274	283	287	278	243	224	207

Veh/15 min	Veh/hr
<425	< 1700
≥ 425	≥ 1700
≥ 475	≥ 1900
≥ 500	≥ 2000
≥ 525	≥ 2100
≥ 550	≥ 2200

A flowrate 1,700 vehicles/hour or higher suggests a need manage flows in merge lane. Darker colors indicate higher volumes and a greater need to manage flows.

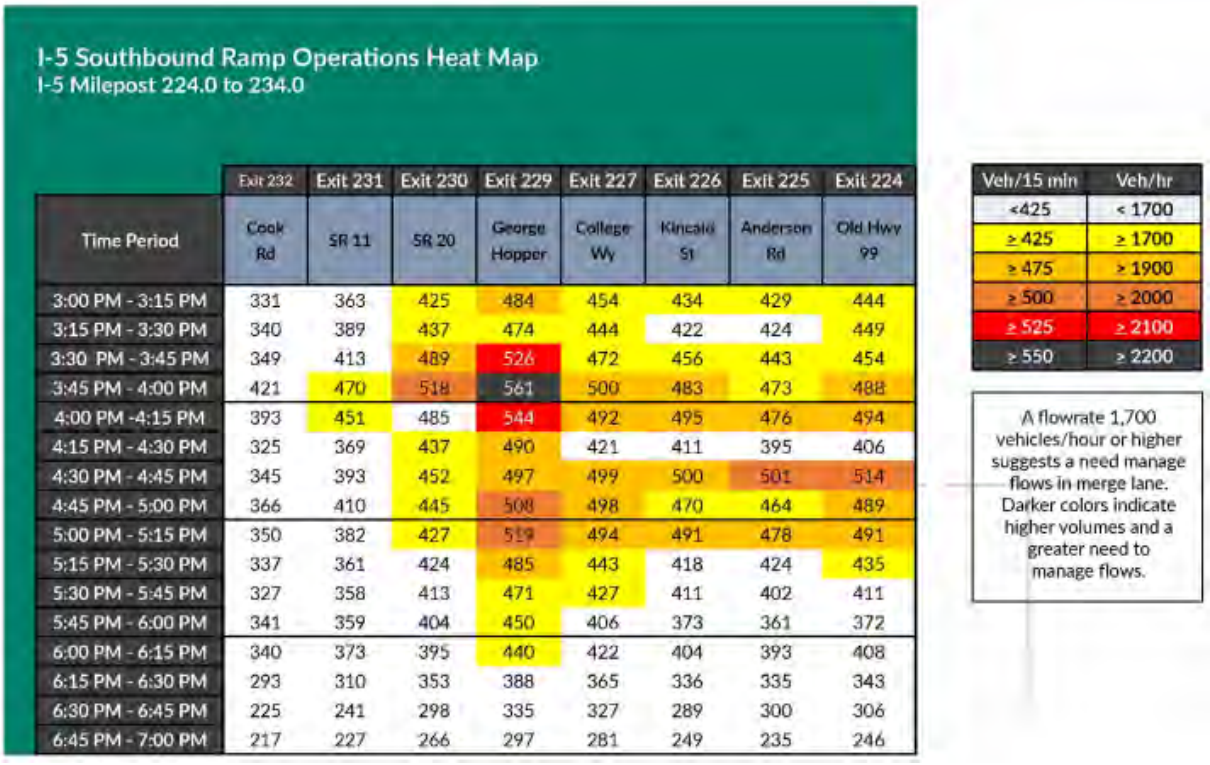
Exhibit 6 2045 Northbound I-5 On-Ramp Heat Map

The 2021 analysis shows that on-ramps at Kincaid Street, College Way, and George Hopper Road interchanges have traffic flow conditions that exceeded 1,700 vehicles/hour or higher suggesting a need to develop strategies to better manage traffic flow conditions at the merge point on the freeway mainline. Forecast operations in 2045 show that Anderson Road and SR 20 interchanges may also exceed the threshold within the next twenty years. Additional analysis may be warranted during Phase II to address short-, mid- and long-term traffic operation conditions that fall below regional performance expectations.

Southbound Operations

As shown in Exhibit 7, a heat map was created of on-ramp merge volume conditions for the southbound direction of I-5, in 15-minute periods between 3:00 p.m. and 7:00 p.m. The locations and times that are at or above the 1,700 vehicles-per-hour threshold are shown in colored sections. The darker the colors, the higher the merge lane volumes and the greater the need to manage traffic flow in the merge lane.

The 2021 analysis shows that on-ramps at George Hopper Road and College Way interchanges have traffic flow conditions that exceed the 1,700 vehicle/hour or higher suggesting a need to develop strategies to better manage traffic flow conditions at the merge point on the freeway mainline. Forecasted operations in 2045 show that most of the interchanges on the I-5 corridor would exceed the 1,700 vehicles-per-hour threshold. Additional interchanges added as a result of the forecast analysis include SR 20, Kincaid St, Anderson Rd and Old Highway 99.



I-5 Southbound Ramp Operations Heat Map
I-5 Milepost 224.0 to 234.0

Time Period	Exit 232 Cook Rd	Exit 231 SR 11	Exit 230 SR 20	Exit 229 George Hopper	Exit 227 College Wy	Exit 226 Kincaid St	Exit 225 Anderson Rd	Exit 224 Old Hwy 99
3:00 PM - 3:15 PM	331	363	425	484	454	434	429	444
3:15 PM - 3:30 PM	340	389	437	474	444	422	424	449
3:30 PM - 3:45 PM	349	413	489	526	472	456	443	454
3:45 PM - 4:00 PM	421	470	518	561	500	483	473	488
4:00 PM -4:15 PM	393	451	485	544	492	495	476	494
4:15 PM - 4:30 PM	325	369	437	490	421	411	395	406
4:30 PM - 4:45 PM	345	393	452	497	499	500	501	514
4:45 PM - 5:00 PM	366	410	445	508	498	470	464	489
5:00 PM - 5:15 PM	350	382	427	519	494	491	478	491
5:15 PM - 5:30 PM	337	361	424	485	443	418	424	435
5:30 PM - 5:45 PM	327	358	413	471	427	411	402	411
5:45 PM - 6:00 PM	341	359	404	450	406	373	361	372
6:00 PM - 6:15 PM	340	373	395	440	422	404	393	408
6:15 PM - 6:30 PM	293	310	353	388	365	336	335	343
6:30 PM - 6:45 PM	225	241	298	335	327	289	300	306
6:45 PM - 7:00 PM	217	227	266	297	281	249	235	246

Veh/15 min	Veh/hr
<425	< 1700
≥ 425	≥ 1700
≥ 475	≥ 1900
≥ 500	≥ 2000
≥ 525	≥ 2100
≥ 550	≥ 2200

A flowrate 1,700 vehicles/hour or higher suggests a need manage flows in merge lane. Darker colors indicate higher volumes and a greater need to manage flows.

Exhibit 7 2045 Southbound I-5 On-Ramp Heat Map

SAFETY ASSESSMENT

The existing safety assessment was conducted in the 2021 Existing Conditions Analysis. This included a Target Zero Summary, Crash Summary Assessment, and Highway Safety Manual Analysis. The 2021 analysis revealed some corridor segments are not performing within expectations (the Highway Safety Manual methodology treats segments as non-directional). The general locations include northbound I-5 between Kincaid Street and George Hopper Road and southbound I-5 between SR 20 and Kincaid Street. The Highway Safety Manual Analysis also indicated two sections performing below average for safety: a one-mile section between SR 538 and George Hopper Road; and in the vicinity of the SR 20 interchange. (The Highway Safety Manual methodology treats segments as non-directional).

The future safety assessment will be primarily used as a baseline for comparing alternatives in the Phase 2 effort of the study. Similar to the 2021 Existing Conditions Analysis, the safety assessment used the Interactive Highway Safety Design Model (IHSDM) crash prediction methodology. It is important to note that this predictive analysis does not take into account historical crash data and does not reflect “above average” or “below average” metrics. On the other hand, the 2021 safety analysis is based on the historical crash data (Empirical Bayes) from 2016 to 2020. The predictive safety analysis of 2045 will be used to compare if potential solutions are predicted to be better or worse than the 2045 baseline condition (as noted below).

Exhibit 8 shows the predicted crash frequency for freeway segments along the corridor based on volumes and geometry using the IHSDM methodology. As forecasted volumes are higher in 2045, the overall crash frequencies increased as well compared to 2021 conditions. Predicted crash frequencies are generally highest south of the College Way interchange.

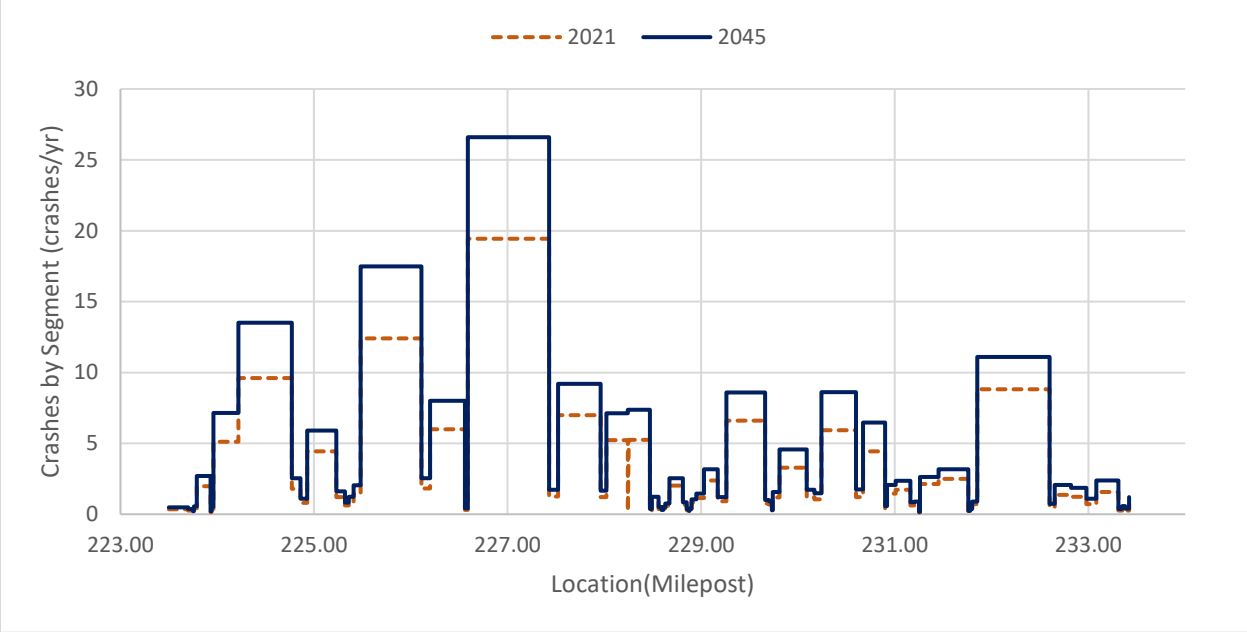


Exhibit 8 2021 versus 2045 Predicted I-5 Crash Frequency: Freeway Segments

Exhibit 9 shows the predicted crash frequency for speed/lane change areas along the corridor based on freeway and ramp volumes and geometry using the IHSDM methodology. As forecasted volumes are higher in 2045, the overall crash frequencies increased as well compared to 2021 conditions. Similarly, Exhibit 9 shows that all of the corridor experiences higher crash rates compared to 2021 conditions, with higher sensitivity to volume growth with higher initial crash rates.

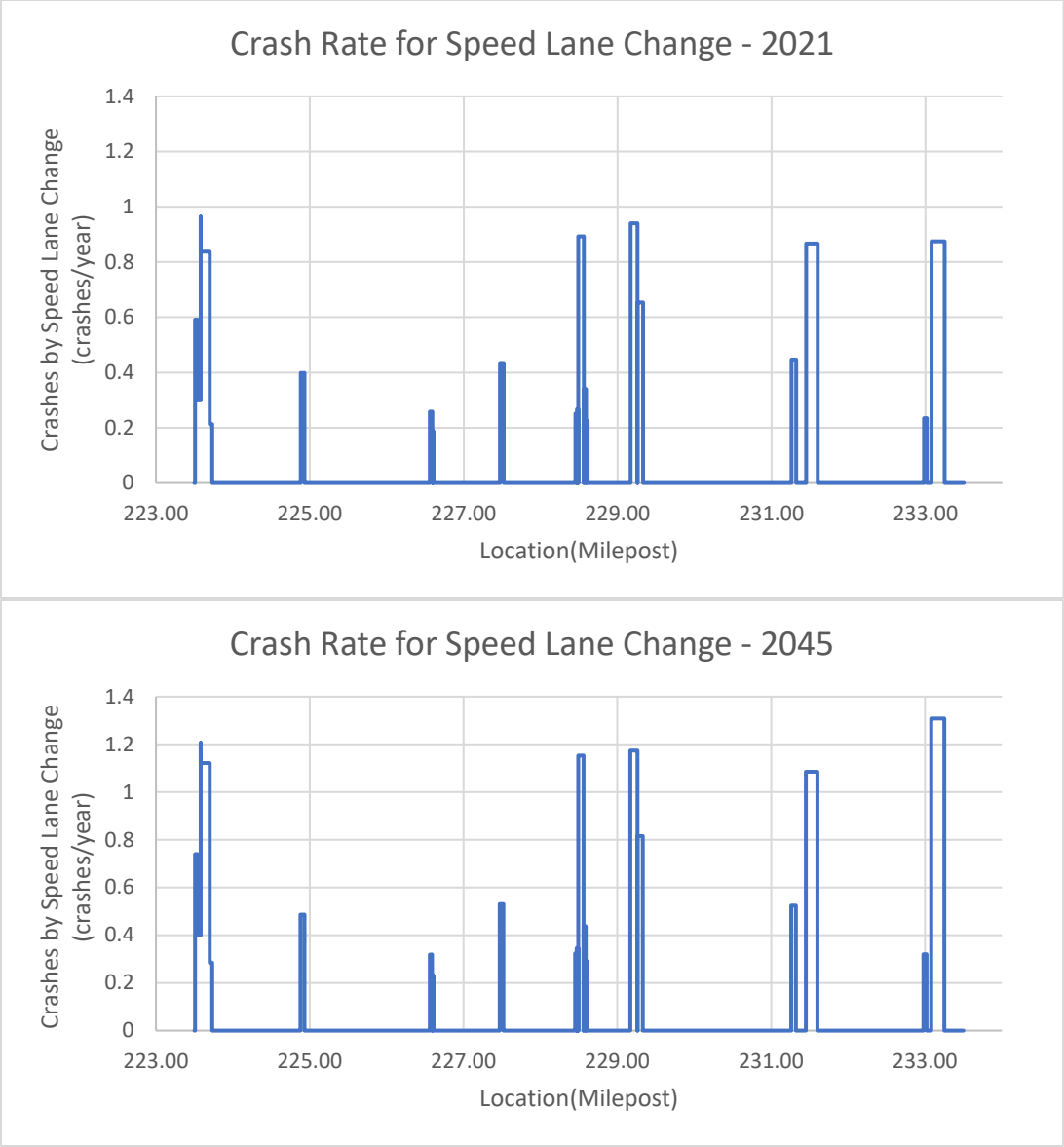


Exhibit 9 2021 versus 2045 Predicted I-5 Crash Frequency: Speed/Lane Change Areas

Additional safety analysis may need to be considered in Phase 2 of this study. For example, the land-specific safety assessment of merge lane and on-ramps may help in determining benefits of certain improvement strategies.

TRAVELER CONTEXT INFORMATION

The I-5 traveler context information refers to other analytical information that would be useful in addressing operational needs of the corridor. Future regional conditions as reflected in the 2045 Skagit Council of Governments (SCOG) Regional Transportation Plan and travel demand model is summarized. The origin and destination patterns for I-5 travelers are also presented.

SKAGIT 2045 REGIONAL TRANSPORTATION PLAN

This section provides details about population growth, comprehensive plans, SCOG model forecasts, and resulting forecast issues for the I-5 corridor in 2045. Much of this information is based on findings in the Skagit 2045 Regional Transportation Plan.

Population Growth

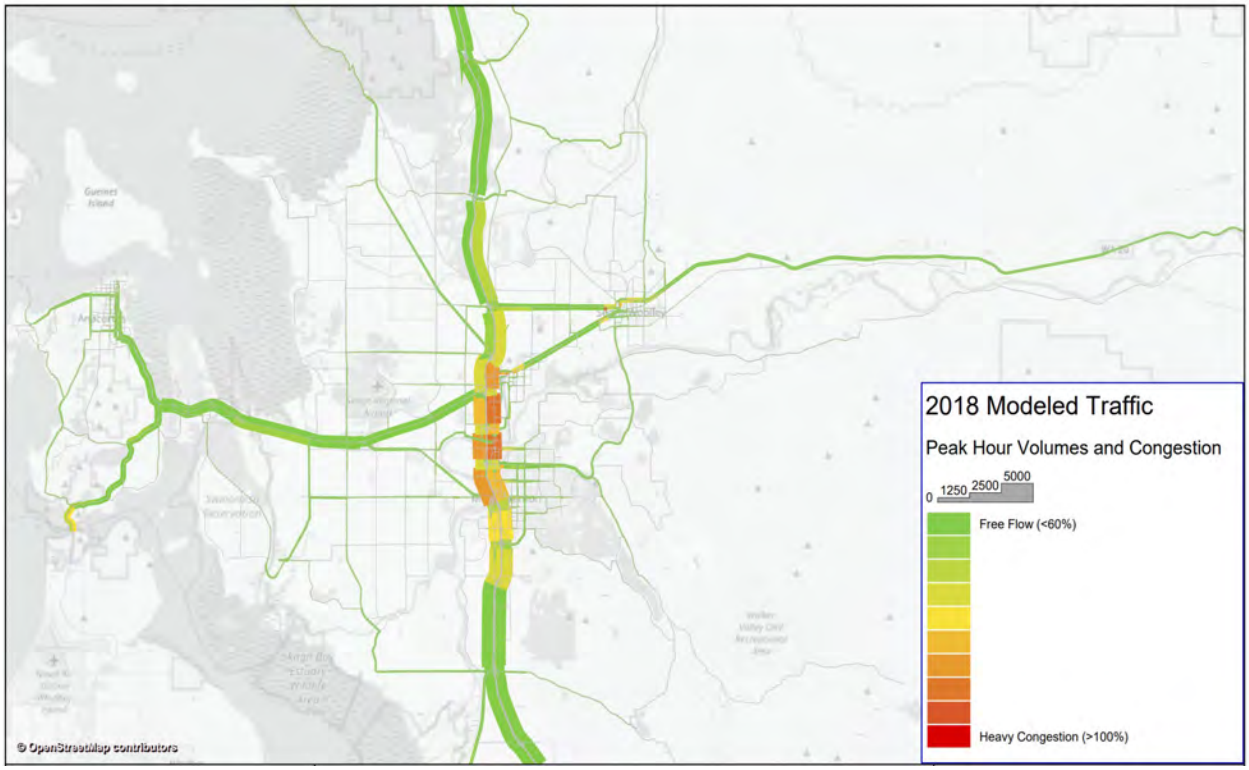
The Skagit Regional Transportation Plan includes a population growth forecast of 46,000 new residents resulting in about 177,000 Skagit County residents by 2045, representing a 1.1 annual growth rate. The Washington Growth Management Act (GMA) and Skagit's countywide planning policies call for compact urban areas and infill development with 80 percent of future population growth (36,800) to be primarily accommodated in cities and urban growth areas. Future growth and urban development will come with associated traffic impacts, adding pressure to I-5 and the regional transportation system.

Comprehensive Plan Updates

Skagit County, Mount Vernon, and Burlington, as well as Sedro-Woolley, Anacortes, La Conner, and smaller cities are all required to update their Comprehensive Plans by mid-2025. In addition, Skagit Transit has recently updated their 6-Year Transit Development Plan (2022-2027). These plan updates represent an opportunity for cities and the regional transit agency to change urban land use patterns, encourage mixed use development, increase urban densities, and redesign, repurpose, and incentivize local streets to include active transportation facilities and facilitate opportunities for transit service with the goal of reducing vehicle trips needing to use I-5.

Travel Model Forecasts

The SCOG travel demand model forecasts an overall 6.5 percent increase in vehicle traffic by 2045 (including state and non-state roadways). However due to congestion, traffic growth along the I-5 corridor is expected to be at a much smaller rate, particularly during peak hours where facilities are reaching capacity. This may include a potential traffic increase on I-5 in the north and south portions of the study area from 77,000 to 82,000 ADT and a potential traffic increase at the Skagit River bridge from 81,000 to 86,000 ADT. Regionwide, the SCOG travel model forecasts an increase of 28 percent more vehicle miles traveled by 2045. Exhibits 10 and 11 show how traffic congestion is expected to worsen between 2018 and 2045 as shown in the SCOG travel demand model.

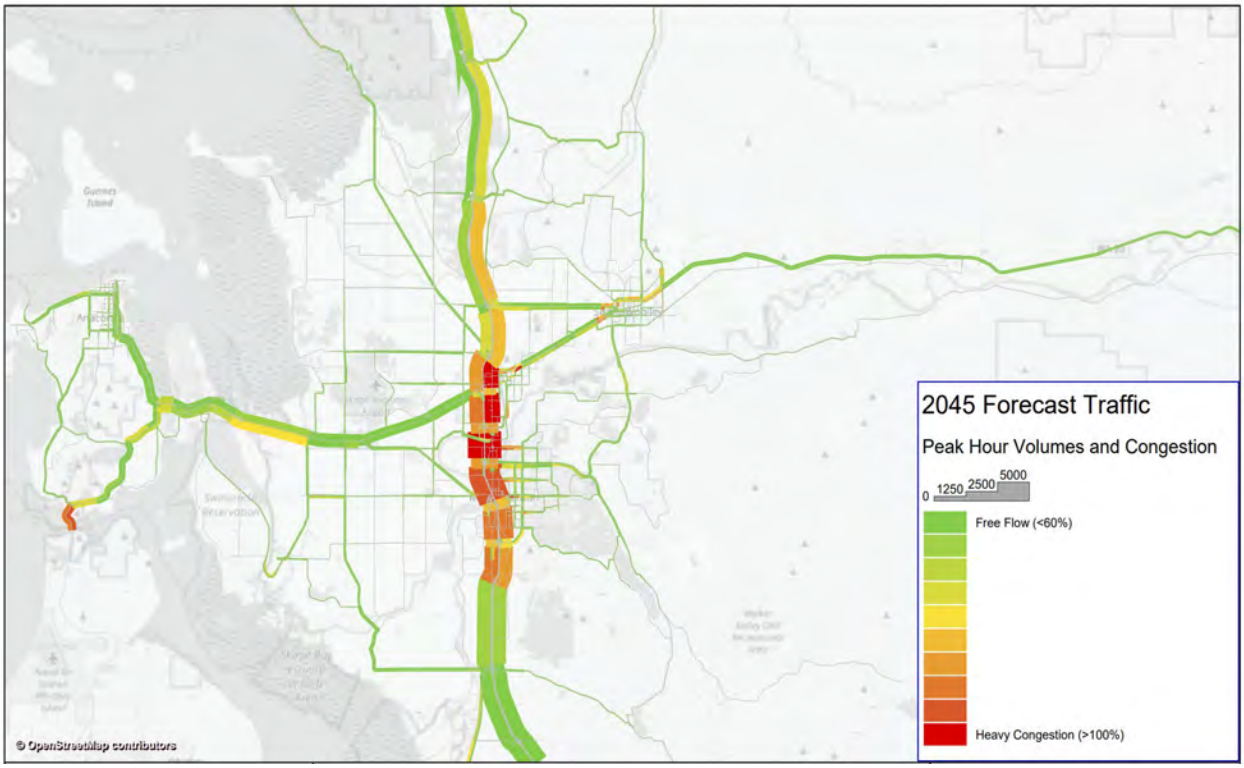


(Source: SCOG 2018 Travel Demand Model)

Exhibit 10 Congestion in Skagit County in 2018

Forecast Issues

With mainline I-5 already operating at or near LOS throughput capacity during the weekday PM peak hour, mainline I-5 traffic congestion will also create congestion on local street approaches to I-5 interchanges, which could increase safety and operations issues on both I-5 and local streets. Increased congestion and delay can reduce the ability of I-5 and local streets to allow the efficient transport of freight and goods, which can have economic ramifications. Local Comprehensive Plan transportation elements promote mixed use land use patterns, increased urban densities, transit-oriented development, and more active transportation facilities will create opportunities for more walking, biking, trail use, and transit ridership, which could relieve some pressure on I-5, state highways, and local streets. It is also important to note that this section of mainline I-5 would also reflect growth within the larger northwest Washington and Canada travel.



(Source: SCOG 2045 Travel Demand Model)

Exhibit 11 Congestion in Skagit County in 2045

ORIGIN-DESTINATION PATTERNS

Patterns related to the origin and destination of I-5 trips were obtained from Replica, a national model that incorporates location-based data sets (cellphone and fleet information), US Census data, and other travel data used in common traveler information systems and applications. See Replica for more information (http://help.replicahq.com/en/).

Local versus Regional Trips

To understand the origin-destination patterns, the region was split into two districts as shown in Exhibit 12. These district boundaries largely coincide with US Census geographies. The "Internal District" represents "local" districts, and are centered around Burlington, Sedro-Woolley, and Mount Vernon. The "Regional District" represents "regional" districts north, south, east, and west of the study area.

Within the Replica model, all I-5 northbound study area trips were selected to determine origin and destination patterns. This selection set included daily trips entering the study area from the south on the I-5 mainline as well as all northbound on-ramp volumes at the interchanges. For the purposes of this discussion, it should be noted that a "trip end" can be either the beginning or ending of one vehicle trip – point "a" or point "b" – a complete trip has two ends. Based on this analysis the following patterns were observed:

- 20 percent of northbound I-5 trips started AND stopped within the "local" districts.
- 43 percent of northbound I-5 trips had one trip end within a "local" district and the other end in a "regional" district.

- 37 percent of northbound I-5 trips had both trip ends within regional districts (did not stop in “local” districts).

About 20 percent of northbound trips are local users, using the I-5 corridor for local circulation patterns. More than a third of northbound trips are pass-through regional traffic, including both I-5 and SR 20 regional trips. Commercial northbound trips have similar patterns, with local short trips at 16 percent and trips with only one end in the local area are 50 percent.

Similar analysis was conducted for southbound daily trips:

- 14 percent of southbound I-5 trips started AND stopped within the “local” districts.
- 46 percent of southbound I-5 trips had one trip end within a “local” district and the other end in a “regional” district.
- 39 percent of southbound I-5 trips had both trip ends within regional districts (did not stop in “local” districts).

Smaller than northbound conditions, about 14 percent of southbound trips are local users using the I-5 corridor for local circulation patterns. Similar to northbound conditions, more than a third of southbound trips are pass-through regional traffic. Almost half of southbound trips are associated with local users linked with regional locations. Commercial southbound trips have similar patterns, with local short trips at 9 percent and trips with only one end in the local area are 52 percent.

The following represents a combined version of this analysis, showing both northbound and southbound trips together.

- 17 percent of study area I-5 trips started AND stopped within the “local” districts.
- 44 percent of study area I-5 trips had one trip end within a “local” district and the other end in a “regional” district.
- 38 percent of study area I-5 trips had both trip ends within regional districts (did not stop in “local” districts).

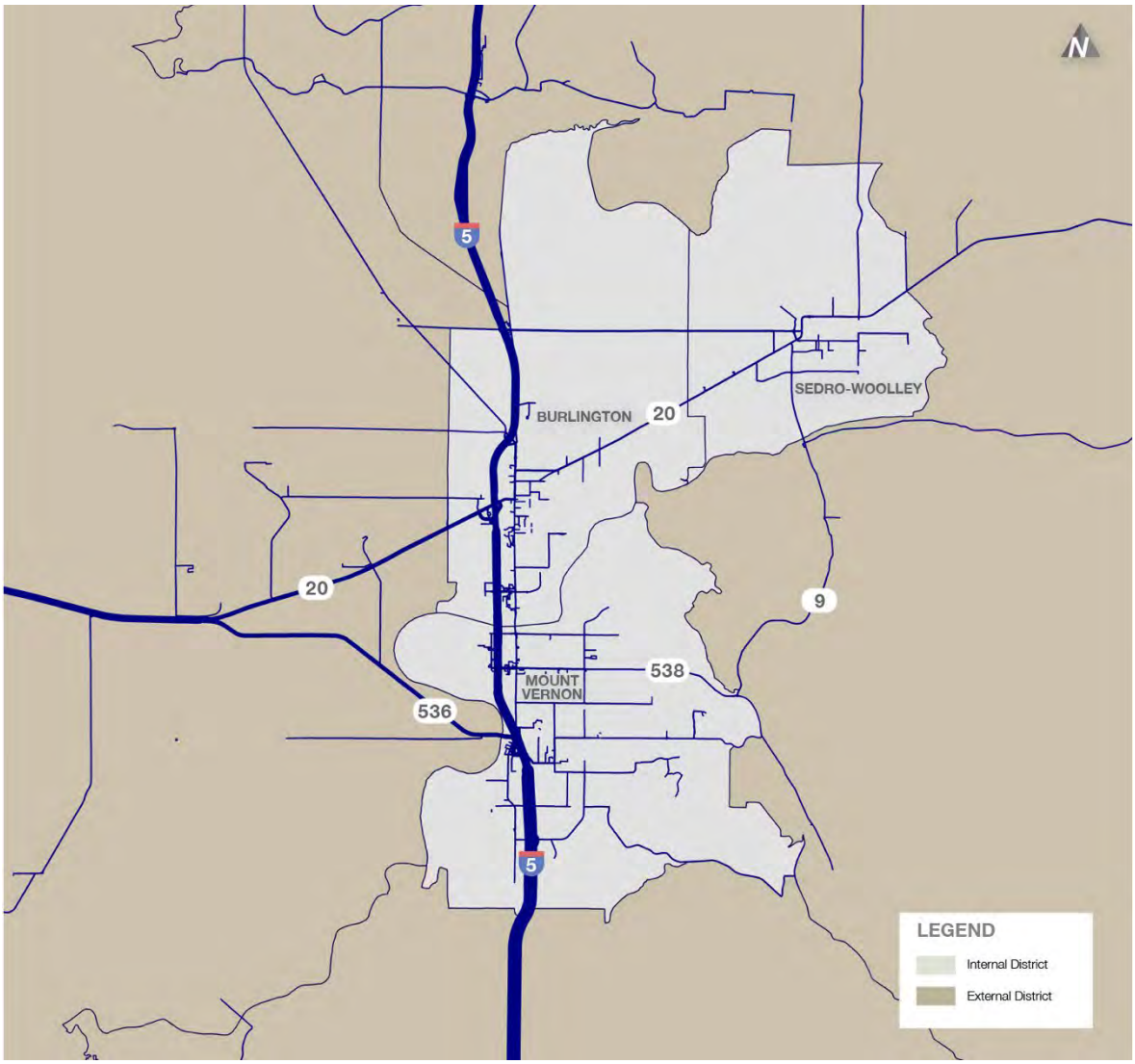


Exhibit 12 Districts Used in Origin-Destination Analysis

Interchange-to-Interchange Patterns

Another origin-destination pattern analyzed related to trips that enter the I-5 corridor at one interchange and exit at a nearby interchange. These interchange-to-interchange patterns provide insights on how local users use the I-5 mainline corridor for short-trip urban area traffic circulation and access to other state highways in the study area. Exhibits 13 and 14 show the percent of on-ramp trips that exit at subsequent ramps for northbound and southbound conditions, respectively.

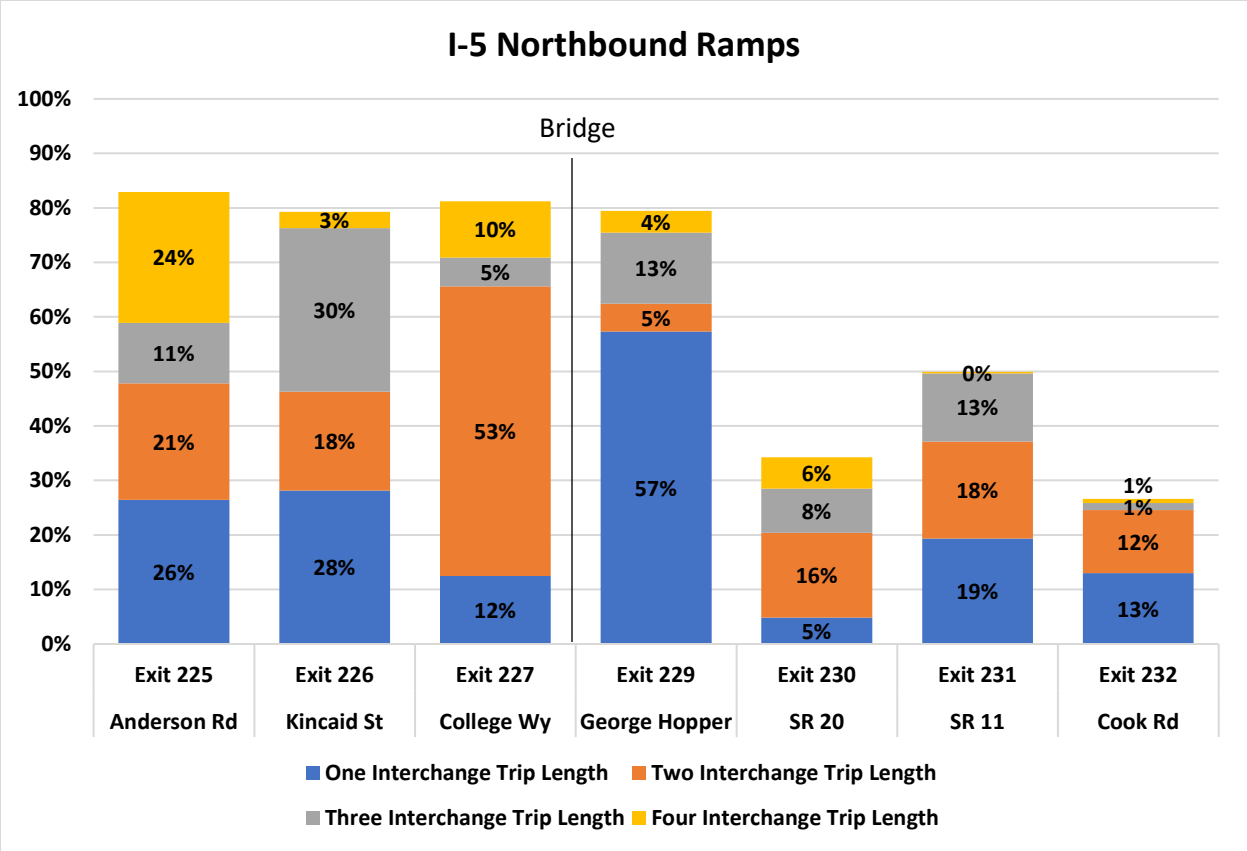


Exhibit 13 Interchange-to-Interchange Trips in Northbound Direction

As shown in Exhibit 13, close to 80 percent of on-ramp trips at the Anderson Road, Kincaid Street, College Way, and George Hopper Road interchanges exited within the study area. The George Hopper Road interchange had the highest percentage of northbound trips (57 percent) that exited at the very next interchange. The College Way interchange had 53 percent exiting at two interchanges north. These two patterns reflect the major connection of these two regional commercial areas with the SR 20 corridor (52 percent to Burlington/Sedro-Woolley, 41 percent to SR 20 west, 6 percent to SR 20 east, and rest to north Skagit County areas). At SR 20 and north, the northbound on-ramp trips become more regional compared to the southern end of the corridor.

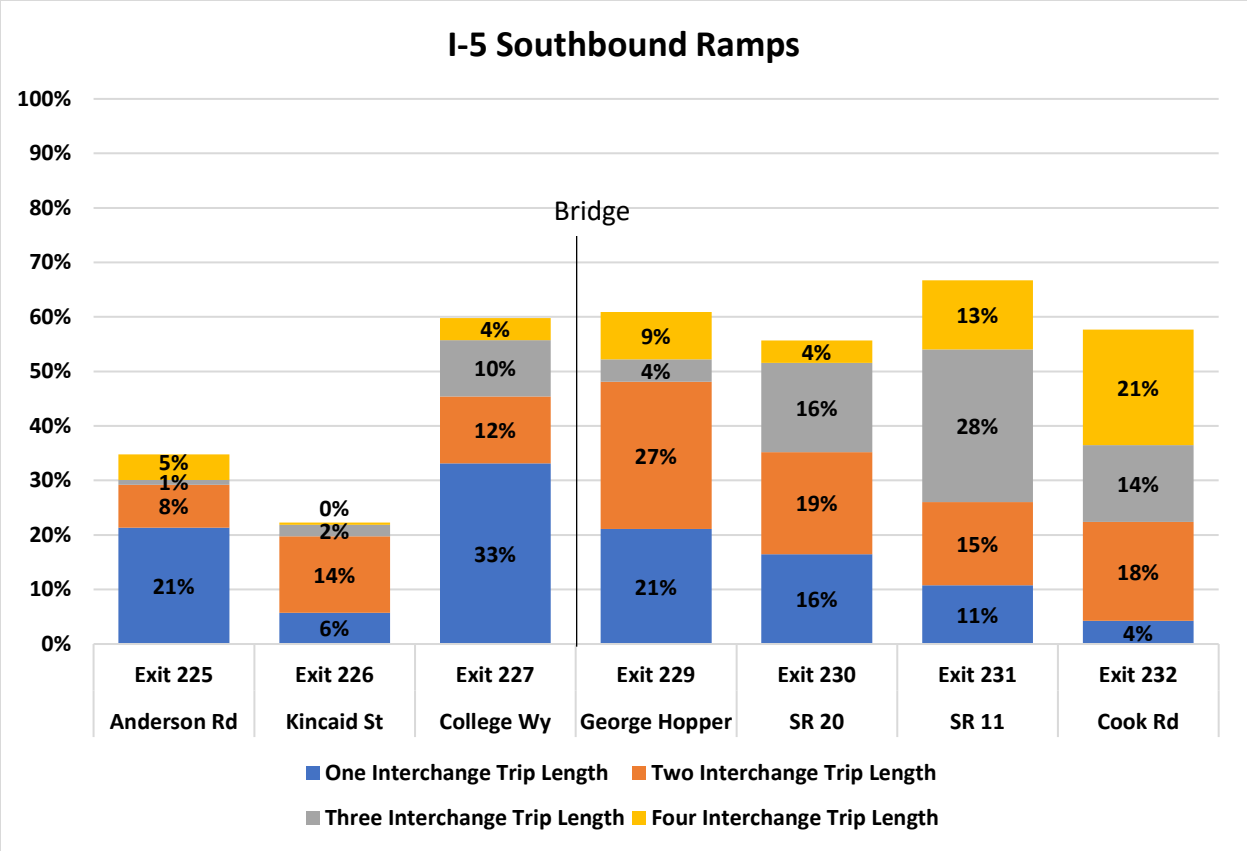


Exhibit 14 Interchange-to-Interchange Trips in Southbound Direction

As shown in Exhibit 14, about 60 percent of the on-ramp trips at the College Way, George Hopper Road, SR 20, SR 11, and Cook Road interchanges exited within the study area. There is a sizeable portion of George Hopper Road and College Way southbound trips linked to the Kincaid Street interchange, which indicates that local drivers are choosing to use I-5 rather than local street connections. The Skagit River and limited access across the river may be a major influential factor. Additional analysis for trip purpose and distribution on I-5 will be analyzed in Phase II to determine the influence of the Skagit River and how state highway in the Study Area influence travel behavior.

Trip Purpose

The Replica Model was used to identify the general trip purposes for travelers using the I-5 corridor in the study area. This includes any person trip in vehicles that use any part of I-5 within the corridor. The following summarizes the trip purpose as percent of I-5 trips based on trip ends (also shown graphically in Exhibit 15):

- 34 percent of trip ends are associated with residential homes.
- 18 percent are associated with social or recreational destinations.
- 16 percent are associated with work/employment locations.
- 16 percent are associated with shopping/retail destinations.

- 8 percent are associated with commercial freight operations.
- 8 percent reflect all other trip purposes.

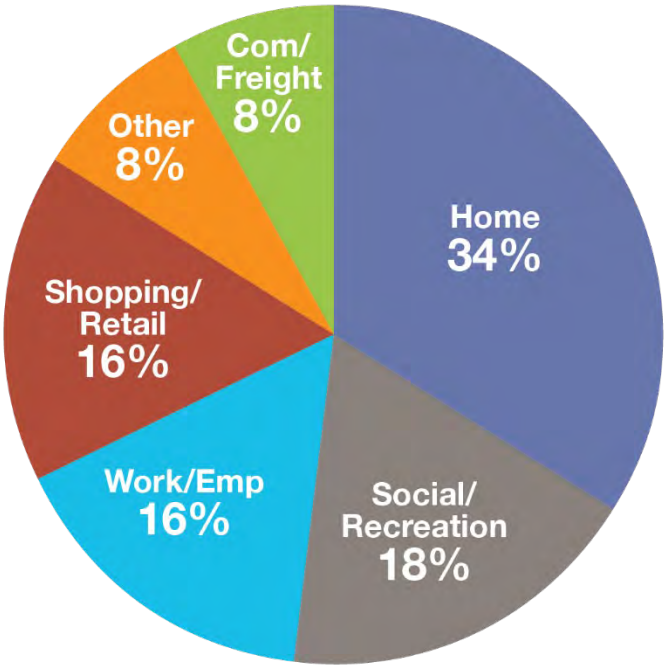


Exhibit 15 Trip Purpose by Percentage using I-5 Corridor

Trip Lengths

The Replica Model was used to identify the trip lengths for travelers using the I-5 corridor in the study area. This encompasses all vehicle trips that involve any segment of I-5 within the corridor, regardless of whether they are passing through or originating and ending within the corridor. The complete length of the trip, spanning from the starting point to the final destination, was taken into consideration. It should be noted that in the local vs regional analysis mentioned previously, the “local area” is 6 miles wide and 10 miles tall. And trips traversing adjacent I-5 interchanges may still have considerable travel outside the I-5 corridor. Exhibits 16 and 17 shows trip lengths in miles and minutes.

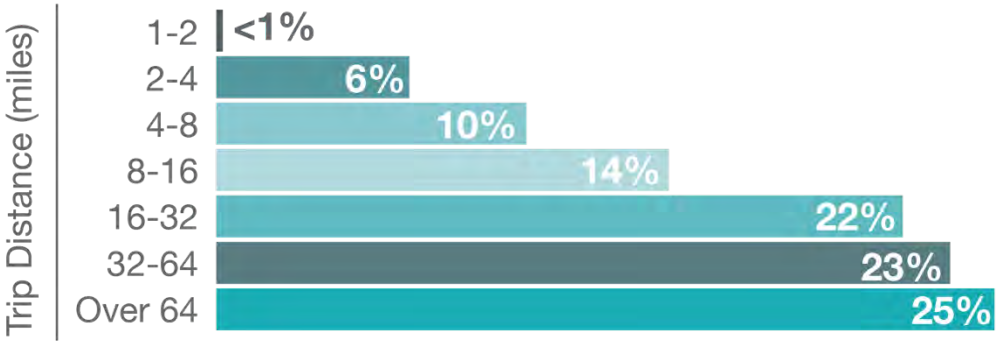


Exhibit 16 Distribution of Daily Trip Lengths (in Miles)

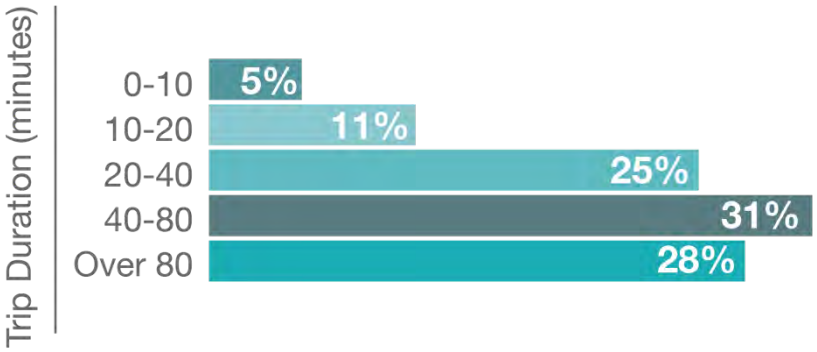


Exhibit 17 Distribution of Daily Trip Lengths (in Minutes)

APPENDIX 1. I-5 MAINLINE DENSITY AND LOS

Washington State Department of Transportation

Density (pc/mi/ln)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14 - 16		17	18 - 20		21	22 - 24			25	26	27	28	29	30	31
3 PM	12.2	12.2	17.8	22.1	16.7	24.2	21.7	25.8	19.4	28.6	25.6	30.5	20	30.2	32.6	21	24.8	15.3	15	20.9	17	21	13.7	17.2	14.9	18.8	11.6	14.8	13.1
	15.3	15.3	23	27.4	21.1	30.9	27.8	32.2	24.4	35.8	32.9	36.8	25.5	38.1	38.9	26.9	33.7	19.3	20.1	26.4	22	26	18.1	22.7	19.9	24.4	16.3	20.8	18.3
	13.2	13.2	19.2	23.5	19.1	28	25.1	29.6	22	31.4	28.3	33.2	21.3	32	34.1	22.7	27.2	16.6	14.6	18.9	15	19.1	11.5	15	13.1	16.4	9.8	13.9	12.4
	17.8	17.8	27.9	31.6	24.2	35.1	32	35.8	27.7	41	38.6	40.6	28.2	41.8	41.3	29.7	36.2	20.1	21.4	28.1	23	27.7	18.6	23.4	20.6	25.1	16.8	21.6	19.1
4 PM	15.9	15.9	24.5	28.8	22.1	31.5	28.2	32.6	24.7	35	32	36	25	38.7	39.4	27.8	33.4	19.1	19.9	26.6	22	26.3	17.7	22.2	19.4	23.9	15.6	20.5	18.1
	15.1	15.1	22.7	27.1	21.2	30.9	27.7	32.2	24.4	34.6	31.5	35.8	23.8	36.2	37.5	25.6	30.2	17.9	17.5	23.7	19	23.7	15.3	19.7	17.1	21.5	12.8	17.4	15.3
	15.9	15.9	24.4	28.8	22	33.1	30	34.2	26.5	41.1	39.1	41	27.6	43	42.4	29.1	38.1	20.8	22.2	30.5	26	29.9	20.2	25.8	22.9	27.2	19.4	24.2	21.6
	14.9	14.9	22.7	27.1	20.7	30.5	27.4	31.8	24.3	36.4	33.7	37.4	25	39.4	39.8	29.4	35.1	19.7	20.9	28.6	24	28.4	18.1	23.2	20.4	25	15.9	20.6	18.2
5 PM	18.3	20.4	29.8	33	25.8	37	33.3	36.6	28.3	52.1	54.8	57.5	73.6	42.2	45.4	60.6	42.2	25.2	25.7	34	29	32.5	23.6	29.4	26.5	30.5	21.8	27.5	24.8
	14.1	16	21.3	25.7	20	26.7	23.4	27.8	22.7	32.8	29.6	34.7	67.4	53.4	40.1	64.2	42.1	24.9	25.7	35.2	30	33.2	24.5	29.9	27	30.9	22.1	28.1	25.5
	15.5	17.5	24	28.3	21.8	27.9	24.5	29	22.1	31.8	27.9	32.7	22.7	35.9	36.1	28.8	38.5	23.6	23.2	29.5	25	28.8	20	24.8	21.8	26.4	17.2	21.6	19
	10.1	11.5	14.6	18.2	14.3	18.3	16.3	19.4	14.8	21.3	18.8	22.7	16.1	25.4	26.9	19.7	25.8	16.7	16.1	21.7	17	21.6	14.3	18	15.6	19.6	12.5	15.8	13.9
6 PM	13.6	15.4	20.4	24.7	18.9	23.9	21.1	25	19.2	26.1	22.8	27.3	17.8	26.6	28	19.5	25.6	16.7	15.1	19.9	16	19.8	13.3	16.5	14.4	18.1	10.5	13.4	11.8
	12.2	13.9	18.2	22.4	18.2	22.6	20	23.6	18.4	24.6	21.6	25.8	18.2	27.3	28.6	21.1	27.2	17.4	17.4	22.2	18	21.9	15.3	18.3	15.9	19.9	12.2	15	13.2
	9.7	11.1	14.2	17.6	14.3	17.9	16	19	15.1	20.4	18.1	21.6	15.9	23	24.3	18.3	23	14.9	15.4	19.1	15	19	13.9	16.5	14.3	17.9	11.8	14.3	12.6
	9.4	10.7	14	17.3	14	16.6	14.9	17.6	13.4	18.1	16	19.2	13.8	19.3	20.6	15.4	19.6	12.7	12.2	15.7	13	15.6	10.9	13	11.4	14.2	9.3	11.4	10.1

Density (pc/mi/ln)

- < 11
- 11 - 18
- 18 - 26
- 26 - 35
- 35 - 45
- > 45

Level of Service

	1	2	3	4	5	6	7	8	9	10	11	12	13	14 - 16		17	18 - 20		21	22 - 24			25	26	27	28	29	30	31
3 PM	B	B	B	C	B	C	C	C	C	C	C	D	C	C	D	C	C	B	B	B	B	B	C	B	B	B	C	B	B	B
	B	B	C	D	C	C	D	D	C	D	D	E	C	D	E	D	D	C	C	C	B	C	D	C	C	C	C	B	B	C
	B	B	C	C	C	C	C	D	C	D	D	D	C	C	D	C	D	B	B	B	B	B	C	B	B	B	B	A	B	B
	B	B	D	D	C	D	D	D	D	E	E	E	D	D	E	D	E	C	C	C	C	C	D	C	C	C	C	B	C	C
4 PM	B	B	C	D	C	D	D	D	C	D	D	D	C	D	E	D	D	C	C	C	B	C	D	B	C	C	C	B	B	C
	B	B	C	D	C	C	D	D	C	D	D	D	C	D	E	C	D	B	B	B	B	C	C	B	C	B	C	B	B	B
	B	B	C	D	C	D	D	D	D	E	E	E	D	D	E	D	E	C	C	C	C	C	D	C	C	C	D	C	C	C
	B	B	C	D	C	C	D	D	C	D	D	E	C	D	E	D	E	C	C	C	C	C	D	C	C	C	C	B	B	C
5 PM	C	C	D	E	C	D	D	E	D	F	F	F	F	F	F	F	F	C	C	C	C	D	D	C	D	D	D	C	C	C
	B	B	C	D	C	C	C	C	C	D	D	D	F	F	F	F	E	C	C	C	C	D	F	C	D	D	D	C	C	C
	B	B	C	D	C	C	C	D	C	D	D	D	C	D	D	D	E	C	C	C	C	C	D	C	C	C	C	B	C	C
	A	B	B	C	B	B	B	B	B	C	C	C	B	C	C	C	C	B	B	B	B	B	C	B	B	B	C	B	B	B
6 PM	B	B	C	C	C	C	C	C	C	C	C	C	B	C	C	C	C	B	B	B	B	B	C	B	B	B	B	A	B	B
	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	D	B	B	B	B	B	C	B	B	B	C	B	B	B
	A	B	B	C	B	B	B	B	B	C	C	C	B	C	C	C	C	B	B	B	B	B	C	B	B	B	B	B	B	B
	A	A	B	B	B	B	B	B	B	B	B	B	B	B	C	B	C	B	B	B	B	B	B	A	B	B	B	A	B	A

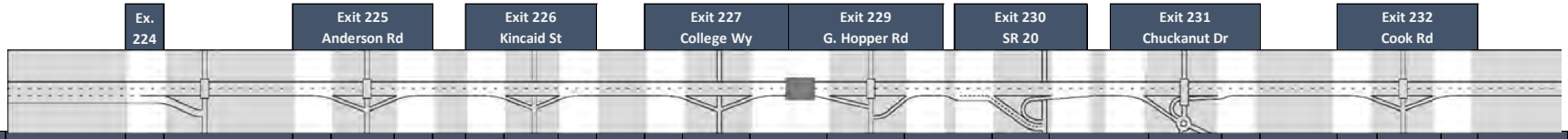
Level of Service

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

2021 Northbound I-5 Mainline Density and LOS

November 1, *2023*

Washington State Department of Transportation



Density (pc/mi/ln)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14 - 16		17	18 - 20		21	22 - 24			25	26	27	28	29	30	31
3 PM	14.8	16.8	21.6	26.1	20.7	28.2	24.7	29.4	23.1	33.8	30.4	35.3	28.5	41.2	40.2	29.2	38.4	23.3	26	34.6	30	32.8	25.2	30.1	27.2	30.8	23.3	28.2	25.5
	18.9	21.1	30.7	33.6	26.2	36.4	32.6	36.4	27.4	39.5	35.6	38.6	27.7	40.1	39.6	26.3	36.4	22.4	22.5	29.6	25	28.8	19.6	24.5	21.5	25.9	18	22.8	20.2
	16.1	18.3	24.4	28.5	22.4	31.3	27.6	32.2	23.8	33.5	29.5	34.3	24.8	36.1	36.8	25.4	34.3	21.6	22.4	28.3	23	27.8	19.7	24.7	21.7	26.1	19	24.8	22.1
	22.2	24.2	37.9	38	33.2	44.8	41.5	41.8	32.5	47.6	44.2	43.4	31.8	46.1	43	30.3	40.5	24.2	22.6	29.9	25	29.2	18.5	23.5	20.6	24.9	17.1	21.9	19.3
4 PM	18.7	20.9	29.5	32.8	25.7	34.4	30.5	34.8	26.1	36.6	32.6	36.5	26.5	39.8	39.3	28.1	37.5	22.9	24.5	32.7	28	31.4	22	27.1	24.1	28.3	21	26.8	24.1
	17.6	19.9	27.6	31.3	24.4	33.7	29.9	34.3	25.2	35.3	31.4	35.7	25.9	38.1	38.2	26.7	35.2	21.9	22.5	30.2	25	29.4	20.2	25.4	22.5	27	19.2	25	22.3
	18.5	20.7	29.4	32.8	25.9	37.1	33.3	36.9	27.8	42.5	38.8	40.8	29.6	44.6	42.5	29.8	42.5	25	24.8	34.1	29	32.6	22.1	28.2	25.2	29.1	20	24.8	22.1
	17.4	19.6	27.3	31.1	24.1	33.6	29.9	34.2	25.7	38	34	37.7	26.6	40.5	39.6	27	35.6	22	23.2	32	27	31.2	21.2	26.8	23.8	28.1	21.3	26.9	24.2
5 PM	21	23.1	35.9	36.8	28.1	51.6	53.5	55.4	70.5	42.7	38.9	40.5	60.7	42.2	40.7	51	42.2	25	26.3	35.1	30	33.3	22.2	28	25	29.1	20.8	26.5	23.8
	16.1	18.2	24.7	29	23.3	32.5	29.1	33.9	27	37.7	33.7	37.3	79.4	42.1	40.5	30.7	42.1	24.8	27.6	38	33	35.3	26.4	32.2	29.3	32.4	25.2	31.7	29.2
	17.7	19.8	28.3	31.9	24.6	32.1	28.4	33	24.2	34.4	30.4	34.7	26.4	39.6	38.9	29.4	39.5	23.8	25.3	32.4	27	31.2	21.9	26.9	23.9	28.2	20.1	24.8	22.1
	11.4	13	16.3	20.3	16	20.7	18.4	22	16.1	22.6	19.9	24	17.3	26.2	27.8	20	26.1	16.7	17.4	23.6	19	23.4	15.5	19.4	16.9	21	14.4	18.2	15.9
6 PM	16.7	18.8	26.2	30.1	23	29.5	25.9	30.5	22.4	29.9	26.2	30.9	20.7	29.7	30.9	20.8	27.3	17.5	17.3	22.6	18	22.5	15	18.6	16.2	20.2	13	16.4	14.4
	14.9	16.8	22.8	27.1	22.2	27.9	24.5	28.9	22	29	25.3	29.9	21.8	31.3	32.3	23.8	30.6	19.2	21.1	26.8	22	26.1	18.7	22.3	19.5	23.9	16.3	19.9	17.5
	11.9	13.4	17.3	21.3	17.4	21.9	19.4	23.2	18.1	23.9	21	25	18.9	26.1	27.5	20.5	25.7	16.4	18.4	22.8	18	22.5	16.6	19.8	17.2	21.1	15.1	18.2	16
	11.4	12.9	17	20.9	17.1	20.4	18.1	21.6	15.9	20.8	18.4	22	16.2	21.8	23.2	17.2	21.7	13.9	14.8	18.7	15	18.6	13.2	15.6	13.6	16.9	12	14.5	12.8

Density (pc/mi/ln)
- < 11
- 11 - 18
- 18 - 26
- 26 - 35
- 35 - 45
- > 45

Level of Service

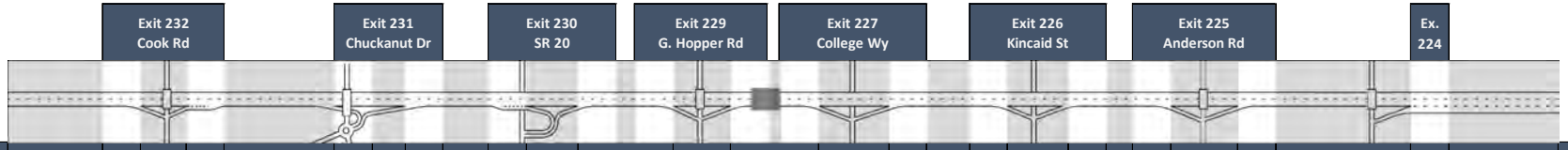
	1	2	3	4	5	6	7	8	9	10	11	12	13	14 - 16		17	18 - 20		21	22 - 24			25	26	27	28	29	30	31
3 PM	B	B	C	D	C	C	C	D	C	D	D	D	D	D	E	D	E	C	C	D	C	D	D	C	D	D	D	C	C	C
	C	C	D	E	D	D	D	E	D	D	E	E	D	D	F	D	E	C	C	C	C	C	D	C	C	C	C	B	C	C
	B	C	C	D	C	D	D	D	C	D	D	D	C	D	D	C	D	C	C	C	C	C	D	C	C	C	C	C	C	C
	C	C	E	E	D	E	E	E	D	F	F	F	D	F	F	D	E	C	C	C	C	C	D	C	C	C	C	B	C	C
4 PM	C	C	D	E	C	D	D	D	D	D	D	E	D	D	E	D	E	C	C	C	C	D	D	C	C	C	D	C	C	C
	B	C	D	D	C	D	D	D	C	D	D	D	C	D	E	D	E	C	C	C	C	C	D	C	C	C	D	C	C	C
	C	C	D	E	C	D	D	E	D	E	F	F	D	F	F	D	E	C	C	C	C	D	D	C	C	C	D	C	C	C
	B	C	D	D	C	D	D	D	C	D	D	E	D	D	E	D	E	C	C	C	C	D	D	C	C	C	D	C	C	C
5 PM	C	C	E	E	D	F	F	F	F	F	F	F	F	F	F	F	F	C	C	D	C	D	E	C	C	C	D	C	C	C
	B	C	C	D	C	D	D	D	D	D	D	E	F	D	E	D	E	C	C	D	D	D	E	D	D	D	D	C	D	D
	B	C	D	D	C	D	D	D	C	D	D	D	D	D	E	D	E	C	C	C	C	D	D	C	C	C	D	C	C	C
	B	B	B	C	B	B	C	C	B	C	C	C	B	C	C	C	D	B	B	B	B	C	C	B	C	B	C	B	B	B
6 PM	B	C	D	D	C	C	C	D	C	D	D	D	C	C	D	C	D	B	B	B	B	C	C	B	B	B	C	B	B	B
	B	B	C	D	C	C	C	D	C	C	C	D	C	C	D	C	D	B	C	C	C	C	D	C	C	C	C	B	B	B
	B	B	B	C	B	C	C	C	C	C	C	C	C	C	C	C	C	B	B	C	B	C	C	B	C	B	C	B	B	B
	B	B	B	C	B	B	C	C	B	C	C	C	B	B	C	B	C	B	B	B	B	B	C	B	B	B	B	B	B	B

Level of Service
- A
- B
- C
- D
- E
- F

2045 Northbound I-5 Mainline Density and LOS

November 1, *2023*

Washington State Department of Transportation



Density (pc/mi/ln)

	1	2	3	4	5	6	7	8	9	10	11	12 - 14			15	16 - 18		19	20	21	22	23	24	25	26	27	28	29	30	31
3 PM	14.4	17.9	12.6	18	15.7	19.4	14.4	20	18.6	13.3	16.6	27.9	26	32.8	23.4	35.3	36.8	23.8	33	29.8	34.4	22.8	30.2	27.3	31.8	21.7	25.7	22.1	14.6	14.6
	14.3	17.8	12.4	18.6	16.3	20	15.2	21.5	20	14.3	18.1	28.6	26	33.4	24.7	34.6	36.1	22.8	32.1	28.9	33.6	23	29.5	26.5	31.1	20.7	25.5	21.8	14.9	14.9
	14.5	17.9	13	19	16.7	20.6	15.5	23	21.4	15.2	19.3	33.1	31	37.9	28.8	40.6	40.8	25	35	31.8	36	24.9	32.6	29.5	34	22.4	27	23.3	15.1	15.1
	18.4	22.5	16.1	23.5	20.8	25	19.3	26.9	25.2	17.4	22.4	35.1	33	39.6	30.4	43.9	43	26.6	36.8	33.7	37.4	26.4	34.2	31.2	35.3	23.6	28.4	24.8	16	16
4 PM	18.2	22.3	16	22.7	20	24.2	18.7	26.6	24.9	17.2	21.3	33.7	31	38.4	29.1	43.7	42.9	26.8	37.8	34.9	38.1	27.1	37.1	34.5	37.7	25.2	30.2	26.5	16.9	17
	13.4	16.6	12.2	18.7	16.4	20.1	15.5	21.4	19.9	14.2	18.3	30	27	34.8	25.9	37.8	39.1	22.5	31.3	28.1	32.9	21.9	29.6	26.7	31.4	20.2	24.3	20.7	13.8	13.8
	15.9	19.7	13.6	19.6	17.2	21.2	15.7	22.7	21.1	15	18.3	31.2	29	36.2	26.4	38.6	39.2	25.9	39.4	36.9	39.5	28.2	38.6	36.1	38.7	27.4	33.2	29.6	18.1	18.1
	17.2	21.2	14.8	20.8	18.2	22.3	16.5	23.6	22	15.5	19.6	30.1	27	34.9	25.5	38.6	39.4	25.2	38.2	35.5	38.8	26.1	34.4	31.5	35.5	23.6	28.9	25.2	16.6	16.7
5 PM	17.6	21.6	15.3	21.3	18.7	22.8	17	23.4	21.7	15.4	18.5	30.9	28	35.7	26.9	43.6	42.7	28.6	41.3	38.8	40.6	29.3	39.8	37.4	39.6	27.1	32.7	29.1	17.9	17.9
	17.4	21.5	14.9	20.3	17.8	21.7	16.6	21.8	20.2	14.4	17.9	30.3	28	35.1	26.8	39.2	40	24.1	35.1	32.1	36.3	24.2	31.9	28.9	33.3	22.4	27.7	24.1	15.5	15.5
	16.7	20.6	14.6	19.6	17.2	21.1	15.8	21.5	20	14.3	18.5	29.1	27	33.8	25.3	37.1	38.3	23.4	33.2	30	34.5	23.7	30.9	27.9	32.5	21.5	25.9	22.2	14.5	14.5
	18.7	23	15.8	20.2	17.7	21.7	16.1	21.3	19.8	14.1	18.3	27.9	25	32.6	24	34.3	35.9	22.6	30.6	27.4	32.2	21.5	27	24.2	28.8	19.4	22.5	19	12.9	12.9
6 PM	15.6	19.4	13.9	19.2	16.8	20.6	16.1	21.1	19.6	14	18.1	25.8	23	30.1	23	31.8	33.5	22.2	30.5	27.4	32.1	22.1	28.4	25.5	30	20.7	23.8	20.2	13.6	13.7
	13.5	16.7	12.3	16.3	14.3	17.6	13.3	17.3	16.2	11.6	15.1	23	21	27.1	20.9	27.9	29.8	19.8	26.2	23.3	28	18.7	23.2	20.9	24.9	17.3	20	16.8	11.5	11.5
	10.4	12.9	9.3	12.4	10.9	13.4	10.2	13.3	12.5	9	12	19.2	18	22.9	17.5	23.7	25.7	16.4	23.2	20.9	25.1	16.4	19.9	18	21.4	15.1	17.9	15.1	10.2	10.2
	9.8	12.1	8.8	11.9	10.5	13	9.9	12.5	11.7	8.4	11	17	16	20.3	15.5	20.7	22.5	15	19.8	17.9	21.4	14	17	15.4	18.4	12.3	13.8	11.6	8.2	8.2

Legend — Density (pc/mi/ln)

- < 11
- 11 - 18
- 18 - 26
- 26 - 35
- 35 - 45
- > 45

Level of Service

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
3 PM	B	C	B	B	B	C	B	B	C	B	B	C	C	D	C	D	D	E	C	D	D	D	C	C	D	D	C	C	C	B	B
	B	C	B	B	B	C	B	B	C	B	C	C	D	D	C	D	D	E	C	D	D	D	C	C	D	D	C	C	C	B	B
	B	C	B	B	B	C	B	C	C	B	C	C	D	E	D	D	E	E	C	D	D	E	C	C	D	D	C	C	C	B	B
	C	C	B	C	C	C	C	C	C	B	C	C	D	E	D	D	E	E	D	D	D	E	D	D	D	D	C	C	C	B	B
4 PM	C	C	B	C	C	C	C	C	C	B	C	C	D	E	D	D	E	E	D	D	D	E	D	D	D	E	C	C	D	B	B
	B	B	B	B	B	C	B	B	C	B	C	C	D	D	C	D	E	E	C	C	D	D	C	C	D	D	C	C	C	B	B
	B	C	B	C	B	C	B	C	C	B	C	C	D	E	D	D	E	E	C	D	E	E	D	D	E	E	D	D	D	C	C
	B	C	B	C	C	C	B	C	C	B	C	C	D	D	C	D	E	E	C	D	E	E	D	D	D	D	C	C	C	B	B
5 PM	B	C	B	C	C	C	B	C	C	B	C	C	D	D	D	D	E	E	D	D	E	E	D	D	E	E	D	D	D	B	B
	B	C	B	C	B	C	B	C	C	B	B	C	D	D	D	D	E	E	C	D	D	E	C	C	D	D	C	C	C	B	B
	B	C	B	C	B	C	B	C	C	B	C	C	D	D	C	D	D	E	C	D	D	D	C	C	D	D	C	C	C	B	B
	C	C	B	C	B	C	B	B	C	B	C	C	C	D	C	D	D	D	C	C	D	D	C	C	C	C	C	C	C	B	B
6 PM	B	C	B	B	B	C	B	B	C	B	C	B	C	D	C	C	D	D	C	C	D	D	C	C	C	D	C	C	C	B	B
	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	D	D	C	C	C	C	C	B	C	C	B	B	B	B	B
	A	B	A	B	A	B	A	B	B	A	B	B	B	C	B	C	C	C	B	C	C	C	B	B	B	C	B	B	B	A	A
	A	B	A	B	A	B	A	B	B	A	A	B	B	C	B	B	C	C	B	B	B	C	B	B	B	B	B	B	B	A	A

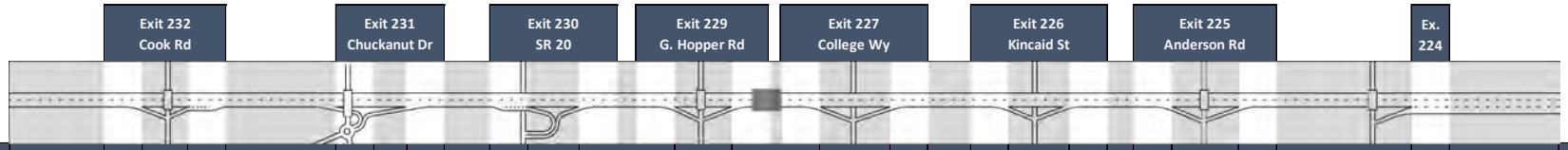
Level of Service

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

2021 Southbound I-5 Mainline Density and LOS

November 1, *2023*

Washington State Department of Transportation



Density (pc/mi/ln)

	1	2	3	4	5	6	7	8	9	10	11	12 - 14			15	16 - 18		19	20	21	22	23	24	25	26	27	28	29	30	31
3 PM	17.6	21.7	15.9	22.3	19.5	23.7	17.8	24.4	22.5	17.7	19.9	31.7	29	33.2	24.9	38.6	38.5	26.8	36.4	32.7	36.6	26.9	35.4	32	36.8	28	33.3	29.5	20	18.1
	17.5	21.6	15.5	23	20.1	24.2	18.2	25.8	23.9	18.6	20.8	31.7	29	33.1	24.4	34.9	35.8	24.7	34.1	30.3	34.6	24.8	31.7	28.3	32.9	25	30.9	27.1	19.3	17.5
	17.8	21.8	15.6	22.7	19.9	24	18.3	27.2	25.3	19.4	22.1	36.6	34	37.1	28.9	41.4	40.7	28.1	38.4	34.7	37.9	28.3	36.9	33.6	37.1	28.2	33.9	30.2	20.1	18.3
	22.8	27.1	20.4	29.4	26.4	30	23.8	33.1	31.3	22.6	26.2	40	37	39.6	31.5	46.8	43.8	30	40.6	37.1	39.5	29.9	38.6	35.4	38.2	29.2	35.2	31.6	20.9	19
4 PM	21.4	25.7	19	26.8	23.8	27.8	21.8	31.1	29.3	21.7	25.4	38.4	35	52.5	70.2	42.2	41.2	27.8	38.4	34.8	38	28.8	39.4	36.3	38.9	30.3	36.3	32.7	21.5	19.6
	15.3	19	13.9	21.2	18.5	22.5	17.2	23.8	22	17.3	19.1	31	28	33.5	26.9	40.4	40.2	26.8	36.2	32.6	36.4	27.2	36.4	33.1	36.8	27.7	33.4	29.6	19.8	18
	18.6	22.8	17	24.2	21.3	25.5	20	28.4	26.5	20.2	23.3	37.8	35	38.1	29.6	44.3	42.1	27.2	40.2	36.7	39.3	28.7	39.5	36.4	38.8	29	35.3	31.7	20.8	19
	20.4	24.7	17.5	24.5	21.6	25.8	19.3	27.6	25.7	19.7	21.5	32	29	33.5	24.7	38.6	38.7	27.1	39.9	36.4	39.2	29.5	38.6	35.4	38.3	30.6	37.6	34.1	22.3	20.4
5 PM	19.2	23.5	16.8	23.4	20.5	24.8	18.3	25.4	23.5	18.5	20.7	33.4	30	34.5	25.9	43.3	41.7	29.2	41.2	37.8	39.9	29.4	40.2	37	39.3	30.4	36.8	33.2	21.4	19.5
	19.2	23.5	16.9	23	20.1	24.2	18	23.7	21.9	17.4	18.2	30.1	27	31.7	23.7	35.8	36.8	25	35.6	31.9	36.1	26.5	34.7	31.3	35.4	26.6	33	29.3	19.8	17.9
	18.3	22.5	15.9	21.4	18.7	22.8	17.3	23.8	22	17.3	19	29.2	26	30.8	23.4	35.2	36.2	23.2	32.2	28.5	33.2	23.3	30.6	27.2	31.9	23.6	28.7	24.8	17.4	15.8
	21.1	25.5	18.4	23.5	20.6	24.8	18.5	24.5	22.7	17.8	20.4	30.1	27	31.7	23.8	34.7	35.7	23.3	31.1	27.4	32.2	23.1	29	25.8	30.4	22.2	26	22.2	16.1	14.6
6 PM	18.5	22.6	15.8	21.9	19.1	23.1	17.2	22.7	20.9	16.6	19.2	26.6	24	28.4	21.3	30	31.4	21	28.5	25.1	29.8	21.1	27.1	24	28.6	21.2	24.6	20.9	15.5	14
	15.9	19.6	14.4	19	16.5	20.3	15.8	20.6	19	15.2	17.6	25.5	23	27.2	21.2	28.7	30.1	21.1	27.5	24.2	28.9	21	26	23.1	27.4	20.9	24.3	20.6	15	13.7
	12.3	15.2	11.3	14.9	13	16.1	12.1	15.7	14.7	11.7	13.7	20.9	19	22.5	17.6	24.1	25.7	18	24.8	21.8	26.2	18.6	22.5	20.1	23.9	18.4	21.6	18.2	13.4	12.2
	11.6	14.4	10.6	14.2	12.4	15.3	11.5	14.5	13.6	10.9	13	18.9	17	20.5	15.9	21.6	23.1	15.8	20.5	18.3	21.9	15.3	18.4	16.6	19.8	15.4	17.1	14.3	10.9	10

Level of Service

	1	2	3	4	5	6	7	8	9	10	11	12 - 14			15	16 - 18		19	20	21	22	23	24	25	26	27	28	29	30	31
3 PM	B	C	B	C	C	C	B	C	C	B	C	C	D	D	C	D	F	D	D	D	E	D	D	D	D	D	D	D	C	C
	B	C	B	C	C	C	C	C	C	C	C	C	D	D	C	D	D	C	D	D	D	C	C	D	D	C	C	D	C	B
	B	C	B	C	C	C	C	C	C	C	C	C	D	E	D	D	F	F	D	D	D	E	D	D	D	E	D	D	D	C	C
	C	D	C	D	D	D	C	D	D	C	D	D	E	F	D	F	F	F	D	D	E	E	D	D	E	E	D	D	D	C	C
	C	D	C	C	C	D	C	C	D	C	C	D	E	F	F	F	F	F	D	D	D	E	D	D	F	E	D	D	D	C	C
4 PM	B	C	B	C	C	C	B	C	C	B	C	C	D	D	D	D	E	E	D	D	D	E	D	D	D	E	D	D	D	C	C
	C	C	B	C	C	C	C	C	D	C	C	C	E	E	D	D	E	E	D	D	E	E	D	D	E	E	D	D	D	C	C
	C	C	B	C	C	D	C	C	C	C	C	C	D	D	C	D	E	E	D	D	E	E	D	D	E	E	D	D	D	C	C
5 PM	C	C	B	C	C	C	C	C	C	C	C	C	D	D	C	D	F	F	D	D	E	E	D	D	E	E	D	D	D	C	C
	C	C	B	C	C	C	B	C	C	B	C	C	D	D	C	D	D	E	C	D	D	E	D	D	D	D	D	D	D	C	B
	C	C	B	C	C	C	B	C	C	B	C	C	D	D	C	D	D	E	C	D	D	D	C	C	D	D	C	C	C	B	B
	C	D	C	C	C	C	C	C	C	B	C	C	D	D	C	D	D	D	C	C	D	D	C	C	C	D	C	C	C	B	B
6 PM	C	C	B	C	C	C	B	C	C	B	C	B	C	C	C	C	D	D	C	C	C	D	C	C	C	C	C	C	C	B	B
	B	C	B	B	B	C	B	B	C	B	B	B	C	C	C	C	C	D	C	C	C	D	C	C	C	C	C	C	C	B	B
	B	B	B	B	B	B	B	B	B	B	B	B	C	C	B	C	C	C	C	C	C	C	C	B	C	C	C	B	C	B	B
	B	B	A	B	B	B	B	B	B	A	B	B	B	C	B	B	C	C	B	B	C	C	B	B	B	B	B	B	B	A	A

Legend

Density (pc/mi/ln)
- < 11
- 11 - 18
- 18 - 26
- 26 - 35
- 35 - 45
- > 45

Level of Service
- A
- B
- C
- D
- E
- F

2045 Southbound I-5 Mainline Density and LOS

November 1, *2023*

Washington State Department of Transportation

APPENDIX F ITS & TECHNOLOGY STRATEGY

I-5 SKAGIT TRANSPORTATION STUDY, PHASE I

Washington State Department of Transportation

Prepared by:
Transpo Group USA, Inc.

Prepared for:
Washington State Department of Transportation Northwest Region
Mount Baker Area Multimodal Transportation Planning Office

Table of Contents

ITS & TECHNOLOGY OPTIONS DEVELOPMENT STRATEGY

INTRODUCTION

The Washington State Department of Transportation Northwest Region Mount Baker Area is initiating the Interstate 5 (I-5) Skagit Transportation Study. This study will gather multimodal transportation and socioeconomic data, incorporate environmental factors, conduct equitable community engagement, and analyze current (2022) and future (2045) transportation conditions to determine how I-5 in Skagit County can better meet regional mobility and safety needs.

This study builds on the findings of the 2021 Technical Report: Interstate 5 Existing Conditions Analysis Mount Vernon / Burlington. The traffic operations analysis, safety analysis and merge threshold analysis component of this study revealed that some corridor segments are not performing within expectations and are experiencing higher vehicle density and poor levels of service for traffic, ramp operations and crashes.[1]

As part of this project, WSDOT will assess potential intelligent transportation systems (ITS), cooperative automated transportation (CAT), electric vehicle (EV) infrastructure and other possible technologies that can support and enhance operational strategies on the corridor.

This plan serves as the guide to the development of the ITS and technology options for the I-5 corridor, summarizing baseline information, potential ITS and technology options, and presenting an assessment methodology that could be used to support future activities in this area.

The ITS and technology option occurs in two phases. During Phase I (2023), the corridor was assessed, and candidate options were developed – which involved reviewing current and planned ITS infrastructure, outlining applicable ITS/technology solutions, and presenting the methodology that will be utilized in Phase II. In Phase II ITS/technology packages of solutions have been identified to assist in identifying solution alternatives to support and/or enhance the overall development of strategies and solution alternatives for the corridor.

PROJECT BACKGROUND

In 2021, WSDOT and the Skagit Council of Governments initiated a baseline analysis of I-5 in the Mount Vernon and Burlington urban areas with the goal of determining if I-5 is meeting regional transportation performance objectives and examining the steps and measures that could be taken to address unmet performance expectations. Using the information and findings from the technical analysis, WSDOT, along with its planning partners have moved to the next stage of the transportation study to address the safety and congestion needs identified in the 2021 Existing Conditions Analysis.

[1] The northbound section between Kincaid St and George Hopper Rd is expected to operate at LOS F between 5 PM and 6 PM, with the primary breakdown zone centered on the Skagit River Bridge. Similarly, the southbound direction shows degraded performance near the bridge, although not as severe as the northbound direction.

Exhibit 1 Project Area Exit 224 to 232

PROJECT AREA

The study area spans the 9-mile-long corridor that runs through the urban areas of Mount Vernon and Burlington in Skagit County. The focus area of the corridor is the segment along I-5 from Old 99 Highway (exit 224) to Cook Road (exit 232), as shown in Exhibit 1.

There are eight interchanges in the study area; four provide access to state highways that intersect with I-5. State highways included in the urban area include State Routes (SR) 536, 538, 20 and 11. There are only two north-south bridges across the Skagit River; the Skagit River Bridge (now formally known as the I-5 Trooper Sean M. O'Connell Jr. Memorial Bridge) and the Riverside Bridge, a local bridge that serves the communities of Burlington and Mount Vernon. In Mount Vernon, the SR 536 Division Street Bridge serves east and west Mount Vernon and is an alternative route to Anacortes/San Juan Ferry and Whidbey Island.

ITS & TECHNOLOGY OPTIONS DEVELOPMENT STRATEGY

This *I-5 Skagit ITS & Technology Options Development Strategy* is organized as follows:

- **Inventory Overview**. This section provides a description of current and planned ITS applications on the I-5 Skagit corridor.
- **Overview of Potential ITS/Technology Options.** This section outlines applicable ITS/technology options for the corridor, based on previous plans, WSDOT TSMO ITS/technology packages, and national examples for analogous corridors.
- **Assessment Methodology**. This section presents the technical process that could be implemented in Phase II to develop ITS/technology packages of solutions that can support and/or enhance the overall I-5 Skagit development of strategies and solutions.
- **Next Steps**. This section provides a look forward as to how this strategy could be implemented during the scheduled Phase II activities to support the development of I-5 Skagit corridor strategies and solutions.

INVENTORY OVERVIEW

This section summarizes an inventory of the primary ITS elements that are currently in the project area (all operated by WSDOT), and then provides a brief discussion of two documents that have recommended some general ITS/technology areas for consideration in the Project Area.

TRANSPORTATION MANAGEMENT CENTER

The ITS defined in this inventory are all managed and operated through WSDOT's Northwest Region Transportation Management Center (TMC) in Shoreline, WA. The TMC operates 24 hours a day, every day, to monitor traffic and to direct and support incident response, in order to keep roads clear and traffic moving safely.

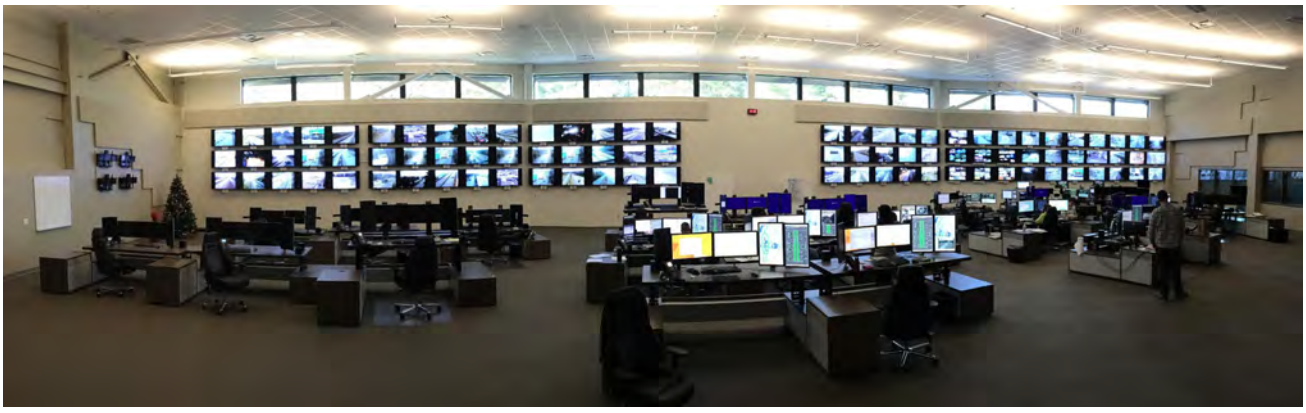


Exhibit 1 WSDOT Northwest Region TMC at Shoreline (source: University of Washington)

More specifically, the Shoreline TMC functions include:

- Monitor traffic and identify roadway incidents using cameras located on the highways (e.g. I-5 and all state routes in the I-5 Skagit Project area).
- Use data from traffic detectors on the highway to observe traffic conditions in real-time, even in areas where cameras may not be available.
    - Currently only one section of roadway is available for real-time data from the study area, see Exhibit 4.
- Oversee operations of WSDOT's ramp meter, reversible lane, and Active Transportation and Demand Management (ATDM) systems, to help manage traffic flow and reduce congestion (note that these ITS/systems are not currently deployed in the I-5 Skagit Project area).
- Coordinate the activities of WSDOT's Incident Response Teams.
- Coordinate responses with Washington State Patrol and other law enforcement and emergency response crews when responding to incidents.
- Coordinate with Public Information Officers (PIOs) to provide up-to-the-minute information about what is happening on the highway system, including mountain pass updates, weather conditions, travel alerts, and travel times.

WSDOT utilizes this TMC to convey information to the traveling public through:

- Variable Message (Electronic) Signs.
- WSDOT Real-time travel data web pages.
- WSDOT App and Twitter Feeds.
- Highway Advisory Radio System.
- Local media stations, such as television and radio traffic reports.
    - This is most often done by a PIO occasionally stationed in the TMC, but often working remotely.
- Active Traffic Management Systems (the lane-management gantries on I-5, I-90, and SR 520).
- Dynamic Tolling Systems.

TRAFFIC FLOW DATA COLLECTION AND MEASUREMENT

Traffic flow metrics and conditions information is measured on I-5 through WSDOT's network of automated traffic counters. These devices typically utilize induction loop detectors, which are installed directly into each lane of pavement at a count location. The recorder function of these devices collects volume, classification, speed and weight data on the freeway lane. This data is then made available through WSDOT's Traffic Count Database System (TCDS), and includes hourly or sub-hourly vehicle volume, classification, speed and weight data. The online TCDS application also provides more granular (daily, hourly, 15-minute) count data collected at each location. Exhibit 3 provides the TCDS counter locations that have recently been utilized (in most cases, within the past 1.5 years) for traffic flow measurements for the I-5 Skagit corridor (including corresponding State Routes). The induction loop detectors also collect occupancy

data which is used as a critical data parameter in a wide variety of transportation studies. Exhibit 4 shows the location of the single continuous traffic counter on I-5 in the corridor, which provides 24/7 data at all times.

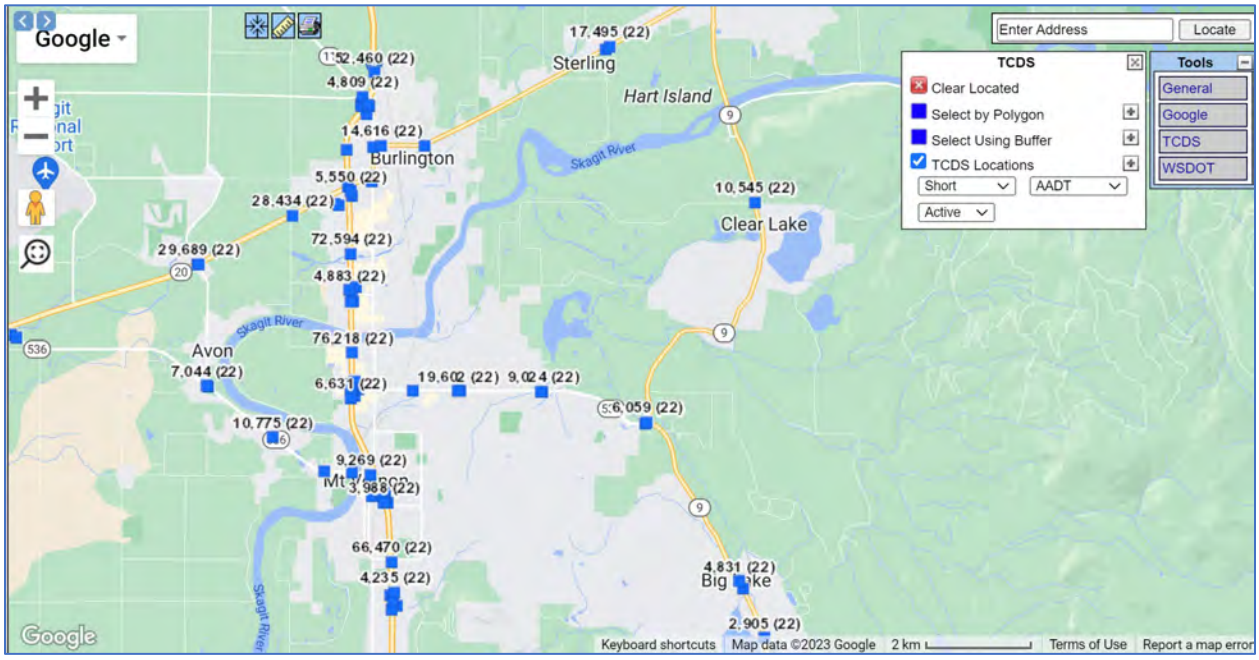


Exhibit 2 Project Area Short-Term Automatic Traffic Counters

Exhibit 3 Single Continuous Automated Traffic Counter in the Project Area

TRAFFIC MONITORING

WSDOT maintains one of the most extensive Closed-Circuit Television Cameras (CCTV) roadway monitoring networks in the nation. CCTV cameras provide WSDOT visual coverage of locations along traveled roadways and are also strategically placed on high-volume corridors and near locations with high concentrations of collisions that require incident management and

response. Exhibit ## shows the age and lifespan of the cameras within the study area. The majority of the existing camera are old models and would benefit from being upgraded to the new system for improved visibility. Exhibit 5 provides an example video capture from a WSDOT CCTV that is deployed in the Project Area at the southbound on-ramp at George Hopper Road interchange (MP 228.8).

Exhibit 4 Example CCTV Screenshot in the Project Area

For the I-5 Skagit Project Area, video feeds are transmitted to the WSDOT Northwest Region TMC in Shoreline for real-time viewing. At the TMC, operators may keep these video feeds on in the background for passive monitoring and early detection of non-routine congestion. During incidents, CCTV cameras can provide WSDOT a high degree of visual clarity of how the incident is progressing, which allows for better management of the event and accurate dissemination of information to the public. Exhibit 6 provides the locations of all of the WSDOT CCTV's currently deployed in the Project Area.

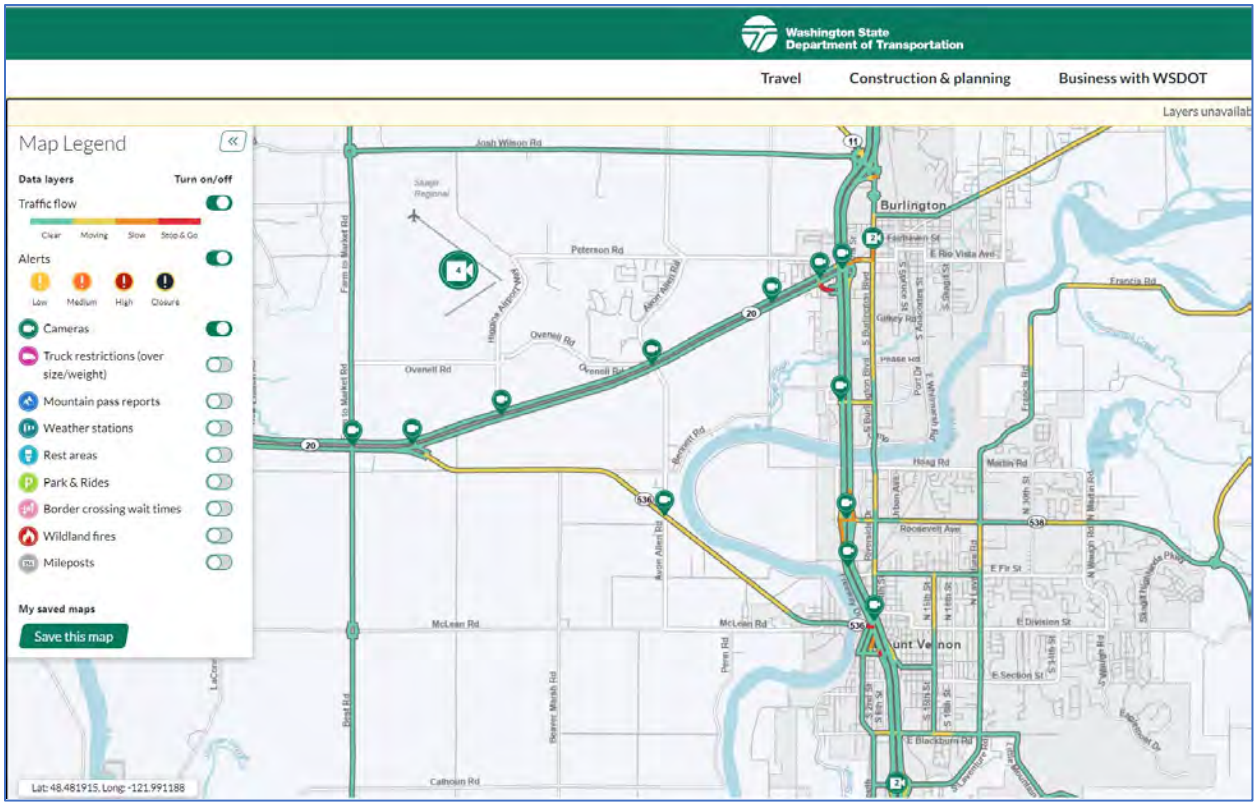


Exhibit 5 CCTV Locations in the Project Area (Google Maps Traffic Flow also shown)

Exhibit 6 also provides the real-time traffic flow information from WSDOT's online travel map (https://wsdot.com/Travel/Real-time/Map/). Additionally, WSDOT uses this map to display information on incidents and alerts, including work zone information, as illustrated in Exhibit 7.

Exhibit 6 Example of WSDOT Workzone Alert Information Near the Project Area

DRIVER INFORMATION

WSDOT's Variable Message Signs (VMS) provide drivers with crucial travel information in real-time. The TMC utilizes VMS to display important information about travel times, upcoming collisions and closures, important events, heavy traffic ahead, public service announcements,

weather conditions, etc. There are no existing VMS within the study area. The nearest VMS are at MP 191 at MP 249 which do not assist drivers get to, go from, or travel within the study area.

WEATHER DETECTION

WSDOT's Road Weather Information System (RWIS) monitors local roadway and weather condition information and alerts public sector agencies and the traveling public about inclement weather conditions. The system sensors can be highly customized to the specific weather conditions and detection needs of a given location. The full menu of sensors that can be included on a deployed RWIS station can allow for the real-time measurement of temperature, atmospheric pressure, precipitation, humidity, wind speed, pavement temperature, and pavement conditions data – and report it to a central WSDOT RWIS software application. Exhibit 8 presents the locations of the WSDOT RWIS stations that are deployed in the Project area. These RWIS collect, aggregate, and communicate road weather information to inform travelers to prepare for adverse driving conditions or avoid them altogether.

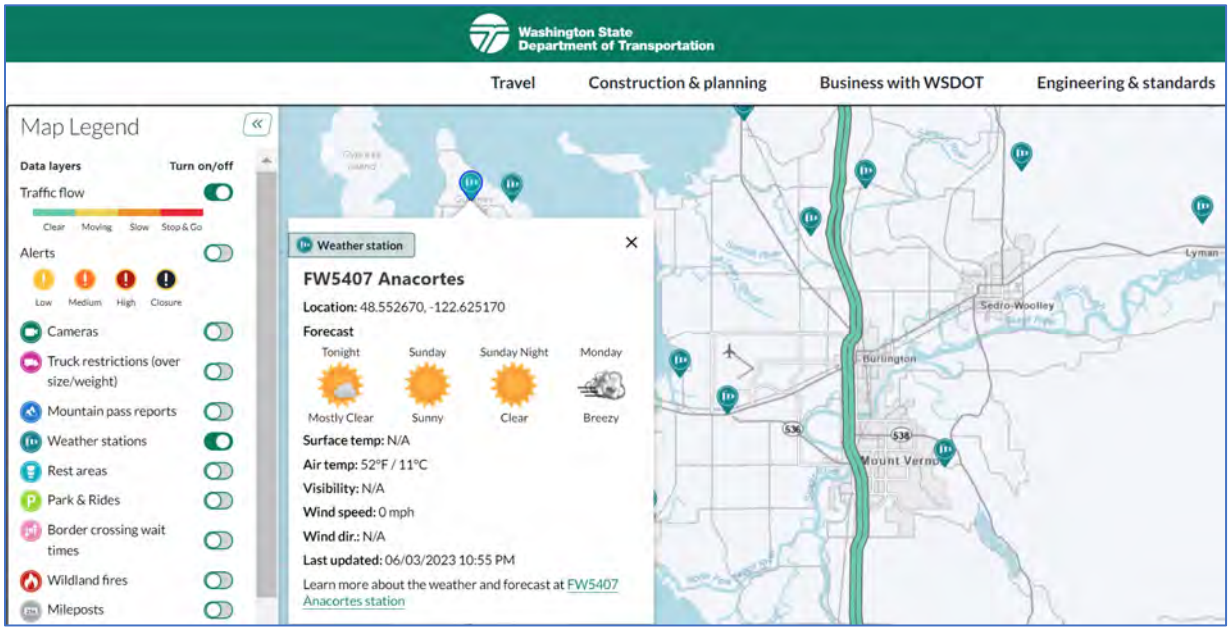


Exhibit 7 WSDOT Weather Detection Stations the Project Area

HIGHWAY ADVISORY RADIO

WSDOT uses Highway Advisory Radio (HAR) devices to communicate with the traveling public. These devices are used to inform drivers to tune into a radio station to hear an important travel advisory message.

MODULAR COMMUNICATIONS HUB (HUB)

WSDOT uses Modular Communications Hubs (HUB) to support the communications system operations within the study area. There exists a small temporary mini-HUB utilizing a camera cabinet near I-5 and SR 20. This mini-HUB is connected to the WSDOT Burlington office through fiber. The WSDOT Burlington office is connected to the WSDOT Everrett office through fiber. The mini-HUB shall be replaced with full sized HUBs containing all necessary support equipment for communications system operations at the SR 532 and SR 20 interchanges. The HUBs shall be connected to the Dayton TMC through WSDOT owned fiber.

COMMUNICATION NETWORK

Fiber is the route of transmittal of CCTV and roadway data from the study area to the TMC. As previously showed, WSDOT has a collection of ITS devices in the study area interconnected with WSDOT owned fiber. While there is some WSDOT owned fiber in the study area, there is not continuous WSDOT fiber throughout the corridor.

PLANNED ITS

There are no specifically defined ITS or other transportation technology projects that have been programmed by WSDOT or surrounding agencies in the study area at this point in time. However, the **Skagit 2045 Regional Transportation Plan**[2] does contain a *Long-Term* recommendation for inclusion of ITS. This is defined as an Active Transportation Management strategy, and is included in the *Illustrative Projects (Not Fiscally Constrained)* category, and is presented here:

> *A wide range of technologies and strategies used to optimize traffic throughput and improve safety during periods of peak travel demand, or when incidents and events occur that affect traffic flow and safety. Active Traffic Management may include adaptive ramp metering, adaptive intersection signal systems, variable message signs, variable speed limits and lane use control signs. This project requires coordination with Skagit County, Mount Vernon and Burlington.*

Of note here, the summary of technologies and strategies also tracks recommended future ITS areas of focus that were included in the **Skagit MPO ITS Architecture**[3] document that was published in 2011.

Despite the lack of specific guidance for future ITS/technology projects in the Project area, WSDOT has recently established a well-defined **Transportation Systems Management and Operations (TSMO)**[4] program and guidance. This guidance provides a structure for the inclusion of multiple integrated ITS and transportation operations innovations for projects in the State. WSDOT's approach to implementing TSMO is system-wide, with five focus areas: planning and policy development, transportation operations, cooperative automated transportation and technology, intelligent transportation systems, and transportation demand management.

The WSDOT TSMO guidance and materials will serve as a key touchstone reference in the implementation of this ITS & Technology Options Development Strategy. Given this, a detailed summary of TSMO and the WSDOT TSMO program is presented in **Appendix 1: TSMO Overview and WSDOT's Program**.

OVERVIEW OF POTENTIAL ITS/TECHNOLOGY OPTIONS

The table in Exhibit 9 outlines the draft candidate ITS/technology options for consideration in the Project area as part of the future Phase II effort. Information is provided that describes the technology option, provides sources that support the inclusion of the option, and describes the potential application to the I-5 Skagit Project. The table will serve as a component to support development of specific strategies during Phase II.

[2] https://www.scog.net/MTP-RTP/2021/Skagit2045RTP-Amended.pdf
[3] https://www.scog.net/ITS/SCOG_MPO_ITS_Architecture-FINAL.pdf
[4] https://tsmowa.org/

Exhibit 8 ITS/Technology Options Summary Table

Technology	Description	Source(s)	Potential Application to Project
Adaptive Ramp Metering[5]	Traffic signals installed on freeway on-ramps to control the frequency at which vehicles enter the flow of traffic on the freeway	• Skagit 2045 RTP • WSDOT TSMO – Active Traffic Mgmt. • WSDOT ITS guidelines	• Applicability to I-5 on-ramps during AM/PM peak and special events • Requires multijurisdictional coordination • Priority need from TMC
Adaptive Signal Systems	Technologies that capture current traffic demand data to adjust traffic signal timing to optimize traffic flow in coordinated traffic signal systems.	• Skagit 2045 RTP • WSDOT TSMO – Active Traffic Mgmt.	• Control arterial traffic flow in advance of and off I-5 exits • Requires multijurisdictional coordination
Variable Message Signs (VMS)	An electronic traffic sign often used on roadways to give travelers real-time information on conditions, incidents and events	• Skagit 2045 RTP • WSDOT TSMO – Active Traffic Mgmt.	• Traffic warnings to vehicles on I-5 to improve traffic flow and safety • Useful to manage traffic flow during special events (e.g. Tulp Festival) • Priority need from TMC
Variable Speed Limits	Uses dynamic speed limit signs to slow traffic before and through adverse conditions on the freeway to improve safety and keep traffic moving efficiently.	• Skagit 2045 RTP • WSDOT TSMO – Active Traffic Mgmt.	• Limited utility given I-5 in corridor is only two lanes in each direction • Can be useful in managing emergencies.
Dynamic Lane Assignment	Includes reversible lanes on highways and arterials, merge (or junction) control on highway ramps, and part-time highway shoulder use.	• Skagit 2045 RTP • WSDOT TSMO – Active Traffic Mgmt.	• Limited utility given I-5 in corridor is only two lanes in each direction • Could support Hard Shoulder Running operations
Hard Shoulder Running	The conversion of shoulders to travel lanes during peak periods as a congestion relief strategy. VMS and Lane Use Control Signs are used to manage the lane use. The shoulders are preserved as refuge areas during the majority of the day.	• FHWA Guide for Planning, Evaluating and Designing for sse of Freeway Shoulders for Travel (2016) • Pilot projects on Ohio and Florida freeways	• Could be used to alleviated severe congestion situations, such as Tulip Festival special event peak traffic conditions • Would be constrained by bridge crossings (with no shoulder space) on the Project I-5 corridor • Supports emergency resilience
Parallel route detouring communication to travelers	Communication to travelers when a roadway detour to a parallel route is needed – through VMS, and potentially supported by info dissemination to traveler apps	• WSDOT TSMO – ITS • Included as part of San Diego Integrated Corridor Management system deployment	• Could be supported by WSDOT Shoreline NW Region TMC • Need to consider the transportation safety and efficiency needs on the parallel/detour route • Supports emergency resilience

[5] Note that WSDOT's guidance for ramp metering stipulates that on-ramps outside of the Seattle metropolitan area shall have a ramp meter installed when the sum of the volume in the right lane of the mainline and the volume of the on-ramp equals or exceeds 1700 vph during the peak hour in the year when operation begins.

Technology	Description	Source(s)	Potential Application to Project
Queue Warnings	Advance warning (Dangerous Slowdown Alerts) for back-of-queue slowdowns to allow drivers to consider a potential safety event ahead of them	• WSDOT TSMO – ITS • Cloud-based applications (e.g. INRIX & Drivewize)	• Improves traffic flow and safety for all vehicles on mainline • Reduces hard braking incidents, especially for trucks
CAV Freeway Safety Application	Automated vehicles that are also Connected Vehicles (CAV) can exchange information on freeway conditions to support automated breaking, incident avoidance and respond to other safety events.	• In research/testing phase by USDOT and auto OEM's • Consistent with WSDOT CAT Program	• Relies on USDOT • Utilizes USDOT/SAE Basic Safety Message Standard SAE J2945/1
CAV Freeway Convoying/ Platooning	A group of CAVs that exchange info, so that they can drive in a coordinated way, allowing very small spacings and, still, travelling safely at freeway speeds, while reducing fuel and emissions	• In demonstration/ prototyping phase • Limited commercialization for tucks (e.g Peloton) • Consistent with WSDOT CAT Program	• Potential application for 2/3-truck platooning in non-peak hours • Potential future application for vehicles during severely congested peak periods.
Planned Event or Incident Signal Timing	Planned event or incident signal timing synchronizes groups of traffic signals to favor traffic entering and exiting a special event venue or area in order to minimize congestion – and to divert traffic around unplanned incidents and evacuations	• WSDOT TSMO – ITS • Recently successfully deployed in Glendale, Arizona to support traffic during Super Bowl Week (2023)	• Could be combined with Adaptive Signal Systems technology option and utilized to support traffic flows associated with region's Spring Tulip Festival • Supports emergency resilience
Special Event Transportation Management	Leveraging DMS, alternative routing, parking availability sensors (and potentially smartphone apps) to optimize traffic and reduce congestion associated with special events	• FHWA web page on Traffic Management for Special Events • WSDOT TSMO – Planning and Policy Development	• Could be used to manage traffic flows associated with region's Spring Tulip Festival • Includes Planned Event or Incident Signal Timing technology options • Will need to add parking mgmt.
Traveler Information Systems	Providing travelers with pre-trip and real-time information about travel times and potential delays can help them make alternate routing and timing decisions to avoid congestion.	• WSDOT Travel Center Map • WSDOT TSMO – ITS • Commercialized traveler information apps (e.g. Wayze)	• Existing WSDOT and commercialized travel apps can support new information provided from the Project • Supports emergency resilience
Electric Vehicle Infrastructure	WSDOT is identifying and prioritizing investments in fast EV charging along the I-5 Alternative Fuel Corridors (AFC) to the federal standards, and will oversee the strategy for meeting the state's Clean Cars 2030 target: that all passenger and light-duty vehicles of model year	• Washington State Plan For Electric Vehicle Infrastructure Deployment (2022) • AFC Fast EV Charging Contracts to be awarded in 2024	• Need to work with WSDOT EV staff and WA State Dept. of Enterprise Services to examine any locations and support needed that should be included in this Project's strategies

Technology	Description	Source(s)	Potential Application to Project
	2030 or later that are registered in WA be electric vehicles.		
Data availability - WSDOT, other agencies & private sector	Secure, cloud-based collection and integration of appropriate WSDOT, MPO, county, city and private sector data that can support future transportation applications.	• API-based data exchange standards • Some states have examined creation of Data Lakes (e.g. TxDOT)	• Strategies developed for this project should consider future data integration needs and benefits • Data privacy and data security must be maintained
Fiber Network Connection	The method of which WSDOT ITS equipment communicates with the TMC and vice versa so they can provide real-time information to the traveling public. Fiber should be installed along I-5 between 236th St NE and the northernmost ITS device in the study area.	• Skagit 2045 RTP • WSDOT TSMO – Active Traffic Management • WSDOT TSMO – ITS	• Necessary for real-time communication • Necessary for adaptive ramp metering, adaptive signal systems, VMS, variable speed limits, dynamic lane assignments, hard shoulder running, parallel route detouring-communication to travelers, planned event or incident signal timing, special events transportation management, and traveler information systems

PROPOSED ITS TECHNOLOGY METHODOLOGY ASSESSMENT

The methodology to fully develop technology strategies and solution alternatives are presented in Exhibit 10. As detailed in the process steps, implementation of this methodology may occur in Phase II together with the identification of other strategies and solution alternatives to address the needs of the study.

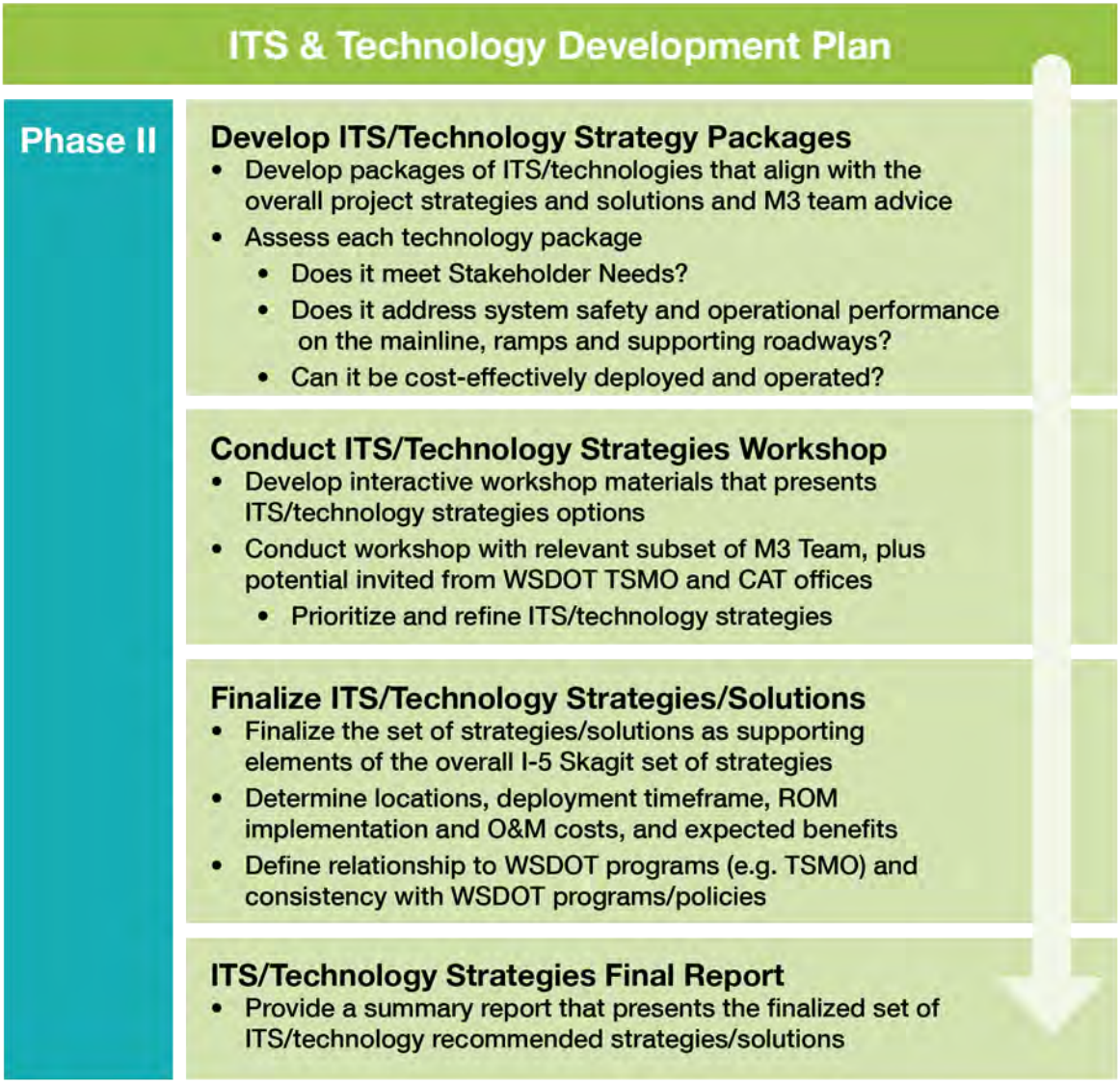


Exhibit 9 ITS/Technology Strategies and Solutions Development

NEXT STEPS

The following task examples are identified as potential steps for identifying ITS & Technology Options in Phase II:

Task 6. Develop and Evaluate Strategies and Solutions

6.1 Identify possible strategies and solutions that consider the identified problems and needs from the corridor assessment and community engagement effort.

6.1.1 Consider countermeasures to address system safety performance and operations, occurring on the mainline, ramps and other affected areas.

6.1.2 Workshop to evaluate potential technology strategies and to integrate them into the overall strategy or set of solutions.

6.1.3 Identify strategies and solutions by location within the corridor, implementation timeframe, and benefit to address near-term and mid-term (10-years) traffic operations, TSMO/technology and demand management strategies consistent with WSDOT Practical Solutions approach.

Task 8. Analyze Feasibility and Priorities

8.2 Complete a report covering future recommended TSMO and technology solutions.

The definition of the subsequent tasks, as well as the schedule, is subject to the final WSDOT approval of the Phase II scope.

APPENDIX 1. TSMO OVERVIEW AND WSDOT'S PROGRAM

TSMO PLANNING GUIDANCE

Transportation System Management and Operations (TSMO) is a set of strategies focused on maintaining and improving existing infrastructure. By leveraging technologies and coordinated policies, TSMO optimizes infrastructure performance, allowing planners and entities to allocate funding more efficiently and benefit a broader range of users. The primary objective of TSMO is to balance supply and demand while adapting to changing conditions. It plays a crucial role in enhancing traffic flow and safety through the adoption of various technologies and equipment. Real-time data from traffic networks is leveraged to take timely actions, resulting in safer systems, improved traffic flow, and increased network reliability. Reduced congestion leads to cost savings for transportation agencies and contributes to economic growth. TSMO offers a high return on investment opportunities by efficiently utilizing current infrastructure and roadways.

TSMO has the potential to transform transportation systems by relying on real-time data and continuous performance monitoring for effective traffic flow management and city planning. Data-driven platforms enable authorities to optimize traffic patterns, prevent congestion, and detect unexpected events causing delays. Travel time is reduced by providing updates and efficient routes to travelers. TSMO also promotes integrated multi-modal planning by coordinating schedules of different transportation modes, enhancing public transit reliability, and supporting sustainable transport. Efficient freight operations are another crucial aspect of TSMO, optimizing freight movement and minimizing its impact on traffic flow. While numerous TSMO projects have been implemented, TSMO itself encompasses a collection of solutions, approaches, mindsets, and investment strategies that need to be integrated into long-term plans. Collaboration among various entities and jurisdictions is essential for the successful implementation of TSMO in long-range plans.

To leverage TSMO in planning, it is crucial to integrate Intelligent Transportation Systems (ITS) technologies and TSMO-based policies into transportation infrastructure development. Well-designed guidelines and maintenance plans are necessary for ITS equipment, and protocols and regulations for data sharing and privacy management should be established. New performance measurement standards, including metrics such as travel times and safety indicators, need to be developed. Local agencies and stakeholders should collaborate to integrate TSMO into their planning and operation management agenda while assessing current infrastructure and capacity to identify gaps and capabilities for effective TSMO solutions. Integrating TSMO in the early stages of projects and aligning TSMO objectives with the planning process maximize benefits and cost savings. Training staff and the workforce on TSMO strategies and technologies expedite the expansion and adoption of TSMO in transportation system management.

Cities can embrace TSMO in their planning process to improve roadway safety, enhance traffic flow in corridors, reduce congestion and delays, and maximize existing infrastructure capacity. Systematic evaluation and data-driven decision-making are key to refining and enhancing TSMO initiatives. TSMO should be incorporated into long-term transportation planning, encompassing traffic management in urban and rural areas, incident management, work-zone operations programs, and multi-modal transit planning to support and promote public transportation.

WSDOT has developed a dedicated website, accessible at https://tsmowa.org/, to provide training on TSMO (Transportation Systems Management and Operations). The primary objective is to offer an effective tool for managing and operating the transportation system in Washington state. The website offers a comprehensive range of resources, including articles and program plans, which provide an overview of TSMO concepts and strategies. Professionals in the field can access various training sources, case studies, and tools, including traffic operations and traffic management software. Additionally, they can stay up to date with TSMO-related news. WSDOT's overarching goal is to integrate TSMO principles into traffic safety, performance, and sustainability initiatives.

TSMO APPLICATIONS OVERVIEW

Transportation System Management and Operations (TSMO) is an integrated approach to optimize the performance of existing infrastructure by implementing multimodal, intermodal, and often cross-jurisdictional systems, services and projects. TSMO seeks to operate the existing transportation system as safely and efficiently as possible, often maintaining or even regaining previous capacity levels and improving safety performance levels. In practice, TSMO is applied on a corridor or in a region as a series of operational strategies.

TSMO strategies frequently integrate operations innovations with intelligent transportation system (ITS) applications – and are near-term solutions that can be applied to multiple types of roadways. These strategies are aimed at optimizing the existing capacity of the transportation system, reducing congestion, and improving safety.

Fostering a regional and cross-jurisdictional environment where TSMO can be successfully implemented is a critical element in a transportation agency's operational congestion and safety goals for its roadways. TSMO can also readily support the performance measurement requirements that are defined in federal and state legislation. A TSMO program can also be leveraged to assist in establishing opportunities to prioritize and budget for strategies to improve network mobility.

Common TSMO Strategies

- *Intelligent Transportation Systems (ITS)*
- *Traffic Incident Management (TIM)*
- *Road Weather Information Systems (RWIS) and road weather management*
- *Work zone management*
- *Traffic signal coordination and performance*
- *Transportation Operations Centers (TOC)*
- *Special event management*
- *Traveler information*
- *Ramp metering/management*
- *Active Traffic Management (ATM)*
- *Integrated Corridor Management (ICM)*
- *Data usage and applications*
- *Truck parking*
- *Transit management*
- *Freight management*
- *Improved bicycle and pedestrian crossings*
- *Connected and Automated Vehicle (CAV) infrastructure investments*
- *Outreach, awareness, and education activities*

Many transportation agencies across the country have conducted operations self-assessments (based on FHWA "Capability Maturity Model" guidance[6]) in order to develop TSMO Program Plans. In Washington, WSDOT has completed these activities, and maintains a TSMO web site that provides details and links concerning its ongoing implementation of TSMO in the State: https://tsmowa.org/. WSDOT's TSMO Program is organized into categories that act as buckets that contain multiple TSMO strategies.

[6] https://ops.fhwa.dot.gov/publications/fhwahop19069/index.htm

WSDOT's TSMO Categories

Successful application of TSMO strategies will optimizes a regions transportation system, resulting in congestion reduction for travelers, and potentially reducing the need for expansion of infrastructure.

APPENDIX G METHODS AND ASSUMPTIONS

I-5 SKAGIT TRANSPORTATION STUDY, PHASE I

Washington State Department of Transportation

Prepared by:
Transpo Group USA, Inc.

Prepared for:
Washington State Department of Transportation Northwest Region
Mount Baker Area Multimodal Transportation Planning Office

Table of Contents

Washington State Department of Transportation

WSDOT ACCEPTANCE

"The undersigned parties, including all members of the WSDOT team, concur with the I-5 Skagit Transportation Study Methods and Assumptions as presented in this document." The signature pages for each agency are attached at the back of this document.

WSDOT – Northwest Region Administration

Signature

Title

Date

Agency

Signature

Title

Date

WSDOT – Environment

Signature

Title

Date

Agency

Signature

Title

Date

WSDOT – Traffic Operations

Signature

Title

Date

Agency

Signature

Title

Date

WSDOT - Planning

Signature

Title

Date

Agency

Signature

Title

Date

METHODS AND ASSUMPTIONS

INTRODUCTION

The Washington State Department of Transportation (WSDOT) Northwest Region Mount Baker Area is initiating the Interstate 5 Skagit Transportation Study. This study will gather multimodal transportation and socioeconomic data, review key environmental factors, and analyze current and future transportation conditions to determine how I-5 in Skagit County can better meet regional mobility and safety needs.

The study preparation is consistent with GCB 1363, a joint agreement between WSDOT, SCOG and Skagit Transit. The agreement outlines the roles and responsibilities of each agency for carrying out comprehensive and coordinated transportation planning and implementation on the regional transportation system. Specific provisions are provided in the agreement for cooperatively developing and sharing information to implement consistent standards and best practices to advance an integrated multimodal transportation system in the region.

The study builds on the findings of the 2021 Technical Report: Interstate 5 Existing Conditions Analysis Mount Vernon / Burlington. The previous study revealed that some corridor segments are not performing within expectations. The traffic operations analysis, safety analysis and merge threshold analysis revealed that there are some segments on the corridor that experience higher vehicle density and poor levels of service for traffic, ramp operations and crashes.

To improve information sharing and support project delivery, overall study objectives include incorporating Planning and Environmental Linkages (PEL) to minimize duplication between planning and the environmental review processes. This will allow outcomes from the study to be incorporated into a National Environmental Policy Act (NEPA) process earlier in the planning and project delivery stages as needed.

As part of the overall effort, WSDOT will implement a public outreach and engagement process to help inform the identification of near, mid- and long-term strategy alternatives. The project team is committed to involving the community in the study to ensure their needs, experiences and vision are reflected in the outcomes.

The Methods and Assumptions document has been prepared to establish the methods followed while the study is being conducted and document assumptions made during the study.

PROJECT BACKGROUND

In 2021, WSDOT in coordination with the Skagit Council of Governments (SCOG) initiated a baseline analysis of I-5 in the Mount Vernon and Burlington urban areas with the goal of determining if I-5 is meeting regional transportation performance objectives and examining the steps and measures that could be taken to address unmet performance needs. Using the information and findings from the technical analysis, WSDOT, along with its planning partners

have moved to the next stage of the transportation study to address the safety and congestion needs identified in the 2021 Existing Conditions Analysis.

Exhibit 1 I-5 Skagit Transportation Project Area

PROJECT AREA

The study area spans the 9-mile-long corridor that runs through the urban areas of Mount Vernon and Burlington in Skagit county. The focus area of the corridor is the segment along I-5 from Old 99 Highway (exit 224 to Cook Road (exit 232) as shown in Exhibit 1.

There are eight interchanges in the study area; four provide access to state highways that intersect with I-5. State highways included in the urban area are State Routes (SR) 536, 538, 20 and 11. There are only two north-south bridges across the Skagit River; the Skagit River Bridge (now formally known as the I-5 Trooper Sean M. O'Connell Jr. Memorial Bridge) and Riverside Ave. In Mount Vernon, the SR 536 Division Street Bridge serves east and west Mount Vernon and is an alternative route to Anacortes/San Juan Ferry and Whidbey Island. There is one dedicated east/west active transportation crossing for pedestrians, bicycles and other rolling modes in the Burlington urban area under I-5.

PREVIOUS STUDIES

This study builds on the findings of the 2021 Technical Report: Interstate 5 Existing Conditions Analysis Mount Vernon / Burlington. This previous study revealed that some corridor segments are not performing within expectations. The traffic operations analysis, safety analysis and merge threshold analysis revealed that there are some segments on the corridor that experience higher vehicle density and poor levels of service for traffic, ramp operations and crashes.

MULTIMODAL TRANSPORTATION STUDY ASSUMPTIONS

ANALYSIS STUDY AREA

The study area is geographically located on I-5 in Skagit County between MP 222.5 and MP 233, or generally the area between Old 99 Highway (exit 224) and Cook Road (exit 232).

The following interchange areas and associated north and south on and off ramps are included in the study area:

- Exit 224 Old Highway 99 / Mount Vernon Road
- Exit 225 Anderson Road
- Exit 226 Kincaid Street / SR 536
- Exit 227 College Way / SR 538
- Exit 229 George Hopper Road
- Exit 230 Avon Cutoff / SR 20
- Exit 231 Chuckanut Drive / SR 11
- Exit 232 Cook Road

ANALYSIS PERIODS AND HOURS ANALYZED

The *2021 Existing Conditions* report provided the existing 2021 base year operations analysis. As part of this study forecast WSDOT updated the 2022 traffic counts and provided a set of revised 2022 traffic volumes for the 2045 forecast analysis consistent with the Skagit Council of Governments regional plan.

The operations analyzed on the interstate are between 3:00 p.m. and 7:00 p.m. on a typical weekday representing peak daily travel periods on the interstate.

TRAFFIC OPERATIONS PERFORMANCE METRICS

Corridor traffic operations will be generally consistent with the prior 2021 analysis. The primary focus of the 2045 conditions performance metrics will be freeway segment level of service. Other ramp related metrics (merge-lane volume threshold, and ramp storage capacity needs.) will be updated as well for comparison with the 2021 analysis.

Freeway Segment Level of Service

The purpose of this metric is to understand how each freeway segment is operating or its level of service (LOS). LOS is defined as a letter grade A through F by the *Highway Capacity Manual* (HCM) 6th Edition for freeway segments using traffic density, or passenger cars per mile per lane, as the defining metric. LOS A represents low density, free-flow conditions whereas LOS F

represents high density or very congested conditions. The adopted WSDOT LOS standard for this section of I-5 is LOS D since it is designated as a Highway of Statewide Significance.

Consistent with the *2021 Existing Conditions* report, the future 2045 LOS will be calculated using the *Highway Capacity Software Version 7* (HCS7) using the Freeway Facilities Analysis HCM methods. These methods are better suited to understand traffic operations where LOS F may be present during one or more 15-minute periods because it takes into account potential queuing impacts during oversaturated conditions. This study will create a heat map (a large table or matrix that shows good and bad conditions at-a-glance based on color-coded values) of freeway LOS conditions for each direction of I-5, in 15-minute periods between 3:00 p.m. and 7:00 p.m. The 2045 horizon year heat map will be compared to the prior heat map developed for 2021 base year conditions.

Merge-Lane Volume Threshold

This metric is used to assist in traffic flow merge conditions with the freeway mainline. On-ramp volumes are added to right-lane volumes on the I-5 mainline for each 15-minute period. As stated in the *2021 Existing Conditions* report, a combined volume that meets or exceeds 1,700 vehicles per lane per hour indicates when a potential conflict may exist at the merge point between the ramp and freeway mainline.

Consistent with the *2021 Existing Conditions* report, the future 2045 volumes will be compared to the merge-lane volume threshold. This study will create a heat map of combined merge volumes for each direction of I-5, in 15-minute periods between 3:00 p.m. and 7:00 p.m. The 2045 horizon year heat map of merge volumes will be compared to the prior heat map developed for 2021 base year conditions.

Ramp Storage Capacity Needs

This metric is used to assist in determining the size of storage needed based on calculated vehicular acceleration and speeds from an on-ramp onto the interstate. This storage capacity is determined using *WSDOT NWR Intelligent Transportation Systems Design Requirements* (Section 4.3).

Consistent with the *2021 Existing Conditions* report, the future 2045 volumes will be used in analyzing some of the ITS strategies. This study will create a table of storage needs based on the future design hour volume.

TRAFFIC DEMAND USED FOR OPERATIONS PERFORMANCE METRICS

The 2045 traffic operations analysis will use the tools and inputs that were used in the *2021 Existing Conditions* report, except that traffic volumes will include the updated 2022 traffic volumes for the 2045 forecast conditions. The following describes the forecast methodology.

Existing 2022 Volumes

The existing 2022 volumes will be used as the foundation for developing future forecasts. As part of the *2021 Existing Conditions report*, traffic volumes for the I-5 mainline and ramp facilities were developed. The data included seasonal adjustments, adjustments to reflect non-pandemic conditions, and spot adjustments to create balanced volumes through the corridor. Based on similar adjustments as before, but using updated 2022 traffic counts, a set of revised

existing 2022 volumes were developed by WSDOT. The study will use these updated existing 2022 volumes in the forecasting process.

Design volumes used in the analysis will be based on a combination of Permanent Traffic Recorder (PTR) hourly volumes and 24-hour volume counts taken on all ramp terminals in late January and early February of 2021.

The PTR located at milepost 226.96 lies between the Kincaid St and College Way interchanges. Hourly volumes from January 2015 through February 2021 will be obtained via the WSDOT Transportation Data, GIS & Modeling office.

This hourly volume will be post processed to obtain Annual Average Daily Traffic (AADT) and K-30 values for pre-pandemic years (2015 to 2019) using the methodology outlined in the current version of the FHWA Traffic Monitoring Guide and FHWA Traffic Data Computation Method Guide. These values will then be used to estimate the yearly growth rates and K-30 factors for pandemic years (2020 and 2021), resulting in final non-pandemic volume estimates for AADT and Design Hour Volume (DHV) for the 2021 analysis year.

Using the estimated AADT and DHV, composite seasonality and design hour factors will be calculated for all days in 2021 and subsequently applied to the corresponding 24-hour counts obtained at the ramp terminals.

Final corridor volumes used in the analysis will be determined using a combination of the adjusted ramp volumes, adjusted PTR volume, and ramp balancing.

Growth Forecasts

The volume growth forecasts will be based on the Skagit County of Governments travel demand model (SCOG Model). The SCOG Model currently has a base year of 2018 and a future horizon year of 2045. The 2045 model includes the population and land use growth anticipated in the region by 2045. The SCOG Model traffic assignment is a PM peak one-hour period between 4:00 p.m. and 6:00 p.m. on a typical weekday.

The forecast methodology for the study will use the difference method. For each I-5 segment and ramp, the difference in 2045 and 2018 model volume will be calculated to reflect volume growth between 2018 and 2045. This growth will be adjusted using the straight-line interpolation methodology to reflect growth between 2021 and 2045. This one-hour growth volume will be combined with the corresponding one-hour 2021 existing volume to create the total 2045 forecast volume. Volume balancing may be performed between interchanges, if needed.

Where 15-minute volumes are available, the distribution pattern of volumes across the 3:00 p.m. to 7:00 p.m. for existing volumes will be used to develop the future 2045 15-minute volumes over the same time period. The 15-minute forecasts will be calculated using traffic count data provided by WSDOT and the one-hour forecast discussed above. WSDOT VISSIM Protocol (September 2014, Section 3.3.3) discusses time-varying volume profile estimation methods. The 15-minute counts, provided by WSDOT, will be used to develop time profiles to expand the 2045 1-hour post-processed volume forecast to 15-minute forecasts between 3:00 p.m. to 7:00 p.m. for both mainline and ramps. The time-varying volume profile estimation method will follow these steps:

- Estimate a peak period origin-destination matrix for the study area using the travel demand model.
- Develop 15-minute volume profiles for the study area links from the WSDOT traffic data recorders.
- Apply the percentage of the origin-destination matrix developed for the peak period to calibrate the 15-minute volume profiles developed for the non-peak hours; with a formula of (existing 15-minute volume) / (existing peak hour count) x (future adjusted).

TRAVELER CONTEXT INFORMATION

The I-5 traveler context will be determined through evaluating origin and destination patterns for study area facilities. Replica data will be used to summarize existing travel patterns and characteristics along the I-5 corridor. The 2045 SCOG Model will also be used to understand future origin-destination patterns in the study area.

SOCIAL EQUITY DATA AND ENVIRONMENTAL JUSTICE ANALYSIS

Phase 1 of this study will collect population, socio-economic, and demographic data within the study area to help identify historically under-served communities and populations subject to health disparities. This will benefit communications, outreach, and engagement activities to involve stakeholders in the study. Phase 2 of this study will incorporate environmental justice analysis (EJA) principles according to current WSDOT guidance for planning studies.

The study will also consider the evolving direction regarding the 2021 Healthy Environment for All (HEAL) Act. The environmental justice analysis will be based on the Phase 1 population demographics, socio-economic factors, and health disparities of the people served by and impacted by Interstate 5 who live within the study area. Data sources are listed at Environmental Guidance - Environmental Justice & Title VI | WSDOT (wa.gov) and include EJ Screen produced by the U.S. Environmental Protection Agency (EPA) and the Washington Tracking Network produced by the Washington State Department of Health (DOH). The assessment will also examine information in the *2022 SCOG Coordinated Public Transit - Human Service Transportation Plan* (HST), which includes relevant and current socio-economic data for Skagit County and is readily available in GIS base layers. The SCOG HST data is based on the 2016-2021 5-Year Average U.S. Census American Community Survey.

SAFETY ASSESSMENT

The existing safety assessment was conducted in the *2021 Existing Conditions* report. This included a Target Zero Summary, Crash Summary Assessment, and Highway Safety Manual Analysis. The 2021 analysis revealed some corridor segments are not performing within expectations. The general locations include northbound I-5 between Kincaid Street and George Hopper and southbound I-5 between SR 20 and Kincaid Street. The Highway Safety Manual Analysis also indicated two sections performing below average for safety: a one-mile section between SR 538 and George Hopper Road; and in the vicinity of the SR 20 interchange.

The future safety assessment will primarily be used as a baseline for comparing alternatives in Phase 2. Similar to the *2021 Existing Conditions* report, the safety assessment will use the Interactive Highway Safety Design Model (IHSDM) crash prediction methodology.

ENVIRONMENTAL SCAN

For this study a desktop review of public domain resources will assess existing conditions and key environmental constraints in the study area. Factors assessed include fish passage barriers, wetlands, streams, mitigation sites, chronic environmental deficiencies (CED), noise walls, historic bridges, stormwater best management practice (BMP) sites and retrofit priorities, climate vulnerability, habitat connectivity, and hazardous materials contamination sites. A limited reconnaissance level survey of portions of the study area will assess mapped wetlands and streams and examine unmapped, potential wetlands and streams for inclusion in the study.

The wetlands evaluation will use methodology from the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region Version 2.0* (U.S. Army Corps of Engineers 2010). The presence or absence of wetlands is determined based on a desktop examination of vegetation, soils, and hydrology and accompanying drive-by reconnaissance. These parameters will be assessed to determine the approximate wetland edge. Wetlands will be estimated using the Washington State Department of Ecology's *Wetland Rating System for Western Washington:* (Hruby 2014).

The stream evaluation will be based on a desktop examination and reconnaissance level screening for the presence or absence of an ordinary high water mark (OHWM) as defined by Section 404 of the Clean Water Act, the Washington Administrative Code (WAC) 220-660-030, and the Revised Code of Washington (RCW) 90.58.030 and guidance documents including *Determining the Ordinary High Water Mark for Shoreline Management Act Compliance in Washington State* (Anderson 2016) and *A Guide to Ordinary High Water Mark (OHWM) Delineation for Non-Perennial Streams in the Western Mountains, Valleys, and Coast Region of the United States* (Mersel and Lichvar 2014).

The study area for wetland and stream field reconnaissance will extend 500 feet from the existing perimeter of the I-5 corridor. Maximum potential buffer widths will be estimated.

Aside from historic bridge information, which is available as a layer on WSDOT's GIS Workbench, the cultural resources assessment will occur with other environmental resource analysis in a future phase of work. Public domain and WSDOT information will be reviewed for this reconnaissance study and is listed below.

- WSDOT GIS Workbench Layers
- USDA NRCS: Web Soil Survey
- USFWS: NWI Wetland Mapper
- USFWS: IPaC Planning Tool
- WDFW: PHS on the Web
- WDFW & NWIFC: Statewide Washington Integrated Fish Distribution
- WNHP Data Explorer
- WA-DNR: Forest Practices Application Mapping Tool
- Google Earth Pro
- Skagit County Interactive GIS
- City of Burlington maps
- City of Mount Vernon maps

TRIBAL ENGAGEMENT AND CONSULTATION

This study will engage and consult with tribes throughout the life of the project in alignment with WSDOT's tribal consultation policy. For more guidance on this, see the tribal consultation policy.

SELECTION OF MEASURES OF EFFECTIVENESS

The metrics to be used to demonstrate the effectiveness of potential alternatives may include, but are not limited to the following:

1. Traffic Operations along I-5 and ramps (LOS/Density, Merge-Lane Volume Threshold, Ramp Storage Capacity Needs)
2. Key Environmental Constraints
3. Environmental Justice Impacts
4. Design Standards/Deviations
5. Right of Way/Access Impacts

CONCLUSION

The study will gather and analyze multimodal transportation and social-economic data, incorporate key environmental factors, and analyze future transportation conditions in conjunction with a robust public outreach and engagement process to identify near and mid-term strategy alternatives. The study will provide outcomes that can be incorporated into a future Planning and Environmental Linkages (PEL) process, if needed.

While degradation of the Interstate system is not an acceptable outcome, there may be localized areas where degradation may occur due to system tradeoffs. The data developed by this effort will be used to develop a range of potential solutions that can be analyzed as part of Phase 2.