

Federal Way City Center Access Study Access Revision Report I-5 Milepost 143 (Vicinity)

Prepared for



June 2022

Prepared by

Parametrix

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Prepared for





City of Federal Way
33325 8th Avenue South
Federal Way, WA 98003

Prepared by

Parametrix
719 2nd Avenue, Suite 200
Seattle, WA 98104
T. 206.394.3700 F. 1.855.542.6353
www.parametrix.com

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<p>Jenna Anderson, P.E. City Center Access Study Project Manager Parametrix 719 2nd Avenue, Suite 200 Seattle, WA 98104</p>			<p>John Perlic, P.E. City Center Access Study Traffic Engineer Parametrix 719 2nd Avenue, Suite 200 Seattle, WA 98104</p>			
SPONSORING AGENCY SIGNATURE						
<p>Recommended for Approval:</p> 			<p>Desiree Winkler, P.E. City of Federal Way Deputy Public Works Director 3325 8th Avenue South Federal Way, WA 98003</p>			
<p>Recommended for Approval:</p> 			<p>Rick Perez, P.E. City of Federal Way City Traffic Engineer 3325 8th Avenue South Federal Way, WA 98003</p>			
SPONSORING REGION SIGNATURE						
<p>Recommended for Approval: Type text here</p>			<p>Mark P. Leth, P.E. WSDOT NW Region Traffic Engineer</p>			

Federal Way City Center Access Study
 Access Revision Report
 I-5 Milepost 143 (Vicinity)
 City of Federal Way

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Approval is valid for three years, after which reevaluation must be considered per Design Manual Chapter 550.06(4). Signature of this document acknowledges WSDOT Policy has been followed.	
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CONCURRENCE SIGNATURES	
The following signatures are members of the Executive Support Team who did not sign on the prior page. See Design Manual Chapter 550.04(1).	
Brian Walsh, P.E. WSDOT HQ Traffic	 Brian J. Walsh 2022.09.16 11:10:03 -07'00'
Brian Patton Sound Transit Project Direction, Tacoma Done Link Extension	 Digitally signed by Brian Patton Date: 2022.07.12 12:16:40 -07'00'
Rose LeSmith, P.E. King County Road Services, Engineering Services Manager	 Digitally signed by Rose LeSmith Date: 8/25/2022 EAE907ED738E47E...
Robin Mayhew, AICP WSDOT Management of Mobility Director	 Digitally signed by Robin Mayhew Date: 9/20/2022

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ACRONYMS AND ABBREVIATIONS

ARR	Access Revision Report
BN	baseline need
CCA	City Center Access
CN	contextual need
DDI	Diverging diamond interchange
DM	Design Manual
FEIS	Final Environmental Impact Statement
FHWA	Federal Highway Administration
FWLE	Federal Way Link Extension
HOV	high-occupancy vehicle
HSM	Highway Safety Manual
LOS	level of service
LRT	light rail transit
PSRC	Puget Sound Regional Council
SST	study support team
ST	Sound Transit
TMC	traffic management center
TDLE	Tacoma Dome Link Extension
v/c	volume-to-capacity
vph	vehicles per hour
WSDOT	Washington State Department of Transportation

EXECUTIVE SUMMARY

The City of Federal Way initiated the City Center Access Project to determine what transportation system changes are needed to preserve future mobility in the City Center. The Federal Way City Center Core is designated as one of 29 regional growth centers identified in the Puget Sound Regional Council's Vision 2040. The purpose of the Federal Way City Center Access project is to improve the economic vitality of the City Center and to improve the quality of life for people who work, play, and live in the City by increasing multimodal mobility and access for regional and local trips while protecting the integrity of the interstate system. Access and mobility are limited by congestion issues along S 320th Street between Pacific Highway S and Military Road, including to and from I-5, and the lack of multimodal facilities across I-5.

Since 2004, several phases of study have been completed. The City restarted the environmental phase of the project in 2017, beginning with the Non-Access Feasibility Study. The Non-Access Feasibility phase of this study was completed in November 2019. Several local elements were identified and analyzed, including roadway capacity improvements, transit connection and priority, and nonmotorized capacity improvements. The conclusion of the Non-Access Feasibility Study was that there was not a reasonable local-only alternative solution that would meet the project Purpose and Need.

Following the Non-Access Feasibility Study, the Access Revision phase of this study was initiated. Several access revision alternatives were developed, including modified access at S 312th Street, S 320th Street, and S 324th Street. The alternatives were analyzed through a Level 1 Screening and Level 2 Screening evaluation.

The S 324th Street Interchange Alternative 2I (Grade Separated Ramps + Roundabouts at S 324th Street) was identified as the alternative that best meets the Purpose and Need of the project. Alternative 2I was recommended to the Federal Way City Council in November 2019 based on the results of the screening. The City Council agreed to move forward with Alternative 2I.

Alternative 2I would provide the following benefits:

- By diverting some traffic from S 320th Street to S 324th Street, decreases roadway congestion, improves freight truck mobility, and improves emergency response on S 320th Street
- Improves access to, from, and around the City Center by reducing congestion and travel times
- Provides transit and HOV priority through an arterial HOV lane along S 320th Street through the City Center and east of I-5
- Improves nonmotorized mobility by extending S 324th Street across the existing barrier that is the I-5 corridor; constructs a shared used path on S 324th Street, provides a connection to the BPA trail to the west, and provides an opportunity to extend the regional trail to the east
- Improves safety for the general traveling public on the S 320th Street corridor by decreasing demand and congestion
- Improves safety and mobility for the general traveling public on the Interstate and ramps by reducing queue spillbacks

- Results in the same number of gore points as existing conditions to and from I-5 and same travel demand on I-5 mainline; however, the alternative includes four new access points onto the I-5 ramp system.
- Maintains adequate spacing (interchange spacing is greater than minimum design requirements) between the SR 18 interchange and the S 320th/S 324th Street ramps to not impact I-5 mainline travel speeds and safety

1. INTRODUCTION

The purpose of this report is to document the access revision process for the Federal Way City Center Access (CCA) Study. The study has been led by the City of Federal Way in partnership with the Federal Highway Administration (FHWA), Washington State Department of Transportation (WSDOT), Puget Sound Regional Council (PSRC), Sound Transit (ST), Pierce Transit, and King County. The study has followed the WSDOT Design Manual (DM) Chapter 550 guidance on freeway access revision (WSDOT 2020).

The first phase of this study analyzed local improvements only and was documented in the Non-Access Feasibility Study (Parametrix 2019). The conclusion of the Non-Access Feasibility Study was that there was not a reasonable local-only alternative solution that would meet the project Purpose and Need. The study resulted in identifying several local elements which could provide benefits for various modes if combined with an interchange access modification alternative.

Because the Non-Access Feasibility Study concluded that an access revision is necessary for this study area, an Access Revision Report (ARR) was required based on WSDOT DM Chapter 550 guidance. This document describes the ARR phase of the study and includes the following sections:

- **Project Background** introduces the City Center Access Study
- **Project Framework** documents the parameters of the project, including the study support team and community outreach process, the project purpose and need, adjacent planning projects, methods and assumptions, and screening criteria
- **Existing Conditions and Year 2045 No Build Condition** describes operations of the study corridors without improvements
- **Non-Access Feasibility Study** documents the development and analysis of local improvements
- **Access Revision Alternatives** documents the development and analysis of freeway improvements

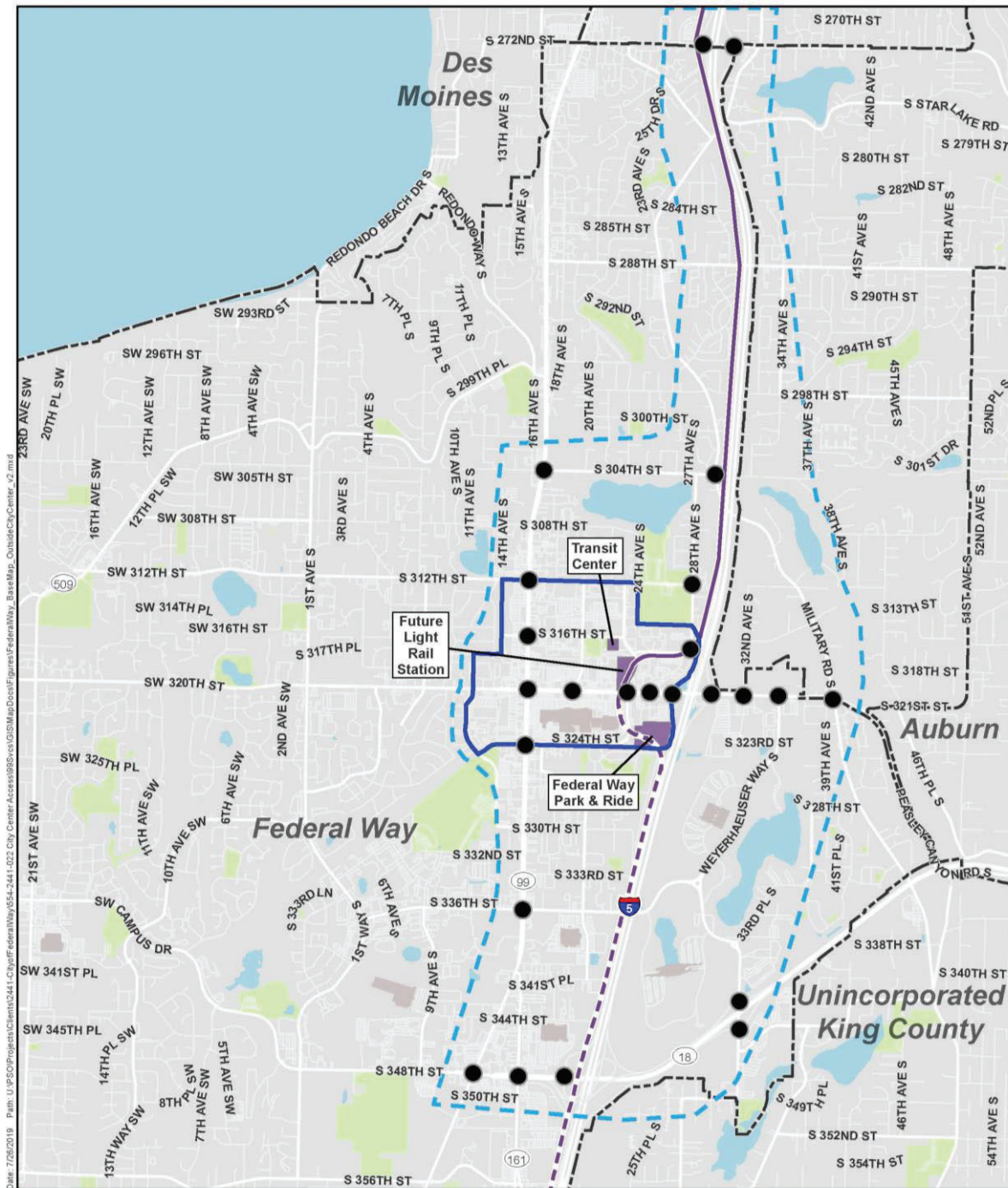
2. PROJECT BACKGROUND

The City Center in Federal Way was established by adoption of the City's first Comprehensive Plan in 1995 and consists of two areas, the City Center Core and the Frame area (both areas combined are referred to as City Center throughout the document). The City Center Core is a designated Puget Sound Regional Council (PSRC) regional growth center. The Frame area is established to provide a zone for dense mixed-use development that surrounds and supports the Core. It also provides a transition between high activity areas in the Core area and the less dense neighborhoods outside of the Frame.

The City Center is served by S 320th Street and is bounded by S 312th Street on the north, S 324th Street on the south, Interstate 5 (I-5) on the east, and 11th Place S and 14th Avenue S on the west. The City's Comprehensive Plan identifies development of the City Center to include a mix of uses, such as the Performing Arts and Events Center, a public park, and a mix of high-density residential, commercial, office, educational, and civic uses. Access between I-5 and the land uses surrounding the City Center is primarily via the S 320th Street interchange with direct HOV access at the S 317th Street interchange that serves the Federal Way Transit Center. Sound Transit's Link Light Rail Transit (LRT) is being extended to Federal Way, with a station opening in the City Center currently scheduled in 2024.

Traffic congestion on S 320th Street and I-5 in the vicinity of the City Center has raised concerns about how to maintain mobility in the future and support the economic vitality of the City Center. City and state infrastructure are showing the strain of sustained residential and economic growth. Anticipated growth and development in the City Center are expected to exacerbate this strain on the infrastructure. Traffic delays during the PM peak period are approaching unacceptable levels, and mobility for other travel modes in the area is also limited.

Exhibit 1 and Exhibit 2 depict the project study area and the City Center. Improvements outside the study area are being considered to alleviate congestion issues within the study area.



Parametrix
 Source: City of Federal Way, King County, © Mapbox, © OpenStreetMap
 0 0.25 0.5 1 Miles

- City Center
- - - Study Area
- Intersection Analysis
- City Limit
- Federal Way Link Extension Alignment
- - - Representative Alignment
- Transit

Study Area
 Federal Way City Center Access
 Federal Way, Washington

Exhibit 1. Project Study Area

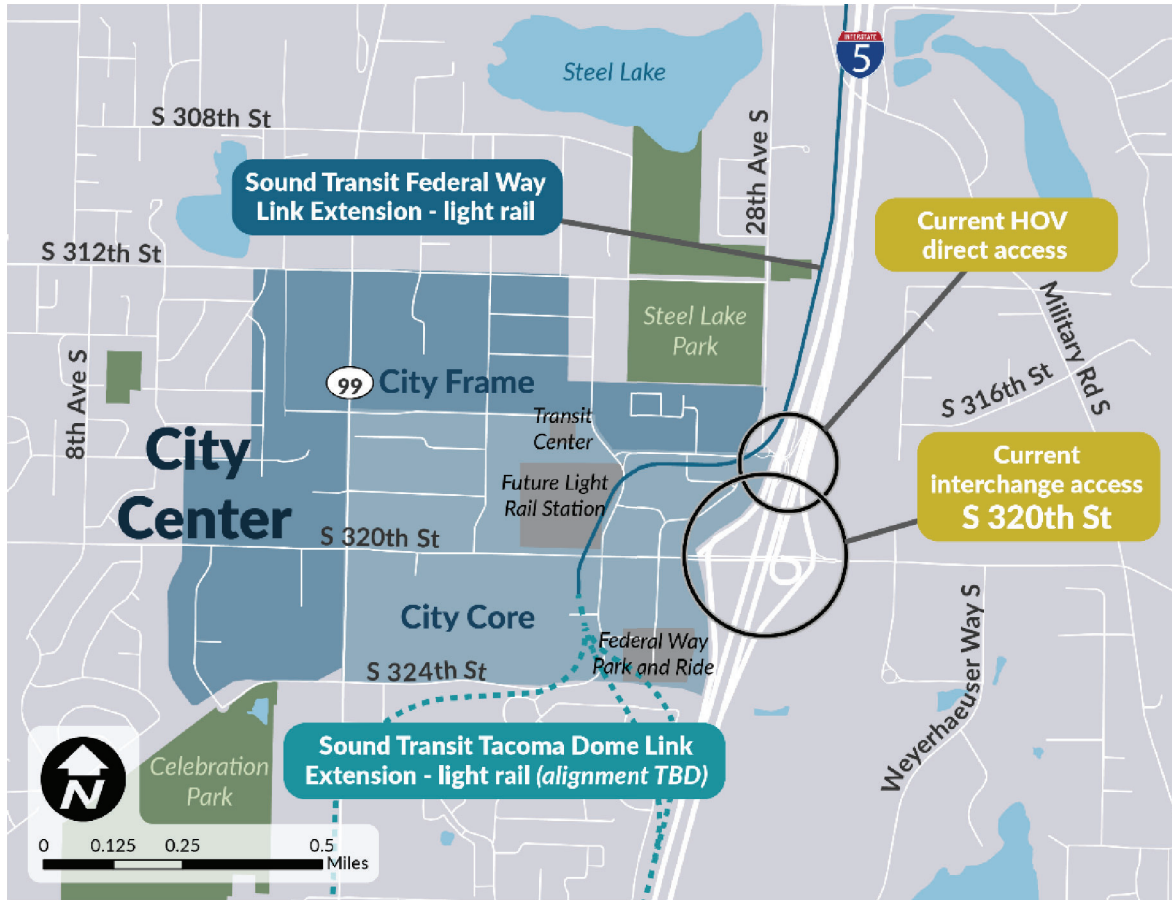


Exhibit 2. City Center Map

3. PROJECT FRAMEWORK

The project team assembled a study support team and engaged the community to validate the project Purpose and Need, develop the Methods and Assumptions, and develop screening criteria for the Build Alternatives.

3.1 Study Support Team

In the fall of 2017, a study support team (SST) was established and included the City, FHWA, WSDOT, transit agencies, tribes, and the neighboring jurisdictions. A few jurisdictions or agencies were invited but opted to minimize their participation. The SST includes the following:

- City of Federal Way
- WSDOT Headquarters
- WSDOT Northwest Region
- FHWA Washington Division
- King County Metro
- King County Roads
- Pierce Transit
- Puget Sound Regional Council
- Sound Transit
- City of Federal Way Police Department
- South King Fire and Rescue

The following tribes were invited to participate but opted to not regularly attend the SST meetings.

- Muckleshoot Indian Tribe
- Puyallup Tribe

Invitations were extended to the following tribes in August of 2018 and the tribes opted to not attend the SST meetings.

- Yakama Nation
- Snoqualmie Tribe
- Squaxin Island Tribe

The following consultants facilitated the SST meetings and provided technical expertise:

- Parametrix
- PRR
- DKS Associates

3.2 Community Outreach

Through 2018 and 2019, the project team held a series of community outreach events including tabling at community festivals; hosting briefings for project neighbors, businesses, and organizations serving environmental justice populations; stakeholder interviews; and an online and in-person open house. Project team members used various outreach methods to inform the public and invite participation and targeted both narrow and broad audiences based on specific community interests, issues, or known

concerns. Community members communicated with the project team in-person at events, online, and over the phone.

The project team incorporated the feedback gathered from the community outreach events into the project purpose and need, and evaluation of solutions to reduce congestion in the City Center. The community members that participated in this process generally supported the modifying the S 324th Street interchange to help ease congestion into, out of, and around the City Center. The residents east of I-5 and north of S 320th Street were opposed to improvements impacting the rural neighborhood character east of I-5 at S 312th Street and 32nd Avenue S. This information was used in the first level screening and in determining the feasibility and placement of local improvements.

As the project progresses into design and environmental review, the City will continue to engage the community and share information.

The outreach effort for the project thus far is documented in the Federal Way City Center Access Project Community Outreach Summary March – April 2018 Purpose and Need (PRR) and the Federal Way City Center Access Project Community Outreach Summary May – October 2019 Proposed Solution (PRR).

3.3 Project Purpose and Need

The project Purpose and Need was developed by the SST and validated through the public involvement process. It is documented in the Project Purpose and Need Memorandum, which is included in Appendix A.

3.3.1 Purpose of the Project

The purpose of the Federal Way City Center Access project is to improve the economic vitality of the City Center and to improve the quality of life for people who work, play, and live in the City by increasing multimodal mobility and access for regional and local trips while protecting the integrity of the interstate system. Access and mobility are limited by congestion issues along S 320th Street between Pacific Highway S and Military Road, including to and from I-5, and the lack of multimodal facilities across I-5.

3.3.2 Needs for the Project

There were two needs categories for the project which were broken into sub-categories used to assess an alternative's ability to meet the needs. The two needs categories were:

- Improve Economic Vitality and Quality of Life.
- Maintain the Integrity of the Interstate System.

3.3.2.1 Improve Economic Vitality and Quality of Life

The following issues were identified:

- **Increasing roadway congestion** on S 320th Street reduces access to the City Center and inhibits planned economic development.
- **Poor multimodal mobility** across S 320th Street and between the ST LRT station, Federal Way Transit Center, and Federal Way Park and Ride lot.

- **Impaired freight truck movement** on T1 and T3 freight corridors in the study area due to generalized congestion. I-5 is a T1 freight corridor; S 320th, Pacific Highway S, and Military Road are T3 freight corridors.
- **Delayed emergency response** for emergency service providers located along S 320th Street due to generalized congestion.
- **Decreased safety** due to local queue spillbacks onto the I-5 corridor.

The project needs included:

- Decrease roadway congestion on S 320th Street (as it affects transit and general travelling public) to improve person mobility
- Maintain access to and from City Center, considering side streets including key transit routes
- Improve nonmotorized mobility to increase use of transit facilities and to provide nonmotorized options to circulate within the City Center
- Improve freight truck mobility to support the City Center and regional service
- Improve emergency response
- Improve safety for the general travelling public on the S 320th Street corridor and study area
- Provide opportunities for through traffic to travel around rather than through the core, thus minimizing the impact of future growth on Citywide traffic patterns and congestion.
- Protect views such as Mount Rainier, especially for civic uses and public parks

3.3.2.2 Maintain Integrity of the Interstate System

I-5, which serves up to 200,000 vehicles per day on a typical weekday in the project area, is a Highway of Statewide Significance, the north-south National Defense System route, a corridor to move freight, and a primary regional and local travel route for the general public. Queues that backup to mainline I-5 affect the integrity of the Interstate system.

The following issues were identified:

- **Local queues impact over 1 mile of mainline I-5** in both directions (year 2045 PM peak hour). These queue spillbacks reduce the ability to move people and freight regionally and introduce the potential for increase in high-speed rear-end collisions.
- **Regional congestion exists on I-5.** Significant regional projects are in progress to address regional congestion. Additional changes to and around the interstate should not further degrade this regional facility.

The project needs include:

- Improve safety for the general travelling public on the Interstate and ramps
- Maintain or improve I-5 mobility for persons and freight trucks

3.4 Planning Linkage

The following describes the planning linkages including on-going projects on adjacent corridors and land use revisions submitted to amend the City's Comprehensive Plan.

- This project was consistent with the City of Federal Way land use and transportation plans, PSRC's regional plan, and King County Metro's long-range plan. This project was situated within the Puget Sound Gateway Program limits; in identifying a solution for Federal Way, this project considered the Puget Sound Gateway Program findings and constraints so that the resulting set of solutions did not conflict with the regional project. The Puget Sound Gateway Program includes the SR 509 and SR 167 corridors and aims to improve regional mobility on I-5. The Puget Sound Gateway Program project would also implement tolls on sections of SR 509 and SR 167 in the vicinity of I-5.
- The City of Federal Way, along with WSDOT, FHWA and PSRC, participated in a city peer exchange to consider land use models, policies and other techniques that may encourage increased mobility options and increased use of multimodal transportation (see Appendix B). Recommendations from the peer exchange were documented and considered when determining additional planning study linkages. These include:
 - The light rail station in Federal Way will serve as a terminus station for over six years while the extension to Tacoma is built and planning considerations will be important for the medium-term and long-term. Peer cities reported that development in the surrounding area increased faster than expected and there was a substantial increase in traffic with station opening. Traffic will increase despite density increase and improved transit access, supporting the decision that a local only improvement would not be adequate.
 - Alternative 2I is acceptable through the study year of 2045. In addition, the City of Federal Way will work towards preserving right-of-way for a potential future diverging diamond (DDI) interchange, through dedication or establishment of setback requirements, to provide for future growth beyond 2045. However, this ARR does not include traffic operations of the DDI and is not intended as approval for a DDI interchange configuration.
 - Multimodal links are enhanced with a multimodal trail on S 324th Street from SR 99 to Weyerhaeuser Way, and on 23rd Avenue S from S 324th Street to S 320th Street to connect the multi-use trail on S 324th Street to the light rail station and transit center.
 - The City has addressed the City Center in Chapter 7 of the Comprehensive Plan and is working with ST on appropriate transit-oriented design development standards.
- Land use changes are under consideration by the City of Federal Way, including redevelopment of the IRG property formerly occupied by Weyerhaeuser and a mixed-use high-density development replacing the current Belmor Park. The Belmor Park developers are positioning to apply for a Comprehensive Plan amendment. While the Federal Way City Center Access Project is required to consider only land use that's been approved through the Comprehensive Plan, these developments would be significant and could potentially result in changes in travel patterns. Further discussion on how the Belmor Park development was considered is available in Section 6.1 below.
- Sound Transit's LRT will be extended from SeaTac south to Federal Way in 2024, aligned through the City Center and terminating south of the existing Federal Way Transit Center. The LRT line

will then be extended further south to Tacoma by 2030. The alignment from SeaTac to Federal Way is finalized. The alignment between Federal Way and Tacoma is in the project development and environmental review phase. The Federal Way City Center Access Study has coordinated with ST on improvements identified and ST has participated actively in the SST meetings.

3.5 Methods and Assumptions Documents

The Methods and Assumptions Document was prepared for the project with the first draft dated November 2017. The document went through various revisions as the project progressed from alternatives development through screening, with the latest document signed in March 2020. The Methods and Assumption Document is included in Appendix C.

A Safety Analysis Methods and Assumptions Document was also completed and approved by WSDOT in February 2020. The Safety Analysis Methods and Assumptions Document is included in Appendix D.

3.6 Screening Criteria

As discussed in the Project Purpose and Need section above, the SST defined various needs for this project. These needs were designated as baseline needs (BN) or contextual needs (CN) in accordance with the WSDOT Practical Design process. According to the WSDOT DM Chapter 1101 on Need Identification, a “baseline need is the primary reason a project has been proposed at a location” while a “contextual need is any identified need that is not a baseline need” and typically includes needs that “were identified through community engagement and/or increased project knowledge and understanding”.

For each of the baseline and contextual needs, metrics and targets were identified to aid in evaluating any proposed improvements according to the needs of the project. For different phases of the project, some needs were analyzed qualitatively while some needs were analyzed quantitatively. In general, the target for any proposed improvements was to match or improve upon the No Build Alternative. The needs, metrics, and targets were built on addressing the following issues: increasing roadway congestion on S 320th Street, poor multimodal mobility, impaired freight truck movement, delayed emergency response, decreased safety, local queues impact mainline I-5, and regional congestion on I-5.

Each individual criterion was assigned a weighting percentage to account for the relative importance of the criteria to one another. These weighting percentages were determined by the SST members, who voted on which criteria were more important than others.

The needs, metrics, targets, and criteria weighting are shown in Appendix E.

In addition to the baseline and contextual needs, design considerations were developed to screen the proposed alternatives based on their feasibility, constructability, and compatibility with other projects. The environmental considerations were used to determine how the proposed alternatives fit into the natural and developed environment. These criteria can also be found in Appendix E.

4. EXISTING CONDITIONS AND YEAR 2045 NO BUILD CONDITION

4.1 Existing Conditions

The City of Federal Way is accessed by three I-5 interchanges – S 272nd Street to the north, S 320th Street in the center, and SR 18/S 348th Street to the south. The spacing of the interchanges (with S 272nd Street located 3 miles north of S 320th Street and SR 18/S 348th Street over a mile and a half to the south) do not operate as alternate routes to similar destinations.

Today the S 320th Street corridor is three lanes in each direction with discontinuous HOV priority lanes. Some improvements have been implemented along the corridor to mitigate increasing congestion issues. While these capacity improvements have addressed some queuing issues, the corridor is reaching its maximum width per the City of Federal Way Comprehensive Plan.

As described in the Purpose and Need above, the Year 2017 Existing Conditions deficiencies include the following:

- Weekday PM peak hour traffic volume demand on S 320th Street between Pacific Highway and east of I-5 is nearing or at capacity today.
- S 320th Street operates at capacity with Level of Service (LOS) E at the intersections at Pacific Highway S and 23rd Avenue S during the PM peak hour, with a volume to capacity (v/c) ratio for westbound traffic at the 23rd Avenue S intersection of 0.95.
- Along S 320th Street, the closely spaced intersections at 23rd Avenue S, 25th Avenue S/Gateway Center, and I-5 southbound ramps have queues which consistently spill out of their storage, blocking adjacent intersections.
- Today, the S 320th Street corridor experiences a higher frequency of crashes per mile than other corridors in the study area.

4.2 Year 2045 No Build Condition

The year 2045 No Build Alternative network includes planned and funded regional and local projects, ST's LRT extension to Tacoma, and the transit agencies' long-range plans (per their network coding through the City of Federal Way in the PSRC 4.1k model). The land use forecasts for the year 2045 No Build Alternative did not include potential redevelopment of the Belmor Park, Commons Mall and IRG (formerly owned by Weyerhaeuser) properties. A complete list of the year 2045 condition assumptions is shown in Exhibit 3.

Exhibit 3. Year 2045 No Build Alternative Network Assumptions

Project	Description
Regional Projects	
Sound Transit LRT extension to Tacoma LRT	Includes station in South Federal Way
Transit service improvements	Routes within the City consistent with Regional Transportation Plan, adopted May 31, 2018
Triangle Project	Phases B and D
Puget Sound Gateway Program	SR 509 Completion Project; SR 167 Completion Project
City of Federal Way Projects	
City Center Grid System - Arterial level connections	Per Comprehensive Plan (Figure VII-8)
14th Ave S: S 312th St to S 316th St	Ring Road extension
S 316th St: SR 99 to 11th Pl S	Ring Road extension
14th Ave S: S 316th St and S 320th St	Add two-lane new roadway connection
S 320th St: 25th Ave S to Military Rd S	Add HOV Lanes; Add lane in each direction across I-5
S 324th St: SR 99 to 23rd Ave S	Widen to five lanes
13th Pl S: S 330th St to S 332nd St	Two-lane new roadway connection between side streets
Weyerhaeuser Way S: S 336th St to 33rd Pl S	Widen to five lanes
SR 99: 16th Ave to S 356th St	Add HOV Lanes
SW 344th St: 15th Ave SW to 18th Place SW	Add three-lane roadway

Consistent with PSRC and the City’s vision, the No Build Alternative assumes increases in population and employment within the City and City Center (a PSRC designated urban growth center). This includes an increase in population to 5,600 and employment to 7,830 by year 2040 within the City Center Core. Population and employment numbers are shown in Exhibit 4.

Exhibit 4. Population and Employment for the City of Federal Way

	Citywide ¹		City Center Core ²	
	2015	2040	2014	2040
Population	91,070	106,570	100	5,600
Employment	34,930	50,150	3,440	7,830

Source:

¹ PSRC

² City of Federal Way data and projections

Due to increases in population and employment and redevelopment of the City Center, in the year 2045 traffic along S 320th Street is expected to increase by 35 percent compared to today with the No Build Alternative. This increase in travel demand results in significantly congested conditions on S 320th Street

which would impact the I-5 ramps and mainline. As described in the Purpose and Need above, the Year 2045 No Build Alternative deficiencies include the following:

- The S 320th Street corridor intersections would degrade to LOS E or F in the year 2045 PM peak hour (at Pacific Highway S, 20th Avenue S, 23rd Avenue S, and I-5 southbound ramps).
- The westbound S 320th Street traffic would be significantly delayed with v/c ratios of up to 1.18.
- The I-5 southbound ramp intersection would also operate with a v/c ratio greater than 1.0, which would result in over a mile of queue spill back from the local street system onto I-5 southbound and mainline.
- Today, the S 320th Street corridor experiences a higher frequency of crashes per mile than other corridors in the study area. As projected growth of traffic volumes occurs and vehicle delay substantially increases through the year 2045, there will likely be an overall decrease in safety for all travel modes.

Traffic volumes for the Year 2045 No Build condition are included in Appendix H. Traffic operations can be found in Appendix H.

5. NON-ACCESS FEASIBILITY STUDY

The Non-Access Feasibility Study was completed in November 2019 and signed by the SST in March 2020 (Parametrix 2019).

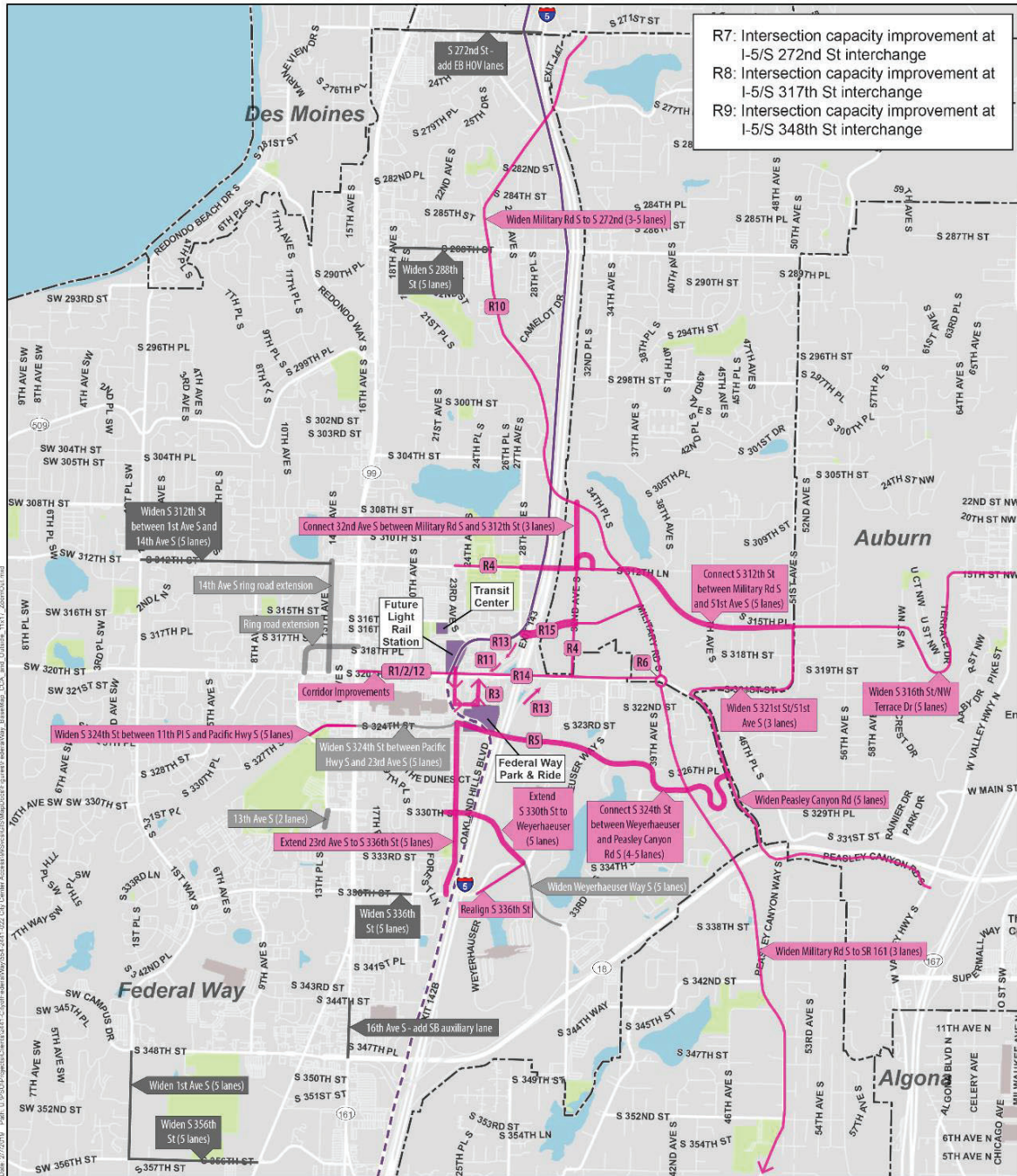
This phase of the study evaluated solutions that would not impact the gore points to and from the I-5 mainline. Local-only improvement elements and alternatives addressing multimodal travel and access needs were identified by the SST, analyzed, and screened based on the project baseline and contextual needs. The local improvement elements were compared to the No Build Alternative. This initial phase of work was consistent with the WSDOT DM Chapter 550 requirements.

Through several SST meetings and workshops, the SST identified 26 individual improvement elements, including roadway capacity improvements, transit connection and priority, and nonmotorized capacity improvements. The elements were evaluated against the baseline and contextual needs to determine which elements did not move towards meeting the project purpose and need. The elements were then combined into three packages: Balanced 1 Alternative, Balanced 2 Alternative, and a Local Improvement Alternative. The Local Improvement Alternative included all improvements and would add a total of 56.9 new lane miles (new roadway or new lanes on an existing corridor). The local improvements included in these alternatives are shown in Exhibit 5.

As described in the Purpose and Need statement, the project is focused on improving mobility and safety to the City Center while maintaining the integrity of the Interstate. A successful project solution would improve travel through the study area including reducing queue spillbacks impacting the Interstate safety and operations.

The local improvement alternatives were evaluated according to the baseline and contextual needs.

The conclusion of the Non-Access Feasibility Study was that there is not a reasonable local-only alternative solution that would meet the project Purpose and Need.



Parametrix

Source: City of Federal Way, King County, © Mapbox, © OpenStreetMap



- Roadway Capacity Improvement Element: New Roadway
- Roadway Capacity Improvement Element: Roadway Widening
- No Build Improvement Element: New Roadway
- No Build Improvement Element: Roadway Widening
- Comprehensive Plan Project (Not Funded)
- Federal Way Link Extension Alignment
- Tacoma Dome Link Extension Representative Alignment
- City Limit

Exhibit 5. Local Only Alternative – Roadway Capacity Projects

6. ACCESS REVISION ALTERNATIVES

The next step was to identify alternatives which may modify I-5 interchange access. These interchange access modification alternatives were developed by the SST and evaluated through the Level 1 Screening analysis and Level 2 Screening analysis.

6.1 Accommodating Other Project Commitments and Plans

The conceptual designs for the alternatives were based on existing I-5 channelization. As identified in the 2003 Puget Sound Gateway Program Final Environmental Impact Statement (FEIS), there is a proposed additional auxiliary lane along I-5 southbound between SR 509 and S 320th Street. This is not a funded project and therefore not included in the traffic operations analysis similar to the projects listed in the No Build Alternative, but this project was taken into consideration for the design compatibility to not preclude future implementation of this additional lane on I-5.

WSDOT has requested regional projects such as ST's LRT and the Federal Way CCA project to not preclude future widening of I-5 through the study area which includes preserving space for an additional through lane (12 feet) and a bus on shoulder lane (14 feet) (Sound Transit 2018, 2020). In addition, ST's LRT operates adjacent to the western edge of I-5 through the Federal Way CCA project study area. WSDOT requires an additional 10-foot buffer between LRT and the freeway to accommodate items such as signage and maintenance access. Further discussion on how the ramps and structures for the Preferred Alternative will be designed to accommodate the future widening of I-5 and the WSDOT 10-foot buffer is available in Section 6.5 below.

The conceptual designs for the alternative also took into consideration a potential mixed-use high-density development replacing the current Belmor Park. The Belmor Park developers are positioning to apply for a Comprehensive Plan amendment but have not to date. This development would be significant and could potentially results in changes in travel patterns. With the Belmor Park redevelopment, the population and employment are expected to increase significantly. This translates to about 4,500 additional vehicles per hour (vph) during the PM peak hour, with 3,000 vph entering the development and 1,500 vph exiting the development, assumptions as provided by the City of Federal Way. This would be a large increase in traffic along S 324th Street. While this development is not approved, it could be used as a basis for alternatives development and screening, however the analysis and screening did consider if the alternatives could be modified if changes to land use occur in the future.

An affirmative determination by FHWA of safety, operational, and engineering acceptability for proposals for new or revised access points to the Interstate System should be reevaluated whenever a significant change in conditions occurs (e.g., land use, traffic volumes, roadway configuration or design, or environmental commitments). Proposals may be reevaluated if the project has not progressed to construction within 3 years of receiving an affirmative determination of engineering and operational acceptability (23 CFR 625.2(a); see also 23 CFR 771.129). If the project is not constructed within this time period, FHWA may evaluate whether an updated justification report based on current and projected future conditions is needed to receive either an affirmative determination of safety, operational, and engineering acceptability, or final approval if all other requirements have been satisfied (23 U.S.C. 111, 23 CFR 625.2(a), and 23 CFR 771.129).

6.2 Previous Interchange Alternatives Considered

Four interchange alternatives were eliminated from further consideration during the 2009 City Center Access Project as documented in City Center Access Study, Screening Level 2 – Refine Alternatives, and Evaluation Technical Memorandum No. 9 (CH2M Hill 2004). The SST did not consider these alternatives for this study phase as they would all require four new gore points to I-5 mainline and would not divert traffic from S 320th Street. Additional I-5 gore points have a negative impact on the safety of a corridor. An alternative which adds a gore point on I-5 would not be approved by WSDOT or FHWA if another alternative which did not add new gore points was identified to meet the project Purpose and Need.

The interchange alternatives that were previously considered and eliminated from further consideration are illustrated in Exhibit 6.

6.3 Level 1 Screening

Alternatives were identified that included modified interchanges at S 312th Street, S 320th Street, and S 324th Street with I-5. Traffic forecasts were completed for these alternatives to determine if they would provide a redistribution of traffic off the S 320th Street corridor, thus relieving queue spillbacks onto I-5 (as described in section 6.3.2). The level 1 analysis also reviewed design constraints such as identifying conflicts with the Federal Way Link Extension alignment.

6.3.1 Alternatives Studied

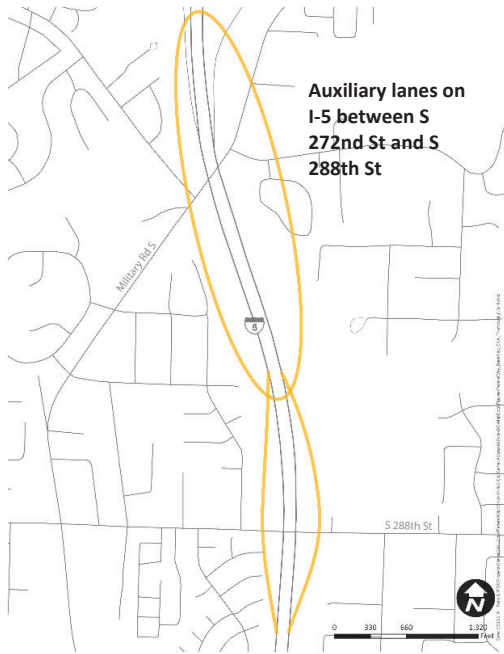
Interchange access modification alternatives were developed by the SST during a workshop in January 2019. The team updated the concepts through conceptual design and additional workshops with WSDOT, ST, and other SST members through May 2019.

There were three interchange alternatives (with sub-options) being considered including:

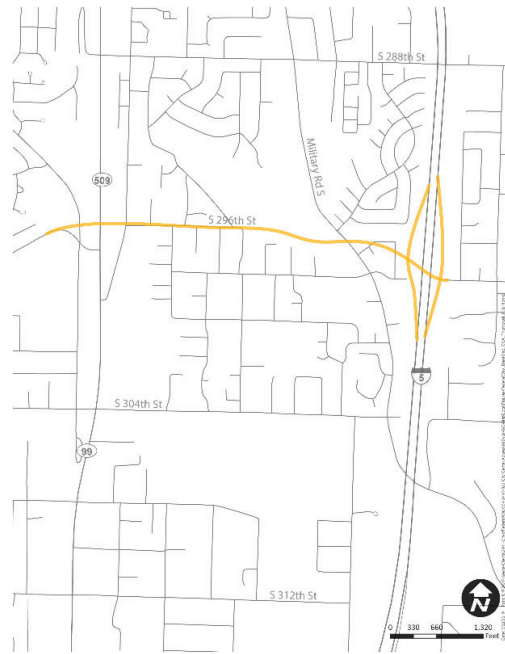
- Alternative 1 – S 312th Street Interchange Access
- Alternative 2 – S 324th Street Interchange Access
- Alternative 3 – S 312th/S 324th Street Interchange Access

These three interchange access modification alternatives are shown in Exhibit 7.

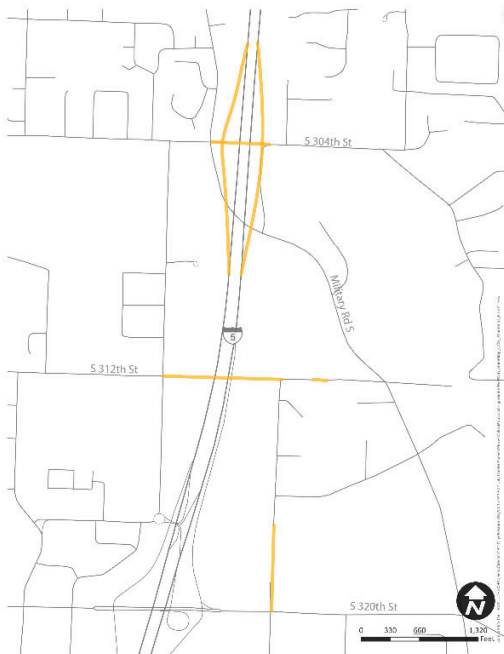
S 288th Street Diamond
(Referenced as F6 in Tech Memo 9)



S 296th Street Diamond
(Referenced as I2 in Tech Memo 9)



S 304th Street Diamond
(Referenced as A5 in Tech Memo 9)



S 336th Street Parclo
(Referenced as J3 in Tech Memo 9)

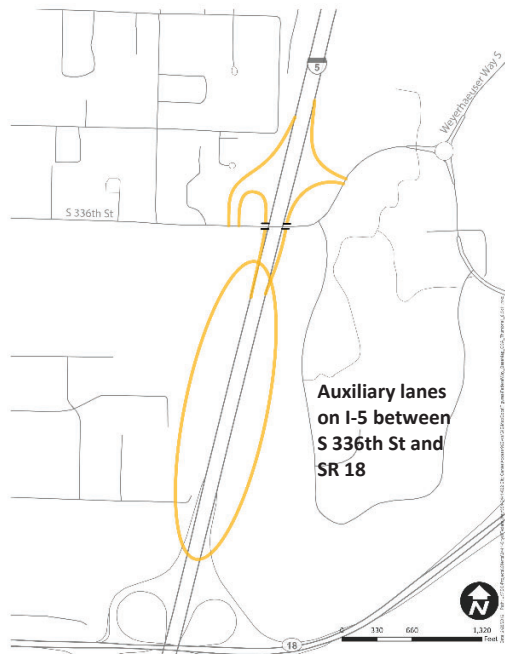
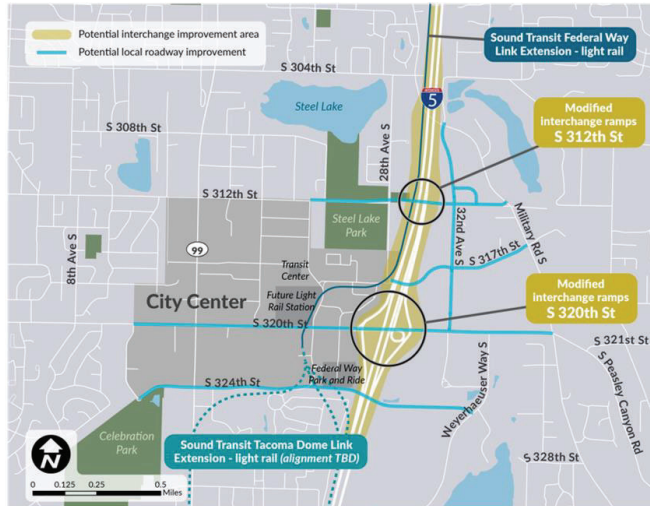
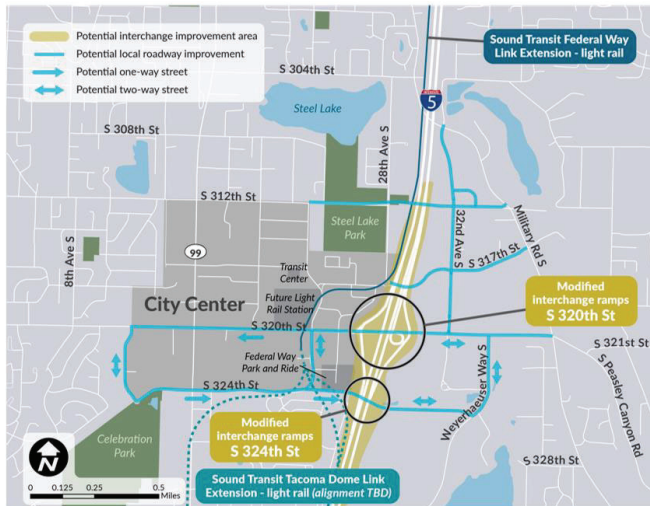


Exhibit 6. Previous Interchange Alternatives Considered

Alternative 1 – S 312th Street Interchange Access



Alternative 2 – S 324th Street Interchange Access



Alternative 3 – S 312th/S 324th Street Interchange Access

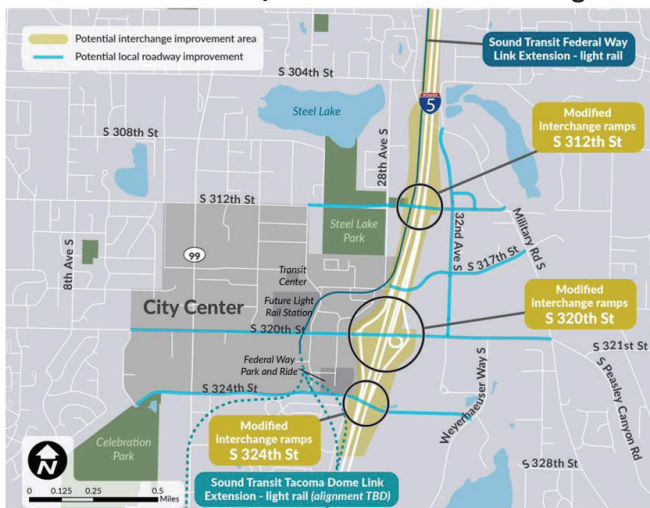


Exhibit 7. Interchange Access Alternatives – Level 1 Screening

As the alternatives were refined, the following elements were considered:

- Transit priority treatments (such as HOV lanes, transit signal priority, transit queue jumps), including HOV lanes on S 320th Street from Pacific Highway S to Military Road to support future high-capacity transit.
- Nonmotorized facilities (such as pedestrian bridges, trails, paths, or sidewalks), in particular a shared use path on S 324th Street across I-5, as this alignment would connect to the existing BPA trail to the west and potentially connect to a future BPA trail to the east. Sidewalks on S 320th Street over I-5 would also be considered.
- Additional local improvements (such as localized capacity improvements, larger scale corridor widening, or construction of new connections).

All of the alternatives assumed the following changes to the local street system:

- Completion of HOV lanes on S 320th Street from Pacific Highway to Military Road S.
- Localized intersection capacity improvements.

The sub-options for the interchange access modification alternatives studied in the level 1 analyses are shown in Exhibit 8 through Exhibit 10.

6.3.1.1 Alternative 1 - S 312th Street Interchange Access

- This alternative includes modified access at S 320th Street with new ramps to and from S 312th Street. Due to design constraints associated with I-5 and ST LRT alignments, the remaining width does not allow for a two-lane off-ramp to serve both S 320th Street and S 312th Street which is required for traffic operations. The ramps to S 312th Street and S 320th Street would need to occur separately, which adds a new off-ramp gore point (compared to today's conditions) from I-5 southbound to S 312th Street.
- This alternative does not result in any additional on-ramp connections but would relocate the on-ramp from S 320th Street to I-5 northbound to north of S 312th Street.
- This alternative would have a total of four new breaks in access: one on the freeway mainline three on the ramps.

The alternative assumes these additional changes to the local street system:

- Extension of S 312th Street from 28th Avenue S to Military Road S.
- Construction of a new two- to three-lane roadway connection along the 32nd Avenue S alignment between S 312th Street and S 320th Street. A quadrant roadway would need to be constructed to connect 32nd Avenue S to the higher elevated S 312th Street.

The interchange concepts include:

- Concept 1A Grade Separated Ramps
- Concept 1B Single-Point Urban Interchange

6.3.1.2 Alternative 2 - S 324th Street Interchange Access

- This alternative includes modified access at S 320th Street with new ramps to and from S 324th Street. This alternative does not result in any additional on-ramp or off-ramp connections on I-5 mainline but would relocate the ramps south of S 320th Street to be south of S 324th Street.
- This alternative would have a total of four new breaks in access, all on the ramp systems. There would be no new access points onto the freeway mainline.

The alternative assumes this additional change to the local street system:

- Extension S 324th Street from 23rd Avenue S to Weyerhaeuser Way S.

The interchange concepts include:

- a. Concept 2A Split Diamond (signals at S 324th Street interchange)
- b. Concept 2B Grade Separated Ramps (signals at S 324th Street interchange)
- c. Concept 2C Arterial Couplet (signals at S 324th Street interchange)
- d. Concept 2D Grade Separated Ramps + Compatible with S 324th Street SE Quadrant Loop Ramp
- e. Concept 2E Split Diamond + Compatible with S 324th Street SE Quadrant Loop Ramp

6.3.1.3 Alternative 3 - S 312th Street/S 324th Street Interchange Access

- This alternative includes modified access at S 320th Street with new ramps at S 312th Street (to and from the north) and S 324th Street (to and from the south). This alternative results in one new off-ramp gore point (compared to today) in the southbound direction. This alternative does not result in any additional on-ramp gore point but would relocate the on-ramp from S 320th Street to I-5 northbound to north of S 312th Street and would relocate the on-ramp from S 320th to I-5 southbound to south of S 324th Street.
- This alternative would have a total of four new breaks in access: one on the freeway mainline three on the ramps.

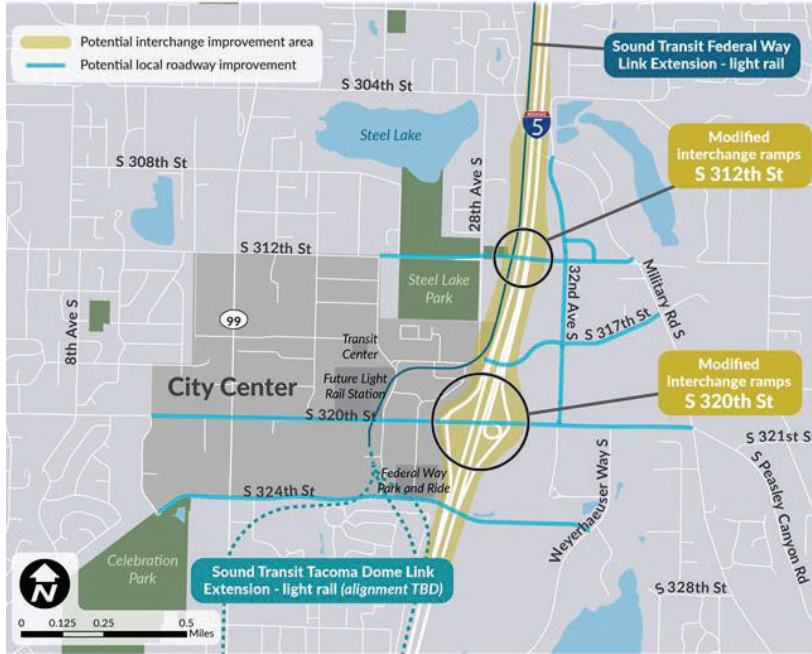
The alternative assumes these additional changes to the local street system:

- Extend S 312th Street from 28th Avenue S to Military Road S.
- Construct a new two- to three-lane roadway connection along the 32nd Avenue S alignment between S 312th Street and S 320th Street. A loop roadway would need to be constructed to connect 32nd Avenue S to the higher elevated S 312th Street.
- Extend S 324th Street from 23rd Avenue S to Weyerhaeuser Way S.

The interchange concepts include:

- a. Concept 3A Grade Separated Ramps
- b. Concept 3B Single-Point Urban Interchange

Alternative 1 Sub-Options



Alternative Sub-Options

1A Grade Separated Ramps



1B Single-Point Urban Interchange



Exhibit 8. S 312th Street Interchange Access Alternatives – Level 1 Screening

Alternative 2 Sub-Options

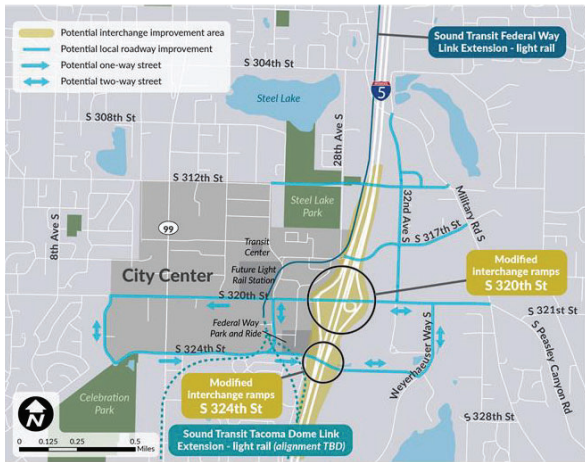
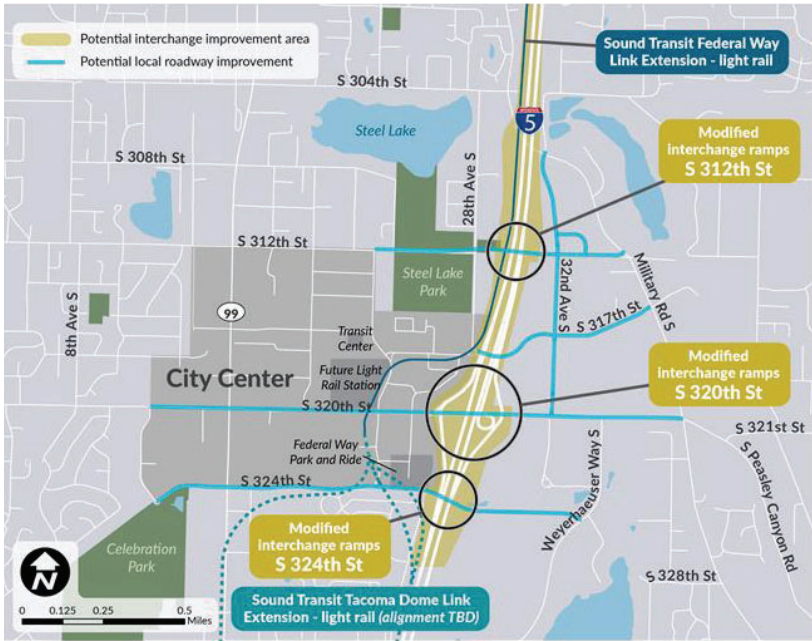


Exhibit 9. S 324th Street Interchange Access Alternatives – Level 1 Screening

Alternative 3 Sub-Options



Alternative Sub-Options

3A Grade Separated Ramps



3B Single-Point Urban Interchange



Exhibit 10. S 312th Street/S 324th Street Interchange Access Alternatives – Level 1 Screening

6.3.2 Level 1 Screening Analysis and Conclusions

The traffic along S 320th Street is expected to increase by 35 percent compared to today with the No Build Alternative (year 2045). The three Build Alternatives would result in a 1,000 to 1,700 vehicles per hour (vph) decrease in traffic on S 320th Street just west of I-5 compared to the No Build Alternative. This is due to the traffic diversion from S 320th Street to either S 312th Street, S 324th Street, or both. Traffic volumes on I-5 with the Build Alternatives would be within two percent of the No Build Alternative within the study area. The S 312th Street Interchange Access alternatives would affect I-5 volumes the most, with some vehicles diverting from S 272nd Street interchange to access the S 312th Street neighborhoods since more direct access would be provided via the S 312th Street ramp connection. The S 324th Street Interchange Access alternatives would not impact I-5 volumes north of S 320th Street or south of S 324th Street. PM peak hour traffic volumes along S 312th Street, S 320th Street, and S 324th Street west of I-5 are shown in Exhibit 11.

For the Level 1 screening, many of the metrics were analyzed qualitatively, though a few metrics were analyzed quantitatively using traffic operations results or cost estimates. Each of the interchange access modification alternatives was assigned a rating according to how well they met the targets. The ratings included:

- Negative (-) –the alternative performs worse than the No Build Alternative
- Neutral (O) –the alternative performs similar to the No Build Alternative
- Positive (+) –the alternative performs better than the No Build Alternative

These ratings were used to identify and remove from consideration those alternatives that did not move towards meeting the project purpose and need or would not meet design or environmental criteria.

The screening results for Level 1 Screening are included in Appendix G. Alternative 1 - S 312th Street Interchange Access Concepts and Alternative 3 - S 312th Street/S 324th Street Interchange Access Concepts were eliminated from further consideration for the following reasons:

1. Alternative 1 - S 312th Street Interchange Access Concepts
 - Improves safety for the general travelling public on the Interstate and ramps (BN13/BN14) as measured by a) number of gore points equal to today and b) change to collision rates: This alternative would add a gore point to I-5 southbound, which is likely to increase collision rates.
 - Constructability (D2) as measured by ability to construct without major impacts to the travelling public and ability to construct to standards without major ROW acquisitions and no relocation of major utilities: This alternative would require at least one tunnel under and one crossing over the proposed LRT guideway. Construction and maintenance of this alternative would likely impact LRT operations.
 - Compatibility with planned I-5 projects (D5) as measured by compatibility with future I-5 expansion projects: This alternative did not align with future plans to widen I-5.
 - Impacts to neighborhoods (E1) as measured by residential displacements, traffic and noise impacts: This alternative had high potential for impacts to surrounding neighborhoods with new interchange access and roadways constructed within residential land uses.
 - Impacts on parks (E2) as measured by property acquisitions, traffic and noise impacts: This alternative had high potential for impacts to Steel Lake Park to construct S 312th

Street/28th Avenue S intersection improvements, and due to increase in traffic demand on S 312th Street adjacent to the park increasing pedestrian/vehicle conflicts.

- Public/stakeholder acceptance (E7) as measured by the feedback from outreach process: This alternative would provide I-5 access at S 312th Street, which lacks stakeholder acceptance as determined through outreach in 2018 and 2019.

2. Alternative 3 - S 312th Street/S 324th Street Interchange Access Concepts

- This alternative included modified interchange access at S 312th Street and would experience the same issues as the S 312th Street Interchange Access Concepts described in the bullets above.

The following alternatives were advanced to Level 2 Screening:

1. Alternative 2 - S 324th Street Interchange Access Concepts

- a. Concept 2A Split Diamond
- b. Concept 2B Grade Separated Ramps
- c. Concept 2C Arterial Couplet
- d. Concept 2D Grade Separated Ramps + Compatible with S 324th Street SE Quadrant Loop Ramp
- e. Concept 2E Split Diamond + Compatible with S 324th Street SE Quadrant Loop Ramp

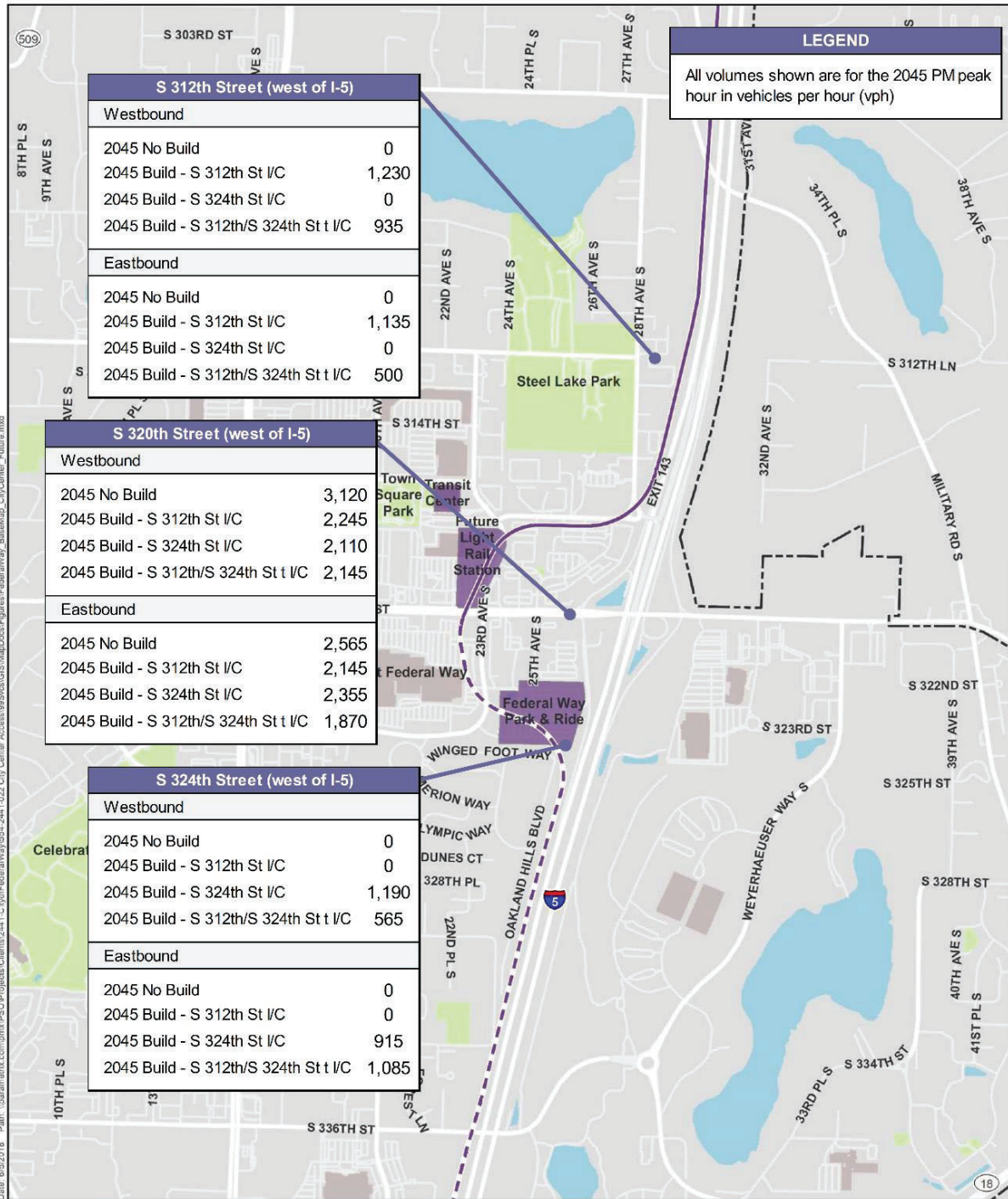


Exhibit 11. Traffic Volume Distribution – Level 1 Screening

6.4 Level 2 Screening

The following describes the alternatives analyzed in the Level 2 Screening.

6.4.1 Alternatives Studied

Following Level 1 Screening, the S 324th Street Interchange Access Alternatives were further refined by the SST and additional S 324th Street alternatives were proposed. Additional variations were identified (Alternatives 2F through 2I). These new alternatives include variations on intersection control and combinations of ramp configurations to minimize property impacts or effects to the ST Federal Way to Tacoma LRT Project alignment.

A sub-option of Alternative 2I included the local arterial improvements that were studied in the Non-Access Feasibility Study and in level 1. The improvements that were included were identified as providing traffic operations benefit within the study area.

The interchange access modification alternatives analyzed were based on three interchange ramp concepts and include the following:

- Split Diamond Interchange Alternatives
- Hybrid Ramp Interchange Alternatives
- Grade Separated Ramps Interchange Alternatives
- Arterial Couplet Concept (could be applied to any of the three interchange alternatives)

All alternatives would include HOV lanes on S 320th Street from Pacific Highway to Military Road S and localized intersection capacity improvements. The alternatives would also include a shared use path on S 324th Street from Pacific Highway to Weyerhaeuser Way S.

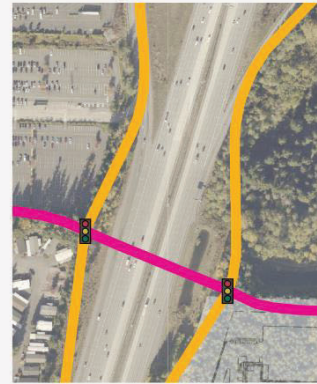
The interchange access modification alternatives studied in the Level 2 Screening are shown in Exhibit 12 through Exhibit 15.

Split Diamond Interchange Alternatives

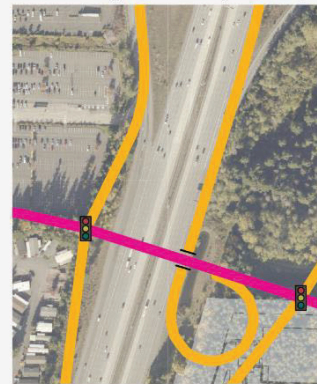


Intersection Control

Alt 2A - Signals



Alt 2E - Compatible with SE quadrant loop ramp



Alt 2G - Roundabouts

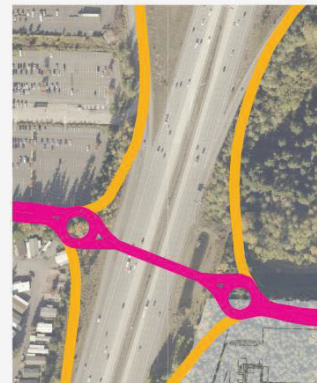


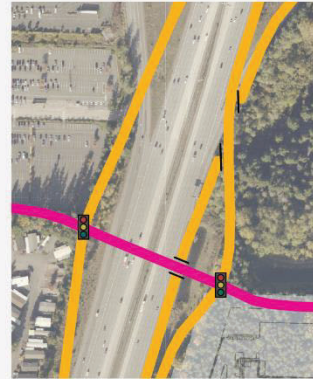
Exhibit 12. S 324th Street Interchange Access Alternatives – Split Diamond (2A, 2E, 2G) – Level 2 Screening

Hybrid Interchange Alternatives



Intersection Control

Alt 2H - Signals



Alt 2J - Roundabouts

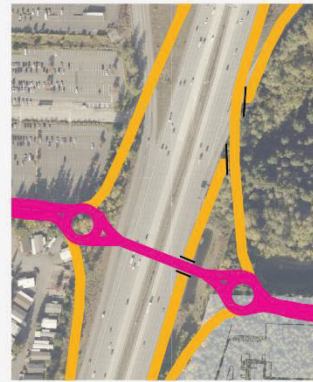


Exhibit 13. S 324th Street Interchange Access Alternatives – Hybrid (2H, 2J) – Level 2 Screening

Grade Separated Ramps Interchange Alternatives



Intersection Control

Alt 2B - Signals

Alt 2D - Compatible with SE quadrant loop ramp

Alt 2F - Diverging Diamond

Alt 2I - Roundabouts

**Exhibit 14. S 324th Street Interchange Access Alternatives – Grade Separated Ramps (2B, 2D, 2F, 2I)
 – Level 2 Screening**

Arterial Couplet Concept

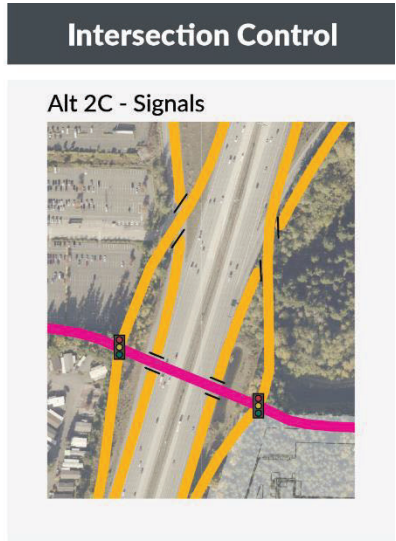


Exhibit 15. Arterial Couplet (2C) (Shown with the Grade Separated Interchange Alternative) – Level 2 Screening

6.4.2 Level 2 Screening Analysis

To support the Level 2 screening, additional traffic operations and safety analysis was completed to provide quantitative data. The following baseline needs required traffic operations or safety analysis:

- Decrease roadway congestion on S 320th Street (BN3)
- Maintain access to and from City Center (BN4, BN5, BN6)
- Improve safety for the general travelling public on the S 320th Street corridor and study area through crash reduction (BN11)
- Improve safety for the general travelling public on the Interstate and ramps through crash reduction (BN12, BN13, BN14)
- Maintain or improve I-5 mobility for persons and freight trucks (BN15, BN16)
- Improve safety for the general travelling public on the S 312th Street and/or S 324th Street corridor and study area through crash reduction (BN18)

6.4.2.1 I-5 Traffic Operations and Safety

There are three key factors that affect operations and safety on I-5. These factors affect both traffic operations (speed and congestion) and safety. These factors are:

- Queue spillback from local streets to I-5 mainline/ramps - This was measured by queue lengths from the local system onto the I-5 ramp terminals.
- Traffic volume changes on I-5 - This is measured as travel demand and throughput on mainline and ramps.
- I-5 mainline geometric changes – For this project, the key change to I-5 mainline is the gore points for the ramps will move. This is captured in the VISSIM model (measures effects to speeds with changes in weave sections).

The key traffic issues that were used to evaluate and ultimately screen out many of the Build Alternatives are shown in Exhibit 18 (see page 6-24).

The Build Alternatives studied in the level 2 analyses all have the same travel demand on the mainline and ramp entry/exit points from I-5 as the No Build Alternative. The flow of traffic from the local streets to I-5 is controlled by ramp meters on the on-ramps. These ramp meters exist in the No Build and Build Alternatives, and the release rate of traffic at the ramp meters is managed by WSDOT. The traffic analysis assumed the same volume release rate for the No Build and Build Alternatives.

In the Seattle metro area, WSDOT typically operates ramp meters in an automatic mode. In automatic mode, all ramp meter commands are initiated by the traffic management center (TMC) central system, without human intervention. The start and end meter control is determined by the level of congestion on the mainline roadway. The system looks at all the data locally in the interchange vicinity and downstream of the interchange to activate or deactivate the ramp meter. The ramp meter persists in an activated or deactivated mode for a minimum duration to avoid frequent on/off activity during the shoulders of the peak periods or in the event of off-peak congestion. Automated meter operation is continuously monitored by TMC staff, and they have the ability to manually override operations if needed.

A VISSIM model was developed for the grade separated alternative (see Section 6.5 below for more discussion). The VISSIM analysis indicates that the modified gore points (moving the southbound on-ramp from S 320th/324th Street and moving the northbound off-ramp to S 320th/324th Street closer to SR 18) does not result in a negative impact on I-5 mainline. The benefit of distributing traffic from I-5 to S 320th Street and S 324th Street with the Build Alternatives however is that the local system can serve those trips and reduces queue spillbacks onto I-5 compared to the No Build Alternative.

Some Build Alternatives would provide a bigger improvement compared to the No Build Alternative than others at two key locations, which include the S 320th Street/I-5 southbound ramps intersection and the S 324th Street/I-5 southbound ramps intersection. Today, approximately 1,000 feet of queue storage is provided for general purpose traffic and 940 feet of queue storage is provided for HOV between the S 320th Street/I-5 southbound ramps intersection and the I-5 southbound on-ramp meter. For each Build Alternative, queue storage would be expanded by adding a second general purpose lane to the I-5 southbound on-ramp from either S 320th Street or S 324th Street and using a metered shoulder during the peak periods, and the ramp meter(s) would be relocated further south. There are constraints to adding additional queue storage due to the Park and Ride lot access, ST's LRT extension to Tacoma, a potential Belmor Park redevelopment, and planned future widening for an HOV lane along I-5 southbound mainline. These constraints also apply to adding additional queue storage on the frontage road in the hybrid ramp configuration (Alternatives 2H and 2J). Each of the Build Alternatives would expand queue storage on the I-5 southbound on-ramp(s) from 1,000 feet today to approximately 3,000 to 5,900 feet for general purpose traffic.

- The alternatives with grade separated ramps (Alternative 2B, 2C, 2D, 2F, and 2I) would not have potential congestion issues at either the S 320th Street/I-5 southbound ramps intersection or the S 324th Street/I-5 southbound ramps intersection.
 - S 320th Street/I-5 southbound ramps intersection: For these alternatives, the I-5 mainline traffic exiting to S 320th Street and exiting to S 324th Street would “split” with traffic destined to S 324th Street travelling below the S 320th Street bridge. The v/c ratio for the southbound movement at S 320th Street/I-5 southbound ramps would operate at a v/c ratio of 0.69 during the PM peak hour.
 - S 324th Street/I-5 southbound ramps intersection: This intersection is anticipated to be impacted at times by congestion spilling back from the I-5 southbound on-ramp, despite providing 1,100 feet of queue storage between the S 324th Street/I-5 southbound ramps intersection and the on-ramp meter. The total volume entering this intersection is less than the other Alternative 2 configurations described below, because traffic destined for I-5 southbound from S 320th Street would bypass this intersection. During the PM peak hour, about 820 vehicles per hour would approach the intersection from the north to this potentially congested location.
- The alternatives with a split diamond (Alternatives 2A, 2E, and 2G) ramp configuration would have potential congestion issues at the S 320th Street/I-5 southbound ramps intersection and the S 324th Street/I-5 southbound ramps intersection.
 - S 320th Street/I-5 southbound ramps intersection: For these alternatives, all I-5 southbound traffic to S 320th Street and S 324th Street use the same off-ramp, with 1,780 vph approaching the intersection (PM peak). The v/c ratio for the southbound thru movement at S 320th Street/I-5 southbound ramps would operate at a v/c ratio of 0.92 (PM peak).

- S 324th Street/I-5 southbound ramps intersection: For these alternatives, all traffic from S 320th Street destined for I-5 southbound passes through the S 324th Street/I-5 southbound ramps intersection. This combined volume totals 1,330 vph during the PM peak hour (or 510 vph more than the Alternatives 2B, 2C, 2D, 2F, and 2I described above). As this intersection is anticipated to be impacted at times by congestion spilling back from the I-5 southbound on-ramp, the additional traffic compared to the other Alternative 2 configurations results in the potential for much longer queued conditions. This is despite providing 1,700 feet of queue storage between the S 324th Street/I-5 southbound ramps intersection and the on-ramp meter.
- The alternatives with a hybrid (Alternatives 2H and 2J) ramp configuration would have potential congestion issues at the S 324th Street/I-5 southbound ramps intersection, but not at the S 320th Street/I-5 southbound ramps intersection.
 - S 320th Street/I-5 southbound ramps intersection: For these alternatives, the I-5 mainline traffic to S 320th Street and S 324th Street would “split” with traffic destined to S 324th Street travelling under the S 320th Street bridge, thus avoiding the intersection. The v/c ratio for the southbound thru movement at S 320th Street/I-5 southbound ramps would operate at a v/c ratio of 0.69 during the PM peak hour.

S 324th Street/I-5 southbound ramps intersection: For these alternatives, all traffic travelling from S 320th Street to southbound I-5 would travel through the S 324th Street/I-5 southbound ramps intersection, potentially adding to the congestion issues spilling through the intersection from the on-ramp. This is despite providing 1,700 feet of queue storage between the S 324th Street/I-5 southbound ramps intersection and the on-ramp meter. Traffic operations for the interchange alternatives and the impacts to the I-5 ramps are shown in Exhibit 16. Additional traffic operations and safety data is included in Appendix H.

6.4.2.2 Local Traffic Operations and Safety

Traffic Operations

In the Methods and Assumptions Document, the study area was defined as a way to capture any changes the proposed Build Alternatives would have on the roadway network. Outside of the S 320th Street and S 324th Street corridors, traffic volumes are forecasted to be the same or within 5 percent for No Build and the Build Alternatives based on travel demand modeling, as shown in Exhibit 17. For Level 2 Screening, only the intersections along S 320th Street and S 324th Street corridors were analyzed to assess the impacts of the Build Alternatives.

PM Peak Hour Traffic Operations



A S 320th Street / I-5 Southbound Ramps intersection Southbound Through Movement		
v/c ratio	Alternative	Explanation
0.92	Split Diamond	All trips from I-5 southbound to S 324th St travel through the intersection
0.69	Hybrid	Trips from I-5 southbound to S 324th St bypass (underneath) S 320th St
0.69	Grade-Separated Ramps	

B S 324th Street / I-5 Southbound Ramps intersection Frontage Road/Ramp Approaching S 324th Street		
Volume (vph)	Alternative	Explanation
1,330	Split Diamond	All trips from S 320th St destined to southbound I-5 travel through the intersection. When bottleneck "C" occurs, more traffic would add to this queue compared to the grade-separated ramps.
1,330	Hybrid	
810	Grade-Separated Ramps	Trips from S 320th St destined to southbound I-5 bypass S 324th St (travel underneath)

C S 320th/324th Streets to I-5 Southbound Ramp meter queues		
Queues	Alternative	Explanation
Yes	Split Diamond	Queues at the meter to southbound I-5 will queue back to S 324th St and spill through the intersection at times, affecting traffic approaching the S 324th St intersection. This occurs in 67% of the iterations modeled in VISSIM. When that queue spillback does occur, it exists for 1.5 hours of the PM Peak.
Yes	Hybrid	
Yes	Grade-Separated Ramps	

Exhibit 16. I-5 Southbound Ramps Key Traffic Operations Issues (PM Peak Hour) – Level 2 Screening

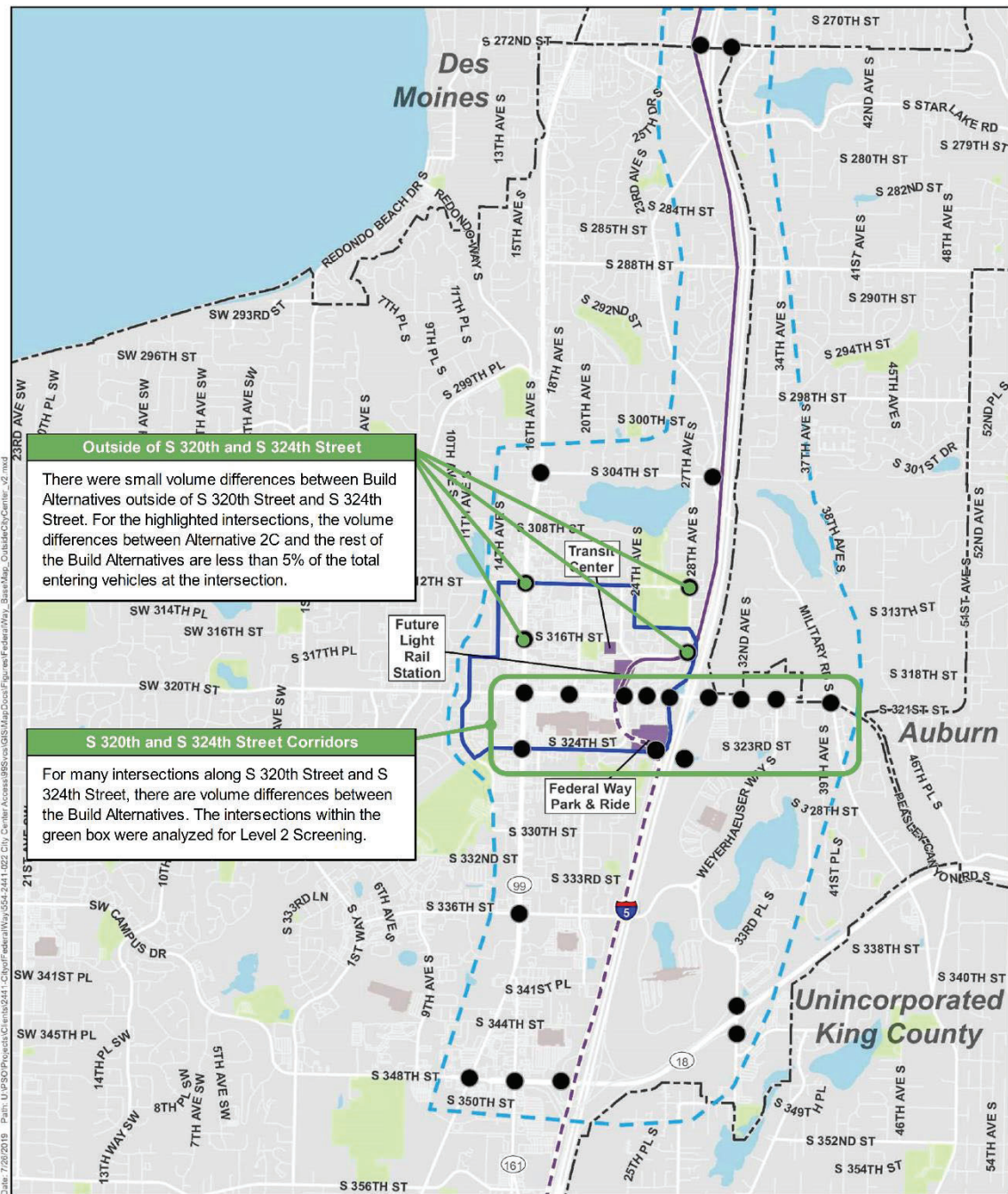


Exhibit 17. Traffic Volume Distribution – Level 2 Screening

There are two factors that impact the local traffic operations and affect the screening between No Build and the Build Alternatives. These factors are:

- Operations of S 320th Street between 23rd Avenue S and the I-5 northbound ramps – This is reported or measured in terms of the volume to capacity ratios at study intersections, with a target of less than 1.0. Congestion in this area impacts I-5 ramp operations (today) and worsens in the future.

- Ramp configuration – Congestion from I-5 southbound approaching SR 18 has been found to affect the southbound ramps from S 320th Street (No Build Alternative) and S 324th Street (Build Alternatives only). The magnitude that this congestion affects the local streets is related to whether the off-ramp traffic is separated from the on-ramp trips. When congestion spills back from the mainline, the queuing on the ramp is exacerbated if off-ramp trips are also present on the section of ramp roadway.

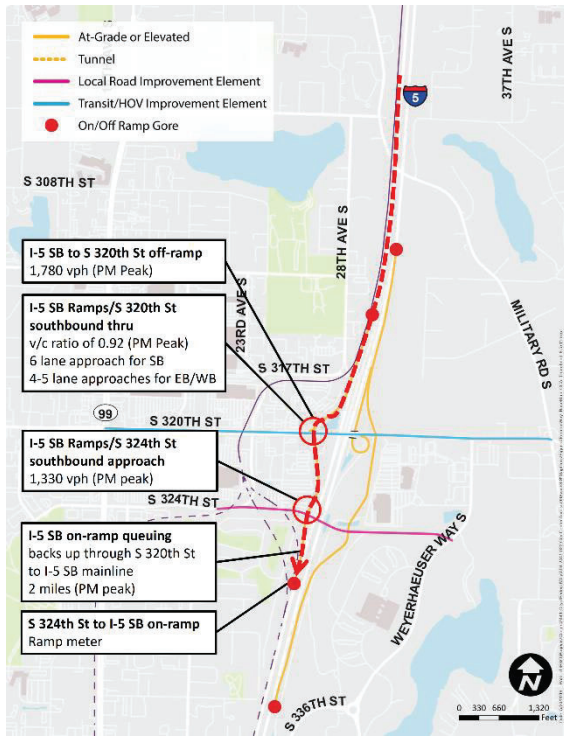
All of the Build Alternatives would improve traffic operations compared to the No Build Alternative as revising the ramp configurations to serve S 324th Street in addition to S 320th Street would better distribute traffic and lessen the pressure on the bottleneck on S 320th Street between 23rd Avenue S and I-5 northbound ramps.

Some Build Alternatives would provide a better improvement compared to the No Build Alternative than other alternatives.

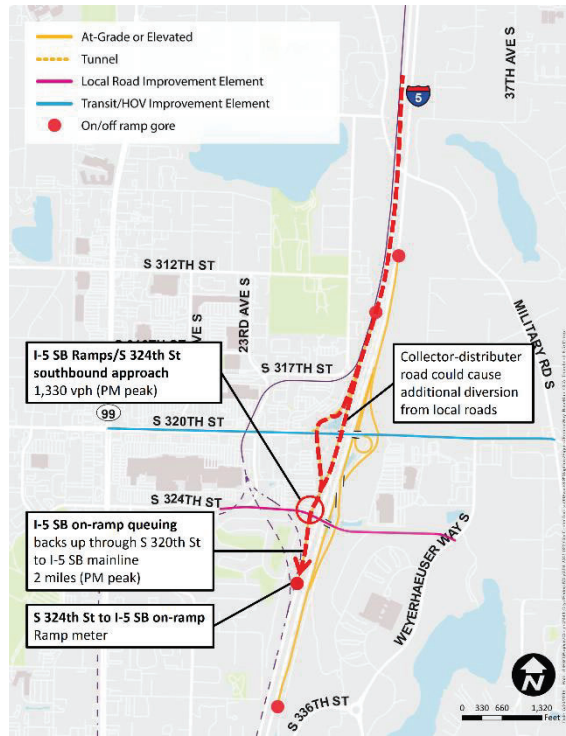
- The alternatives with a split diamond ramp configuration (Alternatives 2A, 2E, and 2G) would provide the least overall benefit. All the traffic exiting southbound would travel through the S 320th Street/I-5 southbound off-ramps signal, resulting in a larger v/c ratio for the southbound thru movement, with a v/c ratio of 0.92 compared to 0.80 in No Build during the PM peak hour.
- Both the alternatives with a split diamond ramp configuration (Alternatives 2A, 2E, and 2G) and hybrid ramp configuration (Alternatives 2H and 2J) would likely operate with congestion on the local streets at times at S 320th Street and S 324th Street as traffic from I-5 southbound would queue through the ramp system and affect the southbound ramps as described in the freeway operations section above. The alternatives with grade separated ramps (Alternative 2B, 2C, 2D, 2F, and 2I) provide a separation of S 324th and S 320th Street ramps. Since the I-5 southbound mainline congestion (PM peak) begins south of the on-ramps, the queue spillback from mainline could impact S 324th Street at times (same as the other Build Alternatives) but would not reach the S 320th Street arterial.
- All alternatives would likely operate with congestion on the local streets due to congestion on the S 324th Street to I-5 southbound on-ramp. Though additional queue storage would be provided between the ramp meter and the upstream intersections, there are constraints to adding additional queue storage due to the Park and Ride lot access, ST's LRT extension to Tacoma, a potential Belmor Park redevelopment, and planned future widening for an HOV lane along I-5 southbound mainline. These constraints also apply to adding additional queue storage on the frontage road in the hybrid ramp configuration (Alternatives 2H and 2J). Each of the Build Alternatives would expand queue storage on the I-5 southbound on-ramp(s) from 1,000 feet today to approximately 3,000 to 5,900 feet for general purpose traffic. For alternatives with grade separated ramps (Alternative 2B, 2C, 2D, 2F, and 2I), queuing on the on-ramp would extend about 550 feet back to the S 324th Street/I-5 southbound ramps intersection during the PM peak hour. Both the alternatives with a split diamond ramp configuration (Alternatives 2A, 2E, and 2G) and hybrid ramp configuration (Alternatives 2H and 2J) would have 510 vph more approaching the S 324th Street/I-5 southbound ramps intersection than the alternatives with grade separated ramps (Alternative 2B, 2C, 2D, 2F, and 2I), which would add about 2 miles of queuing through the system.

Traffic operations for the Build alternatives are shown in Exhibit 18. Additional traffic operations and safety data is included in Appendix H.

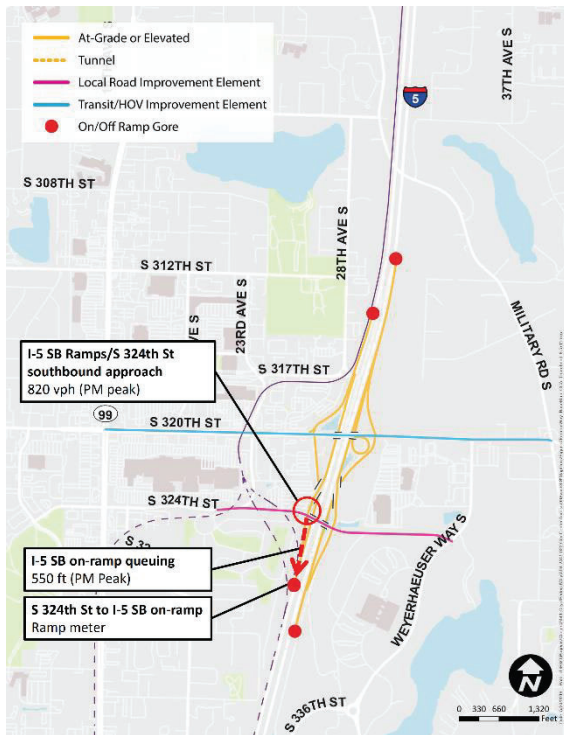
Split Diamond (2A, 2E, 2G)



Hybrid (2H, 2J)



Grade Separated Ramps (2B, 2D, 2F, 2I)



Arterial Couplet (2C)

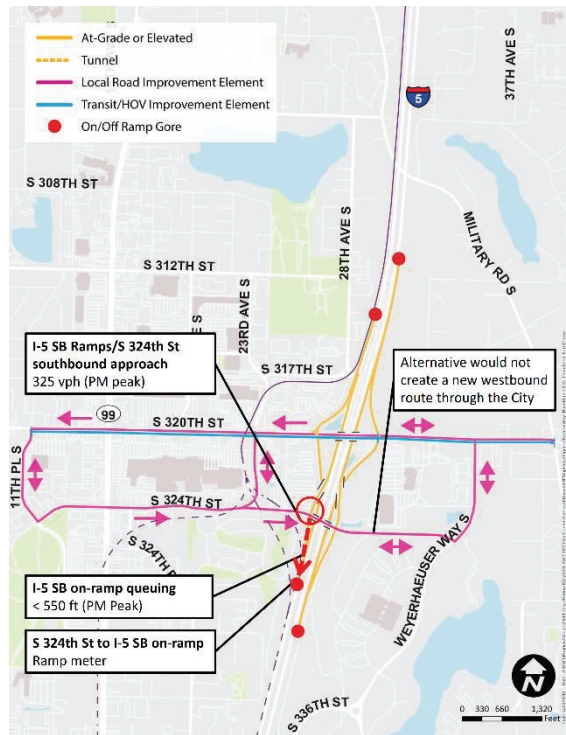


Exhibit 18. Key Traffic Operations Issues (PM Peak Hour) – Level 2 Screening

Safety

There was one factor that was a differentiator between Build Alternatives for the local system safety analysis. This factor was:

- Historic collision rates for the S 320th Street and S 324th Street corridors. These were measured by change in volume demand and throughput, new elements that would decrease safety such as unprotected left turns or new signals, and crash modification factors for intersection control.

All of the Build Alternatives would decrease collision rates along S 320th Street compared to the No Build Alternative by decreasing the travel demand and not introducing new elements that would decrease safety such as unprotected left turns or new signals.

All of the Build Alternatives would increase collision rates along S 324th Street compared to the No Build Alternative by increasing the travel demand. Some Build Alternatives would have lower collision rates though than other Build Alternatives due to the proposed intersection control. Alternative 2G and 2I include roundabouts at the S 324th Street interchange, resulting in the lowest collision rates (per Highway Safety Manual [HSM] crash modification factors). Alternative 2F (DDI) would also result in lower collision rates as the left turns are removed as conflicts in the intersection (though HSM crash modification factors have not been determined for this intersection control). Alternative 2C (arterial couplet) would also have lower rates as the S 320th Street and S 324th Street roadways would operate one way, reducing conflicts at the intersections. Alternatives with signals (Alternatives 2A, 2B, 2D, 2E, 2H) would operate with the greatest collision potential (per HSM crash modification factors).

Additional traffic operations and safety data is included in Appendix H, including detailed v/c ratio and LOS data.

6.4.3 Level 2 Screening Conclusions

Each of the interchange access modification alternatives was assigned a score according to how well they met the targets. The scores are provided on a scale of 1 to 5, with 5 being the best rating and 1 indicating a poor rating and the existence of a significant issue or risk.

These ratings were used to identify and remove from consideration those alternatives that did not address the project purpose and need or would not meet design or environmental criteria.

After a score was assigned for each individual criterion, an overall score was calculated for each of the four criteria categories: baseline needs, contextual needs, design considerations, and environmental considerations. The overall score was calculated using the weighting percentages for each individual criterion shown in Appendix E.

Once an overall score (1 to 5) was calculated for each of the four categories, these scores were totaled to determine the total score (4 to 20) for each alternative. An additional rating was calculated for each alternative to determine how many individual criteria were scored with a "1".

The screening results are shown in Exhibit 19. All alternatives had at least one criterion with a "1" rating except for Alternatives 2B, 2I, and 2J.

Alternative 2I also rated the highest with a combined score of 16.5. Alternative 2I +312th +32nd had a higher baseline needs score than Alternative 2I; however, it had a greater impact to environmental (rating 2.5), rated lower for design feasibility (2.5), and received three "1" ratings.

Exhibit 19. Level 2 Screening Summary

Alternative	Baseline Needs	Contextual Needs	Design	Environmental	Total	Number of Criteria with a Failing Rating of "1"
No Build	3.0	5.0	3.9	3.8	15.6	3
2A Split Diamond	3.5	5.0	3.7	3.7	15.9	2
2B Grade Separated Ramps	4.0	3.0	3.5	3.7	14.1	0
2C Arterial Couplet	3.8	5.0	3.7	2.7	15.1	5
2D Grade Separated Ramps + Compatible with S 324th St SE Quadrant Loop Ramp	3.8	5.0	3.4	3.8	16.0	3
2E Split Diamond + Compatible with S 324th St SE Quadrant Loop Ramp	3.4	5.0	3.5	3.7	15.5	4
2F Grade Separated Ramps + DDI at S 324th St	4.0	5.0	3.3	3.6	15.9	1
2G Split Diamond + RAB at S 324th St	3.6	5.0	3.8	3.6	16.0	2
2H -2A + 2B Hybrid	3.6	5.0	3.7	3.9	16.1	1
2I Grade Separated Ramps + RAB	4.1	5.0	3.7	3.7	16.5	0
2I Grade Separated Ramps + RAB + 312th +32nd	4.2	5.0	2.8	2.5	14.5	3
2J - 2A + 2B Hybrid + RAB	3.7	5.0	3.8	3.5	16.0	0

Note: RAB = roundabout

The data used to complete the Level 2 Screening is included in Appendix F, H, and I. Level 2 screening results are shown in Appendix J.

The No Build Alternative and most of the S 324th Street Interchange Access Alternatives were eliminated from further consideration for the following reasons.

6.4.3.1 No Build Alternative

This alternative did not meet the Purpose and Need as it would not improve the economic vitality and quality of life, as measured by the baseline needs related to relieving traffic congestion, reducing transit delay, and improving nonmotorized connections.

6.4.3.2 Split Diamond Interchange Alternatives (Alternatives 2A, 2E, 2G)

Alternatives based on a split diamond interchange concept would not provide the ability to accommodate future roadway improvements to address potential growth (environmental screening criteria labeled E6 in Appendix E). This alternative would be constrained by the S 320th Street/I-5 southbound ramps intersection, with the southbound thru movement operating with a v/c ratio of 0.89 and would not accommodate future land uses or any shifts in travel patterns. Thus, this alternative received a "1" rating for screening criteria E6 (impacts to future land uses).

This configuration would also fail as traffic from I-5 southbound would queue through the ramp system and affect traffic exiting from I-5 southbound to S 320th and S 324th Street (as those trips "mix" with the trips which are queued back from the S 324th Street to I-5 southbound on-ramp).

This split diamond configuration received a “1” rating for screening criteria related to improving safety on S 312th and S 324th Streets (labeled BN18 in Appendix E), due to the increase in traffic on the I-5 southbound and northbound ramps intersections compared to the grade separated ramp alternatives, and because the ramp terminals include signals not roundabouts.

6.4.3.3 Hybrid Interchange Alternatives (Alternatives 2H, 2J)

The hybrid interchange alternative was designed to minimize the right-of-way issues associated with grade separated ramps and address traffic constraints at the S 320th Street/I-5 southbound ramps intersection associated with the split diamond configuration.

This alternative rated lower than the grade separated ramp alternatives as the southbound connection between S 320th Street and S 324th Street via the frontage road or ramp collector-distributor could be used by local trips instead of utilizing local roadways such as 23rd Avenue S. This type of diversion would result in increased congestion on the ramps and was not desired.

This configuration would also fail as traffic from I-5 southbound would queue through the ramp system and affect traffic exiting from I-5 southbound to S 324th Street (as those trips “mix” with the trips which are queued back from the S 324th Street to I-5 southbound on-ramp). This condition would exist for the hybrid options as well as the split diamond options as described above.

6.4.3.4 Grade Separated Ramp Interchange Alternatives (Alternatives 2B, 2D, 2F, 2I)

The grade separated ramp interchange alternatives were developed to minimize the issues identified with the split diamond operations (see above). The traffic destined to S 320th and S 324th Streets would split after exiting I-5, and traffic destined to I-5 would join together prior to joining the freeway. This would minimize the pressure on the S 320th Street intersection with the southbound I-5 ramps that exists in the split diamond alternatives and would minimize congestion at S 324th Street from impacting the frontage road that would exist between S 320th Street and S 324th Streets with both the hybrid and split diamond options.

Several variations of the grade separated ramps were identified including signaling S 324th Street interchange (Alternative 2B), including a SE quadrant loop ramp at S 324th Street (Alternative 2D), a diverging diamond interchange (Alternative 2F), and roundabouts at the S 324th Street interchange (Alternative 2I). Of the variations of the grade separated ramps concepts and the other interchange concepts, Alternative 2I rated the highest for the screening criteria and met the project Purpose and Need, primarily because it provides roundabouts at the ramp termini (rates well for safety and operations).

6.4.3.5 Arterial Couplet Concept (Alternative 2C)

The arterial couplet could be applied to several of the above alternatives, including those listed under the split diamond, hybrid, or grade separated interchange alternatives.

Alternative 2C was not well received through the public outreach process. The configuration would create a circuitous eastbound route between 11th Street and I-5 and would not create a new westbound route through the City, impacting business and residential access. Thus, this alternative received a “1” rating for screening criteria related to access to, from, and around the core (BN1 and BN17) and screening criteria related to neighborhoods and public acceptance (E1 and E7).

Since the couplet would be separated by four blocks, transit accommodations in the eastbound direction would likely need to be provided on S 320th Street, or the stops would be significantly separated. Providing eastbound transit on S 320th Street would result in a section at least as wide as exists today, thus negating the typical benefit of couplets providing narrowed cross sections.

6.5 Preferred Alternative (Alternative 2I) Detailed Traffic Operations and Safety Analysis

Following Level 2 screening, additional analysis was completed to confirm that the Preferred Alternative (Alternative 2I) improved traffic operations and safety compared to the No Build Alternative. Alternative 2I is shown in Exhibit 20.



Preliminary Design Improvements

1. Interchange at S 324th and modified interchange at 320th with braided ramps. All I-5 on-ramps will be metered.
2. 2-lane bridge along S 324th crossing I-5. Shared-use path on north side with potential future connection to BPA Trail. Sidewalk on south side.
3. Single-lane roundabouts at the ramp terminals with slip lanes in the northwest and southwest quadrants of S 324th/I-5 SB Ramps.
4. Additional SB left-turn lane and additional NB left-turn lane at S 324th/SR 99 to manage westbound queues from new interchange.
5. 5 lanes along S 324th from SR 99 to 23rd S. Shared-use path on north side and sidewalk on south side.
6. 2-lane roundabout at S 324th/23rd S.
7. 4 lanes along S 324th from 23rd S to I-5 SB Ramps.
8. 3 lanes along S 324th from I-5 NB Ramps to Weyerhaeuser. A shared-use path on the north side and sidewalk on the south side.
9. Single-lane roundabout at S 324th/Weyerhaeuser.
10. Road widening for HOV lanes to support future BRT from SR 99 to Military. Eastbound HOV will drop into existing right turn lane at Military.
11. Sidewalk on north and south side of S 320th bridge.
12. No improvements to S 320th St/SR 99 and S 320th/Military intersections.
13. Shared use path.

Exhibit 20. Alternative 2I

6.5.1 Interchange Spacing

Per the WSDOT Design Manual Chapter 1360, the minimum interchange spacing as measured from centerline to centerline of the crossroads is 1 mile for urban areas. The interchange spacing from S 324th Street to SR 18 is approximately 8,100 feet, which exceeds the minimum requirement of 1 mile.

The design manual also specifies the spacing between ramp gores (measures from the nose) is a minimum of 2,000 feet (see Exhibit 1360-3 of the WSDOT Design Manual). The interchange spacing with

Alternative 2I measures from the S 324th Street on-ramp gore to the SR 18 off-ramp gore as 3,000 feet (southbound direction) and from the SR 18 on-ramp gore to the S 324th Street on-ramp gore as 4,100 feet (northbound direction). These measurements are with the existing I-5 mainline configuration. If WSDOT widens I-5 in the future to accommodate the additional lanes as described in section 6.6.1 below, the distances between S 324th Street and SR 18 gores lengthens to 3,600 feet in the southbound direction and 4,300 feet in the northbound direction.

6.5.2 I-5 Traffic Operations and Safety

VISSIM was used to analyze I-5 mainline, ramp, and ramp termini intersections, for existing conditions, the No Build Alternative, and the Preferred Alternative 2I (Grade Separated Ramps + Roundabouts at S 324th Street) for the AM and PM peak hours. Exhibit 21 below shows the VISSIM analysis results for the I-5 mainline in both directions for each peak period.

Today and in the Year 2045, northbound I-5 is the peak direction during the AM peak hour. With the Year 2045 Preferred Alternative, the northbound off-ramps at S 320th Street and S 324th Street would not be impacted by local congestion and would not spill back onto the mainline. The VISSIM analysis confirms that the Preferred Alternative would operate similar to the No Build Alternative in both the northbound and southbound directions during the AM peak period.

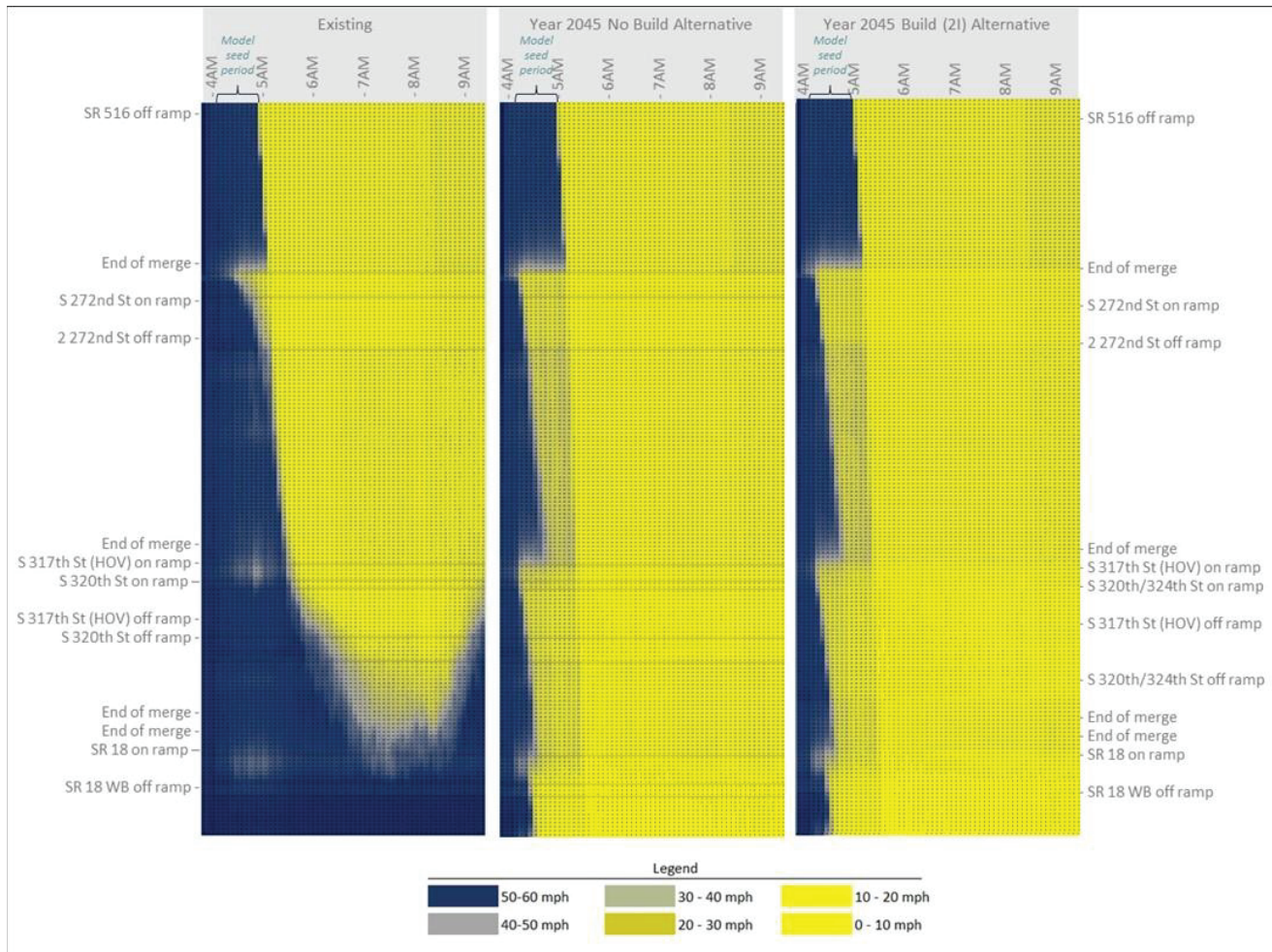


Exhibit 21a. I-5 Mainline VISSIM Results – Northbound AM Peak

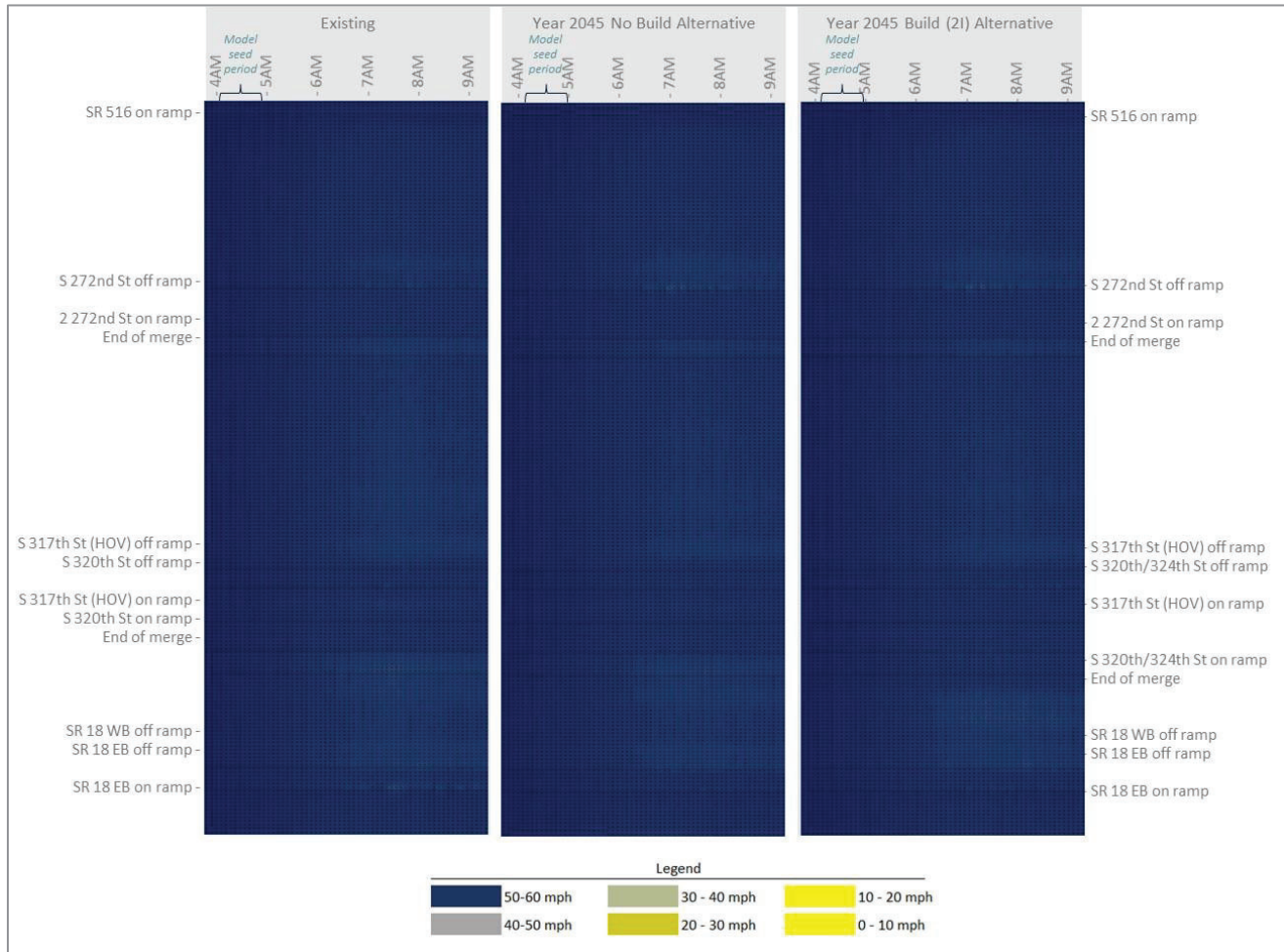


Exhibit 21b. I-5 Mainline VISSIM Results – Southbound AM Peak

In the PM peak, with the Year 2045 No Build Alternative, congestion from S 320th Street intersection signals would queue back and impact the southbound off-ramp to S 320th Street, impacting I-5 mainline operations nearly to S 272nd Street. In the Year 2045 Preferred Alternative, this congestion is eliminated by reducing travel demand through the bottlenecks on S 320th Street by distributing traffic over to S 324th Street. Travel speeds on I-5 mainline south of the S 320th/324th Street on-ramp is the same when comparing the Year 2045 No Build and Build Alternatives. The net result is the Year 2045 Preferred Alternative provides a benefit to southbound I-5 operations during the PM peak.

As described in previous sections, congestion on I-5 southbound approaching SR 18 would queue through the S 324th and S 320th Street on-ramps, and impact the S 320th Street arterial in Existing Conditions. This queue then limits how well the signals operate on S 320th Street and limit the traffic able to exit from I-5 northbound to S 320th Street. In the Year 2045 No Build Alternative, the queue spills onto the I-5 northbound off-ramp to S 320th Street for three or more hours during the PM peak period. In the Year 2045 Preferred Alternative, because traffic volumes overall have been reduced on S 320th Street (and distributed to S 324th Street), the local system is better able to both store that queue from I-5 southbound mainline and still serve additional trips compared to the No Build Alternative. The net result is an improvement to that queue that wraps around and impacts the

northbound I-5 off-ramp, reducing the queued traffic to two hours during the PM peak period with the Preferred Alternative.

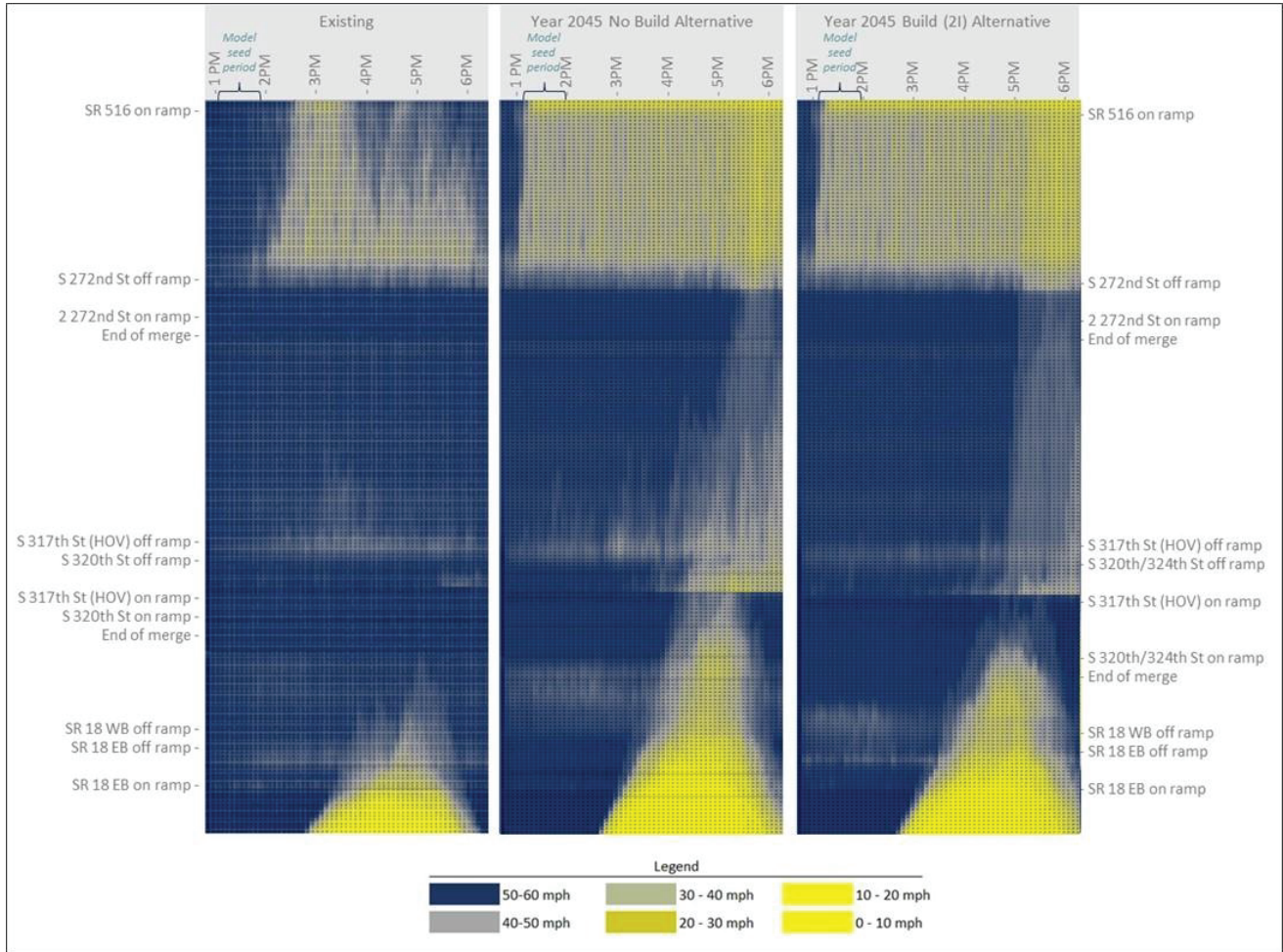


Exhibit 21c. I-5 Mainline VISSIM Results – Southbound PM Peak

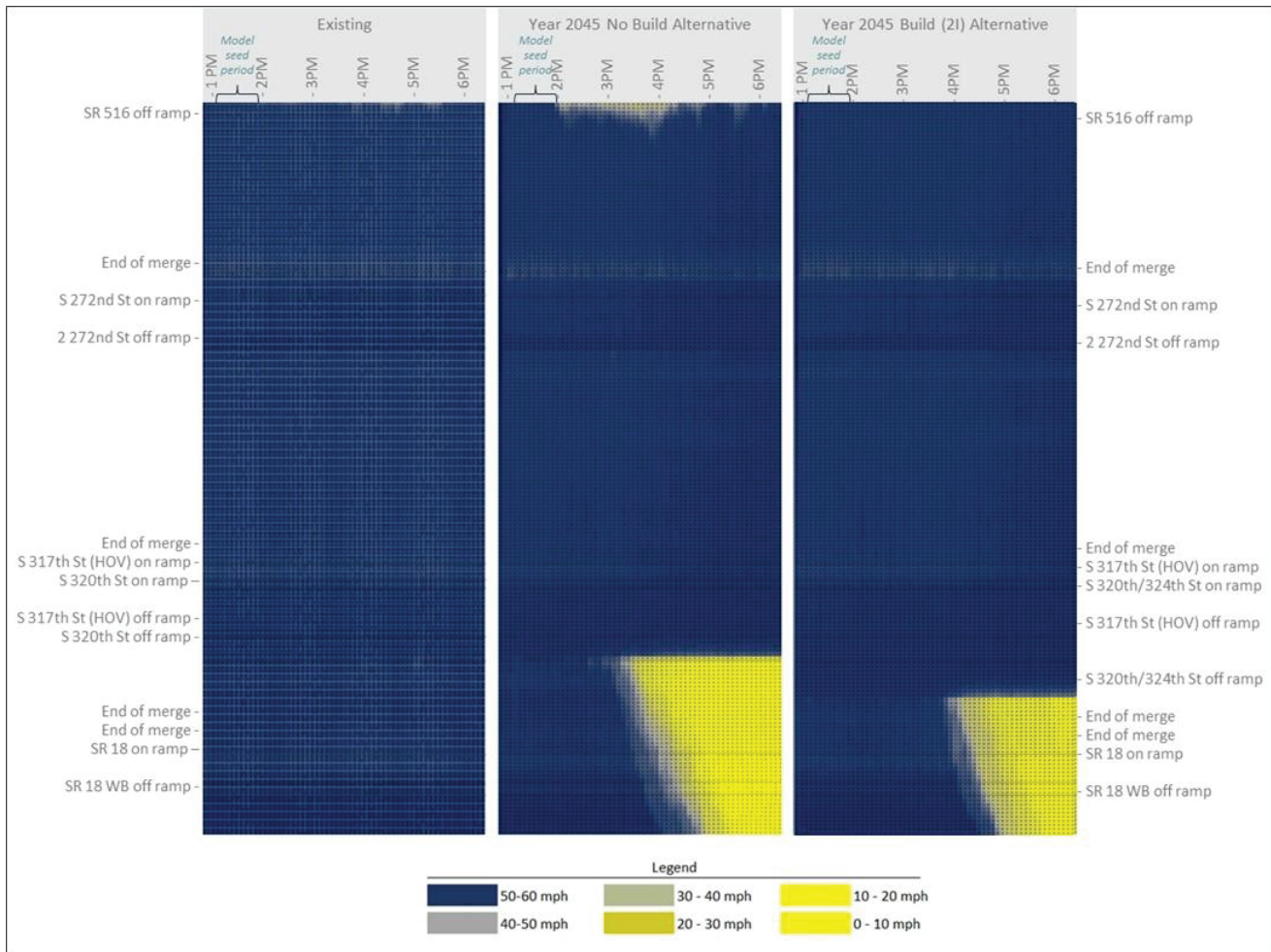


Exhibit 21d. I-5 Mainline VISSIM Results – Northbound PM Peak

Synchro was used to analyze local intersection level of service (LOS) for Existing Conditions, the No Build Alternative, and the Preferred Alternative. Existing and future traffic issues are a system-wide issue and Synchro models only provide traffic operations results for spot locations. Exhibit 22 includes the Synchro LOS results for the PM peak hour for existing and future conditions.

Exhibit 22. Synchro Level of Service Results – PM Peak Hour

(#) Intersection	2017 Existing Conditions	2045 No Build Alternative	2045 Preferred Build Alternative
(11) S 320th Street/23rd Avenue	E	F	D
(12) S 320th Street/25th Avenue S	C	D	C
(13) S 320th Street/I-5 SB Ramps	D	E	B
(14) S 320th Street/I-5 NB Ramps	C	C	B
(18) S 324th Street/Pac Highway	D	F	F
(30) S 324th Street/23rd Avenue S	B	D	C

As discussed previously, the I-5 mainline safety analysis was based on forecasted volumes, queue spillback from the I-5 ramp terminals, and number of gore points. The Preferred Alternative would improve queue spillbacks onto I-5 which would improve safety on the I-5 mainline. I-5 mainline volumes and number of access points would not change from the No Build Alternative and therefore would not impact safety.

6.5.3 Local Traffic Operations and Safety

The VISSIM analysis for the Preferred Alternative also provided more data on the local traffic operations. During both peak hours, operations along S 320th Street between 23rd Avenue S and I-5 would improve for the Preferred Alternative compared to the No Build Alternative. This reduction in travel time with the Build Alternative occurs as east-west traffic and traffic to and from the freeway is distributed to two arterials: S 320th Street and S 324th Street. Exhibit 23 below shows the VISSIM analysis results for travel time along S 320th Street in both directions for each peak period.

During the AM peak hour, the Preferred Alternative would serve 4,000 vph along the S 320th Street and S 324th Street corridors west of I-5 compared to 3,550 vph in the No Build Alternative. This is a 10 percent improvement in vehicle throughput in addition to improved operations and travel times on the S 320th Street corridor, meaning more trips are able to get to and from the City Center compared to the No Build Alternative. During the PM peak hour, the Preferred Alternative would serve 5,500 vph along the S 320th Street and S 324th Street corridors west of I-5 compared to 4,150 vph in the No Build Alternative. This is a 33 percent improvement in vehicle throughput in addition to improved operations and travel times on the S 320th Street corridor.

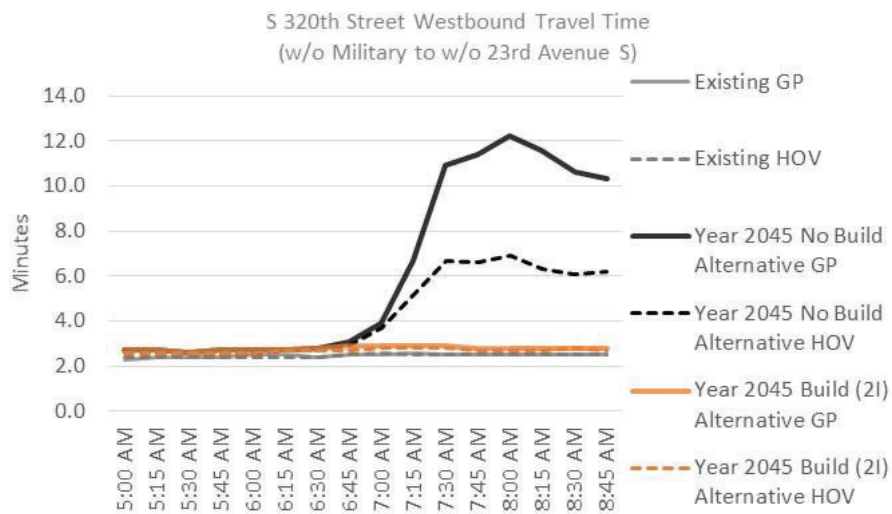


Exhibit 23a. S 320th Street Travel Time – Westbound AM Peak

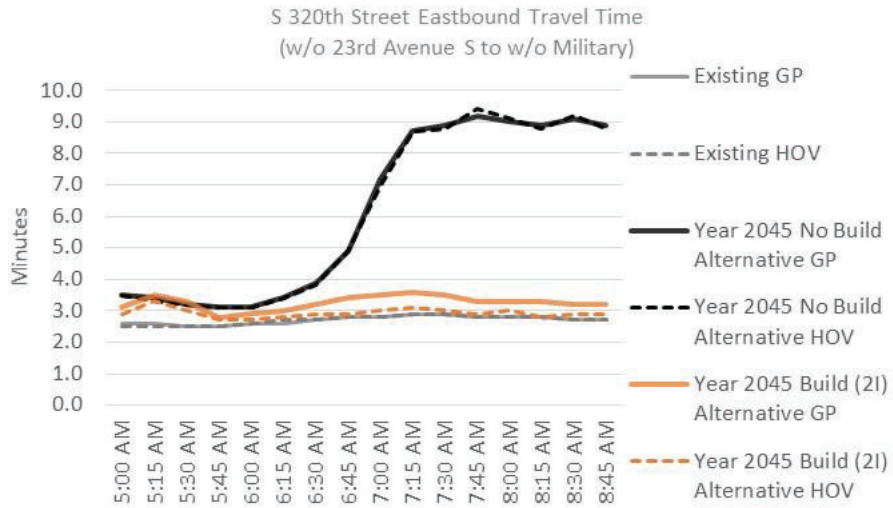


Exhibit 23b. S 320th Street Travel Time – Eastbound AM Peak

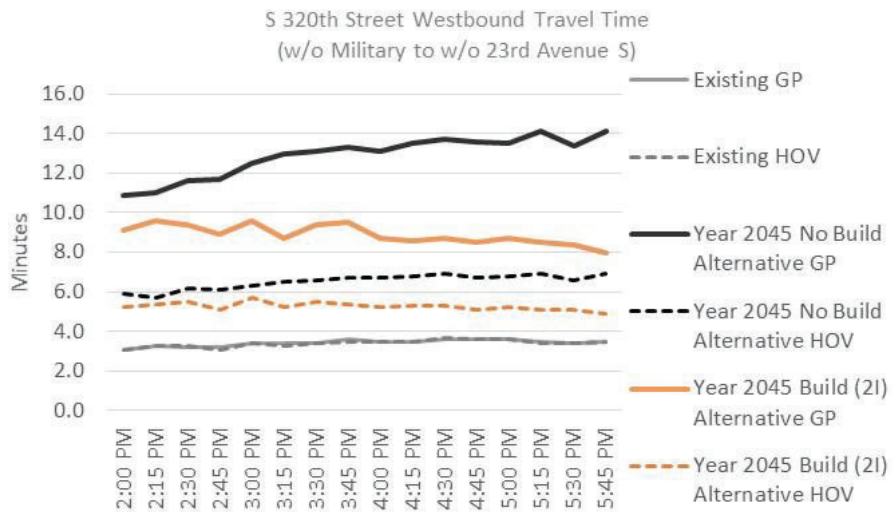


Exhibit 23c. S 320th Street Travel Time – Westbound PM Peak

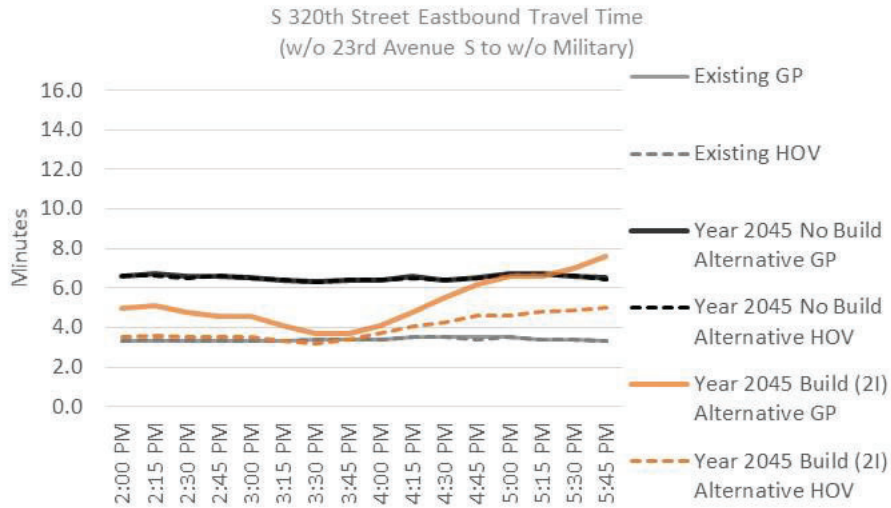


Exhibit 23d. S 320th Street Travel Time – Eastbound PM Peak

As previously discussed, the local safety analysis was based on historic collision rates for the S 320th Street and S 324th Street corridors. Today, the S 320th Street corridor experiences a high frequency of congestion-related crashes, angle crashes, and injury crashes. There have been pedestrian crashes at multiple locations along the S 320th Street corridor and one bicycle-related crash at SR 99. Today, there are no significant issues along the S 324th Street compared to other corridors, though there have been a high frequency of angle crashes and one bicycle-related crash at SR 99.

As projected growth of traffic volumes occurs and vehicle delay substantially increases through the year 2045, there will likely be an overall increase in crashes for all travel modes with the No Build Alternative. With the Preferred Alternative, volumes along S 320th Street are expected to decrease by 10-20 percent which would result in less congestion and fewer congestion-related crashes. The addition of sidewalk on the north side of S 320th Street bridge over I-5 would likely result in fewer pedestrian crashes. Providing new connectivity by extending S 324th Street over I-5 would increase traffic volumes along the corridor which would likely result in increased crashes. However, separating vehicles from bicycles and pedestrians with a shared-use path would reduce the collision rate some.

The Preferred Alternative would be safer than the No Build Alternative for pedestrians. According to WSDOT, roundabouts are designed to be safer than traditional intersections for pedestrians since vehicles move at a slower speed in roundabouts than in traditional roundabouts. In a roundabout, crosswalks are set farther back from the center of the intersection, which allows more time for drivers to react to pedestrians crossing the roadway before merging into or exiting the roundabout. Additionally, triangular islands between conflicting traffic are often included in roundabouts, which provide pedestrians moving through the roundabout with a safe place to wait if they choose to cross only one direction of traffic at a time.

6.6 Design Development and Compatibility

6.6.1 Future Design Considerations

The proposed access will be designed to meet or exceed current standards: 23 CFR 625.2(a), 625.4(a)(2), and 655.603(d) from the FHWA Interstate Access Policy. Design deviations may be required and will be assessed following WSDOT processes on design deviation and in accordance with 23 CFR 625.3(f) from the FHWA Interstate Access Policy during the design of the project.

As the Preferred Alternative (Alternative 2I) design continues to develop, it needs to accommodate the adjacent proposed improvements for ST Federal Way Link Extension (FWLE) and Tacoma Dome Link Extension (TDLE) projects, BPA transmission tower relocations, and the future widening of I-5. Other design constraints and considerations include the existing bog, the existing BP 14-inch Olympic Pipeline, access to the existing King County Metro Park and Ride, and adjacent proposed and existing development. The conceptual design of the Preferred Alternative incorporates input received from the City, WSDOT, and ST during design coordination meetings and submittal reviews.

As discussed with WSDOT in Fall 2020, some deviations from the WSDOT Design Manual may be necessary for the southbound off-ramp design to accommodate the adjacent improvements and the existing S 317th Street HOV direct access bridge. Based on our understanding, the City Center Access project may be constructed prior to the I-5 widening improvements. The proposed ramp design will remain the same, whether City Center Access is constructed first or at the same time as widening I-5. The ramp tapers will either connect to the existing I-5 mainline or the widened I-5 mainline. Some of the potential design deviations may not be necessary for the City Center Access project, instead they may be necessary for the future I-5 widening project. Exhibit 24 below summarizes the potential design deviations for the southbound off-ramp and the project that may trigger those deviations. Design deviations are not anticipated for the southbound on-ramp and the northbound ramps.

Exhibit 24. Potential Design Deviations for Proposed Southbound Off-Ramp

Design Element	Proposed Dimension	Deviation for City Center Access Project?	Deviation for Future I-5 Widening Project?
Ramp Lane Width	22' (two lanes)	Yes	
Ramp Shoulder Width - Outside	Varies 2' to 8'	Yes	
Barrier Shy Distance - face of barrier to edge of shoulder	2'	Yes	
Mainline Lane Width	12' (CCA) 11' (Future I-5)		Yes
Gore Width at C-D Road Beginning Station and Start of 500' Minimum Decision Distance	16' (CCA) 14' (Future I-5)		Yes

Based on discussions with WSDOT, the potential design deviations listed above are anticipated to be acceptable for the City Center Access project and the future I-5 widening project. The necessary design documentation will be completed as the project progresses in future phases.

6.6.2 Forward Compatibility

As previously discussed, a potential Belmor Park redevelopment was considered during the selection and design of the Preferred Alternative (Alternative 2I). Given the large increase in volume using the turning movements at the I-5 ramp intersections, a DDI was assumed to be an appropriate interchange configuration. Since the Belmor Park redevelopment has not been finalized, the S 324th Street interchange is not being designed to accommodate this level of traffic and a DDI was not selected as the preferred intersection control. However, the roundabouts at the I-5 ramp terminals and the adjacent intersections are being designed to be forward compatible with a DDI.

6.7 Conclusion

The S 324th Street Interchange Alternative 2I (Grade Separated Ramps + Roundabouts at S 324th Street) was recommended as the Preferred Alternative to the Federal Way City Council.

Alternative 2I rated the highest with a combined score of 16.5. Alternative 2I+312th+32nd had the highest baseline needs score, but was screened out for the following reasons:

- Local improvements to S 312th Street would likely cause residential displacements. This potential impact resulted in a “1” rating for E1.
- Local improvements to S 312th Street would impact Steel Lake Park. This impact resulted in a “1” rating for E2.
- Local improvements to S 312th Street and 32nd Ave would impact additional wetlands. This impact resulted in a “1” rating for E3.

Alternative 2I had the second highest baseline needs score and would provide the following benefits:

- Decrease roadway congestion, improve freight truck mobility, and improve emergency response on S 320th Street by diverting some traffic from S 320th Street to S 324th Street
- Maintain access to and from City Center by improving traffic and transit operations in the study area
- Improve nonmotorized mobility by providing S 324th Street overcrossing and multi-modal trail from SR 99 to Weyerhaeuser Way. This connection would connect to multi-modal improvements completed on 23rd Avenue S and potential improvements could connect this trail to the BPA trail to the west and a possible future BPA trail to the east.
- Improve safety for the general traveling public on the S 320th Street corridor by distributing demand to S 324th Street
- Protect views by not adding ramp connections that are elevated above the proposed LRT or existing roadways
- Improve safety and mobility for the general traveling public on the Interstate and ramps by reducing queue spillbacks

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Appendix A

Purpose and Need



TECHNICAL MEMORANDUM

DATE: September 30, 2020

TO: Naveen Chandra, City of Federal Way

FROM: Sandy Glover, Parametrix
Tresia Gonzalez, Parametrix

SUBJECT: Federal Way City Center Access Study, Project Purpose and Need

CC:

PROJECT NUMBER: 554-2441-022

PROJECT NAME: Federal Way City Center Access

BACKGROUND

The City Center in Federal Way (City) was established in 1995 and consists of the City Center Core and Frame zones, which are served by S 320th Street and are bounded by S 312th Street on the north, S 324th Street on the south, Interstate 5 (I-5) on the east, and 11th Place S and 14th Avenue S on the west. The City Center Core (referred to as City Center throughout the document) is a designated urban center by the Puget Sound Regional Council (PSRC). The City's Comprehensive Plan identifies development of the City Center to include a mix of uses, such as the Performing Arts and Events Center, a public park, and a mix of residential, commercial, office, educational, and civic uses. People utilizing the land uses surrounding the City Center also access I-5 primarily via the S 320th Street interchange. Link Light Rail is coming to Federal Way, with a station opening in the City Center in 2024.

PURPOSE OF THE PROJECT

The Federal Way City Center is designated as one of 29 regional growth centers as identified in the PSRC's Vision 2040. The purpose of the Federal Way City Center Access project is to improve the economic vitality of the City Center and to improve the quality of life for people who work, play, and live in the City by increasing multimodal mobility and access for regional and local trips while protecting the integrity of the interstate system. Access and mobility are limited by congestion issues along S 320th Street between Pacific Highway S and Military Road S, including to and from I-5.

NEEDS FOR THE PROJECT

There are two needs categories for the project that are each described in this section. Both needs categories are broken into sub-categories that will be used to assess any alternative's ability to meet the needs. The two needs categories are:

- Improve Economic Vitality and Quality of Life
- Maintain the Integrity of the Interstate System

Improve Economic Vitality and Quality of Life

An extensive public outreach process identified that people avoid the Federal Way City Center because of congestion issues in and around the City Center. People choose to shop, dine, and play in Auburn and other locations outside of Federal Way in an effort to avoid delay caused by traffic congestion along S 320th Street. The movement of goods and services and quality of life is also adversely affected by existing congestion.

The Governor of the State of Washington has designated City of Federal Way core and frame as an “Opportunity Zone”. The Opportunity Zone program was a bipartisan proposal in Congress incorporated into in the U.S. Tax Cuts and Jobs act, allowing the governor of every state to designate up to 25 percent of eligible census tracts as Opportunity Zones. Investments made through special funds in these zones will be able to defer or eliminate federal taxes on capital gains.

The Federal Way City Center Access Project is a step towards completing the following goals as identified in the Comprehensive Plan. These overarching goals exceed the scope of the Federal Way City Center Access Project; however, they provide the framework for planning and design projects which occur within the City of Federal Way.

- Establish an environment that supports high capacity transit (HCT) by locating residents and workers within convenient walking distance of HCT.
- Improve auto circulation in the City Center by completing the proposed street grid, creating smaller blocks, and providing opportunities for through traffic to travel around rather than through the core, thus minimizing the impact of future growth on Citywide traffic patterns and congestion.
- Create pedestrian and bicycle connections throughout the City Center and to surrounding neighborhoods. Provide a safe and inviting environment for pedestrians and bicyclists with direct connections between activities and transit facilities. Continue to develop and/or reconstruct streets to include sidewalks, street trees, benches, garbage receptacles, screening of parking areas, etc.
- Create high amenity pedestrian-friendly corridors through the City Center, linked to a transit center and providing an attractive civic focus to the Commons.
- Adopt strategies to protect views such as Mount Rainier, especially for civic uses and public parks.

Land use changes are under consideration by the City of Federal Way, including redevelopment of the area formerly occupied by Weyerhaeuser and a mixed-use high-density development replacing the current Belmor Park. The Belmor Park developers submitted an application for a Comprehensive Plan amendment in the fall of 2018. While the Federal Way City Center Access Project is required to consider only land use that’s been approved through the Comprehensive Plan, these could potentially result in changes in travel patterns.

Increasing Roadway Congestion on S 320th Street

S 320th Street is a principal arterial serving people who access the City Center, the majority of Federal Way and its Potential Annexation Area, and northeast Tacoma. Traffic accessing the City Center, a major I-5 connection, east Federal Way, and northeast Tacoma currently funnel through the S 320th corridor. S 320th Street is at capacity today in the westbound direction just west of I-5 and approaching Pacific Highway S. This is caused by continued regional growth in population and employment, including Federal Way realizing the growth potential in the regional growth center. The S 320th Street corridor also acts as a major detour for traffic from I-5 when congestion occurs on I-5. Congestion on I-5 occurs each evening commute period, and during special events, holidays, and weekends.

Congestion on the S 320th Street corridor can operate as a barrier and decrease north-south mobility from the side street arterials which connect both sides of the future City Center. There is a complex balance between

managing east-west traffic progression via signal optimization without causing significant delay to the north south flow to and from the development properties and between transit facilities.

Traffic demand is forecasted to increase in the area due to both regional and local growth in population and employment. Population within the City is forecasted to increase from 91,066 in 2015 to 106,571 in 2040. One third of that increase is forecasted to occur within the City Center Core. Similarly, employment is forecasted to increase from 34,933 jobs in 2015 to 50,154 jobs in 2040,¹ with half of that occurring within the City Center Core.

Today S 320th Street operates at capacity with Level of Service (LOS) E at the intersections at Pacific Highway S and 23rd Avenue S during the PM peak hour, with a volume to capacity (v/c) ratio for westbound traffic at the 23rd Avenue S intersection of 0.95. Along S 320th Street, the closely spaced intersections at 23rd Avenue S, 25th Avenue S/Gateway Center, and I-5 southbound ramps have queues which consistently spill out of their storage, blocking adjacent intersections.

Because S 320th Street is at capacity today, this additional growth that is anticipated by year 2045 would increase congestion either by length or duration. In other words, where the roadway is at capacity, every added vehicle would be a vehicle in congestion. The 2045 volume forecasts show:

- There would be an additional 1,600 cars in the PM peak hour on S 320th Street just west of I-5, which is added to an at-capacity system.
- The S 320th Street corridor intersections would degrade to LOS E or F in the year 2045 PM peak hour (at Pacific Highway S, 20th Avenue S, 23rd Avenue S, and I-5 southbound ramps). The westbound S 320th Street traffic would be significantly delayed with v/c ratios of up to 1.18. The I-5 southbound ramp intersection would also operate with a v/c ratio greater than 1.0, which would result in over a mile of queue spill back from the local street system onto I-5 southbound ramps and mainline.

Poor Multimodal Mobility

The demand on the roadway system to serve transit, bikes, and pedestrians will increase with the development of the City Center Core Regional Growth Center and the opening of Link Light Rail.

- North of S 320th Street, Sound Transit will open a light rail station in the City Center Core near the Federal Way Transit Center. Sound Transit forecasts 9,000 boardings per day. Sound Transit projects that about 5 percent of these riders will arrive by walking or bicycles, and 75 percent by bus transfer.
- The Federal Way Transit Center Park and Ride with 1,190 parking stalls was 99% utilized in the 4th quarter of 2017. The Federal Way S 320th Street Park and Ride, located on the south side of S 320th Street, with 877 parking stalls was 35% utilized in the 4th quarter of 2017; as the park and ride utilization increases, there will be more vehicles and pedestrians travelling to and from the park and ride lot. (Source: King County Metro Transit Park & Ride Utilization Report, Fourth Quarter 2017)
- Feeder transit service will increase in this area with the opening of the light rail station.

As traffic congestion on S 320th Street increases, transit travel delay would increase.

The 320th Street corridor divides the regional growth center and creates a barrier for bike, pedestrian, and transit travel. This barrier inhibits multimodal travel within the regional growth center and between the transit facilities. Additionally, there are limited multimodal connections across I-5.

¹ Source: PSRC.

Impaired Freight Truck Movement

S 320th Street is a T1 freight corridor east of I-5, and a T2 freight corridor west of I-5, providing a connection between Pacific Highway S, I-5, SR 18, and SR 167 via Peasley Canyon Road. T1 and T2 corridors carry more than 10 million tons of freight per year, and 4 to 10 million tons freight per year, respectively. As commercial development in the City Center Core is realized, there will be an increase in demand in heavy trucks and local deliveries.

As traffic volumes and congestion levels increase, the movement of freight will become unreliable and costly. Increases in freight travel time result in higher costs and will impact businesses within the City Center and throughout the region. This impact to freight travel times could limit the growth and financial health of local and regional businesses, which in turn, could impact local and regional employment.

Delayed Emergency Response

Emergency service providers routinely travel through the S 320th Street corridor between Pacific Highway S and Military Road, including use of the interchange at I-5. The South King Fire and Rescue Department Station 64 is located 1/2 mile east of I-5 with primary access on S 320th Street in the study area. Station 62 is located 2 miles west of I-5 on 1st Avenue S. Both of these stations use S 320th Street as a key east-west route to respond to fire and emergency calls and transport patients to several hospitals located within approximately 2 miles of the I-5 interchange. Congestion and reduced travel time reliability on I-5 and S 320th Street will delay emergency service providers' response and transport times.

Decreased Safety

Today, the I-5 mainline and S 320th Street corridors experience a higher frequency of crashes per mile than other corridors in the study area.

Along I-5 mainline, the segment between the S 320th Street off-ramps and on-ramps experiences the highest frequency of crashes of any ramp or ramp terminal in the study area. In the southbound direction, this segment of I-5 has a crash rate of 170 crashes per mile compared to 60-140 crashes per mile along other segments. In the northbound direction, this segment of I-5 has a crash rate of 200 crashes per mile compared to 100-130 crashes per mile along other segments.

The S 320th Street corridor has a high number of injury crashes, with nearly 50 percent of total crashes between intersections resulting in an injury. Rear-end crashes were the most common type of crash along the S 320th Street corridor, which is likely due to the heavy congestion on S 320th Street. Of the seven signalized intersections along S 320th Street in the study area, the SR-99/S 320th Street intersection has significantly more crashes. This is likely due to the high volumes along both SR-99 and S 320th Street.

Congestion has been shown to correlate with increased vehicle crashes. As projected growth of traffic volumes occurs and vehicle delay substantially increases through the year 2045, drivers' risk taking and collision rates may increase, resulting in an overall decrease in safety for all travel modes.

Issue: *Congested corridors, poor multimodal mobility, and delayed emergency response will continue to affect the quality of life and inhibit economic growth in the City Center.*

The project needs to:

- Provide opportunities for traffic to travel around the City Center core, as measured by improved roadway connections.
- Decrease roadway congestion on S 320th Street (as it affects transit and general travelling public) to improve person mobility, as measured by travel time between Pacific Highway S and Military Road S by mode.
- Maintain or improve access to and from City Center, considering side streets including key transit routes, as measured by intersection volume to capacity ratios, level of service, and transit delay.
- Improve nonmotorized mobility to increase use of transit facilities and to provide nonmotorized options to circulate within the City Center and at the study area boundaries improve connections to regional or the citywide facilities, as measured by nonmotorized system gap analysis, level of traffic stress, and roadway crossing widths
- Improve freight truck mobility to support the City Center and regional service, as measured by travel time between Pacific Highway S and Military Road S.
- Improve emergency response at the South King Fire and Rescue Station 64 access, as measured by maintaining clear roadway in front of the fire department driveway.
- Improve safety for the general travelling public on the S 312th, S 320th, and S 324th Street corridors and study area, as measured by a review of historic collision rates and anticipated effect on primary collision cause.
- Protect views such as Mount Rainier, especially for civic uses and public parks.
- Maintain roadway cross section consistent with City's street design standards.

Maintain Integrity of the Interstate System

I-5, which serves up to 200,000 vehicles per day on a typical weekday in the project area, is a Highway of Statewide Significance, the north-south National Defense System route, a corridor to move freight, and a primary regional and local travel route for the general public. Queues that backup to mainline I-5 affect the integrity of the interstate system.

Local Queues Impact Mainline I-5

The S 320th Street interchange is used for access between I-5 and the City Center, and residential areas of Federal Way and northeast Tacoma. Origin and destination studies for the 2040 PM peak hour show that 40 percent of the traffic on the I-5 interchange ramps with S 320th Street are to/from the City Center, 15 percent are to/from the commercial core developments along Pacific Highway, 10 percent are to/from the business parks east and adjacent to I-5, 20 percent are to/from the residential areas to the west, and 15 percent are to/from outside the City. That means that the majority of trips in 2040 are destined to within 1-1/2 miles of the interchange.

Congestion on the S 320th Street corridor in the year 2045 in the PM peak period would result in queue spillbacks impacting over 1 mile of mainline I-5 in both directions. These queue spillbacks reduce the ability to move people and freight regionally and introduce the potential for increase in high-speed rear-end collisions.

Regional Congestion on I-5

I-5 operates with significant congestion through south King County and beyond. WSDOT Gateway Program and the Triangle Project and other regional planning efforts are working to identify strategies to maintain or improve the mobility of persons and goods on the I-5 corridor. The project needs include protecting the operations of the interstate system.

Today, I-5 northbound operates with speeds of less than 45 miles per hour (mph) for 4 hours during the AM peak period in the vicinity of the S 320th Street interchange. Between SR 18 and S 272nd Street, travel times along I-5 northbound vary between 10 minutes and 24 minutes during the AM peak period.

I-5 southbound operates at free flow during the evening in the immediate vicinity of the S 320th Street interchange; however significant congestion occurs north and south of the interchange. I-5 southbound is congested approaching S 272nd Street and again at SR 18/Enchanted Parkway. Between S 272nd Street and SR 18, travel times along I-5 southbound vary between 8 minutes and 11 minutes during the PM peak period.

In the year 2045, with an increase in regional travel demand, congestion will worsen in the vicinity of the S 320th Street interchange because of queues spilling back from the local street system. It is forecasted that queues will build on the S 320th Street corridor and impact both the I-5 northbound off and southbound off ramps, impacting more than a mile of mainline I-5 in both directions. Between SR 18 and S 272nd Street, travel times along I-5 northbound are expected to be between 18 and 32 minutes during the AM peak period. Between S 272nd Street and SR 18, travel times along I-5 southbound are expected to be between 9 and 15 minutes during the PM peak period.

The future conditions assume that the funded portions of the Gateway Program and Triangle Project are complete and that the travel demand reflects the growth anticipated with the redevelopment of the City Center and expansion of Link Light Rail to Tacoma.

Issue: Queues that backup on mainline I-5 impact regional mobility, including freight, and decrease safety. I-5 mobility needs to be maintained without impacting safety.

The project needs to:

- Improve safety for the general travelling public on the interstate and ramps, as measured by local queue spillback on I-5 off ramps in the study area, number of access points, and review of historic collision rates.
- Maintain or improve I-5 mobility for persons and freight trucks, as measured by travel time on I-5 between S 272nd Street to SR 18/S 348th Street.

Appendix B

Peer City Review





Transportation Planning Capacity Building (TPCB) Peer Program

City of Federal Way Peer Exchange

A TPCB Peer Exchange Event

Location: Federal Way, Washington

Date: November 14-15, 2018

Host Agency: City of Federal Way, Washington

National Peers: Cyrus Abhar, City of Rancho Cordova, California
Hans Friedel, AICP, City of Lone Tree, Colorado
Steve Hebert, AICP, City of Lone Tree, Colorado
Mark Thomas, City of Rancho Cordova, California

Local Peers: Emil King, AICP, City of Bellevue, Washington
Miranda Redinger, AICP, City of Shoreline, Washington

Federal Agencies: Federal Highway Administration
Federal Transit Administration



U.S. Department of Transportation
Federal Highway Administration



U.S. Department of Transportation
Federal Transit Administration

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Introduction

This report highlights key recommendations and noteworthy practices identified at the “City of Federal Way Peer Exchange” held on November 14-15, 2018 in Federal Way, Washington. This event was sponsored by the Transportation Planning Capacity Building (TPCB) Peer Program, which is jointly funded by the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA). The goal of the peer exchange program is to facilitate knowledge transfer and capacity building by connecting peers from different states and/or agencies to exchange best practices and innovative solutions to transportation planning challenges.

Peer Exchange Overview

The Washington State Department of Transportation and Development (WSDOT), with support from the FHWA Washington Division, requested a peer exchange from the FHWA/FTA TPCB Program to assist the city of Federal Way as it develops from a suburban community into more of an urban community. Based on the results of a study concluded in 2009, Federal Way, a community just south of Seattle, requested access revisions at the existing South 320th Street-Interstate 5 interchange, which is already very congested during the morning and evening peak periods.

Federal Way is a suburban city and its city center is a designated regional growth center through the Puget Sound Regional Council’s centers planning process. The city has been working to grow and densify the city center around the planned Sound Transit light rail station, which has the potential to transform Federal Way into a denser, multimodal city. Federal Way was looking to peer communities for other possible solutions to improve mobility in ways other than adding more pavement or access to already congested regional streets and highways.

Event Goals and Peer Selections

The City of Federal Way Peer Exchange was a 1.5-day event focused on exploring opportunities for the City of Federal Way to develop as a more urban community in light of planned transportation investments. By sharing the experiences of peers in other jurisdictions and discussing their applicability in Federal Way, the event provided an opportunity for city of Federal Way staff and their partners to consider their approach to partnerships with other entities, transportation investments, and funding mechanisms. The event was



City of Federal Way staff lead the peers on a tour of downtown Federal Way (Courtesy of the Volpe Center)

hosted by the city of Federal Way and sponsored by the FHWA/FTA's TPCB program, which assisted with planning and documentation of the event and funded the participation of two of the peer presenters. In addition to the two funded peers, the city of Rancho Cordova and the city of Lone Tree each self-funded a second peer presenter's travel, and the city of Bellevue and the city of Shoreline each self-funded one peer presenter's travel. The peer presenters were:

Cyrus Abhar, City Manager, City of Rancho Cordova, CA

Cyrus Abhar is Rancho Cordova's City Manager. In this role, Cyrus oversees all aspects of the City's functions, including policy recommendations and implementation, operations, finances and City staff.

Cyrus previously served as the City's Public Works Director and the Chief Building Official. He has 30+ years of experience in public administration and business management. An employee since the City incorporated on July 1, 2003, Cyrus has played a key role in growing Rancho Cordova into a vibrant and thriving community.

Cyrus is a registered Professional Engineer and a licensed Land Surveyor. He graduated from the University of Texas at Austin with a B.S. in Civil Engineering. He is also a graduate of the University of California Davis Executive Program and the Harvard Kennedy School Senior Executives and Local Government Program. He currently serves on the Folsom Lake College Foundation Board of Directors.

Hans Friedel, AICP, Senior Land Use Planner, City of Lone Tree, CO

Hans Friedel AICP is a Senior Land Use Planner with the City of Lone Tree, a thriving edge city in Colorado's South Denver Metro corridor. He brings creativity and an interdisciplinary approach to both current and long-range planning, coordinating large-scale commercial, residential, and mixed-use developments through the review and entitlements process. Current interests include healthy communities, park and recreational equity, affordable housing, complete streets, and continuous process improvement.

As an intern in Lockhart, Texas, he successfully managed a corridor improvement planning process and grant application that received \$13.4 million in Federal transportation funds and a Texas Chapter of the American Planning Association Long Range Planning award. He co-founded Imagine Lockhart, a volunteer community service, grassroots planning and tactical small-town urbanist organization that went on to organize community litter cleanups, a weekly farmers' market, and create a downtown pocket park.

Hans earned a Bachelor of Business Administration in Marketing and dual master's degrees in Applied Geography Land/Area Development and Management and Secondary Education from Texas State University. He received the John Wiley Outstanding Graduate Student award in 2011 for academic excellence and his research in mapping food accessibility in Austin's east neighborhoods. In addition to planning, he taught high school social studies and English.

Steve Hebert, AICP, Deputy City Manager, City of Lone Tree, CO

Steve Hebert is the deputy city manager for the City of Lone Tree, Colorado. In addition to managing multiple and diverse special projects, he leads the human resources, IT, city clerk, municipal court, risk management and facilities divisions. Prior to his appointment to his current

position, Mr. Hebert served as the community development director for the city from 2008 to 2014. He was responsible for the management of the planning, building and code enforcement divisions and presided over the transition from contract services to in-house staff.

From 2001 to 2008, Mr. Hebert was the planning manager for the City of Greenwood Village, CO where he was responsible for the management of the development review, long range planning, transportation planning; and code enforcement activities of the Village. He was actively involved in the management of two transit-oriented development projects – The Village Center at Arapahoe Station and redevelopment of the area around the Orchard Road light rail station.

Prior to Greenwood Village, Mr. Hebert was the vice president of Community Matters, Inc., a local planning firm, where he managed several comprehensive planning projects in Colorado and Wyoming. Between 1989 and 1996, Mr. Hebert was the director of special projects for the Anschutz Corporation and the Southern Pacific Real Estate Enterprises. While with Southern Pacific, he managed the redevelopment efforts of the Sacramento Railyards. The mixed-use transit oriented development was one of the first large-scale brownfield projects in the nation.

Mr. Hebert received his master's degree in city planning from the University of Tennessee, while working at the Oak Ridge National Laboratory.

Mark Thomas, Senior Engineer, City of Rancho Cordova, CA

Mark Thomas is a Senior Engineer at the City of Rancho Cordova. After working in Cincinnati, Denver and Chicago, Mark moved to Rancho Cordova, CA to prepare planning elements of the City's General Plan including the Bicycle, Pedestrian, ITS, and Transit Master Plans. Mark's career focus centered on multi-modal planning, Intelligent Transportation Systems, congestion management, traffic engineering and preliminary highway design. With a Civil and Environmental Engineering degree from the University of Cincinnati, Mark obtained professional engineering licenses in Illinois and California.

Mark is the Vice Chair on the One Community Health Board and is a director on the CARES Foundation Board.

Emil King, AICP, Strategic Planning Manager, City of Bellevue, WA

Emil King leads the strategic planning group at the City of Bellevue. Emil joined the City's Community Development Department in 2000. Prior to that, he worked in the private sector for 7 years, consulting cities and counties across Washington State on growth management and planning issues. Emil's responsibilities at Bellevue include focused work on integrating land use and transportation planning throughout the City, developing urban design solutions for the built environment and transportation projects, demographic and economic trends analysis, and strategic development initiatives. Emil holds a master's in urban planning from the University of Washington and bachelor's degree in economics from the University of Hawaii.

Miranda Redinger, AICP, Senior Planner, City of Shoreline, WA

Miranda grew up in the mountains of Virginia and attended the University of Virginia's School of Architecture under Dean William McDonough, who inspired her with "waste-equals-food" and "cradle-to-cradle" sustainable design principles. She joined the City of Shoreline in 2007 and is currently a Senior Planner, specializing in long-range strategic plans such as the 2012 major

update to the Comprehensive Plan. From 2013-2016, she managed subarea planning for two light rail stations coming to Shoreline in 2024. As co-chair of the City's Green Team, she also worked on the Environmental Sustainability Strategy, sustainability indicator tracking website, Climate Action Plan, Carbon Wedge Analysis, and Deep Green Incentive Program, and represents the City through the King County-Cities Climate Collaboration.

A list of key peer exchange contacts is included in Appendix A.

Peer Exchange Sessions

The Peer Exchange took place over 1.5 days, November 14-15, 2018 in Federal Way, WA. The following is an overview of the presentations, activities, and discussions held during the peer exchange:

- **The City of Federal Way: Current Trends and Anticipated Impacts:** Representatives from the city of Federal Way gave presentations about Federal Way and its current and planned transportation system.
- **Peer Perspectives: Transforming a City – Promoting Multi-modalism and Building Consensus:** Representatives from the city of Lone Tree and the city of Rancho Cordova gave presentations on their respective communities' efforts to build consensus among stakeholders for a multimodal transportation system.
- **Full Group Discussion: Transforming a City, and Reflections on Morning Discussions:** James Garland from FHWA facilitated a full group discussion on the themes of the earlier presentations.
- **Peer Perspectives: Focusing on Outcomes – Policies and Strategies for Implementation and Lessons Learned:** Representatives from the city of Lone Tree and the city of Rancho Cordova gave presentations on the policies and strategies that helped them successfully transform their communities, and the lessons that they learned along the way.
- **Peer Perspectives: Focusing on Outcomes – Tales of Transformation from Local Cities in Washington:** Representatives from the city of Bellevue and the city of Shoreline presented on their cities' experiences with development in light of transit expansion.
- **Break-out Group Discussions: Focusing on Outcomes, and Reflections on the Day:** Participants split into four groups to discuss their key takeaways from the day's sessions and to identify some challenges that Federal Way faces for its future as a more urban community.
- **Round Table Discussion #1: Opportunities, Challenges, and Lessons Learned:** Jared Fijalkowski from the Volpe Center led a group discussion how the communities have adapted their plans to reality, and the challenges they faces and lessons they learned in the process.
- **Round Table Discussion #2: Funding Mechanisms and Financial Commitments:** James Garland led a group discussion on their cities' transformations through managing its financial commitments and capital investments.

The peer exchange agenda is included in Appendix B.

The City of Federal Way: Current Trends and Anticipated Impacts

Background

Federal Way was established as a logging settlement in the 19th century. Today, the city's population is around 100,000 people and covers 22 square miles. Largely a suburban community, 58 percent of the housing stock is single family and 42 percent is multi family. The median household income is \$59,000, compared to the median household income of King County of \$79,000.

Federal Way was incorporated as a city in 1990 in response to concerns that the community was not in control of the rapid growth in its part of King County. The community had poor land use, no center, and it lacked a distinct image. As a part of its incorporation as a city, Federal Way created a police department, took over control from the county for maintaining some roads and for waste management, and created a parks department. Later, the city changed its form of government from council-manager to strong-mayor.

The city was hard-hit by the recession in the last decade. Weyerhaeuser, which had 5,000 to 6,000 employees at its Federal Way headquarters at its height, closed and relocated its headquarters in winter 2016. That departure, coupled with the loss of 500,000 square feet of retail space, reduced the number of jobs in Federal Way significantly.

Vision

To address these challenges, the city of Federal Way has embarked on four initiatives as part of an economic development strategy approved in 2014:

- Reuse of the Weyerhaeuser property,
- Establishing a university,
- Creating a center, and
- Branding.

To achieve the goal of creating a center for Federal Way, the city built a performing arts center, built Town Square Park, and acquired several parcels for development, including a closed shopping center. The city also signed a memorandum of understanding with the University of Washington, Highline



This roundabout services an on-ramp to I-5 on the northern end of downtown Federal Way (Courtesy of the Volpe Center)

College, and the Federal Way public schools department to establish a university in Federal Way. The city has also recruited several businesses to locate offices in Federal Way. By incorporating the light rail station and young people in the vision for Federal Way, the city hopes to grow more diverse and sustainable.

Federal Way leadership sees the city changing in several ways in the near future. First, leaders anticipate an increase in lower income professional populations. Second, they expect the median age of the population to increase while median income also increases. They see

Federal Way becoming an interim destination between Tacoma and Seattle. They want to see an increased professional economic base, and expect higher density development to occur, particularly in the downtown area.



The Federal Way Transit Center in downtown Federal Way (Courtesy of the Volpe Center)

Transportation Planning in Federal Way

Federal Way has access to the regional transportation system through three existing corridors: I-5, State Route 99, and State Route 18. Most home-based trips in Federal Way travel through commercial areas to get to those routes, creating significant congestion. This limits the options for dispersing trips adequately across the city's street network.

Transportation and land use planning are closely tied through the State of Washington's Growth Management Act (GMA). The GMA is a series of State statutes, first adopted in 1990, that requires fast-growing cities and counties (including Federal Way and King County) to develop comprehensive plans to manage population growth. Under the GMA, development that exceeds the city's or county's transportation capacity is prohibited. So, development typically occurs with concurrent improvements to transportation infrastructure. Communities establish their own adequate levels of service. Federal Way's level of service is E with a volume to capacity ratio of 1.00 (though it has since climbed to 1.20). In essence, this means that the city was allowing development to consume all available road capacity, and has since changed this to allow development that would have the potential to exceed that road capacity by 20 percent.

Despite existing low population densities, Federal Way has some of the highest suburban transit route ridership in King County. While 71 percent of residents use single-occupant vehicles for commute trips, 14 percent carpool, 8 percent use transit, 4 percent work from home, 2 percent walk, and 1 percent use a bicycle. Table 1 provides a comparison of the commute to work more shares of Federal Way and Washington State.

Table 1: Comparison of Commute to Work Mode Share for Federal Way and Washington State

	Federal Way	Washington State
Single-Occupant Vehicle	71%	73%
Carpool	14%	10%
Public Transportation	8%	6%
Walk	2%	4%
Bicycle	1%	2%
Work from Home	4%	5%

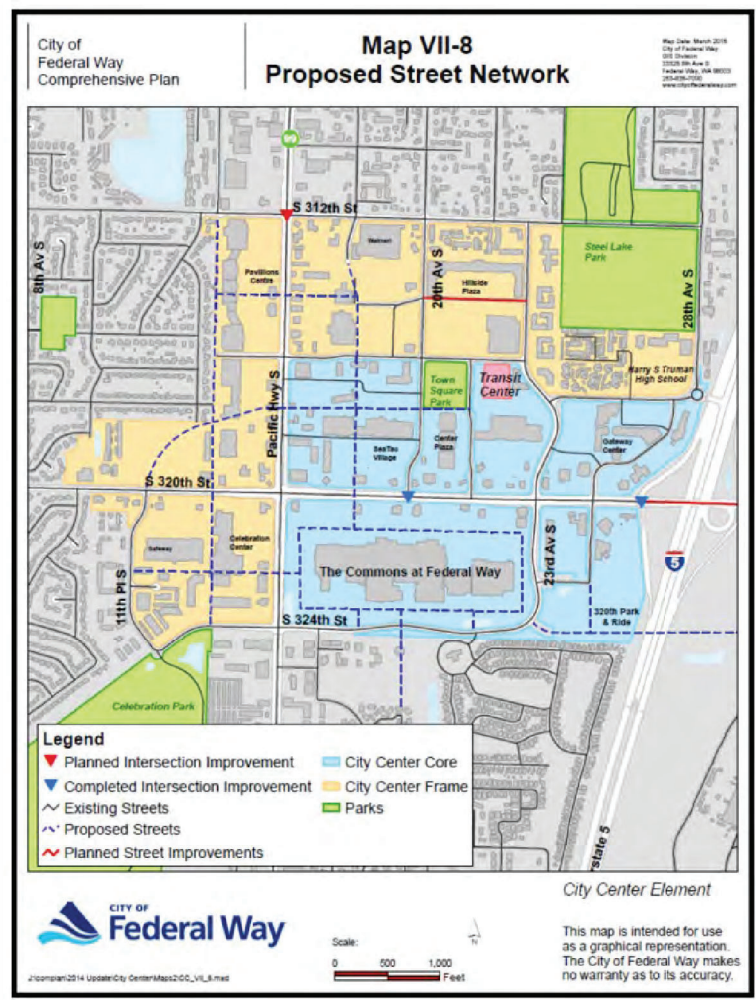
Source: U.S. Census

The transportation element of Federal Way’s comprehensive plan for its city center involves establishing new streets to break up the existing quarter-mile mega-blocks. The plan also includes establishing a “ring road” to divert through traffic from the commercial center of the city. Finally, it includes modifying I-5 access at South 320th Street to disperse traffic through multiple east-west corridors (possibly South 324th Street), which will divert traffic from South 320th Street and will improve access to the city center.

The Comprehensive Plan also includes enhanced bicycle and pedestrian accommodations. It involves making better connections among Celebration Park, Town Square Park, Steel Lake Park, and the Federal Way Transit Center. It also includes grade-separated crossings across State Route 99 and South 320th Street. Finally, it includes extending the BPA Trail across I-5.

In an effort to support development and reduce congestion, Federal Way first evaluated alternatives for improving access to I-5 in 2001. The city advanced two alternatives for environmental review, but following the analysis, the City Council chose the no-action alternative due to public opposition to both evaluated alternatives. However, in 2014, as congestion worsened, the city reinitiated the analysis.

Federal Way is anticipating changes in traffic patterns, in part because of WSDOT’s Connecting Washington program, and as housing affordability drives residential development further from job centers. In 2015, the governor and State legislature approved a \$16 billion funding package



The proposed street network in the city of Federal Way’s Comprehensive Plan (Courtesy of the city of Federal Way)

to enhance the statewide transportation system and maintain critical infrastructure. Connecting Washington is a 16-year program, funded primarily by an 11.9-cent gas tax increase that was fully phased-in on July 1, 2016. The Gateway Project, funded through Connecting Washington, will complete gaps in the freeway system both north and south of Federal Way, potentially increasing volumes on I-5.

Due to changes in freeway traffic forecasts generated in part by the Gateway Project, WSDOT raised concerns about the city of Federal Way’s plans and policies regarding development and transportation improvements in the city center. The hope is that Federal Way can take full advantage of the multimodal opportunities presented with the extension of the light rail to Federal Way in 2024, and avoid impacting I-5 with additional access.

Transforming a City – Promoting Multi-modalism and Building Consensus

Lone Tree, CO

Incorporated in 1995, Lone Tree is an edge city of about 14,000 residents on the southern side of the Denver metropolitan area. The city is located at the busy Colorado 470/E-470/I-25 interchange. Lone Tree has a large regional shopping mall, a regional hospital, small and large employers, and housing within its 10 square miles. The city’s population doubles during the daytime due to a relatively large employment base. The Denver Regional Transportation District (RTD) has two light rail stations in or near Lone Tree, and three more stations are nearing completion with service expected in 2019.

The Denver region has 3.1 million residents and experienced a population growth of 13.5 percent between 2010 and 2017.¹ The Denver Regional Council of Governments (DRCOG), the metropolitan planning organization for the Denver region, adopted Metro Vision, which promotes



Infographic and map of Lincoln Station in Lone Tree, CO (Courtesy of the city of Lone Tree).

¹ This is high compared to the national average population growth of 5.3 percent between 2010 and 2017 (Source: U.S. Census).

regional cooperation among jurisdictions and encourages new development in urban centers instead of through suburban sprawl.

The Southeast Corridor, of which Lone Tree is a part, is designated as an urban center, and is the most successful business district in the region outside of downtown Denver. It has 35 million square feet of office space and 130,000 employees. Since the two existing light rail stations opened in 2006, development has accelerated, particularly near the light rail stations. 4.1 million square feet of office space were built since 2006, 66 percent of which was within 0.5 miles of a light rail station. Similarly, 4,000 new housing units were built, 80 percent of which were within 0.5 miles of a light rail station.

One of the stations in Lone Tree, Lincoln Station, is currently serving as the terminus (last) station for the light rail line. It opened in 2006 and has a 1,300-space parking garage. The area around the station has flexible mixed-use zoning and has developed organically.

RTD's Southeast Rail Extension project includes the construction of three new light rail stations extending south from Lincoln Station. All three stations will be in the city of Lone Tree. The project was funded in 2014 through a combination of Federal, private, and local funds. A local match of 14 percent of the \$233 million project was funded from private businesses and local governments in the Southeast Corridor. Partnerships like the ones that enabled the funding of the light rail extension have been critical in Lone Tree's urban development process.

Rancho Cordova, CA

Rancho Cordova is a small city of about 75,000 residents about 14 miles east of downtown Sacramento. There are 60,000 jobs in Rancho Cordova, but 90 percent of those jobs are filled by people who live outside of Rancho Cordova. The city is served by four Sacramento Regional Transit light rail stations, one of which opened in 1998, and the remaining three opened in 2004.



Light Rail station in Rancho Cordova, CA (Courtesy of the city of Rancho Cordova).

Rancho Cordova began as a suburban community and has been urbanizing over the last few decades. The city has faced challenges in its efforts to develop and urbanize; a large employer relocated out of the region, the local Air Force Base closed, and the community lacked a downtown center. Additionally, there were limited transportation options for people to access the light rail for the first or last mile of their trips.

To address these issues, the city of Rancho Cordova took a multi-pronged approach. It implemented a land use plan for Folsom Boulevard, the main roadway that parallels the light rail line, to promote high-

density housing and to discourage strip commercial development. The city also conducted transit-oriented development studies for the areas around its light rail stations and has implemented some new housing near transit as a result. Finally, the city has implemented a complete streets program, which has included projects totaling \$25 million to build sidewalks, bicycle lanes, medians/access control, and landscaping.

Full Group Discussion

The national peer agency representatives were impressed with the large investment in transit that voters approved in Washington State. Paul Bennett from Sound Transit noted that work on ballot initiatives for transit began in 1998. While an earlier roads and transit ballot failed, an initiative that included transit for suburban communities passed in 2004. Since then, people across the region and State have seen the benefits of Sound Transit. Due to the popularity of Sound Transit, the agency decided to be bold with the most recent ballot initiative. The \$53 billion package, which includes extending the Link light rail to Federal Way by 2024, passed.

Participants from Federal Way liked that Lone Tree has more jobs than residents, and expressed that Federal Way also seeks to increase its employment base. Steve Hebert from Lone Tree noted that the relationship between the public and private sectors was the key to having high concentrations of jobs in the southeast corridor. Many employers sought to locate in the corridor after a large employer opened. They were attracted to the access to the transit network that the light rail provides.

The group noted that it takes a lot of work to have a suburban community undergo urban development. Steve Hebert noted that, when bringing light rail into a built-out community, you need to make sure that development is transit-oriented, not just transit-adjacent. Pedestrian bridges over interstate highways can help connect transit users to residential and commercial properties, but they must be part of an extensive pedestrian network.



Discussions during the peer exchange (Courtesy of the Volpe Center).

Focusing on Outcomes – Policies and Strategies for Implementation and Lessons Learned

Lone Tree, CO

While the Denver region has been expanding its light rail system over the last few decades, the percentage of workers taking public transit has continued to decline. In 2010, 3.8 percent of workers took public transit to work, down from 5.8 percent in 1980. This is likely due to land use patterns that have been increasingly suburban, until recently. While the percentage of workers who live in Lone Tree using public transportation (3.6 percent) is below that of the city of Denver (7.1 percent), it is higher than Parker (2.2 percent), another suburban community in the region that does not have light rail service.

The representatives from Lone Tree offered the following three lessons learned:

Transit-adjacent doesn't mean transit-oriented: *Why the built environment in the last mile is so important.* Locating development near transit stations isn't enough. The development should be built so that it facilitates access to and from transit. The typical suburban environment prioritizes cars, not people or transit. Large parking structures are common at suburban light rail stations, but they generate more traffic. Suburban cities that are looking to urbanize around new light rail stations should take advantage of the companies and developers that want to be close to transit and work with them to design their properties to encourage transit use. The developments should preserve existing transportation connections, break down existing barriers, and create new connections. Lone Tree is planning for Lone Tree Center Station to have more transit-oriented development to increase the city's transit mode share.



Aerial view of the Southeast Corridor in Lone Tree, CO (Courtesy of the city of Lone Tree).

Density dilemma: *The market wants density, but many suburban residents don't.* In a suburban community, transit access is a necessity for some, but an amenity for most. There are often concerns among residents that light rail will lead to denser development, which is often true. It is important to carefully plan a comfortable transition between dense transit-oriented developments and more

traditional suburban developments along the “vulnerable edge.” Some ways to determine how to do this is through sub-area plans, station area plans, design guidelines, and framework plans.

More transit likely means more cars: *Know your message.* Increased growth and density in suburban areas will likely lead to more vehicle trips, given current behavior patterns. Lone Tree has a set of micro transit services to solve the first-mile/last-mile connection issue for some commuters through a public-private partnership. There is one circulator that uses three shuttle buses and an on-demand shuttle that is operated by Uber. Combined, the services provide about 400 rides per weekday. In addition to micro transit, Lone Tree is working on implementing adaptive traffic signals and encourages employers to offer transportation demand management services for their employees.

Rancho Cordova, CA

When the light rail was being expanded to Rancho Cordova, it was sold to the community as the solution to all of their problems. However, transit is not a panacea. It does, however, provide residents with another choice for transportation, and entices good, dense growth. With density comes traffic.

Rancho Cordova has a City Council that is very supportive of transit. In particular, the members support improving access to transit, are enthusiastic about new service ideas, and have led the city in developing a visionary general plan for transportation, development, and related issues. However, the city will soon update its plan to reflect the current realities; a planned streetcar may need to be removed, but the proliferation of ridesharing and bike sharing will be incorporated.



The Rancho CordoVan in Rancho Cordova (Courtesy of the city of Rancho Cordova).

In California, the Transportation Development Act allocates funding for transportation to cities based on population. Rancho Cordova receives about \$3 million annually for transit operations, which the city passes through to the Sacramento Regional Transit District for the light rail. The city also assesses a transit tax on new residential and commercial developments. While Rancho Cordova provides funding to the transit district for light rail service, the transit district pays Rancho Cordova to maintain the stations.

Like Lone Tree, Rancho Cordova has been working to address the first-mile/last mile connection to transit issue. The Rancho CordoVan currently operates three routes that serve the Zinfandel, Anatolia, Kavala Ranch, and Sunridge Park neighborhoods. These routes operate Monday through Friday in the mornings and evenings to provide access to light rail at the Zinfandel Regional Transit Light Rail Station. Due to low ridership and high operating costs, the city is considering micro transit opportunities for low-density areas and is working with the transportation network company Lyft on a first-mile/last-mile project.

Peer Perspectives: Focusing on Outcomes – Tales of Transformation from Local Cities in Washington

Shoreline, WA

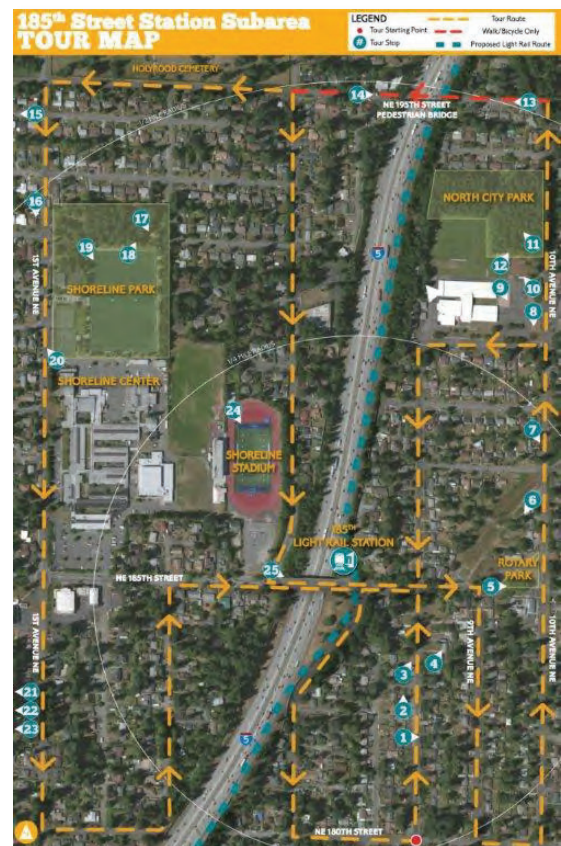
The city of Shoreline is a small city of about 55,000 residents located just north of Seattle. It will have two new light rail stations by 2024. In anticipation of light rail service, the city conducted visioning sessions with the community, making a special effort to reach out to lower-income residents and Korean-American populations. The city also conducted “walk-shops” to bring together residents that have more of a local view of the communities with decisionmakers who typically have a broader, longer-term view of the community. Based on this extensive outreach, the city developed design concepts for each station. The city does not have funding to improve the roadways that serve the transit stations, and is therefore relying on fees from future development to fund these improvements.

The current land use around the planned stations is primarily single-family homes. Shoreline has implemented new, phased zoning designations in anticipation of the light rail extension. The zoning calls for higher densities but is relatively flexible on what is built; buildings can be all commercial, all residential, or a mix of both. Shoreline has requirements and incentives for building green and affordable housing. The new zoning is attracting Seattle developers who are accustomed to building to similar standards. Shoreline decided to zone for the long-range vision so that developers would build more densely closer to the stations.

Because of the presence of single-family homes, it is likely to take a long time for transit-oriented development to build out around the stations. However, denser development is happening faster than expected. Some property owners are banding together to sell multiple lots to developers at once so that they can get higher prices for their properties while the developers can build larger buildings.

Bellevue, WA

Bellevue, WA is the third-largest city in the Seattle metropolitan region with a population of about 144,000 people. Bellevue was incorporated in 1953 and emerged as a bedroom community to Seattle in the 1960s. Downtown Bellevue’s street grid was originally designed to prioritize cars. Over the past few



Map of one of the “walk-shop” tour routes (Courtesy of the city of Shoreline).

decades, it has become a major jobs center in the Seattle region, and the city has strived to improve pedestrian and transit access.

Reflective of its growth and potential for future development, six new light rail stations are under construction in Bellevue; they are slated to open in June 2023. The Downtown Bellevue station will be located next to Bellevue City Hall. Three other stations were intentionally located in the middle of existing low-density commercial or industrial area with redevelopment potential instead of locating them in freeway right-of-way. The expectation is that these stations will create three new, distinct neighborhoods.



Rendering of planned development around the future Spring District station (Courtesy of the city of Bellevue).

The city of Bellevue received a \$100 million Federal Transportation Infrastructure Finance and Innovation Act (TIFIA) loan to develop transportation infrastructure to facilitate development around the new light rail stations. One large area employer, REI, is relocating 1,000+ employees to a new headquarters in Bellevue adjacent to the future Spring District light rail station. The city has set a goal to double the non-single-occupant-vehicle mode split in the designated growth areas around the light rail stations from 20 percent to 40 percent.

Discussion Topics

Focusing on Outcomes

On the afternoon of the first day, the participants were divided into four small groups to discuss their key takeaways from the day's sessions, and to identify some challenges that Federal Way faces for its future as a more urban community.

Takeaways

- Increasing access to transit accelerates development, which will eventually lead to more traffic.
- It is important to focus on first-mile/last-mile connections to and from transit. Micro transit may be something to explore.
- Transit is only one piece of the puzzle in the future of Federal Way's transportation system.
- It will be important to plan for the people who will be either displaced from their homes or priced out of the housing market as a result of the station opening.
- Federal Way should ensure that future development around the planned station is high-density.
- It is important to keep the focus on multimodal transportation solutions for Federal Way.

Challenges

- The light rail station in Federal Way will serve as a terminus station (the end of the line) for six years while the extension to Tacoma is built. Traffic may be temporarily increased as a result of transit users driving north to access the station in Federal Way.
- It will be a challenge to manage the expectations of stakeholders and the public throughout the process.
- Federal Way needs to determine what kind of community it wants to become. Look to others for examples but implement the right vision for Federal Way.
- Leverage public-private partnerships to develop subarea economic plans.
- Working with the public to implement large-scale change is a challenge.
- Capacity may be a bigger challenge for Federal Way than for Rancho Cordova or Lone Tree.

Opportunities, Challenges, and Lessons Learned

On the morning of the second day, Jared Fijalkowski facilitated a discussion among the attendees about how the communities have had to adapt their plans to reality, the challenges they faced, and lessons they learned in the process.

The representatives from Lone Tree noted that their Master Plan was developed with expected changes in mind, but they did not anticipate a large financial services employer locating a facility nearby. That

change required the city to modify the location of a planned arts center. Additionally, Lone Tree faced unanticipated traffic issues related to parking and school buses. One lesson learned was that it can require flexibility to stay on track with plans. Also, it is important to have land owners on-board with the vision.

The representatives from Rancho Cordova said that things are prone to happen that are outside of the city's control, including businesses closing or relocating. Developers may not be interested in conforming their plans to the city's vision, and will try to circumvent them by appealing directly to the City Council. The city has also had challenges getting the school board to agree to the city's vision of fewer travel lanes and narrower roadway widths.

The representative from Bellevue said that it is important to be flexible with what is built now. For example, the first floor of a new building may not support the ultimate land use that you would like it to have long-term, but the building should be constructed to accommodate the use that you desire should conditions change in the future. Also, consider the long-term use of parking structures and the impact they may have on the public realm.

The representative from Shoreline noted that the city's design standards have traditionally been more aimed at apartment buildings, but that townhomes are more common in the current economic climate.



Participants broke into small groups to discuss key takeaways and challenges (Courtesy of FHWA).

It is important to plan projects with plenty of flexibility in timing and budget to allow for a successful implementation if things change.

Desiree Winkler from Federal Way noted that the city has struggled with property owners who do not agree with the city's planned changes. She asked how other communities have handled this issue. Lone Tree faced a similar issue with their Entertainment District. The city worked with them to implement legislation that addressed their concerns and a business improvement district to promote the area. The property owners then agreed to tax themselves to fund the business improvement district because they believed in the vision. They recommended identifying champions in the private sector who can encourage other property owners to support the vision.

Paul Bennett from Sound Transit suggested that Sound Transit and Federal Way partner to address the access issues that the new station will face. By planning early and together, the two entities can consider and address issues related to parking, bicycle and pedestrian access, and bus access to the station.

Funding Mechanisms and Financial Commitments

Later in the morning on the second day, James Garland facilitated the final roundtable discussion on funding mechanisms and financial commitments. The peers discussed their experience in facilitating their cities' transformations through managing its financial commitments and capital investments.

The representatives from Lone Tree discussed a variety of funding mechanisms in Colorado, including funds from the city (including sales tax revenues), developer fees, county funds, and metropolitan district funds. They stressed that the partnerships and intergovernmental agreements the city has with these entities are crucial to funding the various projects. For example, Lone Tree has a micro transit service for first-mile/last-mile connections to the light rail. The service costs \$650,000 per year to operate but is free to users. The city pays \$250,000 annually for the service, and the rest of the cost is borne by private partners.

The representatives from Rancho Cordova described a few of their unique funding mechanisms. There is the Community Enhancement fund, which is a county-wide half-cent sales tax; one third of which goes to the State, one third to the local community, and one third to transit. This funding has allowed Rancho Cordova to spend \$1 million to perform operations and maintenance activities and to implement some capital projects. Rancho Cordova also implements development agreements with developers, many of which include transportation impact fees and transit fees.

The representative from Bellevue established a cost-sharing agreement with Sound Transit which involved Bellevue providing property to the transit agency as part of its share of the costs of the planned transit expansion. In addition, the city received a Federal TIFIA loan to build out the roadway infrastructure necessary for the transit expansion. The city also has an Enterprise fund that can be used for certain projects, including stormwater projects, but cannot be used for property acquisition.

The representative from Shoreline noted that interdepartmental partnerships have been helpful. For example, developers pay a park impact fee that funds the purchase or expansion of parks in the area. These kinds of partnerships are more easily developed if you bring the players to the table early in the process. She noted that the metropolitan planning organization in their area is a helpful resource for information about funding mechanisms.

Representatives from Federal Way noted that they have fewer funding options than some of the peer agencies. Establishing a transit benefit district is an option, but the public is not likely to have an appetite for increased taxes for transit after having already approved the measure that is funding the transit expansion. Additionally, city leadership is hesitant to raise taxes.



Discussions during the peer exchange (Courtesy of the Volpe Center).

Participants suggested a few approaches for Federal Way to consider. They suggested that Federal Way come up with a standard format for engaging with partners to help them understand the city's vision and to determine how their mutual desires can be met. Another suggestion was for similar communities (i.e., the communities in Washington that will be receiving new light rail stations in the coming years) to meet regularly to coordinate and share experiences.

Conclusion

The City of Federal Way Peer Exchange featured two national peers and two local peers with experience in preparing their communities to develop and improve their transportation networks as light rail was (or will be) extended into them. Communication and engagement were central to the success of these communities' effort. Through this TPCB Peer Exchange, the city of Federal Way learned the following lessons from the peers.

Planning Considerations

- It will be important to plan for the people who will be either displaced from their homes or priced out of the housing market as a result of the introduction of light rail service.
- The light rail station in Federal Way will serve as a terminus station for six years while the extension to Tacoma is built, which may temporarily lead to increased traffic. Plan for both the medium term (while Federal Way is the terminus) as well as the long term (when Federal Way is no longer the terminus).
- Federal Way should clearly define what kind of community it wants to become, share that vision broadly, and work to bring stakeholders on board. Look to other communities for examples, but choose the right vision for Federal Way.
- Plan projects with plenty of flexibility in timing and budget to allow for a successful implementation if things change.
- It can require flexibility to stay on track with your plans.

Multimodal Transportation Considerations

- Transit alone will not solve all of a community's problems. It provides residents with another choice for transportation, and entices good, dense growth.
- Consider the long-term use of parking structures and the impact that they may have on the public realm.
- Transit is only one piece of the puzzle in the future of Federal Way's transportation system. Keep the focus on multimodal transportation solutions.

Access to Transit

- Sound Transit and Federal Way should partner to address the access issues that the new station will face. By planning early and together, the two entities can consider and address issues related to parking, bicycle and pedestrian access, and bus access to the station.
- Micro transit is an emerging option to solving first-mile/last mile issues. Consider partnering with transportation network companies to implement micro transit, in conjunction with Sound Transit.

Development and Density

- When bringing light rail into a built-out community, it is important to make sure that development is transit-oriented, not just transit-adjacent. Locating development near transit stations isn't enough. The development should be built so that it facilitates access to and from transit. It should preserve existing transportation connections, break down existing barriers, and create new connections.
- It is important to carefully plan a comfortable transition between dense transit-oriented developments and more traditional suburban developments along the "vulnerable edge." Some ways to determine how to do this are through sub-area plans, station area plans, design guidelines, and framework plans.
- With density, comes traffic. Increasing access to transit accelerates development, which will eventually lead to more traffic.
- It is important to be flexible with what is built now. For example, the first floor of new buildings may not have the use that you would like them to have, but the building should be built to accommodate the use that you desire should conditions change in the future.

Public and Private Sector Coordination

- The relationship between the public and private sectors can be the key to having high concentrations of jobs locate near transit.
- Leverage public-private partnerships to develop subarea economic plans.
- Develop a standard format for engaging with partners to help get them on board with the city's vision and to determine how their mutual desires can be met. Identify champions in the private sector that can help get other property owners on board with the vision.
- Work closely with city leadership to get them on board with the vision and the objectives to achieve the vision.
- Interdepartmental partnerships can be helpful in implementing the vision. These kinds of partnerships are more easily developed if you get the players to the table early in the process.

- Engage the metropolitan planning organization in the project. They can be a helpful resource for information about funding mechanisms and for intercity coordination.
- The communities in Washington that will be receiving new light rail stations in the coming years should meet regularly to coordinate and share experiences.

Public Outreach

- Conduct experiential public engagement like “walk-shops” to bring together residents that have more of a local view of the communities with decisionmakers who typically have a broader, longer-term view of the community.
- Carefully manage the expectations of stakeholders and the public throughout the process.
- Working with the public to implement large-scale change is challenging. Stay focused on the vision and be persistent.

Appendices

Appendix A: Key Contacts

Cyrus Abhar, City Manager
City of Rancho Cordova, California
916-496-6657
cabhar@cityofranhocordova.org

Mike Barry, GIS Specialist/Transportation Planner
FHWA Office of Planning
202-380-7413
Michael.Barry@dot.gov

Naveen Chandra, Street Systems Project Engineer
City of Federal Way, Washington
253-797-6820
Naveen.Chandra@cityoffederalway.com

Anna Corniel, Community Planner
FTA Office of Planning
202-366-2888
Anna.Corniel@dot.gov

Hans Friedel, AICP, Senior Planner
City of Lone Tree, Colorado
303-242-0429
hans.friedel@cityoflonetree.com

James Garland, Lead, Planning Capacity Building Team
FHWA Office of Planning
202-309-6470
James.Garland@dot.gov

Steve Hebert, AICP, Deputy City Manager
City of Lone Tree, Colorado
303-718-3318
Steve.Hebert@cityoflonetree.com

Emil King, AICP, Strategic Planning Manager
City of Bellevue, Washington
425-452-7223
EAKing@bellevuewa.gov

Robin Mayhew, Management of Mobility Director
Washington State Department of Transportation
206-464-8383
MayhewR@wsdot.wa.gov

Rick Perez, City Traffic Engineer
City of Federal Way, Washington
253-261-3784
Rick.Perez@cityoffederalway.com

Miranda Redinger, AICP, Senior Planner
City of Shoreline, Washington
206-801-2513
mredinger@shorelinewa.gov

Mark Thomas, Senior Engineer
City of Rancho Cordova, California
312-391-0211
mthomas@cityofranhocordova.org

Appendix B: Peer Exchange Agenda

WEDNESDAY, NOVEMBER 14, 2018

Time	Session	Speaker(s)
8:30 – 9:00 am	Registration and Check-in	
9:00 – 9:05	Opening and Introductions	<ul style="list-style-type: none"> • James Garland Team Lead, Planning Capacity Building, FHWA Office of Planning • EJ Walsh Director, Public Works, City of Federal Way
9:05 – 9:25	Welcome and Remarks from Leadership	<ul style="list-style-type: none"> • Jeanne Burbidge Former Councilwoman, Deputy Mayor, and Mayor, City of Federal Way • Patty Rubstello Assistant Secretary, Urban Mobility & Access, Washington State Department of Transportation • Daniel Mathis Division Administrator, FHWA Washington Division
9:25 – 9:30	Overview of and Goals for Peer Exchange	<ul style="list-style-type: none"> • Michael Barry GIS Specialist/Transportation Planner, FHWA Office of Planning
9:30 – 10:15	The City of Federal Way: <i>Current Trends and Anticipated Impacts</i>	<ul style="list-style-type: none"> • Tim Johnson Economic Development Director, City of Federal Way • Doc Hansen Planning Manager, City of Federal Way • Rick Perez City Traffic Engineer, City of Federal Way
10:15 – 10:30	<i>Break</i>	
10:30 – 11:30	Peer Perspectives: <i>Transforming a City – Promoting Multi-modalism and Building Consensus</i>	<ul style="list-style-type: none"> • Hans Friedel, AICP Senior Planner, City of Lone Tree, CO • Steve Hebert, AICP Deputy City Manager, City of Lone Tree, CO • Cyrus Abhar City Manager, City of Rancho Cordova, CA • Mark Thomas Senior Engineer, City of Rancho Cordova, CA

Time	Session	Speaker(s)
11:30 am – 12:00 pm	Full Group Discussion: <i>Transforming a City, and Reflections on Morning Discussions</i>	<ul style="list-style-type: none"> • Peer Exchange Participants • Facilitator: James Garland Team Lead, Planning Capacity Building, FHWA Office of Planning
12:00 – 12:45	Lunch	
12:45 – 1:00	Recap of Morning and Overview of Afternoon Sessions	<ul style="list-style-type: none"> • Jared Fijalkowski Community Planner, U.S. DOT Volpe National Transportation Systems Center
1:00 – 2:00	Peer Perspectives: <i>Focusing on Outcomes – Policies and Strategies for Implementation and Lessons Learned</i>	<ul style="list-style-type: none"> • Hans Friedel, AICP Senior Planner, City of Lone Tree, CO • Steve Hebert, AICP Deputy City Manager, City of Lone Tree, CO • Cyrus Abhar City Manager, City of Rancho Cordova, CA • Mark Thomas Senior Engineer, City of Rancho Cordova, CA
2:00 – 2:15	Break	
2:15 – 3:15	Peer Perspectives: <i>Focusing on Outcomes – Tales of Transformation from Local Cities in Washington</i>	<ul style="list-style-type: none"> • Miranda Redinger, AICP Senior Planner, City of Shoreline, WA • Emil King, AICP Strategic Planning Manager, City of Bellevue, WA • Moderator: Robin Mayhew, AICP Director, Management of Mobility, Washington State Department of Transportation
3:15 – 4:15	Break-out Group Discussions: <i>Focusing on Outcomes, and Reflections on the Day</i>	<ul style="list-style-type: none"> • Peer Exchange Participants
4:15 – 4:30	Wrap-up and Concluding Remarks	<ul style="list-style-type: none"> • Anna Corniel Community Planner, FTA Office of Planning and Environment • Desiree Winkler Deputy Public Works Director/Street Systems Manager, City of Federal Way
4:30 pm	Adjourn	

THURSDAY, NOVEMBER 15, 2018

Time	Session	Speaker(s)
8:30 – 9:00 am	Registration and Check-in	
9:00 – 9:30	Review of Day One / Debrief	<ul style="list-style-type: none"> • Michael Barry GIS Specialist/Transportation Planner, FHWA Office of Planning
9:30 – 10:30	Round Table Discussion #1: Opportunities, Challenges, and Lessons Learned <i>Session facilitated by: Jared Fijalkowski, U.S. DOT Volpe Center</i>	<ul style="list-style-type: none"> • Peer Exchange Participants
10:30 – 10:45	Break	
10:45 – 11:45	Round Table Discussion #2: Funding Mechanisms and Financial Commitments <i>Session facilitated by: James Garland, FHWA Office of Planning</i>	<ul style="list-style-type: none"> • Peer Exchange Participants
11:45 am – 12:00 pm	Wrap-up and Conclusions	<ul style="list-style-type: none"> • Michael Barry GIS Specialist/Transportation Planner, FHWA Office of Planning • Desiree Winkler Deputy Public Works Director/Street Systems Manager, City of Federal Way
12:00 pm	Adjourn	

Appendix C

Methods and Assumptions



Federal Way City Center Access Study, ARR Methods and Assumptions Document I-5 Milepost 143 (Vicinity)

Prepared for

City of Federal Way
33325 8th Avenue South
Federal Way, WA 98003

Prepared by

Parametrix
719 2nd Avenue, Suite 200
Seattle, WA 98104
T. 206.394.3700 F. 1.855.542.6353
www.parametrix.com

CITATION

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ARR Methods and Assumptions Document
I-5 Milepost 143 (Vicinity).
Prepared by Parametrix, Seattle, WA.
February 2022.

STAKEHOLDER ACCEPTANCE

The following Methods and Assumptions document has been drafted consistent with current WSDOT Access Revision Report (ARR) policy per the Design Manual Chapter 550 (DM 550).

“The undersigned parties, including all members of the support team from WSDOT, FHWA and the Local Agencies, concur with the ARR Methods and Assumptions for the Federal Way City Center Access Study as presented in this document.”

- (1) Participation on the Stakeholders Committee and/or signing of this document does not constitute approval of the Federal Way City Center Access Study ARR.
- (2) All members of the Stakeholder Committee will accept this document as a guide and reference as the study progresses through the various stages of project development. If there are any agreed upon changes to the methods or assumptions in this document a revision will be created, endorsed and signed by all the stakeholders.

At the time this Methods and Assumptions Document was signed, the latest and controlling version of the WSDOT Design Manual Chapter 550 was dated: July 2018.

Date	Revision Number	Comment / Need
November 8, 2017	Draft 1	IJR Team Review Draft
July 18, 2018	Draft 2	SST Review Draft – Modified to include local improvement alternative development and screening; Remove Policy Points 4, 6, and 8.
July 23, 2018	Draft 3	Address comments received in July SST Meeting
December 6, 2018	Draft 4	Updated for ARR
February 1, 2019	Draft 5	Updated to address SST comments
March 20, 2019	Draft 6	Updated to address Exec team comments
November 20, 2019	Draft 7	Updated freeway analysis scope
November 19, 2021	Draft 8	Updated access revision definition; Updated safety analysis methodology reference
February 23, 2022	Final	

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APPENDICES

A	SimTraffic Methodology
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1. INTRODUCTION

The Federal Way City Center Access project led by the City of Federal Way, and in partnership with FHWA, WSDOT, PSRC, Sound Transit, Pierce Transit, and King County, will work towards identifying a solution which addresses the project Purpose and Need.

Traffic congestion on S 320th Street and I-5 in the vicinity of the Federal Way City Center (City Center), raises concerns about how to maintain mobility in the future and support the economic vitality of the City Center. The Federal Way City Center is the designated Regional Growth Center and includes the area bounded by I-5 to the east, S 312th Street to the north, 11th Place S to the west, and S 324th Street to the south. City and state infrastructure is showing the strain of sustained residential and economic growth. Anticipated growth and development in the City Center are expected to exacerbate this strain. Traffic delays during the PM peak period are approaching unacceptable levels, and mobility for other travel modes in the area is also limited. A strategy is needed to ensure future mobility can be maintained.

The project study area is shown in Exhibit 1. The map identifies the City Center and the key study corridors identified in the project Purpose and Need, which include S 320th Street from Pacific Highway S to Military Road S and I-5 between S 272nd Street to S 348th Street/SR 18. The congestion-related issues identified in the project Purpose and Need are influenced by the surrounding transportation network. This larger network is shown in the exhibit as a box and is generally bounded by S 272nd Street to the north, Pacific Highway S to the west, Military Road S to the east, and S 348th Street/SR 18 to the south.

A local-only improvements alternative including no-build improvements addressing multi-modal travel and access needs was developed and analyzed under the Non-Access Feasibility Study. The team found that a local improvements alternative including no-build improvements did not meet the project Purpose and Need. The local improvement alternative development, screening, and findings are described in the Federal Way City Center Access Study, DRAFT Non-Access Feasibility Study I-5 Milepost 143 (Vicinity) (Parametrix, December 2018).

2. TEAM PARTICIPANTS

In the fall of 2017, a study support team (SST) was established and includes the City, FHWA, WSDOT, transit agencies, tribes, and the neighboring jurisdictions. The SST includes the following:

- City of Federal Way
- WSDOT Headquarters
- WSDOT Northwest Region
- FHWA Washington Division
- King County Metro
- King County Roads
- Pierce Transit
- Puget Sound Regional Council
- Sound Transit
- City of Federal Way Police Department

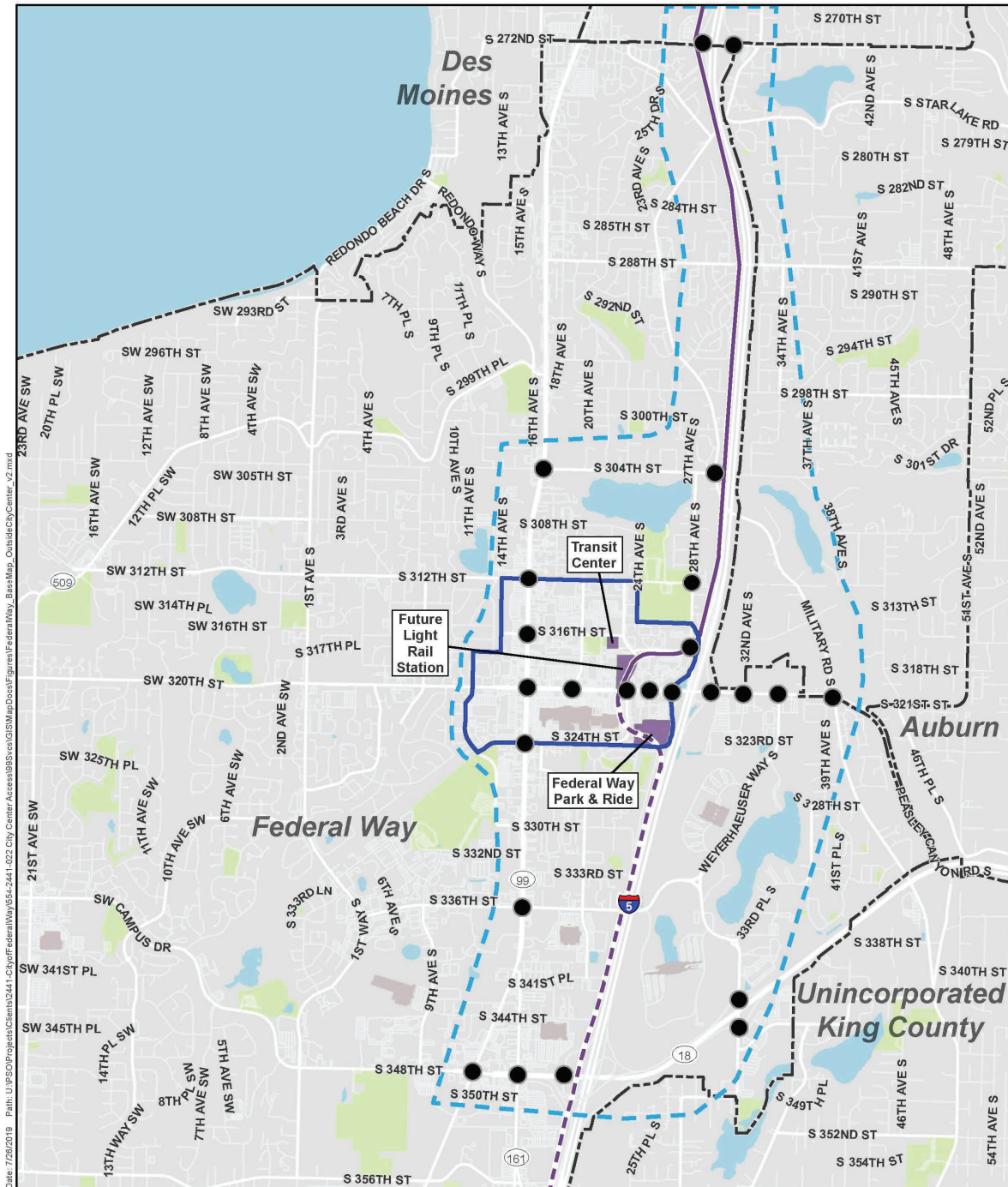
- South King Fire and Rescue
- Parametrix (Consultant)
- PRR (Consultant)
- DKS (Consultant)
- Muckleshoot Indian Tribe
- Puyallup Tribe
- Yakama Nation
- Snoqualmie Tribe
- Squaxin Island Tribe

3. PURPOSE AND NEED

The Federal Way City Center is designated as one of 29 regional growth centers as identified in the PSRC's Vision 2040. The purpose of the Federal Way City Center Access project is to improve the economic vitality of the City Center and to improve the quality of life for people who work, play, and live in the City by increasing multimodal mobility and access for regional and local trips while protecting the integrity of the Interstate system. Access and mobility is limited by congestion issues along S 320th Street between Pacific Highway S and Military Road S, and the ramps to and from I-5.

Exhibit 2 summarizes the project issues, the baseline and contextual needs, and metrics and targets.

The project will be focused on improving mobility and safety to the City Center while maintaining the integrity of the Interstate. A successful project solution will improve travel through the study area including reducing queue spillbacks impacting the Interstate safety and operations.



Parametrix

Source: City of Federal Way, King County, © Mapbox, © OpenStreetMap

0 0.25 0.5 1 Miles

- City Center
- - - Study Area
- Intersection Analysis
- City Limit
- Federal Way Link Extension Alignment
- - - Representative Alignment
- Transit

Study Area
 Federal Way City Center Access
 Federal Way, Washington

Exhibit 1. Study Area Map

Exhibit 2. Baseline and Contextual Needs (BN/CN)					
	Issue	Need Statement	Metric	Target	BN/CN
Improve Economic Vitality and Quality of Life	Address City of Federal Way Comprehensive Plan goals	Provide opportunities for through traffic to travel around rather than through the core, thus minimizing the impact of future growth on Citywide traffic patterns and congestion.	Do other routes exist that do not bisect the City center? (Qualitative review)	Yes	BN1
		Protect views such as Mount Rainier, especially for civic uses and public parks within the City Center.	Are views obscured? (Qualitative review)	No	CN1
		Maintain roadway cross section consistent with City's street design standards.	Are the roadway cross sections consistent with the City's street design standards?	Yes	BN2
	Increasing roadway congestion on S 320th Street	Decrease roadway congestion on S 320th Street (as it affects transit and general travelling public) to improve person mobility.	Travel time between Pacific Highway S and Military Road S (report by mode) and report number of people by mode affected (mode share)	Travel time equal to today (qualitatively weighted by mode share)	BN3
			LOS and v/c at intersections	v/c less than 1.0 on every lane group (arterial intersections) LOS D (ramp terminals)	BN4
			Delay (for approaches which serve transit)	Delay equal to today on approaches which serve transit	BN5
			Are access management standards (roadways and driveways) to development properties maintained or improved? (qualitative)	Yes	BN6
	Poor multi modal mobility	Improve nonmotorized mobility to increase use of transit facilities and Improve nonmotorized mobility to increase use of transit facilities. Provide nonmotorized options to circulate within the City Center and at the study area boundaries improve connections to regional or the citywide facilities.	Nonmotorized system gap analysis. Do non-motorized connections exist? (Qualitative review)	Yes	BN7
			Nonmotorized level of traffic stress criteria	LTS <= 2	BN8
			Minimize roadway crossing widths for nonmotorized modes	Consistent with City's street design standards	BN9
	Impaired freight truck movement	Improve freight truck mobility to support the City Center and regional service.	Travel time between Pacific Highway S and Military Road S	Travel time equal to today	BN10
Delayed emergency response	Improve emergency response by minimizing queue spillbacks through study intersections and at the South King Fire and Rescue Station 64 access.	Potential for reoccurring queue spillbacks measured by v/c ratios at study intersections	v/c less than 1.0 on every lane group	CN2	
Decreased safety	Improve safety for the general travelling public on the S 320th Street corridor and study area.	Improvement to expected and predicted collision rates per the Advanced Analysis Level ¹	Better than No Build	BN11	
Maintain Integrity of the Interstate System	Local Queues Impact Mainline I-5	Local queue spillback on I-5 off ramps (length and duration) at S 272nd, S 320th, and S 348th Streets	Local queues do not extend into ramp deceleration area	BN12	
		Number of gore points on I-5 mainline	Equal to today	BN13	
		Improvement to expected and predicted collision rates per the Advanced Analysis Level, or qualitative analysis	Better than No Build	BN14	
	Regional Congestion on I-5	Maintain or improve I-5 mobility for persons and freight trucks.	Local queue spillback on I-5 off ramps (length and duration) at S 272nd, S 320th, and S 348th Streets	Local queues do not extend into ramp deceleration area	BN15
			Travel time on I-5 between S 272nd Street to SR 18/S 348th Street	Equal to today	BN16

¹ Advanced Analysis Level per WSDOTs Safety Guidance for Corridor Planning Studies – June 2015

4. ALTERNATIVES DEVELOPMENT AND SCREENING

As part of the Non-Access Feasibility phase, an analysis was conducted to determine if a local improvements alternative including no-build improvements would address the project Purpose and Need. This initial work determined that the issues identified could not be managed with local improvement elements alone. However, some local improvement elements may be carried forward into a revised or modified interchange access.

The SST will identify interchange modification alternatives and screen them based on criteria shown in Exhibit 2 above. The screening will include two tiers of analyses. The Level 1 screening will address some of the metric and targets qualitatively. The Level 2 screening will address the metrics and targets as shown in Exhibit 2 above. The following describes where Level 1 analysis will provide different level of analysis detail compared to Level 2.

- Travel times – For the Level 1 analyses, a qualitative review of improvement or degradation to travel time on the local system will be conducted using the Synchro analysis tool (local) or changes in travel distance or volume changes (freeway). For the Level 2 analyses, travel times will be captured in SimTraffic (local) or VISSIM (freeway).
- Safety analyses – A basic analysis (summarizing trends in collision locations, types, causes) will be conducted for Level 1. The Level 2 analyses may be based on WSDOT’s advanced analysis, including reporting expected and predicted crash totals, or may be qualitative depending on the improvement types

Additional environmental screening criteria may include the following. Criteria and measures of effectiveness will be reviewed by the SST and environmental subgroup.

- Potential impacts to neighborhoods - Objective is to qualitatively assess the potential direct and indirect impacts on residential neighborhoods in the study area, most (if not all) of which are characterized by the presence of minority and low income populations. Impacts could be characterized by residential displacements, and by noise and traffic impacts. Noise and traffic screening criteria can include: increase in roadway travel lanes, change in travel lane location relative to homes, change in roadway classification, or substantial increases in traffic volumes (such as doubling of volumes on corridors over 1,000 vph).
- Potential impacts on parks - Objective is to qualitatively assess the potential direct and indirect impacts on parks in the study area and to address the procedural requirements of Section 4f/6f as they relate to alternatives analysis. Impacts could be characterized by property acquisitions, and by noise and traffic impacts. Noise and traffic screening criteria can include: increase in roadway travel lanes, change in travel lane location relative to homes, change in roadway classification, or substantial increases in traffic volumes (such as doubling of volumes on corridors over 1,000 vph).
- Potential impacts on Waters of the U.S. / critical areas - Objective is to qualitatively assess the potential direct impacts on wetlands, streams, and critical habitats and to address the mitigation sequencing requirements of various local, state, and federal regulations. Impacts could be evaluated by relative estimates of fill and proximity to identified resources.
- Potential impacts to cultural resources. Impacts could be evaluated by proximity to identified resources.

- Potential impacts to commercial/industrial properties. Impacts could be evaluated by relative potential for acquisition.
- Potential cumulative effects on traffic. Impacts could be evaluated based on the ability of an alternative to accommodate or be compatible with future roadway improvements to address potential growth that is not currently accounted for in the project baseline.
- Public/stakeholder acceptance based on feedback from past and planned outreach activities.

This screening analysis will determine if the project Purpose and Need can be met with a set of local and interchange modification improvements. This analysis supports both the NEPA and the practical design analysis processes. The outcome of this process will be the Preferred Alternative.

Additional information on the operations and collision analysis to support alternative development and screening is included in section 5 below.

5. OPERATIONAL AND COLLISION ANALYSIS

5.1 Analysis Years and Analysis Periods

The traffic forecast and operations analysis will be conducted for the following existing and horizon years:

- Current Year: 2017
- Year of Opening: 2025
- Design Year: 2045

Traffic analysis will be focused on the AM and PM peak hours (for local intersections) and peak periods (for the freeway system). More information on the analysis periods and analysis tools can be found under the Traffic Operations section.

5.2 Study Area and Project Limits

The study area will include the I-5 mainline and ramps for and between the following interchanges:

- S 272nd Street interchange
- S 317th Street (HOV only) interchange
- S 320th Street interchange
- SR 18 interchange

The ramp termini intersections for the interchanges shown above will be included in the analysis. Additionally, arterial intersections near potential new interchange access locations are included for analysis. The study intersections are shown in Exhibit 3.

Exhibit 3. Study Intersections

Number	Intersection
1	S 272nd Street / I-5 SB Ramps
2	S 272nd Street / I-5 NB Ramps
3	Pacific Highway S / S 304th Street
4	Military Road S / S 304th Street
5	Pacific Highway S / S 312th Street
6	28th Avenue S / S 312th Street
7	Pacific Highway S / S 316th Street
8	28th Avenue S / S 317th Street / I-5 Ramps
9	Pacific Highway S / S 320th Street
10	20th Avenue S / S 320th Street
11	23rd Avenue S / S 320th Street
12	25th Avenue S / S 320th Street
13	I-5 SB Ramps / S 320th Street
14	I-5 NB Ramps / S 320th Street
15	32nd Avenue S / S 320th Street
16	Weyerhaeuser Way S / S 320th Street
17	Military Road S / S 320th Street
18	Pacific Highway S / S 324th Street
19	Pacific Highway S / S 336th Street
20	Pacific Highway S / S 348th Street
21	16th Avenue S / S 348th Street
22	SR 18 EB / Weyerhaeuser Way
23	SR 18 WB / Weyerhaeuser Way
24	I-5 SB Ramps / SR 18
	(Triangle Project adds movements; not applicable today)

5.3 Traffic Operations Analysis

5.3.1 Methodology

A traffic analysis will be completed to support alternative screening and refinement of the Preferred Alternative. The analysis will be completed per WSDOT protocol as shown in the following documents:

- WSDOT Synchro and SimTraffic Protocol – April 2017
- WSDOT Sidra Policy Settings – April 2018
- WSDOT Protocol for VISSIM Simulation – September 2014

Information regarding regional constraints (either queues backing into the Federal Way City Center Access study area or constraints serving traffic to the study area) as documented in a project

environmental documentation or IJR/ARR from the Puget Sound Gateway Program and the Triangle project will be included in the modeling analysis, to the greatest extent feasible.

This analysis will support the alternative development, screening, and documentation and focuses on the movement of persons and goods via cars, transit, and truck.

5.3.2 Software

The analysis tools and time periods are shown in Exhibit 4.

Exhibit 4. Analysis Periods, Tools, and Assumptions

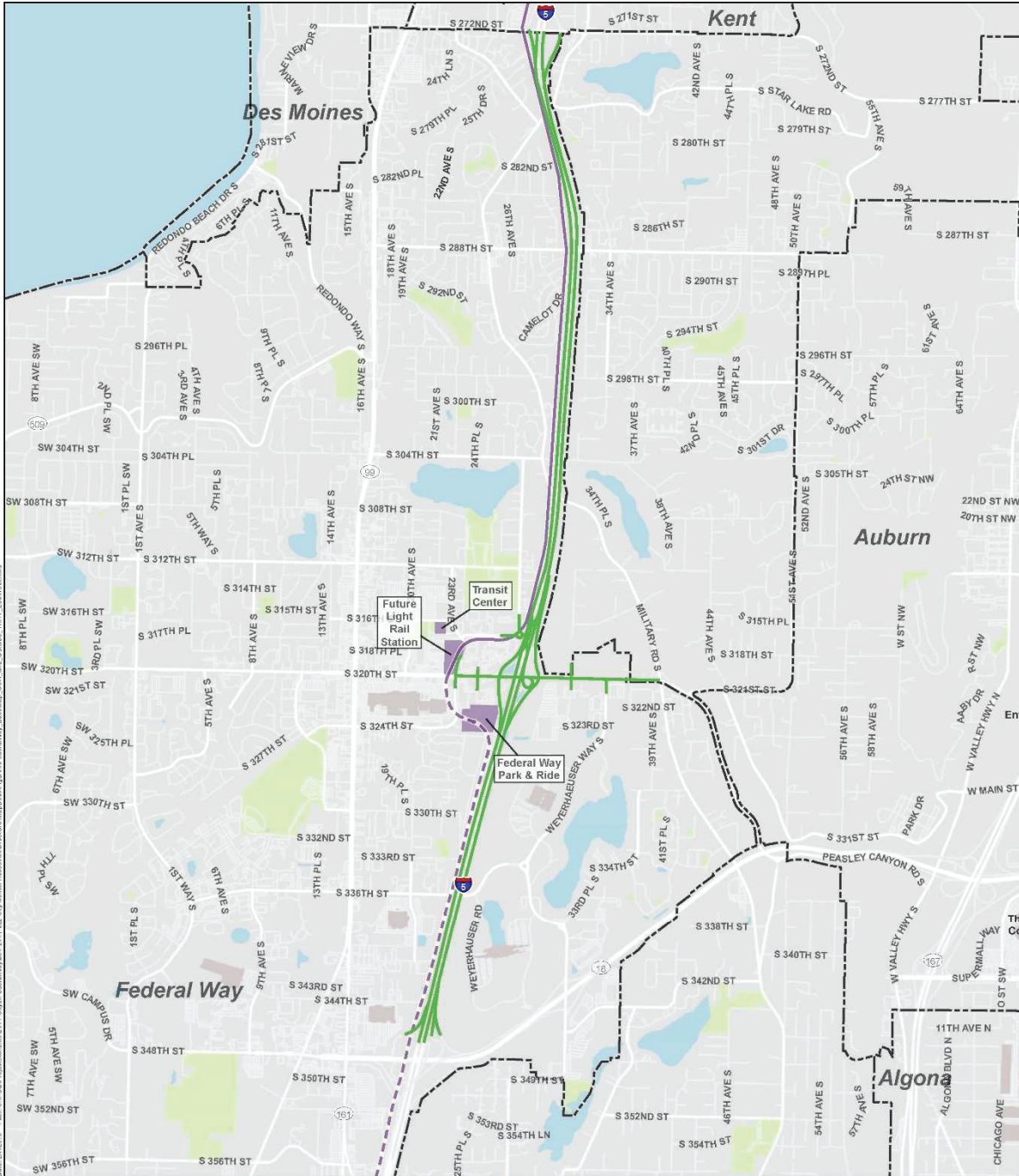
Location ^a	Weekday Peak	Weekday Daily	Weekend
I-5 Mainline and Ramps			
Tool:	VISSIM 7	Forecast only	Sensitivity test forecast for select locations and peaks.
Key Assumptions:	5 to 8 AM; 2 to 6 PM 15 minute increments By mode (GP, HOV)	Total (no mode split)	
Ramp Termini Intersections			
Tool:	VISSIM 7	Forecast only	Sensitivity test forecast for select locations and peaks
Key Assumptions:	5 to 8 AM; 2 to 6 PM 15 minute increments By mode (GP, HOV)	Total (no mode split)	
Tool:	Synchro 10 or Sidra 6.1		
Key Assumptions:	AM and PM peak hours		
Non-Highway Study Intersections			
Tool:	Synchro 10 or Sidra 6.1	None	None
Key Assumptions:	PM peak hours (Include AM peak at S 320 th St/Military Rd S)		
Tool:	VISSIM 7	None	None
Key Assumptions:	PM peak hour NOTE: Study area - S 320 th St between 23 rd Ave S and Weyerhaeuser and S 324 th St between 23 rd Ave S and Weyerhaeuser		

^a Defined in section Study Area and Project Limits

The freeway VISSIM (and safety) analysis study area is shown in Exhibit 5.

Calibration and modeling methodologies will be developed for the modeling tools and included in the following appendices:

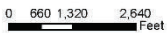
- Appendix A: SimTraffic Model Methodology and Assumptions
- Appendix B: Synchro Model Methodology and Assumptions
- Appendix C: VISSIM Model Methodology and Assumptions



Parametrix



Source: City of Federal Way, King County, © Mapbox, © OpenStreetMap



- Freeway Analysis Study Area
- Federal Way Link Extension Alignment
- - - Tacoma Dome Link Extension Representative Alignment
- - - City Limit

Exhibit 5. Freeway Analysis Study Area (VISSIM and Safety)

5.3.3 Results to be Reported (Scenarios for Analysis)

The operations and safety analysis will be conducted for the existing, No Build, local improvements, and build alternatives identified through the screening process for the years and time periods described above.

5.4 Travel Forecast

Federal Way’s travel demand models will be used for existing conditions and the 2040 future conditions modeling. EMME software will be used to run both models. Federal Way’s models are based on the Puget Sound Regional Council (PSRC) Regional 4K Model, and the transit coding for routes traveling through the City of Federal Way was updated for consistency with the PSRC 4.1K Model. The land use assumptions in the existing conditions and the 2040 future conditions models will be updated. PSRC’s current base year is 2014.

The existing conditions model will be validated by comparing link level model outputs with traffic count data for up to eight north/south and east/west screenlines within the City of Federal Way with additional refinement at intersections within the project area. Model calibration will focus on link/node, turn penalty, speeds, capacities and volume delay functions. Methods from NCHRP Report 716 will be employed along with standard practices for model validation.

5.4.1 Network Assumptions

The existing conditions model will be updated to reflect the existing conditions roadway network. All roadway networks will be updated to match the existing conditions structure defined by the City with the inclusion of projects between 2012 and 2017 that have been fully constructed.

The 2040 model will be updated to include Sound Transit’s Link Light Rail Transit (LRT) extension from Federal Way to Tacoma and adopted transit long range plans as they relate to routes operating through the City of Federal Way. Funded portions of the Gateway Program and the Triangle project are included. Additional planned and funded projects, or likely to be constructed inside the City of Federal Way are shown in Exhibit 6.

Exhibit 6. Year 2040 Travel Demand Model/Year 2045 Analysis Network Assumptions

Project	Description
Regional Projects	
Sound Transit LRT extension to Tacoma LRT	Includes station in South Federal Way
Transit service improvements	Routes within the City consistent with Regional Transportation Plan, adopted May 31, 2018
Triangle Project	Phases B and D
Puget Sound Gateway Program	SR 509 Completion Project; SR 167 Completion Project
City of Federal Way Projects	
City Center Grid System - Arterial level connections	per Comprehensive Plan (Figure VII-8)
14th Ave S: S 312th St to S 316th St	Ring Road extension
S 316th St: SR 99 to 11th Pl S	Ring Road extension
14th Ave S: S 316th St and S 320th St	Add two lane new roadway connection
S 320th St: 25th Ave S to Military Road S	Add HOV Lanes; Add lane in each direction across I-5

Exhibit 6. Year 2040 Travel Demand Model/Year 2045 Analysis Network Assumptions (continued)

Project	Description
** No Build only includes section from I-5 northbound ramp to Military Road S)	
S 324th St: SR 99 to 23rd Ave S	Widen to 5 lanes
13th Pl S: S 330th St to S 332nd St	Two lane new roadway connection between side streets
Weyerhaeuser Wy S: S 336th St to 33rd Pl S	Widen to 5 lanes
SR 99: 16th Ave to S 356th St	Add HOV Lanes
SW 344th St: 15th Ave SW to 18th Place SW	Add three lane roadway

5.4.2 Volume Development

Existing traffic volume counts collected within the last 3 years will be supplemented with new counts.

The travel demand models represent conditions for years are 2014 and 2040; and the traffic analysis study years are 2017 (existing), an opening year of 2025, and a horizon year of 2045. The growth identified from the travel demand model will be applied to 2017 (existing) year data to develop opening and horizon year volumes. Data will be linearly interpolated for year 2025 and extrapolated for year 2045.

To forecast future conditions, a methodology will be created to develop intersection turn movement, ramp, and I-5 mainline traffic volumes from the updated travel demand model effort. The method is consistent with WSDOT and National Cooperative Highway Research Program (NCHRP) methodologies. The forecast method will include the following steps:

1. Develop link volume forecasts. These values will equal the growth identified from the travel demand model and applied to existing year data.
2. Develop intersection turn movement forecasts. NCHRP 255 methodologies will be used to estimate future turn movements.
3. Develop freeway ramp and mainline volumes. These values will equal the growth identified from the travel demand model and applied to the existing year data. The forecast effort will include coordination with the Puget Sound Gateway Program and the Triangle Project to incorporate regional demand trends into the project forecasts, if available.

Existing and modeled trends in mode split will be used to develop mode split estimates.

5.5 Selection of Measures of Effectiveness (MOEs)

The Measures of Effectiveness (MOEs) used in the screening process are shown above in Exhibit 2.

5.6 Collision Analysis

The safety performance of the existing freeway system and local transportation system, as well as future no build and proposed alternatives, will be analyzed within the safety analysis study area.

5.6.1 Methodology

The safety analysis will be completed consistent with WSDOT procedures. The safety analysis method used for this study is documented in the Safety Analysis Methods and Assumptions Technical Memorandum (Parametrix, 2020).

5.6.2 List All Assumptions

The following lists the key assumptions regarding the safety analysis methodology:

- The most recent available 5 years of crash data will be used.
- The safety analysis will include the I-5 mainline, ramps, and ramp termini, and select local arterial intersections as determined by the SST.

5.7 Nonmotorized Analyses

5.7.1 Methodology

An analysis of nonmotorized facilities will be conducted by identifying gaps in the system, and rating facilities using the level of traffic stress criteria. The level of traffic stress imposed on pedestrians or bicycles is rated based on input such as (but not limited to) adjacent roadway speed limits, traffic volumes, intersection control, presence and width of bikeways.

5.7.2 List All Assumptions

The following lists the key assumptions regarding the safety analysis methodology:

- The analysis will be conducted for corridors as agreed upon with the SST.

6. PLANNING LINKAGE

The following describes the planning linkages including on-going projects and potential land use changes within or adjacent to the study area.

- This project is consistent with the City of Federal Way land use and transportation plans and PSRC's regional plans including the transit long range plans.
- The project is situated within the Puget Sound Gateway Program limits; in identifying a solution for Federal Way, this project will consider the Puget Sound Gateway Program findings as documented in the project environmental documentation or IJR/ARR, and constraints so that the resulting set of solutions do not conflict with the regional project. The Puget Sound Gateway Program includes the SR 509 and SR 167 corridor studies and aims to improve regional mobility on I-5.
- Sound Transit's LRT will be extended from SeaTac south to Federal Way in 2024, aligned through the City Center and terminating near the existing Federal Way Transit Center. The LRT line will then be extended further south to Tacoma by 2030. The alignment from SeaTac to Federal Way is finalized. The alignment between Federal Way and Tacoma is in the planning phase. The Federal Way City Center Access Study will continue to coordinate with the Sound Transit on the LRT alignment as it intersects with any proposed project improvements, and to develop multi-modal access solutions.

- The City of Federal Way, along with WSDOT, FHWA and PSRC, participated in a city peer exchange to consider land use models, policies and other techniques that may encourage increased mobility options and increased use of multimodal transportation. Recommendations from the peer exchange will be documented and referenced when determining additional planning study linkages. The results of the peer exchange can also inform the Context and Modal Accommodation Report (CMAR).
- Land use changes are under consideration by the City of Federal Way, including redevelopment of the area formerly occupied by Weyerhaeuser and a mixed use high density development replacing the current Belmor Park. The Belmor Park developers have submitted an application for a Comprehensive Plan amendment in the fall of 2018. While the Federal Way City Center Access Project is required to consider only land use that's been approved through the Comprehensive Plan, these developments are significant and could potentially result in changes in travel patterns. The SST environmental sub group recommended land use changes could be addressed through indirect and cumulative effects.

7. ENVIRONMENTAL LINKAGE

In general, the complexity of the project will define the extent of the NEPA analysis. The Probable Environmental Documentation for the City Center Access is a Documented Categorical Exclusion (DCE), and would comply with the practical design process outlined in Design Manual Chapter 1100. An Environmental Assessment will be considered if Public Outreach proves the project and selection of a preferred alternative to be controversial, or if the project cannot avoid substantial impacts to environmental justice populations, Section 4(f) resources or Section 106 resources. Detailed environmental documentation will be developed during the project design phase.

The Environmental Linkage with the ARR includes early coordination between the City, consultant team, FHWA and WSDOT environmental representatives and tribes and an environmental kickoff meeting to verify the process aligns with NEPA requirements. Additionally, utilizing evaluation criteria for NEPA topics such as social and economic issues, cumulative impacts and mitigation considerations; practical design to minimize these effects; and qualitative assessment of the direct and indirect impact on residential neighborhoods, parks, and wetlands and streams contribute to the alignment of the ARR and environmental processes.

8. COMMUNITY ENGAGEMENT

The Public Involvement and Communications Plan will be updated. It includes a description of the outreach that occurred during the early planning efforts (developing project Purpose and Need, and local improvement alternative elements) and the outreach that will extend into the ARR process. The document will describe the methods and tools (both traditional and non-traditional) to be used for engaging the community and stakeholders during this phase. This document also will address environmental justice outreach.

The project includes coordination with the following jurisdictions, agencies, and groups that are not participating as part of the SST:

- City Council
- Residents

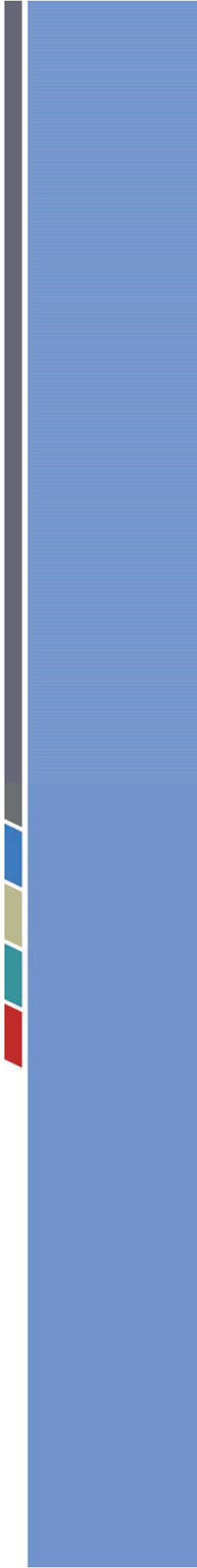
- Property owners
- Business owners
- Environmental justice groups

Outreach may be conducted in various forms including:

- Tabling at community events (fairs and festivals)
- Neighborhood briefings
- Business outreach
- City managed project website, including online open house
- Public meetings

Appendix A

SimTraffic Methodology



SIMTRAFFIC METHODOLOGY

The SimTraffic analysis (version 10) will be used to supplement the Synchro (local street) and VISSIM (freeway and interchange) traffic operations analysis. The analysis will be conducted for the S 320th Street corridor for the critical or worst operating time period (PM peak, year 2045) to establish the project Need and for use in the alternatives analysis and screening. An existing conditions model will be developed to support documentation of model calibration.

The limits of the SimTraffic model will include S 320th Street from Pacific Highway S to Military Road S. The model will include the following intersections:

- S 320th Street/Pacific Highway S
- S 320th Street/20th Avenue S
- S 320th Street/23rd Avenue S
- S 320th Street/25th Avenue S
- I-5 Southbound Ramps/S 320th Street
- I-5 Northbound Ramps/S 320th Street
- S 320th Street/32nd Avenue S
- S 320th Street/Weyerhaeuser Way S
- S 320th Street/Military Road S

WSDOT has not developed a protocol for a SimTraffic model. However, the project SimTraffic model will be developed from a Synchro model which will follow WSDOT's April 2017 Synchro model protocol.

The model will represent a single hour and be calibrated to existing PM peak hour conditions. The SimTraffic model will be calibrated based on the following model parameters compared to field data:

- Queues (compared to field observations)
- Vehicle throughput (compared to count data)

The seed time necessary to calibrate the model will be established during model calibration and documented. The PHF adjust and anti-PHF adjust parameters will be applied in the model consistent with the description in the Synchro 9 User Guide (Pg. 25-3, Oct 2017). The PHF adjust parameter is used commonly to model 15 minutes of peaking traffic while the anti-PHF models the following intervals of off-peak traffic. While the PHF adjust parameter increases the hourly count for the peak 15-minute period, the volume for the three remaining 15-minute intervals would decrease from the hourly rate such that over all four 15-minute intervals, the hourly volume would be met and applied to the model. The PHF adjust parameter will be applied to the second 15-minute interval of the one-hour recording period, while the anti-PHF adjust parameter will be applied to the other three 15-minute intervals and the seeding period.

In the existing conditions model, a PHF will be applied to each intersection consistent with count data. A single PHF will be selected for each intersection, rather than applying varied PHF for each approach (consistent with WSDOT Synchro protocol). Also, consistent with WSDOT protocol, the future conditions PHF will be set to 1.0.

Appendix B

Synchro Methodology



SYNCHRO METHODOLOGY

This Synchro analysis methodology addresses analysis needs to support the alternative development, refinement, and screening consistent with the City of Federal Way practices and addresses the WSDOT Synchro and SimTraffic Protocol, April 2017 as portions of the study area are on I-5 interstate's interchanges.

The Synchro analysis will be conducted for the study intersections and time periods as described in the Methods and Assumptions document body. The analysis includes an existing year, opening year, and horizon year. It is assumed that the opening year will follow the methodology and assumptions consistent with existing conditions unless otherwise noted.

This document includes two sections:

- analysis methodology relative to the WSDOT Synchro protocol
- arterial high occupancy vehicle (HOV) lane coding

Analysis Methodology Relative to the WSDOT Synchro Protocol

The methodology is described relative to the WSDOT Synchro protocol as the protocol provides a framework based on reasonable analysis methods. Variations in method are typically due to available and specialized local data or to meet jurisdictional standards, as the majority of the study intersections are outside the WSDOT right of way.

Per the WSDOT Synchro protocol,

“All parameters within Synchro have been identified as one of the following categories:

- Category A: Input parameters with specific thresholds or values are provided in this protocol.
- Category B: Input parameters that are dependent on project data and/or are unique to a particular project. Minimal guidance provided.
- Category C: Input parameters that should remain as the default value. Modifying these parameters requires written justification and approval from Region traffic office or HQ Traffic office. These parameters consist of all parameters not listed in Category A or Category B, a list will not be provided in this protocol.”

Variations to input parameters within Category A of the WSDOT Synchro protocol include:

- Ideal saturated flow rate (in lane settings): The Synchro ideal saturated flow rates are based on the adjusted headway factor (in simulation settings) from the SimTraffic model calibration. The ideal saturated flow rates apply to the following conditions.
 - Intersection movements with two or more turn lanes, through lanes adjacent to HOV lanes, and HOV lanes will use a saturated flow rates between 1,700 and 1,800 vehicles per hour per lane (vphpl).
 - All other lanes will use a saturated flow rate of 1,800 to less than 1,900 vphpl, which is consistent with a SimTraffic headway factor of approximately 1.1.

- Timing settings: The City's signal timing plans (current and forecasted) will be used for existing, opening year, and horizon year conditions.
- Phasing settings: The City's signal timing plans (current and forecasted) will be used for existing, opening year, and horizon year conditions.

No variations to the input parameters within Category B of the WSDOT Synchro protocol are proposed.

Under Category C, HCM 2000 will be used to report intersection operations as several of the study intersection because the current and future intersection configurations are beyond the scope of the HCM 2010 methodology.

Arterial HOV Lane Coding

Several of the study intersections along S 320th Street and Pacific Highway S include arterial HOV lanes. These lanes are HOV only or shared HOV through/general purpose (GP) right turn lanes. The lane utilization factors at locations with HOV lanes will be adjusted to reflect the lane utilization based on existing field data and forecasted HOV volumes.

In addition to assessing the existing and No Build condition, one of the project's Baseline Needs is to "Maintain or improve access to and from City Center, considering side streets including key transit routes." The metric for this need is to measure delay for approaches which serve transit. To report transit delay for alternative screening, the model will be adjusted so that the HOV only lane is coded separately (see Exhibit 1). This model will be used only to calculate and report transit delay. In this scenario, the default (not the adjusted) lane utilization factors will be used.

Appendix C

VISSIM Methodology

NOTE: Insert following SST review



VISSIM METHODOLOGY

1. INTRODUCTION

This document describes the methods and assumptions that will be used to analyze the freeway operations for the Federal Way City Center Access project with the VISSIM microsimulation tool.

The purpose of this analysis is to identify any benefits or impacts associated with the Build alternatives to support alternative screening. The VISSIM model will allow the team to determine if there are benefits or impacts to I-5 due to Build alternatives which may change ramp gore locations, redistribute traffic volumes, and change how local queues spill back onto I-5.

An existing conditions VISSIM model will be developed and calibrated to current operations (year 2019). Following the calibration, the existing conditions model will be updated with future year volumes to represent the Year 2045 No Build. Finally, the No Build model network and volumes will be updated to reflect the Alternative 2 configuration. Alternative 2I will be modeled and is a representative of the operations of the Alternative 2 set of solutions that are considered in the Level 2 Screening, as they affect I-5 operations.

2. APPROACH

2.1 Analysis Tool

VISSIM will be used to analyze traffic operations on I-5. Information from previous Synchro analysis completed for the City Center Access project will be used including optimized signal timing plans for the future alternatives.

2.2 Study Area

The modeled area encompasses the I-5 mainline, ramps and interchange areas from the S 272nd Street interchange to the SR 18 interchange including:

- I-5 mainline between SR 516 (north of S 272nd Street) and SR 18
- All I-5 ramps to and from S 272nd Street, and the two ramp intersections
- The HOV ramps to and from S 317th Street, and the S 317th Street and 28th Avenue S intersection
- All ramps to and from S 320th Street
- All signalized intersections on S 320th Street between 23rd Avenue S and Weyerhaeuser Way S
- The ramps from I-5 southbound to SR 18 eastbound and westbound
- The ramps from SR 18 eastbound and westbound to I-5 northbound

The Year 2045 Build (2I) model will also include the proposed S 324th Street interchange including the ramp intersections and ramp connections to the existing S 320th Street ramps.

2.3 Study Period

The study analysis period is based on existing congestion and travel time information in the area. The VISSIM model will include traffic volumes for 4 to 9 AM and 1 to 6 PM, however the first hour of both models (4 to 5 AM and 1 to 2 PM) will be used as a seeding period and is not included in the reported values.

2.4 Traffic Volumes

Existing volumes will be developed based on local turn movement count data and freeway volumes from the WSDOT data portal. For the I-5 freeway corridor (ramps and mainline), vehicle detector data from October 2017 will be extracted from the WSDOT data portal for the HOV and SOV lanes, mainline and ramps. These volumes will be balanced to create 15-minute forecast volumes for the AM and PM peak periods (including seeding period). The balanced volumes will be used to create an origin-destination (OD) matrix for each 15-minute time period.

At local intersections in the study area weekday peak 15-minute traffic volumes developed for the Level 1 screening will be extrapolated for the multi-hour study period. Local intersection volumes will be adjusted to match the balanced ramp volumes entering and leaving each interchange area. The balanced intersection turn movements for each 15-minute time period will then be used to create OD matrices for each interchange area.

Year 2045 peak hour volumes were developed as part of the Level 1 screening. Those volumes will be extrapolated and into the multi-hour peak similar to the existing conditions volumes described above. This will include developing 15-minute volume intervals and OD matrices for the 2045 No Build and Build VISSIM models.

2.5 External Constraints

Congestion occurs on I-5 and local streets beyond the limits that are modeled. I-5 congestion can be observed via speed data provided by WSDOT (Tuesdays – Thursdays in October 2019). Figures 1 and 2 show congestion in the study area on I-5 northbound and southbound, respectively.

As shown in Figure 1, congestion originates north of the 272nd Street interchange (milepost 147) and spills back through the entire study area from approximately 5 to 9 AM. As shown in Figure 2, congestion in the study area on I-5 southbound originates south of the SR 18 off ramps (milepost 142) and spills back to the SR 18 off ramps from approximately 4 to 6 PM.

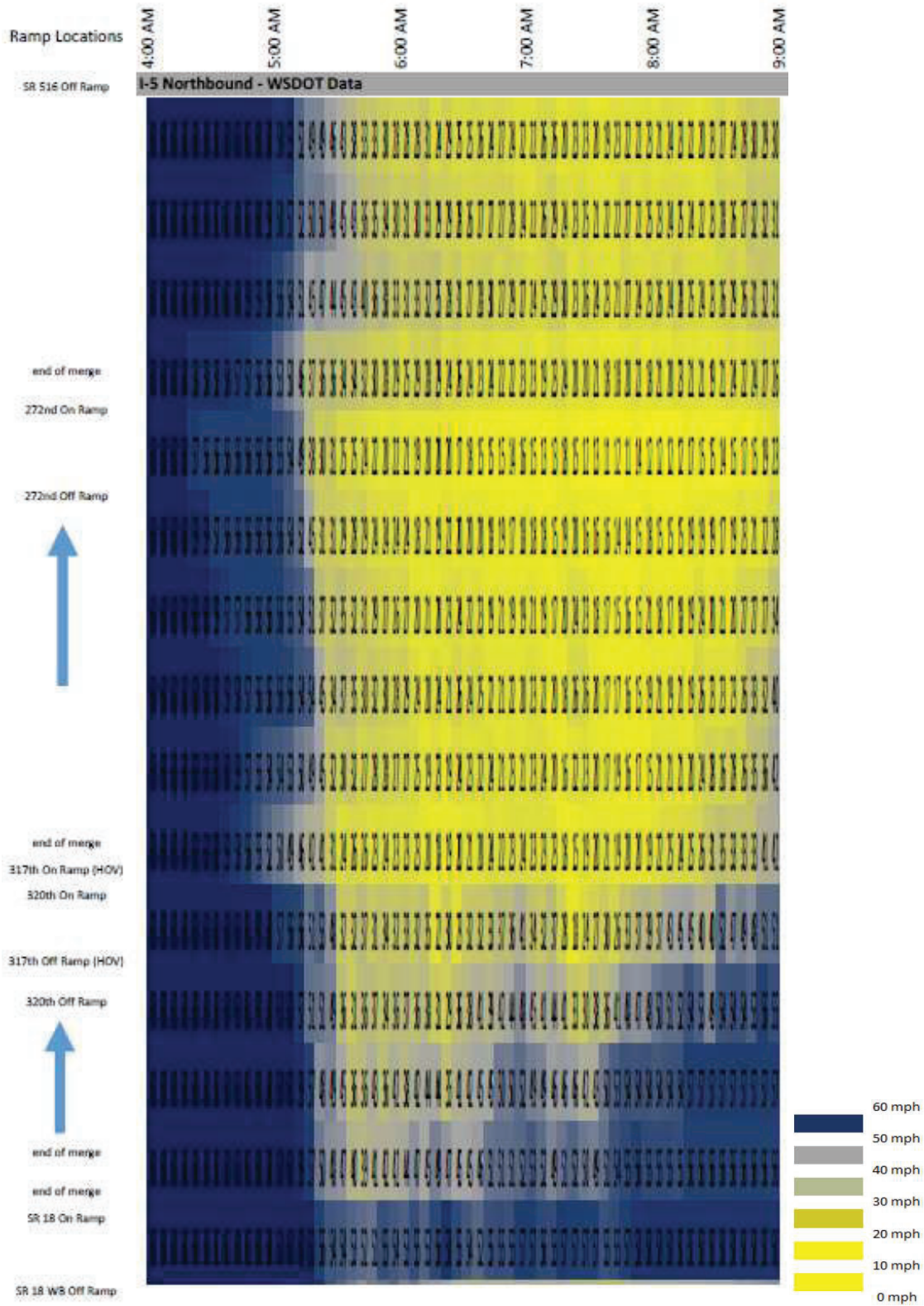


Figure 1. Study Area Congestion Diagram - I-5 Northbound

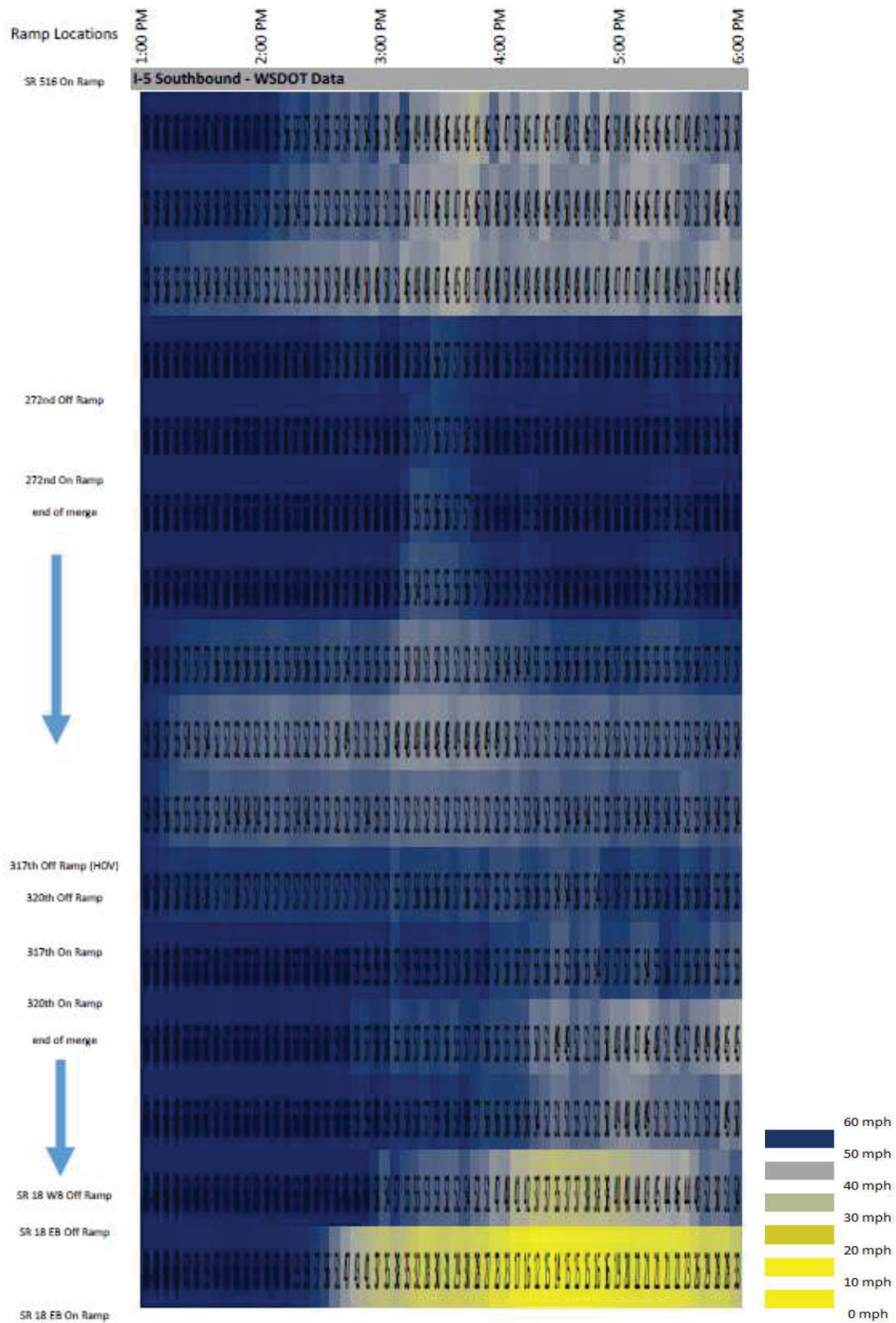


Figure 2. Study Area Congestion Diagram - I-5 Southbound

Figure 2. Study Area Congestion Diagram - I-5 Southbound

The existing conditions VISSIM model exit links on I-5 (northbound in the AM peak and southbound in the PM peak) will be modified to create artificial bottlenecks at the system exits. The artificial bottlenecks will be modeled by creating a dummy link at the end of the system with artificially low capacity, and routing vehicles onto the dummy link for a period of time necessary to create the congestion exiting the system.

Congestion originating outside the study area in the future year 2045 VISSIM models will be accounted for in a similar manner. The Gateway Project IJR will be referenced to compare against the Federal Way CCA model, to determine if the duration and extents of the congestion originating outside the study area is similar. The capacity on the dummy link and the period of time vehicles are routed to the dummy link may be adjusted if necessary. The results of the Gateway Project IJR are not directly comparable to the Federal Way CCA model though as the Gateway Project IJR includes the unfunded southbound auxiliary lane between SR 509 and S 320th Street. This improvement draws more trips into the Federal Way CCA study area but is not included in the Federal Way CCA project as it is not a funded improvement.

3. VISSIM CONFIDENCE AND CALIBRATION

3.1 Confidence – Number of Model Runs

The number of VISSIM model runs needed to ensure an accurate reflection of the average model output will be determined by comparing the average output from n runs to the average output from $n-5$ runs. For example, the average output of 15 runs will be calculated, and compared to the average output from only 10 of those runs. If the average output values are similar, this indicates that 15 model runs are sufficient because the 5 additional runs (compared to the original 10) did not change the average output from the model. If the output values are different between the 15-run and 10-run averages, this indicates that 15 runs may not be sufficient because the 5 additional runs (compared to the original 10) are changing the average output. The number of runs required will be determined in the existing calibration. The year 2045 models will use the same number of runs and same random seed values.

3.2 Calibration Targets

The existing VISSIM model will be calibrated to reflect conditions in the field during the weekday AM and PM peak periods. The VISSIM models will be calibrated to throughput volumes, freeway speeds, and travel times as described below.

- Throughput Volumes – The model throughput volume at all I-5 mainline and ramp segments in the study area will be calibrated to a GEH less than three during the peak hour. Total volumes during the 4-hour peak periods will also be reviewed for the same locations, but the total volumes will be calibrated to within five percent of total peak period 4-hour count volumes because the GEH is not applicable to multi-hour volume periods.
- Freeway Speeds – WSDOT provided speed data (see Figures 1 and 2) will be visually compared to model speed data, supplemented with field observations of freeway operations

during the peaks. The speeds shown in Figures 1 and 2 are representative of speed data at a point every half mile, for a 5-minute period. The speed data at each point is extrapolated from loop detector data where available. The extrapolation from available loop detector locations to half-mile points results in some inconsistencies between congestion shown in the charts and congestion observed in the field.

- For example, Figure 2 shows congestion during the PM peak occurring at milepost 148, but field observations indicate this congestion occurs at the off ramp to S 272nd Street, which is at milepost 147.
- Travel Times – The model corridor travel times on I-5 between north of SR 18 and south of SR 516 will be calibrated to between the 50th percentile and 95th percentile travel times provided by WSDOT for each 15-minute interval during the 4-hour peak periods.

3.3 Calibration Parameters

The model parameters described below will be adjusted to meet the calibration targets:

- Local arterials and off ramps will use the Wiedemann 74 driver behavior model which includes the following parameters:
 - Observed vehicles – The default value is 4 vehicles, but observed vehicles includes network elements such as stop signs, priority rules and signals. On busy urban arterials, this value may need to be increased.
 - Average standstill distance – the default value is 6.56 feet, this value may be adjusted to modify the queue length of stopped vehicles.
 - W74bxAdd/W74bsMult – the default values are 2/3, adjusting these values modifies the desired safety distance between moving vehicles. These values will be adjusted by the same absolute value if modified, e.g. from 2/3 to 2.5/3.5 (+0.5 to each parameter)
- Freeway segments and on ramps will use the Wiedemann 99 driver behavior model which includes the following parameters:
 - CC0 (Standstill Distance) – The default value is 4.92, this value may be adjusted to modify the queue length of stopped vehicles.
 - CC1 (Headway Time) – the default value is 0.9, adjusting this value modifies the desired safety distance between moving vehicles and is the primary factor for setting roadway capacity.
- Lane change distance will be adjusted as necessary at off ramps, drop lanes, and turn movements at intersections so that vehicles do not stop upstream of a connector to make a lane change.

Appendix D

Safety Methods and Assumptions



TECHNICAL MEMORANDUM

DATE: February 5, 2020
TO: Naveen Chandra
FROM: Sandy Glover,
Charles Allen
SUBJECT: Safety Analysis Methods and Assumptions
CC: Desiree Winkler
Rick Perez
Tresia Gonzalez
PROJECT NUMBER: 554-2441-022
PROJECT NAME: Federal Way City Center Access Study

The following describes the safety analysis methods and assumptions for the project. The purpose of the analysis is to determine the effect of the preliminary preferred Build Alternative (Alternative 2I) compared to the No Build Alternative, for documentation in the Access Revision Report and to support environmental documentation.

BUILD ALTERNATIVE DESCRIPTION

The Build Alternative would modify the ramps to and from the existing S 320th Street to include a connection to S 324th Street, as depicted in Exhibit 1. The ramp gore locations to and from I-5 to the south would move further south, but there would not be an increase in the number of gores to and from I-5. One off ramp in each direction would serve both S 320th and S 324th Street, and one on ramp in each direction would serve both roadways. Ramp meters would be installed to meter traffic from S 324th Street. S 320th Street on ramp traffic would be metered as they are today with potential modifications for increased queue storage.

The Build Alternative assumes the local changes to the local street system:

- Include HOV lanes on S 320th Street from Pacific Highway to Military Road S.
- Extend S 324th Street from 23rd Avenue S to Weyerhaeuser Way S. The intersection of S 324th Street/23rd Avenue S would likely be a signal or roundabout; and the intersection of S 324th Street/Weyerhaeuser Way S would be a roundabout.

The *Federal Way City Center Access Study Interchange Access Modification Alternatives Definitions Technical Memorandum* (Parametrix, November 2019) includes a detailed description of the No Build and Build Alternatives.

METHODOLOGY

The safety conditions will be analyzed according to methods in the WSDOT Safety Analysis Guide which recommends using the Highway Safety Manual (HSM) predictive methods. However, the WSDOT Safety Analysis Guide states that using HSM predictive methods outside the boundaries for which they are developed jeopardizes

results. When these conditions occur, the HSM predictive models cannot be used. Instead, the WSDOT Safety Analysis Guide states that observed crash history should be used along crash modification factors (CMFs).

Study area existing conditions and the Build Alternative employ several components that extend beyond the limitations for HSM predictive methods for freeway and arterial facilities, namely continuous access High Occupancy Vehicle (HOV) lanes, roundabouts, and arterials with six or more lanes. Hence, the analysis will follow a modified approach. The study area historic crashes will be reviewed for existing safety concerns. For portions of the I-5 corridor where the preliminary preferred alternative changes network conditions, HSM CMFs (if applicable) or a qualitative analysis will be used to document the effect of the preliminary preferred alternative. Safety concerns within portions of I-5 beyond the immediate impact area of the preliminary preferred alternatives will be noted but specific mitigations will not be identified if conditions remain the same as the No Build. Safety issues on surface streets within the study area will be evaluated according to Federal Way policy.

The identification of safety concerns will separate crashes into sub areas by facility type and feature:

- arterial segments
- arterial intersections
- freeway mainline segments
- freeway ramps
- freeway ramp terminals

Each analysis sub area will be analyzed in the context of the facility type and feature. Analysis will include a human factor review of the preliminary preferred alternative and a review of fatal and serious injury crashes, as well as pedestrian-involved and bicycle-involved crashes. The safety impacts of the changes proposed by the preliminary preferred alternative will receive particular focus, such as the shifting of I-5 ramp gore points, the addition of HOV lanes on S 320th Street, and roadway reconfigurations to connect to the new I-5/S 324th Street interchange. If it is determined at a later date that quantitative analysis with HSM predictive methods for a specific area of concern is needed and appropriate, the approach may be amended to reflect the revised methodology.

ASSUMPTIONS

The following are the key assumptions,

- WSDOT will provide five years of crash data
- The safety analysis study area will include:
 - I-5 mainline from S 272nd Street to SR 18 (see Exhibit 2)
 - I-5 ramps to/from S 324th Street and S 320th Street and the ramp termini at these interchanges
 - S 320th Street from SR 99 to Weyerhaeuser Way S
 - S 324th Street from SR 99 to Weyerhaeuser Way S
- Analysis will be conducted for Existing Conditions, Year 2045 No Build Alternative, and Year 2045 Alternative 2I (preliminary preferred)

Exhibit 1. Build Alternative (Alternative 2I)



Intersection Control

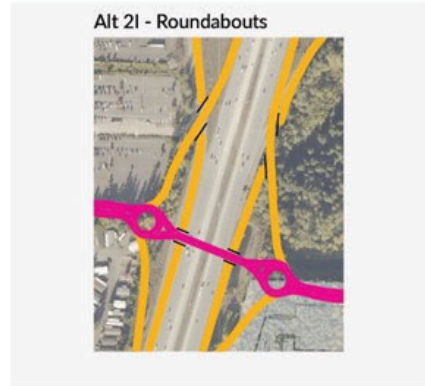
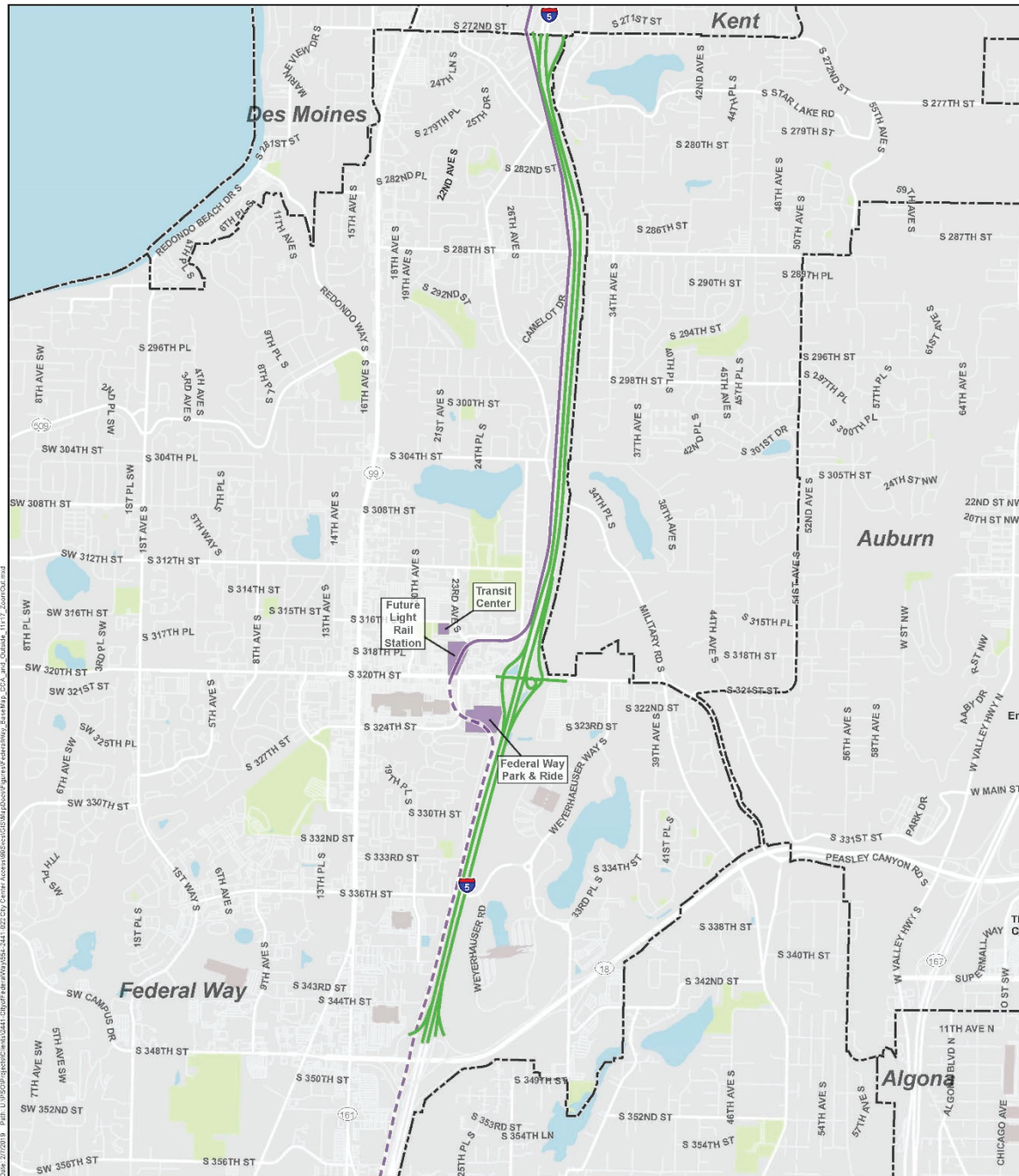


Exhibit 2. I-5 Corridor Limits



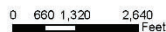
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Parametrix



Source: City of Federal Way,
King County, © Mapbox,
© OpenStreetMap

- Freeway Analysis Study Area
- Federal Way Link Extension Alignment
- - - Tacoma Dome Link Extension Representative Alignment
- - - City Limit



Appendix E

Screening Criteria and Weighting



Baseline and Contextual Needs

Issue/Needs Statements	BN/CN	Metric	Target
Improve Economic Vitality and Quality of Life			
Issue: Address City of Federal Way Comprehensive Plan goals			
Needs:			
Provide opportunities for traffic to travel around the core	BN1	Do routes exist that do not bisect the City center?	Yes
Protect views within the City Center	CN1	Are views preserved?	Yes
Maintain roadway cross section consistent with City's standards	BN2	Are the roadway cross sections consistent with City's standards?	Yes
Issue: Increasing roadway congestion on S 320th St			
Needs:			
Decrease roadway congestion on S 320th St	BN3	Travel time between Pac Hwy and Military Rd and # number of people (by mode)	Travel time <= today
Maintain or improve access to and from City Center	BN4	LOS and v/c at intersections	v/c < 1.0 on every lane group
	BN4		LOS D (ramp terminals)
	BN5	Delay (transit)	Delay <= today
	BN6	Are access management standards maintained or improved?	Yes
	BN17	Is business access maintained and property takes minimized?	Yes
Issue: Poor multi modal mobility			
Needs:			
Improve nonmotorized mobility to increase use of transit facilities. Provide nonmotorized options to circulate within the City Center and at the study area boundaries improve connections to regional or the citywide facilities.	BN7	Nonmotorized system gap analysis	Yes
	BN8	Level of traffic stress (LTS) criteria	LTS <= 2
	BN9	Minimize roadway crossing widths	Consistent with City's street design standards
Issue: Impaired freight truck movement			
Needs:			
Improve freight truck mobility to support the City Center and regional service	BN10	Travel time between Pac Hwy and Military Rd	Travel time <= today

Issue: Delayed emergency response

Needs:

Improve emergency response	CN2	Potential for reoccurring queue spillbacks	v/c < 1.0 on every lane group
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Issue: Decreased safety

Needs:

Improve safety for the general traveling public on the S 320th St corridor and study area	BN11	Improvement to collision rates	Better than No Build
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Improve safety for the general traveling public on the S 312th and/or S 324th St corridor and study area	BN18	Improvement to collision rates	Better than No Build
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Maintain Integrity of the Interstate System

Issue: Local Queues Impact Mainline I-5

Needs:

Improve safety for the general traveling public on the Interstate and ramps	BN12	Local queue spillback on I-5 off ramps at S 272th, S 320th, and S 348th St	Local queues do not extend into ramp deceleration area
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BN13	Number of gore points equal to today	Yes
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BN14	Improvement to collision rates	< No Build
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Issue: Regional Congestion on I-5

Needs:

Maintain or improve I-5 mobility for persons and freight trucks	BN15	Local queue spillback on I-5 off ramps (length and duration) at S 272th, S 320th, and S 348th St	Local queues do not extend into ramp deceleration area
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BN16	Travel time on I-5 between S 272th St to SR 18/S 348th St	<= today
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Design and Environmental Considerations

Criteria	Criteria #	Metric
Design Considerations/Issues		
Operations and Maintenance	D1	O&M costs, such as for tunnels (life safety systems, pumping), additional signal systems vs roundabouts, landscaping, structures
Constructability	D2	Ability to construct without major impacts to the traveling public Ability to construct to standards without major ROW acquisitions and no relocation of major utilities
Ability to treat stormwater per requirements	D3	Room to treat, detain and maintain per stormwater targets
Cost	D4	Relative comparison of alternatives based on presence of high cost elements
Compatibility with planned I-5 projects	D5	Compatibility with future I-5 expansion projects and LRT (Federal Way Link Extension, Tacoma Link Extension)
Environmental Screening		
Impacts to neighborhoods	E1	Residential displacements, traffic and noise impacts (increase in travel lanes, change in travel lane location, change in roadway classification, increases in traffic volumes)
Impacts on parks	E2	Property acquisitions, traffic and noise impacts (increase in travel lanes, change in travel lane location, change in roadway classification, increases in traffic volumes) to Steel Lake Park
Impacts on Ecological Resources	E3	Proximity to identified resources
Impacts to cultural resources	E4	Proximity to cultural resources
Impacts to existing or planned commercial/industrial properties	E5	Relative potential for acquisition
Impacts to future land uses	E6	Ability to accommodate or be compatible with future roadway improvements to address potential growth
Public/stakeholder acceptance	E7	Degree of public acceptance and identified concerns

Each individual criterion was assigned a weighting percentage to account for the relative importance of the criteria to one another. For each of the four categories, the weighting percentages totaled 100%, as shown below. These weighting percentages were determined by the SST members, who voted on which criteria were more important than others.

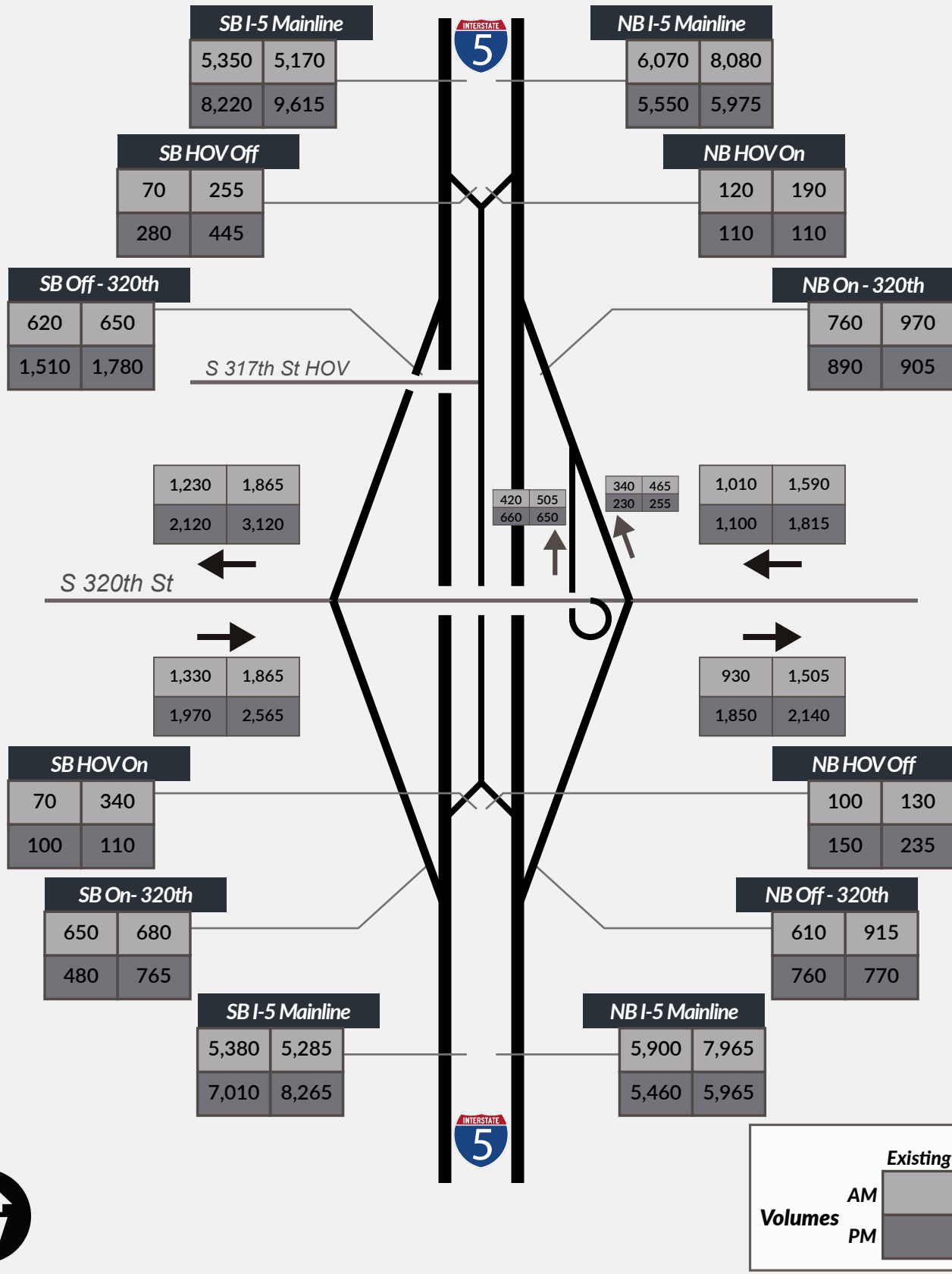
Criteria Weighting

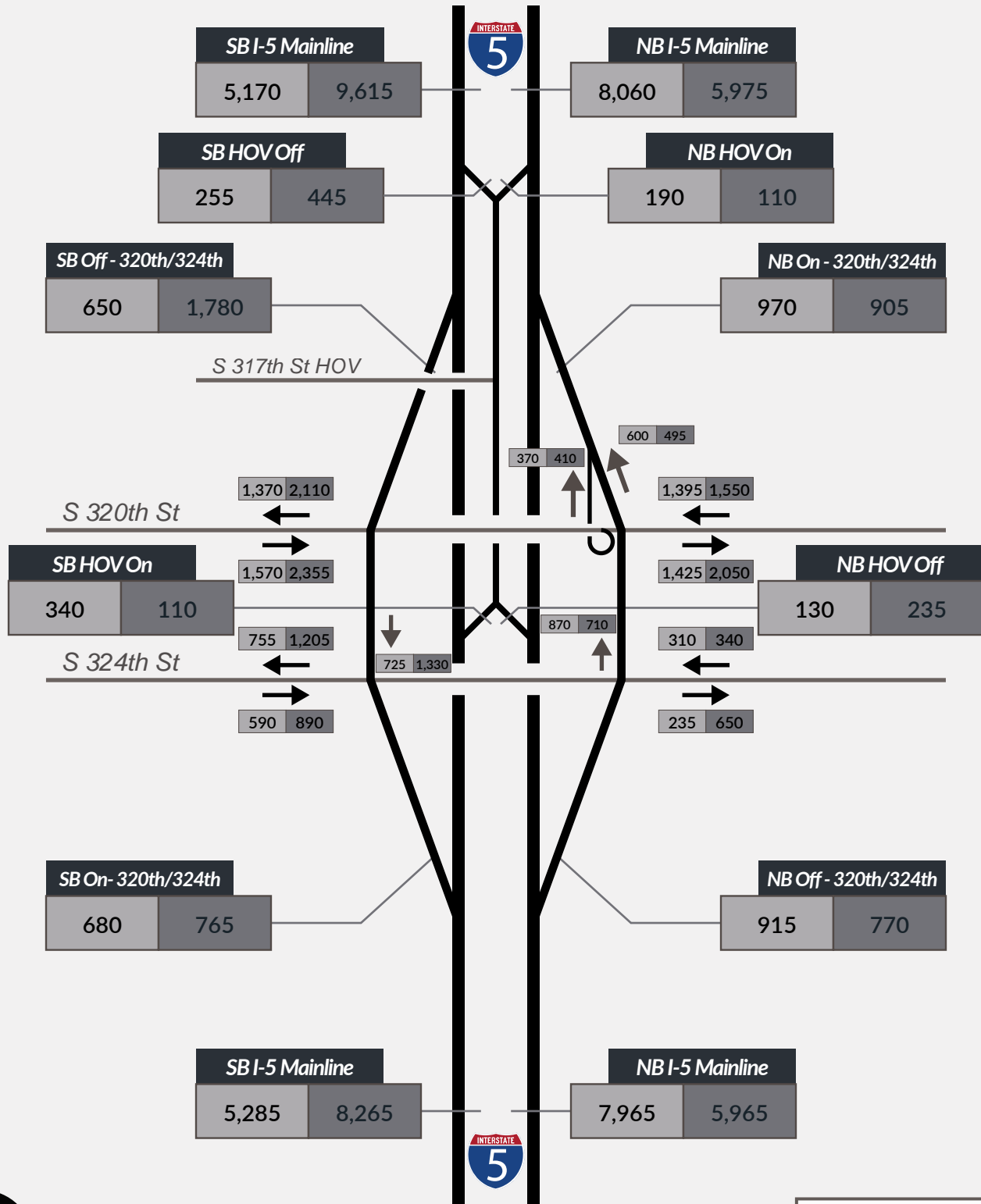
BASELINE AND CONTEXTUAL NEEDS		OTHER SCREENING CRITERIA	
BN/CN	Weighting Percentage	Criteria #	Weighting Percentage
BN1	3%	D1	16%
BN2	2%	D2	14%
BN3	5%	D3	12%
BN4	4%	D4	28%
BN5	5%	D5	30%
BN6	2%	TOTAL	100%
BN7	6%	E1	16%
BN8	3%	E2	20%
BN9	5%	E3	14%
BN10	4%	E4	18%
BN11	9%	E5	6%
BN12	10%	E6	14%
BN13	6%	E7	12%
BN14	10%	TOTAL	100%
BN15	10%		
BN16	6%		
BN17	3%		
BN18	8%		
TOTAL	100%		
CN1	0%		
CN2	100%		
TOTAL	100%		

Appendix F

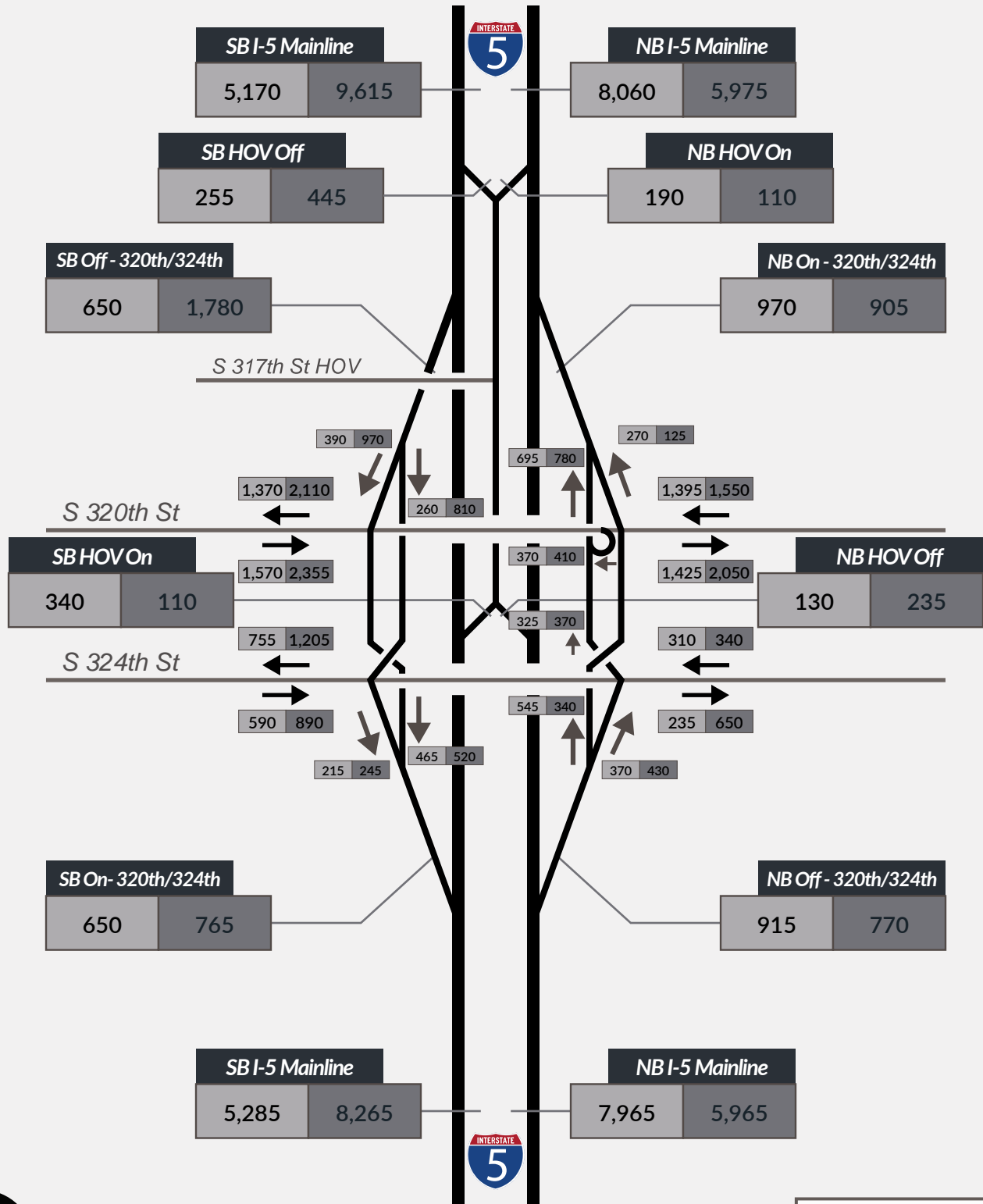
Traffic Volume Forecasts



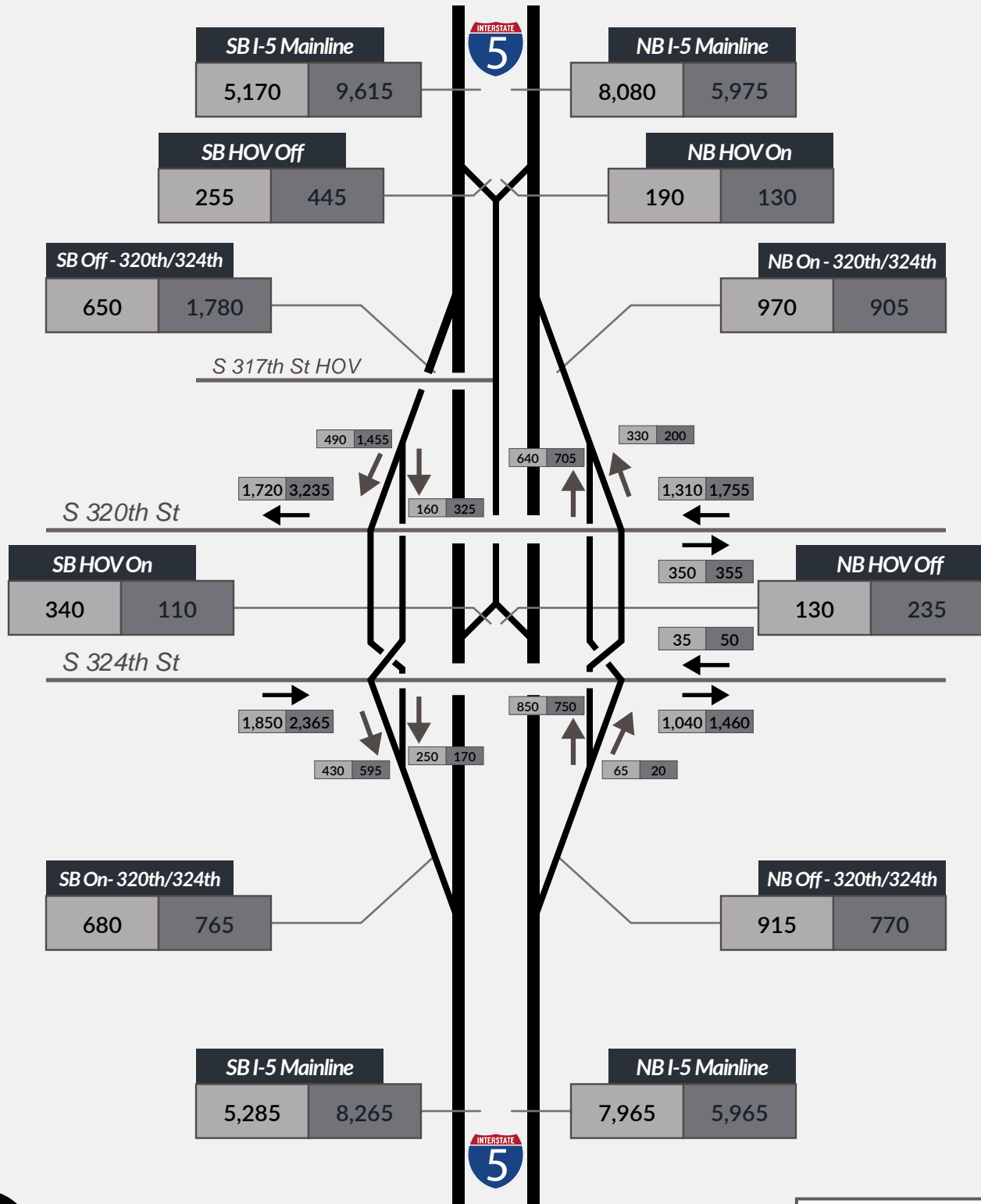




	AM Peak Hour	PM Peak Hour
Volumes		



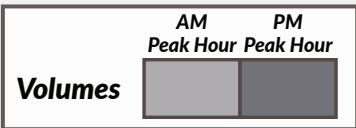
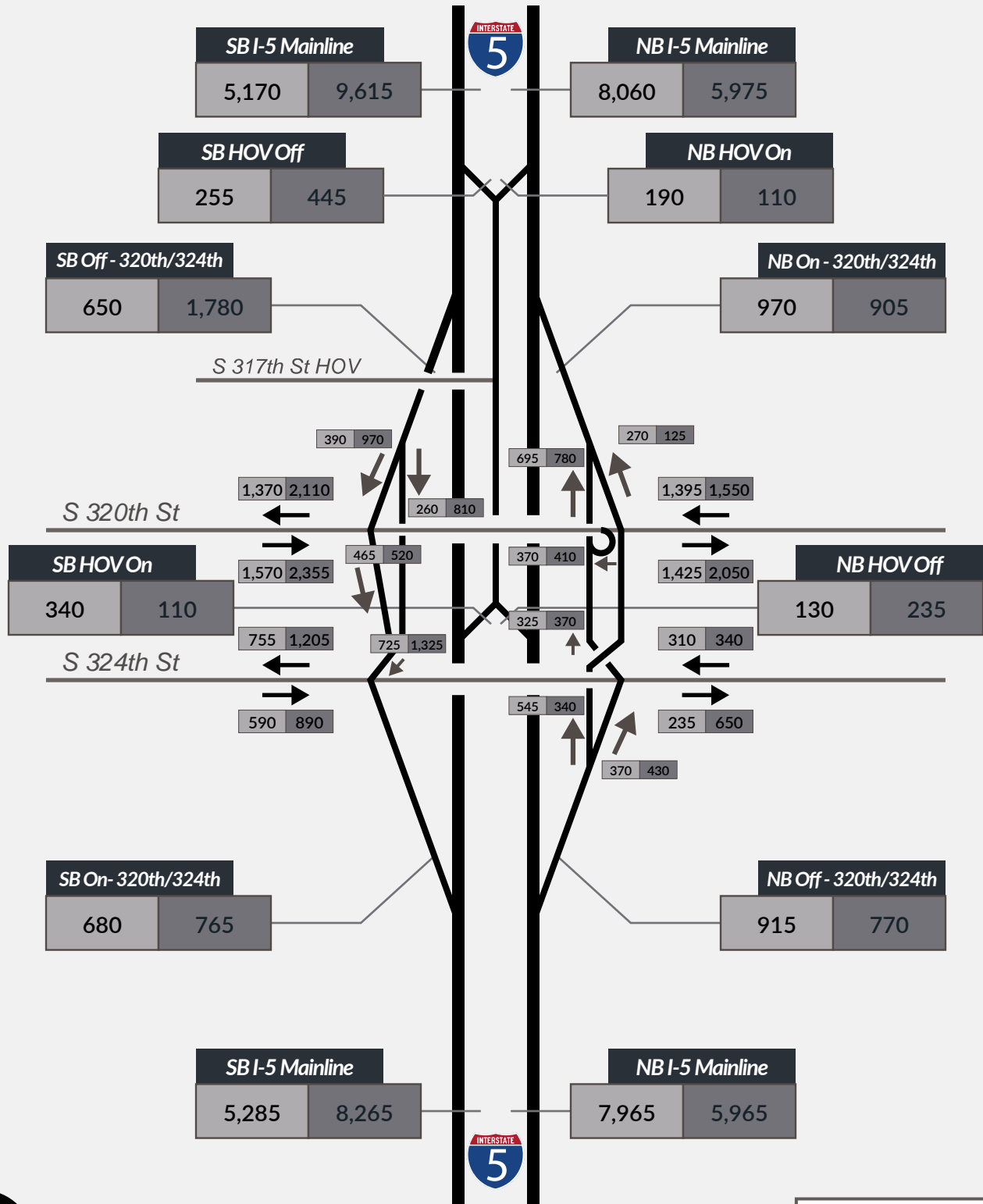
	AM Peak Hour	PM Peak Hour
Volumes		



	AM Peak Hour	PM Peak Hour
Volumes		

Parametrix

**Grade Separated Ramps Alternative, Arterial Couplet (2)
Year 2045 AM and PM Peak Vehicles per Hour**

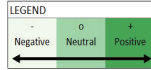


Appendix G

Level 1 Screening Results



City of Federal Way CCA
Interchange Concepts Fatal Flaw and Level 1 Preliminary Screening



BASELINE AND CONTEXTUAL NEEDS				SCREENING ANALYSIS DEFINITIONS	
Issue/Needs Statements	BN/CN	Metric	Target	Level 1	Level 2
Issue: Address City of Federal Way Comprehensive Plan goals					
Needs:					
Provide opportunities for traffic to travel around the core	BN1	Do routes exist that do not bisect the City center?	Yes	Negative - restricts existing routes Neutral - no change Positive - new or improved alternate routes	Same as Level 1 screening
Protect views within the City Center	CN1	Are views preserved?	Yes	Data source: qualitative review Negative - views not preserved Positive - views are preserved	Same as Level 1 screening
Maintain roadway cross section consistent with City's standards	BN2	Are the roadway cross sections consistent with City's standards?	Yes	Data source: qualitative review Negative - standards not met Positive - standards are met	Same as Level 1 screening
Issue: Increasing roadway congestion on S 320 St					
Needs:					
Decrease roadway congestion on S 320 St	BN3	Travel time between Pac Hwy and Military Rd and # number of people (by mode)	Travel time <= today	Negative - increase v/c Neutral - v/c similar to No Build Positive - some v/c < 1.0	Same as Level 1 screening Data source: SimTraffic or VISSIM
Maintain or improve access to and from City Center	BN4	LOS and v/c at intersections	v/c < 1.0 on every lane group	Data source: Synchro v/c ratios Negative - increase v/c Neutral - v/c similar to No Build Positive - some v/c < 1.0	Same as Level 1 screening
	BN4	LOS D (ramp terminals) -- Assumed overall intersection LOS not approach.	LOS D (ramp terminals) -- Assumed overall intersection LOS not approach.	Data source: Synchro v/c ratios Negative - LOS D or worse Neutral - LOS similar to No Build Positive - LOS better than D	Same as Level 1 screening
	BN5	Delay (transit)	Delay <= today	Data source: Synchro HCM LOS Negative - some transit delays increase Neutral - similar to No Build Positive - some transit delays decrease	Same as Level 1 screening
	BN6	Are access management standards maintained or improved?	Yes	Data source: Synchro v/c ratios Negative - standards worsen Positive - standards maintained or improved	Same as Level 1 screening
	BNx	Is business access maintained and property takes minimized?	Yes	Negative - worsens Neutral - maintains Positive - improves	Same as Level 1 screening
Issue: Poor multi modal mobility					
Needs:					
Improve nonmotorized mobility to increase use of transit facilities. Provide nonmotorized options to circulate within the City Center and at the study area boundaries	BN7	Nonmotorized system gap analysis	Yes	Negative - increases gaps Neutral - no change in gaps Positive - decreases gaps	Same as Level 1 screening
Improve connections to regional or the citywide facilities.	BN8	Level of traffic stress criteria	LTS <= 2	Negative - LTS worsens compared to No Build Neutral - no change to LTS compared to No Build Positive - LTS <= 2	Same as Level 1 screening Data source: LTS analysis
	BN9	Minimize roadway crossing widths	Consistent with City's street design standards	Data source: qualitative LTS Negative - not consistent with street standards Neutral - consistent with street standards Positive - reduces ped crossings widths	Same as Level 1 screening
Issue: Impaired freight truck movement					
Needs:					
Improve freight truck mobility to support the City Center and regional service	BN10	Travel time between Pac Hwy and Military Rd	Travel time <= today	Negative - increase v/c compared to No Build Neutral - v/c similar to No Build Positive - some v/c < 1.0	Same as Level 1 screening Data source: SimTraffic or VISSIM
				Data source: Synchro v/c	

Improve Economic Vitality and Quality of Life



	SCREENING ANALYSIS DEFINITIONS			
	Issue/Needs Statements	BN/CN	Metric	Target
				Level 1 Rating criteria Data source
				Level 2
	Issue: Delayed emergency response			
	Needs:			
	Improve emergency response	CN2	Potential for reoccurring queue spillbacks	v/c < 1.0 on every lane group
				Negative - increase v/c compared to No Build Neutral - v/c similar to No Build Positive - some v/c < 1.0 Data source: Synchro v/c
	Issue: Decreased safety			
	Needs:			
	Improve safety for the general traveling public on the S 320 St corridor and study area	BN11	Improvement to collision rates	Better than No Build <u>NOTE: Qualitative review for Level 1 screening</u>
				Negative - collision rates increase compared to No Build Neutral - collision rates similar to No Build Positive - collision rates decrease compared to No Build Data source: HSM analysis (at ramp terminals)
	Same as safety above but for S 312th St and S 324th St corridors			
	Issue: Local Queues Impact Mainline I-5			
	Needs:			
	Improve safety for the general traveling public on the Interstate and ramps	BN12	Local queue spillback on I-5 off ramps at S 272, S 320, and S 348 St	Local queues do not extend into ramp deceleration area <u>NOTE: Qualitative review for Level 1 screening</u>
				Negative - queues increase compared to No Build Neutral - similar to No Build Positive - queues decrease compared to No Build Data source: Synchro v/c ratios
		BN13	Number of gore points equal to today	Yes
				Negative - increased gore points Neutral - no change in gore points Positive - reduction in gore points Data source: Synchro v/c ratios
		BN14	Improvement to collision rates	< No Build <u>NOTE: Qualitative review for Level 1 screening</u>
				Negative - collision rates increase compared to No Build Neutral - collision rates similar to No Build Positive - collision rates decrease compared to No Build Data source: HSM analysis
	Issue: Regional Congestion on I-5			
	Needs:			
	Maintain or improve I-5 mobility for persons and freight trucks	BN15	Local queue spillback on I-5 off ramps (length and duration) at S 272, S 320, and S 348 St	Local queues do not extend into ramp deceleration area <u>NOTE: Qualitative review for Level 1 screening</u>
				Negative - queues increase Neutral - similar to No Build Positive - queues decrease Data source: Synchro v/c ratios
		BN16	Travel time on I-5 between S 272 St to SR 18/S 348 St	<= today <u>NOTE: Qualitative review for Level 1 screening</u>
				Negative - increase v/c Neutral - v/c similar to No Build Positive - some v/c < 1.0 Data source: SimTraffic or VISSIM
	Data source: Synchro v/c ratios			

Maintain integrity of the Interstate System

OTHER SCREENING CRITERIA			
Criteria	Criteria #	Metric	
Design Considerations/Issues (Feasibility)			
Operations and Maintenance	D1	O&M costs, such as for tunnels (life safety systems, pumping), additional signal systems vs roundabouts, landscaping, structures	<p>Negative - Increase in O&M cost compared to today (such as stormwater pumping systems & life safety systems for tunnels, or significant new structure)</p> <p>Neutral - No change in O&M cost compared to today</p> <p>Positive - Reduced in O&M cost compared to today</p> <p>Data source: qualitative review</p> <p style="text-align: right;">➡</p>
Constructability	D2	Ability to construct without major impacts to the traveling public Ability to construct to standards without major ROW acquisitions and no relocation of major utilities	<p>Negative - Includes highly complicated design issues (such as relocation of BPA transmission lines, conflict with Olympic gas pipeline, ST rail closures outside 1-4 AM window, tunnels located below water level, bridges over 50 feet high)</p> <p>Neutral - No highly complicated issues but anticipate construction traffic impacts</p> <p>Positive - No complicated issues identified and minimal construction traffic impacts</p> <p>Data source: qualitative review</p> <p style="text-align: right;">➡</p>
Ability to treat stormwater per requirements	D3	Room to treat, detain and maintain	<p>Negative - Target is met for all project elements except for two. Two project elements will require proprietary treatment BMPs, R/W acquisition, off-site equivalent area mitigation, or pumping.</p> <p>Neutral - Target is met for all project elements except for one. one project element will require proprietary treatment BMPs, R/W acquisition, off-site equivalent area mitigation, or pumping.</p> <p>Positive - Target is met for all project elements</p> <p>Data source: qualitative review</p>
Cost	D4	Dollars	<p>Qualitative relative to other alternatives</p> <p>Same as Level 1 screening</p>
Compatibility with planned I-5 projects	D5	Consider compatibility with future I-5 expansion projects	<p>NOTE: Costs do not include ROW and the 2C local Arterial Couplet bid items</p> <p>Negative - No room to build project alternative</p> <p>Neutral - NA</p> <p>Positive -Room to build project alternative</p> <p>Data source: qualitative review</p> <p>NOTE: Costs do not include ROW and the 2C local Arterial Couplet bid items</p> <p style="text-align: right;">➡</p>
Environmental Screening			
Impacts to neighborhoods	E1	Residential displacements, traffic and noise impacts (increase in travel lanes, change in travel lane location, change in roadway classification, increases in traffic volumes)	<p>Negative - Improvements close to relatively large number of residential properties</p> <p>Neutral - Improvements close to some residential properties</p> <p>Positive - Fewest residential properties affected</p> <p>Data source: qualitative review</p> <p style="text-align: right;">➡</p>
Impacts on parks	E2	Property acquisitions, traffic and noise impacts (increase in travel lanes, change in travel lane location, change in roadway classification, increases in traffic volumes)	<p>Negative - Acquisition of Steel Lake Park property (no other parks identified adjacent to improvements)</p> <p>Neutral - No park property acquisition required</p> <p>Data source: qualitative review</p> <p style="text-align: right;">➡</p>
Impacts on Ecological Resources	E3	Proximity to identified resources	<p>Negative - more substantial impacts on ecological resources</p> <p>Neutral - some impacts on ecological resources</p> <p>Positive - no impacts on ecological resources</p> <p>Data source: qualitative review</p> <p style="text-align: right;">➡</p>
Impacts to cultural resources	E4	Proximity to cultural resources	<p>Negative - alignment traverses identified archaeological site</p> <p>Neutral - alignment may affect historic properties</p> <p>Data source: qualitative review</p> <p style="text-align: right;">➡</p>
Impacts to commercial/industrial properties	E5	Relative potential for acquisition	<p>Negative - directly impacts existing or planned development</p> <p>Neutral - indirectly impacts existing or planned development</p> <p>Positive - no impacts to existing or planned development</p> <p>Data source: qualitative review</p> <p style="text-align: right;">➡</p>
Impacts to future land uses	E6	Ability of an alternative to accommodate or be compatible with future roadway improvements to address potential growth	<p>Negative - Design does not accommodate land use changes in comp plan amendment and potential desired design modifications</p> <p>Neutral - Design does accommodate land use changes in comp plan amendment and compatible with potential capacity improvements</p> <p>Positive - Design does accommodate land use changes in comp plan amendment and provides space for potential capacity improvements</p> <p>Data source: qualitative review</p> <p style="text-align: right;">➡</p>
Public/stakeholder acceptance	E7	Feedback from outreach process	<p>Negative - Known to be highly controversial</p> <p>Neutral - Potentially controversial, needs more vetting</p> <p>Positive - Not expected to be controversial</p> <p>Data source: qualitative review</p> <p style="text-align: right;">➡</p>



BASELINE AND CONTEXTUAL NEEDS

Issue/Needs Statements	BN/CN	Metric	Target
Issue: Address City of Federal Way Comprehensive Plan goals			
Needs:			
Provide opportunities for traffic to travel around the core	BN1	Do routes exist that do not bisect the City center?	Yes
Protect views within the City Center	CN1	Are views preserved?	Yes
Maintain roadway cross section consistent with City's standards	BN2	Are the roadway cross sections consistent with City's standards?	Yes
Issue: Increasing roadway congestion on S 320 St			
Needs:			
Decrease roadway congestion on S 320 St	BN3	Travel time between Pac Hwy and Military Rd and # number of people (by mode)	Travel time <= today
Maintain or improve access to and from City Center	BN4	LOS and v/c at intersections	v/c < 1.0 on every lane group
	BN4		LOS D (ramp terminals) -- Assumed overall intersection LOS not approach.
	BN5	Delay (transit)	Delay <= today
	BN6	Are access management standards maintained or improved?	Yes
	BNx	Is business access maintained and property takes minimized?	Yes
Issue: Poor multi modal mobility			
Needs:			
Improve nonmotorized mobility to increase use of transit facilities. Provide nonmotorized options to circulate within the City Center and at the study area boundaries	BN7	Nonmotorized system gap analysis	Yes
improve connections to regional or the citywide facilities.	BN8	Level of traffic stress criteria	LTS <= 2
	BN9	Minimize roadway crossing widths	Consistent with City's street design standards
Issue: Impaired freight truck movement			
Needs:			
Improve freight truck mobility to support the City Center and regional service	BN10	Travel time between Pac Hwy and Military Rd	Travel time <= today

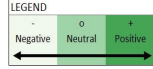
Improve Economic Vitality and Quality of Life

S 312th St Interchange Access Concepts			
1A Grade Separated Ramps		1B Single-Point Urban Interchange	
Level 1	Discussion	Level 1	Discussion
+	Extension of S 312th St creates an E-W route that extends from SR 509/Dash Point Rd to Military Rd S.	+	Extension of S 312th St creates an E-W route that extends from SR 509/Dash Point Rd to Military Rd S.
-	Elevated ramps to/from S 312th St along I-5 southbound could impact views.	0	Ramp connections are not elevated above LRT or existing roadways.
+	Standards are met.	+	Standards are met.
+	Issues remain at S 320th St/Military Rd S (County).	+	Issues remain at S 320th St/Military Rd S (County).
+	Issues remain at S 320th St/Military Rd S (County).	+	Issues remain at S 320th St/Military Rd S (County).
+	Criteria targets are met.	+	Criteria targets are met.
+	Issues remain at S 320th St/Military Rd S (County) with a WB v/c > 1.0.	+	Issues remain at S 320th St/Military Rd S (County) with a WB v/c > 1.0.
+	Standards are maintained.	+	Standards are maintained.
0	Potential impacts to apartment building.	0	Potential impacts to apartment building.
0	Does not improve connection opportunities to regional BPA trail.	0	Does not improve connection opportunities to regional BPA trail.
	POTENTIAL ALT MOD - Add S 317th St or S 324th St crossing.		POTENTIAL ALT MOD - Add S 317th St or S 324th St crossing.
0	Reduction in traffic volume on S 320th St will improve the LTS rating; Increased volume on S 312th St will degrade the LTS rating.	0	Reduction in traffic volume on S 320th St will improve the LTS rating; Increased volume on S 312th St will degrade the LTS rating.
0	S 312th St widening will increase crossing widths and pedestrian delays but crossings are within standards for an arterial.	0	S 312th St widening will increase crossing widths and pedestrian delays but crossings are within standards for an arterial.

				Level 1	Discussion	Level 1	Discussion	
Maintain integrity of the Interstate System	Issue/Needs Statements	BN/CN	Metric	Target				
	Issue: Delayed emergency response Needs: Improve emergency response	CN2	Potential for reoccurring queue spillbacks	v/c < 1.0 on every lane group				
	Issue: Decreased safety Needs: Improve safety for the general traveling public on the S 320 St corridor and study area	BN11	Improvement to collision rates	Better than No Build <i>NOTE: Qualitative review for Level 1 screening</i>	+	Decrease in travel demand; no new elements that would decrease safety such as unprotected left turns, or new signals.	+	Decrease in travel demand; no new elements that would decrease safety such as unprotected left turns, or new signals.
	Same as safety above but for S 312th St and S 324th St corridors							
	Issue: Local Queues Impact Mainline I-5 Needs: Improve safety for the general traveling public on the Interstate and ramps	BN12	Local queue spillback on I-5 off ramps at S 272, S 320, and S 348 St	Local queues do not extend into ramp deceleration area <i>NOTE: Qualitative review for Level 1 screening</i>	+	Criteria targets are likely met.	+	Criteria targets are likely met.
		BN13	Number of gore points equal to today	Yes	-	Adds a southbound off ramp gore point.	-	Adds a southbound off ramp gore point.
		BN14	Improvement to collision rates	< No Build <i>NOTE: Qualitative review for Level 1 screening</i>	-	Adds a southbound off ramp gore point and slightly higher southbound I-5 volumes north of S 312th St; will increase collision rate.	-	Adds a southbound off ramp gore point and slightly higher southbound I-5 volumes north of S 312th St; will increase collision rate.
	Issue: Regional Congestion on I-5 Needs: Maintain or improve I-5 mobility for persons and freight trucks	BN15	Local queue spillback on I-5 off ramps (length and duration) at S 272, S 320, and S 348 St	Local queues do not extend into ramp deceleration area <i>NOTE: Qualitative review for Level 1 screening</i>				
		BN16	Travel time on I-5 between S 272 St to SR 18/S 348 St	<= today <i>NOTE: Qualitative review for Level 1 screening</i>	+	Similar I-5 mainline volumes as No Build plus reduction of local queue spillbacks would likely result in improved travel times.	+	Similar I-5 mainline volumes as No Build plus reduction of local queue spillbacks would likely result in improved travel times.

OTHER SCREENING CRITERIA			Level 1	Discussion	Level 1	Discussion
Design Considerations/Issues (Feasibility)						
Operations and Maintenance	D1	O&M costs, such as for tunnels (life safety systems, pumping), additional signal systems vs roundabouts, landscaping, structures	-	2 tunnels; structures over LRT * Includes two tunnels (S 312th St SB off-ramp and S 312th St NB bypass off-ramp) that require maintenance of fire-suppression, ventilation and drainage pumps. S 312th St SB off-ramp tunnel requires groundwater management. * S 312th St SB on-ramp bridge height and length create complications in access for maintenance and will impact LRT Operations.	-	1 tunnel; structures over LRT * Includes one tunnel (S 312th St NB bypass off-ramp) that require maintenance of fire-suppression, ventilation and drainage pumps. * Bridge maintenance on SPUI and S 312th St ramps will impact LRT operations.
Constructability	D2	Ability to construct without major impacts to the traveling public Ability to construct to standards without major ROW acquisitions and no relocation of major utilities	-	2 tunnels; 2 LRT overcrossings (none require significant closures); potential conflict with Olympic pipeline (with S 312th St NB bypass off-ramp) * S 312th St SB off-ramp tunnel will be under groundwater elevation and will need dewatering systems during construction. The tunnel is located under FWLE LRT and Military Rd S. * S 312th St SB on-ramp bridge will cross over the FWLE LRT. Construction likely can occur between 1 and 4 AM when LRT is closed. S 312th St SB on-ramp likely not enough clearance under the BPA high voltage transmission lines. * S 312th St NB bypass off-ramp may not be constructible do to conflicts with the Olympic pipeline. POTENTIAL DESIGN MOD - Remove S 312th St NB bypass off-ramp and replace with weaving ramps.	-	1 tunnel; 1 LRT overcrossing (requires significant closures); potential conflict with Olympic pipeline (with S 312th St NB bypass off-ramp) * The construction of the S 312th St SPUI and associated SB ramps require large cross rigging structures that will cross over the FWLE and I-5. Construction can not occur during 1 to 4AM ST rail closure window. * S 312th St SB on-ramp bridge will cross over the FWLE LRT. Construction likely can occur between 1 and 4 AM when LRT is closed. S 312th St SB on-ramp likely not enough clearance under the BPA high voltage transmission lines. * S 312th St NB bypass off-ramp may not be constructible do to conflicts with the Olympic pipeline. POTENTIAL DESIGN MOD - Remove S 312th St NB bypass off-ramp and replace with weaving ramps.
Ability to treat stormwater per requirements	D3	Room to treat, detain and maintain	-	Two or more elements might require relocation of existing stormwater facilities to new location and / or reconstruction to more stringent standards. Existing and/or new stormwater facilities for two or more elements might be impacted by scope of injunction culverts.	-	Two or more elements might require relocation of existing stormwater facilities to new location and / or reconstruction to more stringent standards. Existing and/or new stormwater facilities for two or more elements might be impacted by scope of injunction culverts.
Cost	D4	Dollars	-	Estimated at \$358.4M. The tunnels for the S 312th St SB off-ramp and NB S 312th St bypass Off-ramp as well as the S 312th St On-ramp bridge are the biggest cost items.	-	Estimated at \$306.0M.
Compatibility with planned I-5 projects	D5	Consider compatibility with future I-5 expansion projects	-	Not compatible with the Gateway Project when building the SB 312th Off-ramp.	-	Not compatible with the Gateway Project when building the SB 312th Off-ramp.
Environmental Screening						
Impacts to neighborhoods	E1	Residential displacements, traffic and noise impacts (increase in travel lanes, change in travel lane location, change in roadway classification, increases in traffic volumes)	-	Displacement relatively high due to MF and SF impacts west of I-5. One impacted property is a group home. Partial acquisition is required for more residential properties, putting traffic closer to homes.	O	Displacement reduced due to SPUI and tighter ramps west of I-5. Still the elevation of S 312th St looks to eliminate access to some homes. Loop access to 32nd also takes some properties.
Impacts on parks	E2	Property acquisitions, traffic and noise impacts (increase in travel lanes, change in travel lane location, change in roadway classification, increases in traffic volumes)	-		-	
Impacts on Ecological Resources	E3	Proximity to identified resources	-	More potential impacts to wetlands and streams.	-	More potential impacts to wetlands and streams.
Impacts to cultural resources	E4	Proximity to cultural resources	O		O	
Impacts to commercial/industrial properties	E5	Relative potential for acquisition	O	Ramp west of I-5 may encroach on hotel.	+	
Impacts to future land uses	E6	Ability of an alternative to accommodate or be compatible with future roadway improvements to address potential growth	-		-	
Public/stakeholder acceptance	E7	Feedback from outreach process	-		-	

City of Federal Way CCA
Interchange Concepts Fatal Flaw and Level 1 Preliminary Screening



BASELINE AND CONTEXTUAL NEEDS

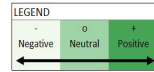
Issue/Needs Statements	BN/CN	Metric	Target
Issue: Address City of Federal Way Comprehensive Plan goals			
Needs:			
Provide opportunities for traffic to travel around the core	BN1	Do routes exist that do not bisect the City center?	Yes
Protect views within the City Center	CN1	Are views preserved?	Yes
Maintain roadway cross section consistent with City's standards	BN2	Are the roadway cross sections consistent with City's standards?	Yes
Issue: Increasing roadway congestion on S 320 St			
Needs:			
Decrease roadway congestion on S 320 St	BN3	Travel time between Pac Hwy and Military Rd and # number of people (by mode)	Travel time <= today
Maintain or improve access to and from City Center	BN4	LOS and v/c at intersections	v/c < 1.0 on every lane group
	BN4		LOS D (ramp terminals) -- Assumed overall intersection LOS not approach.
	BN5	Delay (transit)	Delay <= today
	BN6	Are access management standards maintained or improved?	Yes
	BNx	Is business access maintained and property takes minimized?	Yes
Issue: Poor multi modal mobility			
Needs:			
Improve nonmotorized mobility to increase use of transit facilities. Provide nonmotorized options to circulate within the City Center and at the study area boundaries	BN7	Nonmotorized system gap analysis	Yes
improve connections to regional or the citywide facilities.	BN8	Level of traffic stress criteria	LTS <= 2
	BN9	Minimize roadway crossing widths	Consistent with City's street design standards
Issue: Impaired freight truck movement			
Needs:			
Improve freight truck mobility to support the City Center and regional service	BN10	Travel time between Pac Hwy and Military Rd	Travel time <= today

Improve Economic Vitality and Quality of Life

2A Split Diamond		2B Grade Separated Ramps	
Level 1	Discussion	Level 1	Discussion
O	Extension of S 324th St creates an E-W route that extends from 11th Ave S to Weyerhaeuser Wy S.	O	Extension of S 324th St creates an E-W route that extends from 11th Ave S to Weyerhaeuser Wy S.
O	Ramp connections are not elevated above LRT or existing roadways.	O	Ramp connections are not elevated above LRT or existing roadways.
+	Standards are met.	+	Standards are met.
+	Issues likely at S 320th St/Military Rd S (County).	+	Issues likely at S 320th St/Military Rd S (County).
+	Issues remain at S 324th St/Pac Highway and issues likely at S 320th St/Military Rd S (County).	+	Issues remain at S 324th St/Pac Highway and issues likely at S 320th St/Military Rd S (County).
+	Criteria targets are met.	+	Criteria targets are met.
+	Issues likely at S 320th St/Military Rd S (County).	+	Issues likely at S 320th St/Military Rd S (County).
+	Standards are maintained.	+	Standards are maintained.
+	Business access is maintained.	+	Business access is maintained.
+	Allows potential connection to BPA trail via S 324th St overcrossing and Weyerhaeuser Wy.	+	Allows potential connection to BPA trail via S 324th St overcrossing and Weyerhaeuser Wy.
O	Reduction in traffic volume on S 320th St will improve the LTS rating; Increased volume on S 324th St will degrade the LTS rating.	O	Reduction in traffic volume on S 320th St will improve the LTS rating; Increased volume on S 324th St will degrade the LTS rating.
O	No significant roadway required. (Potential Weyerhaeuser Wy widening in locations; TBD).	O	No significant roadway required. (Potential Weyerhaeuser Wy widening in locations; TBD).

				Level 1	Discussion	Level 1	Discussion	
Maintain integrity of the Interstate System	Issue/Needs Statements	BN/CN	Metric	Target				
	Issue: Delayed emergency response Needs: Improve emergency response	CN2	Potential for reoccurring queue spillbacks	v/c < 1.0 on every lane group				
	Issue: Decreased safety Needs: Improve safety for the general traveling public on the S 320 St corridor and study area	BN11	Improvement to collision rates	Better than No Build <i>NOTE: Qualitative review for Level 1 screening</i>	+	Decrease in travel demand; no new elements that would decrease safety such as unprotected left turns, or new signals.	+	Decrease in travel demand; no new elements that would decrease safety such as unprotected left turns, or new signals.
	Same as safety above but for S 312th St and S 324th St corridors							
	Issue: Local Queues Impact Mainline I-5 Needs: Improve safety for the general traveling public on the Interstate and ramps	BN12	Local queue spillback on I-5 off ramps at S 272, S 320, and S 348 St	Local queues do not extend into ramp deceleration area <i>NOTE: Qualitative review for Level 1 screening</i>	+	Criteria targets are likely met.	+	Criteria targets are likely met.
		BN13	Number of gore points equal to today	Yes	O	Criteria targets are met	O	Criteria targets are met
		BN14	Improvement to collision rates	< No Build <i>NOTE: Qualitative review for Level 1 screening</i>	O	Traffic volumes and number of gore points similar to No Build (I-5 mainline).	O	Traffic volumes and number of gore points similar to No Build (I-5 mainline).
	Issue: Regional Congestion on I-5 Needs: Maintain or improve I-5 mobility for persons and freight trucks	BN15	Local queue spillback on I-5 off ramps (length and duration) at S 272, S 320, and S 348 St	Local queues do not extend into ramp deceleration area <i>NOTE: Qualitative review for Level 1 screening</i>				
		BN16	Travel time on I-5 between S 272 St to SR 18/S 348 St	<= today <i>NOTE: Qualitative review for Level 1 screening</i>	+	Similar I-5 mainline volumes as No Build plus reduction of local queue spillbacks would likely result in improved travel times.	+	Similar I-5 mainline volumes as No Build plus reduction of local queue spillbacks would likely result in improved travel times.

OTHER SCREENING CRITERIA			Level 1	Discussion	Level 1	Discussion
Design Considerations/Issues (Feasibility)						
Operations and Maintenance	D1	O&M costs, such as for tunnels (life safety systems, pumping), additional signal systems vs roundabouts, landscaping, structures	O	No tunnels; no structure over LRT	O	No tunnels; no structure over LRT
Constructability	D2	Ability to construct without major impacts to the traveling public Ability to construct to standards without major ROW acquisitions and no relocation of major utilities	O	No tunnels; No LRT crossings; No major Olympic pipeline conflicts; No BPA conflicts	O	No tunnels; No LRT crossings; No BPA conflicts
Ability to treat stormwater per requirements	D3	Room to treat, detain and maintain	-	Two or more elements might require underground and/or proprietary treatment BMPs and/or be located below LRT structure. Existing and/or new stormwater facilities for two or more elements might be impacted by scope of injunction culverts.	-	Two or more elements might require relocation of existing stormwater facilities to new location and / or reconstruction to more stringent standards. Existing and/or new stormwater facilities for two or more elements might be impacted by scope of injunction culverts.
Cost	D4	Dollars	O	Estimated at \$127.3M	O	Estimated at \$126.6M
Compatibility with planned I-5 projects	D5	Consider compatibility with future I-5 expansion projects	+	Compatible with all future projects.	+	Compatible with all future projects.
Environmental Screening						
Impacts to neighborhoods	E1	Residential displacements, traffic and noise impacts (increase in travel lanes, change in travel lane location, change in roadway classification, increases in traffic volumes)	+	Only a couple of residential displacements in the corner of Belmor, but ramps closer to this community in general resulting in other impacts like noise.	+	Only a couple of residential displacements in the corner of Belmor, but ramps closer to this community in general resulting in other impacts like noise.
Impacts on parks	E2	Property acquisitions, traffic and noise impacts (increase in travel lanes, change in travel lane location, change in roadway classification, increases in traffic volumes)	O		O	
Impacts on Ecological Resources	E3	Proximity to identified resources	O	Some impacts to wetlands and streams.	O	Some impacts to wetlands and streams.
Impacts to cultural resources	E4	Proximity to cultural resources	O		O	
Impacts to commercial/industrial properties	E5	Relative potential for acquisition	+		+	
Impacts to future land uses	E6	Ability of an alternative to accommodate or be compatible with future roadway improvements to address potential growth	O		O	
Public/stakeholder acceptance	E7	Feedback from outreach process	O		O	



S 324th St Interchange Access Concepts
2C Arterial Couplet 2D Grade Separated Ramps + Compatible with S 324th St SE Quadrant Loop Ramp

BASELINE AND CONTEXTUAL NEEDS			
Issue/Needs Statements	BN/CN	Metric	Target
Issue: Address City of Federal Way Comprehensive Plan goals			
Needs:			
Provide opportunities for traffic to travel around the core	BN1	Do routes exist that do not bisect the City center?	Yes
Protect views within the City Center	CN1	Are views preserved?	Yes
Maintain roadway cross section consistent with City's standards	BN2	Are the roadway cross sections consistent with City's standards?	Yes
Issue: Increasing roadway congestion on S 320 St			
Needs:			
Decrease roadway congestion on S 320 St	BN3	Travel time between Pac Hwy and Military Rd and # number of people (by mode)	Travel time <= today
Maintain or improve access to and from City Center	BN4	LOS and v/c at intersections	v/c < 1.0 on every lane group
	BN4		LOS D (ramp terminals) -- Assumed overall intersection LOS not approach.
	BN5	Delay (transit)	Delay <= today
	BN6	Are access management standards maintained or improved?	Yes
	BNx	Is business access maintained and property takes minimized?	Yes
Issue: Poor multi modal mobility			
Needs:			
Improve nonmotorized mobility to increase use of transit facilities. Provide nonmotorized options to circulate within the City Center and at the study area boundaries	BN7	Nonmotorized system gap analysis	Yes
Improve connections to regional or the citywide facilities.	BN8	Level of traffic stress criteria	LTS <= 2
	BN9	Minimize roadway crossing widths	Consistent with City's street design standards
Issue: Impaired freight truck movement			
Needs:			
Improve freight truck mobility to support the City Center and regional service	BN10	Travel time between Pac Hwy and Military Rd	Travel time <= today

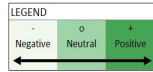
Improve Economic Vitality and Quality of Life

Level 1	Discussion	Level 1	Discussion
O	Extension of S 324th St creates an E-W route that extends from 11th Ave S to Weyerhaeuser Wy S.	O	Extension of S 324th St creates an E-W route that extends from 11th Ave S to Weyerhaeuser Wy S.
O	Ramp connections are not elevated above LRT or existing roadways.	O	Ramp connections are not elevated above LRT or existing roadways.
+	Standards are met.	+	Standards are met.
+	Issues likely at S 320th St/Military Rd S (County).	+	Issues likely at S 320th St/Military Rd S (County).
+	Issues remain at S 324th St/Pac Highway and issues likely at S 320th St/Military Rd S (County).	+	Issues remain at S 324th St/Pac Highway and issues likely at S 320th St/Military Rd S (County).
+	Criteria targets are met.	+	Criteria targets are met.
+	Issues likely at S 320th St/Military Rd S (County).	+	Issues likely at S 320th St/Military Rd S (County).
+	Standards are maintained.	+	Standards are maintained.
+	Business access is maintained.	+	Business access is maintained.
+	Allows potential connection to BPA trail via S 324th St overcrossing and Weyerhaeuser Wy.	+	Allows potential connection to BPA trail via S 324th St overcrossing and Weyerhaeuser Wy.
O	Reduction in traffic volume on S 320th St will improve the LTS rating; Increased volume on S 324th St will degrade the LTS rating.	O	Reduction in traffic volume on S 320th St will improve the LTS rating; Increased volume on S 324th St will degrade the LTS rating.
O	No significant roadway required. (Potential Weyerhaeuser Wy widening in locations; TBD).	O	No significant roadway required. (Potential Weyerhaeuser Wy widening in locations; TBD).
SAME AS BN3			

	Issue/Needs Statements	BN/CN	Metric	Target	Level 1	Discussion	Level 1	Discussion
Maintain integrity of the Interstate System	Issue: Delayed emergency response Needs: Improve emergency response	CN2	Potential for reoccurring queue spillbacks	v/c < 1.0 on every lane group				
						SAME AS BN4		
	Issue: Decreased safety Needs: Improve safety for the general traveling public on the S 320 St corridor and study area	BN11	Improvement to collision rates	Better than No Build <i>NOTE: Qualitative review for Level 1 screening</i>	+	Decrease in travel demand; no new elements that would decrease safety such as unprotected left turns, or new signals.	+	Decrease in travel demand; no new elements that would decrease safety such as unprotected left turns, or new signals.
	<i>Same as safety above but for S 312th St and S 324th St corridors</i>							
	Issue: Local Queues Impact Mainline I-5 Needs: Improve safety for the general traveling public on the Interstate and ramps	BN12	Local queue spillback on I-5 off ramps at S 272, S 320, and S 348 St	Local queues do not extend into ramp deceleration area <i>NOTE: Qualitative review for Level 1 screening</i>	+	Criteria targets are likely met.	+	Criteria targets are likely met.
		BN13	Number of gore points equal to today	Yes	O	Criteria targets are met	O	Criteria targets are met
		BN14	Improvement to collision rates	< No Build <i>NOTE: Qualitative review for Level 1 screening</i>	O	Traffic volumes and number of gore points similar to No Build (I-5 mainline).	O	Traffic volumes and number of gore points similar to No Build (I-5 mainline).
	Issue: Regional Congestion on I-5 Needs: Maintain or improve I-5 mobility for persons and freight trucks	BN15	Local queue spillback on I-5 off ramps (length and duration) at S 272, S 320, and S 348 St	Local queues do not extend into ramp deceleration area <i>NOTE: Qualitative review for Level 1 screening</i>				
		BN16	Travel time on I-5 between S 272 St to SR 18/S 348 St	<= today <i>NOTE: Qualitative review for Level 1 screening</i>	+	Similar I-5 mainline volumes as No Build plus reduction of local queue spillbacks would likely result in improved travel times.	+	Similar I-5 mainline volumes as No Build plus reduction of local queue spillbacks would likely result in improved travel times.
						SAME AS BN12		

OTHER SCREENING CRITERIA			Level 1	Discussion	Level 1	Discussion
Design Considerations/Issues (Feasibility)						
Operations and Maintenance	D1	O&M costs, such as for tunnels (life safety systems, pumping), additional signal systems vs roundabouts, landscaping, structures	O	No tunnels; no structure over LRT	O	No tunnels; no structure over LRT
Constructability	D2	Ability to construct without major impacts to the traveling public Ability to construct to standards without major ROW acquisitions and no relocation of major utilities	O	No tunnels; No LRT crossings; No BPA conflicts	O	No tunnels; No LRT crossings; No BPA conflicts
Ability to treat stormwater per requirements	D3	Room to treat, detain and maintain	-	Two or more elements might require relocation of existing stormwater facilities to new location and / or reconstruction to more stringent standards. Existing and/or new stormwater facilities for two or more elements might be impacted by scope of injunction culverts.	-	Two or more elements might require relocation of existing stormwater facilities to new location and / or reconstruction to more stringent standards. Existing and/or new stormwater facilities for two or more elements might be impacted by scope of injunction culverts.
Cost	D4	Dollars	O	Estimated at \$121.8M. Removing the upgrade to the S 320th St SE loop makes this the cheapest.	O	Estimated at \$129.1M
Compatibility with planned I-5 projects	D5	Consider compatibility with future I-5 expansion projects	+	Compatible with all future projects.	+	Compatible with all future projects.
Environmental Screening						
Impacts to neighborhoods	E1	Residential displacements, traffic and noise impacts (increase in travel lanes, change in travel lane location, change in roadway classification, increases in traffic volumes)	O	Only a couple of residential displacements in the corner of Belmore, but ramps closer to this community in general resulting in other impacts like noise. Couplets create changes in travel patterns for several neighborhoods.	+	Only a couple of residential displacements in the corner of Belmor, but ramps closer to this community in general resulting in other impacts like noise.
Impacts on parks	E2	Property acquisitions, traffic and noise impacts (increase in travel lanes, change in travel lane location, change in roadway classification, increases in traffic volumes)	O		O	
Impacts on Ecological Resources	E3	Proximity to identified resources	O	Some impacts to wetlands and streams.	O	Some impacts to wetlands and streams.
Impacts to cultural resources	E4	Proximity to cultural resources	O		O	
Impacts to commercial/industrial properties	E5	Relative potential for acquisition	O	Couplet changes travel patterns for commercial and industrial traffic.	-	SE quadrant loop ramp directly impacts planned development
Impacts to future land uses	E6	Ability of an alternative to accommodate or be compatible with future roadway improvements to address potential growth	O		+	
Public/stakeholder acceptance	E7	Feedback from outreach process	O		O	

City of Federal Way CCA
Interchange Concepts Fatal Flaw and Level 1 Preliminary Screening



2E Split Diamond + Compatible with S 324th St SE Quadrant Loop Ramp

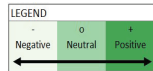
BASELINE AND CONTEXTUAL NEEDS

Issue/Needs Statements	BN/CN	Metric	Target	Level 1	Discussion
Issue: Address City of Federal Way Comprehensive Plan goals					
Needs:					
Provide opportunities for traffic to travel around the core	BN1	Do routes exist that do not bisect the City center?	Yes	O	Extension of S 324th St creates an E-W route that extends from 11th Ave S to Weyerhaeuser Wy S.
Protect views within the City Center	CN1	Are views preserved?	Yes	O	Ramp connections are not elevated above LRT or existing roadways.
Maintain roadway cross section consistent with City's standards	BN2	Are the roadway cross sections consistent with City's standards?	Yes	+	Standards are met.
Issue: Increasing roadway congestion on S 320 St					
Needs:					
Decrease roadway congestion on S 320 St	BN3	Travel time between Pac Hwy and Military Rd and # number of people (by mode)	Travel time <= today	+	Issues likely at S 320th St/Military Rd S (County).
Maintain or improve access to and from City Center	BN4	LOS and v/c at intersections	v/c < 1.0 on every lane group	+	Issues remain at S 324th St/Pac Highway and issues likely at S 320th St/Military Rd S (County).
	BN4		LOS D (ramp terminals) -- Assumed overall intersection LOS not approach.	+	Criteria targets are met.
	BN5	Delay (transit)	Delay <= today	+	Issues likely at S 320th St/Military Rd S (County).
	BN6	Are access management standards maintained or improved?	Yes	+	Standards are maintained.
	BNx	Is business access maintained and property takes minimized?	Yes	+	Business access is maintained.
Issue: Poor multi modal mobility					
Needs:					
Improve nonmotorized mobility to increase use of transit facilities. Provide nonmotorized options to circulate within the City Center and at the study area boundaries	BN7	Nonmotorized system gap analysis	Yes	+	Allows potential connection to BPA trail via S 324th St overcrossing and Weyerhaeuser Wy.
Improve connections to regional or the citywide facilities.	BN8	Level of traffic stress criteria	LTS <= 2	O	Reduction in traffic volume on S 320th St will improve the LTS rating; Increased volume on S 324th St will degrade the LTS rating.
	BN9	Minimize roadway crossing widths	Consistent with City's street design standards	O	No significant roadway required. (Potential Weyerhaeuser Wy widening in locations; TBD).
Issue: Impaired freight truck movement					
Needs:					
Improve freight truck mobility to support the City Center and regional service	BN10	Travel time between Pac Hwy and Military Rd	Travel time <= today		

Improve Economic Vitality and Quality of Life

	Issue/Needs Statements				Level 1	Discussion
	BN/CN	Metric	Target			
Maintain integrity of the Interstate System	Issue: Delayed emergency response Needs: Improve emergency response					
	CN2	Potential for reoccurring queue spillbacks	v/c < 1.0 on every lane group			
	Issue: Decreased safety Needs: Improve safety for the general traveling public on the S 320 St corridor and study area					
	BN11	Improvement to collision rates	Better than No Build <i>NOTE: Qualitative review for Level 1 screening</i>	+	Decrease in travel demand; no new elements that would decrease safety such as unprotected left turns, or new signals.	
	<i>Same as safety above but for S 312th St and S 324th St corridors</i>					
	Issue: Local Queues Impact Mainline I-5 Needs: Improve safety for the general traveling public on the Interstate and ramps					
	BN12	Local queue spillback on I-5 off ramps at S 272, S 320, and S 348 St	Local queues do not extend into ramp deceleration area <i>NOTE: Qualitative review for Level 1 screening</i>	+	Criteria targets are likely met.	
	BN13	Number of gore points equal to today	Yes	O	Criteria targets are met	
	BN14	Improvement to collision rates	< No Build <i>NOTE: Qualitative review for Level 1 screening</i>	O	Traffic volumes and number of gore points similar to No Build (I-5 mainline).	
	Issue: Regional Congestion on I-5 Needs: Maintain or improve I-5 mobility for persons and freight trucks					
	BN15	Local queue spillback on I-5 off ramps (length and duration) at S 272, S 320, and S 348 St	Local queues do not extend into ramp deceleration area <i>NOTE: Qualitative review for Level 1 screening</i>			
	BN16	Travel time on I-5 between S 272 St to SR 18/S 348 St	<= today <i>NOTE: Qualitative review for Level 1 screening</i>	+	Similar I-5 mainline volumes as No Build plus reduction of local queue spillbacks would likely result in improved travel times.	

OTHER SCREENING CRITERIA			Level 1	Discussion
Criteria	Criteria #	Metric		
Design Considerations/Issues (Feasibility)				
Operations and Maintenance	D1	O&M costs, such as for tunnels (life safety systems, pumping), additional signal systems vs roundabouts, landscaping, structures	O	No tunnels; no structure over LRT
Constructability	D2	Ability to construct without major impacts to the traveling public Ability to construct to standards without major ROW acquisitions and no relocation of major utilities	O	No tunnels; No LRT crossings; No major Olympic pipeline conflicts; No BPA conflicts
Ability to treat stormwater per requirements	D3	Room to treat, detain and maintain	-	Two or more elements might require underground and/or proprietary treatment BMPs and/or be located below LRT structure. Existing and/or new stormwater facilities for two or more elements might be impacted by scope of injunction culverts.
Cost	D4	Dollars	O	Estimated at \$140.5M
Compatibility with planned I-5 projects	D5	Consider compatibility with future I-5 expansion projects	+	Compatible with all future projects.
Environmental Screening				
Impacts to neighborhoods	E1	Residential displacements, traffic and noise impacts (increase in travel lanes, change in travel lane location, change in roadway classification, increases in traffic volumes)	+	Only a couple of residential displacements in the corner of Belmor, but ramps closer to this community in general resulting in other impacts like noise.
Impacts on parks	E2	Property acquisitions, traffic and noise impacts (increase in travel lanes, change in travel lane location, change in roadway classification, increases in traffic volumes)	O	
Impacts on Ecological Resources	E3	Proximity to identified resources	O	Some impacts to wetlands and streams.
Impacts to cultural resources	E4	Proximity to cultural resources	O	
Impacts to commercial/industrial properties	E5	Relative potential for acquisition	-	SE quadrant loop ramp directly impacts planned development
Impacts to future land uses	E6	Ability of an alternative to accommodate or be compatible with future roadway improvements to address potential growth	+	
Public/stakeholder acceptance	E7	Feedback from outreach process	O	



3A Grade Separated Ramps		S 312th St/S 324th St Interchange Access Concepts		3B Single-Point Urban Interchange	
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BASELINE AND CONTEXTUAL NEEDS			
Issue/Needs Statements	BN/CN	Metric	Target
Issue: Address City of Federal Way Comprehensive Plan goals			
Needs:			
Provide opportunities for traffic to travel around the core	BN1	Do routes exist that do not bisect the City center?	Yes
Protect views within the City Center	CN1	Are views preserved?	Yes
Maintain roadway cross section consistent with City's standards	BN2	Are the roadway cross sections consistent with City's standards?	Yes
Issue: Increasing roadway congestion on S 320 St			
Needs:			
Decrease roadway congestion on S 320 St	BN3	Travel time between Pac Hwy and Military Rd and # number of people (by mode)	Travel time <= today
Maintain or improve access to and from City Center	BN4	LOS and v/c at intersections	v/c < 1.0 on every lane group
	BN4		LOS D (ramp terminals) -- Assumed overall intersection LOS not approach.
	BN5	Delay (transit)	Delay <= today
	BN6	Are access management standards maintained or improved?	Yes
	BNx	Is business access maintained and property takes minimized?	Yes
Issue: Poor multi modal mobility			
Needs:			
Improve nonmotorized mobility to increase use of transit facilities. Provide nonmotorized options to circulate within the City Center and at the study area boundaries	BN7	Nonmotorized system gap analysis	Yes
improve connections to regional or the citywide facilities.	BN8	Level of traffic stress criteria	LTS <= 2
	BN9	Minimize roadway crossing widths	Consistent with City's street design standards
Issue: Impaired freight truck movement			
Needs:			
Improve freight truck mobility to support the City Center and regional service	BN10	Travel time between Pac Hwy and Military Rd	Travel time <= today

Improve Economic Vitality and Quality of Life

Level 1	Discussion	Level 1	Discussion
+	Extension of S 312th St creates an E-W route that extends from SR 509/Dash Point Rd to Military Rd. Extension of S 324th St creates an E-W route that extends from 11th Ave S to Weyerhaeuser Wy S.	+	Extension of S 312th St creates an E-W route that extends from SR 509/Dash Point Rd to Military Rd. Extension of S 324th St creates an E-W route that extends from 11th Ave S to Weyerhaeuser Wy S.
O	Ramp connections are not elevated above LRT or existing roadways.	O	Ramp connections are not elevated above LRT or existing roadways.
+	Standards are met.	+	Standards are met.
+	Issues remain at S 320th St/23rd Ave S Ave S and issues likely at S 320th St/Military Rd S (County).	+	Issues remain at S 320th St/23rd Ave S Ave S and issues likely at S 320th St/Military Rd S (County).
+	Issues remain at S 320th St/23rd Ave S Ave S and issues likely at S 320th St/Military Rd S (County).	+	Issues remain at S 320th St/23rd Ave S Ave S and issues likely at S 320th St/Military Rd S (County).
+	Criteria targets are met.	+	Criteria targets are met.
O	Issues remain at S 320th St/23rd Ave S Ave S with similar v/c ratios to No Build. Issues likely at S 320th St/Military Rd S (County).	O	Issues remain at S 320th St/23rd Ave S Ave S with similar v/c ratios to No Build. Issues likely at S 320th St/Military Rd S (County).
+	Standards are maintained.	+	Standards are maintained.
O	Potential impacts to apartment building.	O	Potential impacts to apartment building.
+	Allows potential connection to BPA trail via S 324th St overcrossing and Weyerhaeuser Wy.	+	Allows potential connection to BPA trail via S 324th St overcrossing and Weyerhaeuser Wy.
O	Reduction in traffic volume on S 320th St will improve the LTS rating; Increased volume on S 312th St and S 324th St will degrade the LTS rating.	O	Reduction in traffic volume on S 320th St will improve the LTS rating; Increased volume on S 312th St and S 324th St will degrade the LTS rating.
O	S 312th St widening will increase crossing widths and pedestrian delays but crossings are within standards for an arterial.	O	S 312th St widening will increase crossing widths and pedestrian delays but crossings are within standards for an arterial.

				Level 1	Discussion	Level 1	Discussion	
Maintain integrity of the Interstate System	Issue/Needs Statements	BN/CN	Metric	Target				
	Issue: Delayed emergency response Needs: Improve emergency response	CN2	Potential for reoccurring queue spillbacks	v/c < 1.0 on every lane group				
	Issue: Decreased safety Needs: Improve safety for the general traveling public on the S 320 St corridor and study area	BN11	Improvement to collision rates	Better than No Build <i>NOTE: Qualitative review for Level 1 screening</i>	+	Decrease in travel demand; no new elements that would decrease safety such as unprotected left turns, or new signals.	+	Decrease in travel demand; no new elements that would decrease safety such as unprotected left turns, or new signals.
	Same as safety above but for S 312th St and S 324th St corridors							
	Issue: Local Queues Impact Mainline I-5 Needs: Improve safety for the general traveling public on the Interstate and ramps	BN12	Local queue spillback on I-5 off ramps at S 272, S 320, and S 348 St	Local queues do not extend into ramp deceleration area <i>NOTE: Qualitative review for Level 1 screening</i>	O	Issues remain at S 320th St/23rd Ave S Ave S with similar v/c ratios to No Build.	O	Issues remain at S 320th St/23rd Ave S Ave S with similar v/c ratios to No Build.
		BN13	Number of gore points equal to today	Yes	-	Adds a southbound off ramp gore point	-	Adds a southbound off ramp gore point
		BN14	Improvement to collision rates	< No Build <i>NOTE: Qualitative review for Level 1 screening</i>	-	Adds a southbound off ramp gore point and slightly higher southbound I-5 volumes north of S 312th St; will increase collision rate.	-	Adds a southbound off ramp gore point and slightly higher southbound I-5 volumes north of S 312th St; will increase collision rate.
	Issue: Regional Congestion on I-5 Needs: Maintain or improve I-5 mobility for persons and freight trucks	BN15	Local queue spillback on I-5 off ramps (length and duration) at S 272, S 320, and S 348 St	Local queues do not extend into ramp deceleration area <i>NOTE: Qualitative review for Level 1 screening</i>				
		BN16	Travel time on I-5 between S 272 St to SR 18/S 348 St	<= today <i>NOTE: Qualitative review for Level 1 screening</i>	+	Similar I-5 mainline volumes as No Build plus reduction of local queue spillbacks would likely result in improved travel times. Issues at S 320th St/23rd Ave S Ave S could result in queues which impact mainline operations worse than other options.	+	Similar I-5 mainline volumes as No Build plus reduction of local queue spillbacks would likely result in improved travel times. Issues at S 320th St/23rd Ave S Ave S could result in queues which impact mainline operations worse than other options.

OTHER SCREENING CRITERIA						
Criteria	Criteria #	Metric	Level 1	Discussion	Level 1	Discussion
Design Considerations/Issues (Feasibility)						
Operations and Maintenance	D1	O&M costs, such as for tunnels (life safety systems, pumping), additional signal systems vs roundabouts, landscaping, structures	-	1 tunnel * Includes one tunnel (S 312th St SB off-ramp) that require maintenance of fire-suppression, ventilation, drainage pumps and groundwater management.	-	No tunnel; structures over LRT * Bridge maintenance on SPUI and S 312th St ramps will impact LRT operations.
Constructability	D2	Ability to construct without major impacts to the traveling public Ability to construct to standards without major ROW acquisitions and no relocation of major utilities	-	1 tunnel; no LRT crossings; No BPA or Olympic pipeline conflicts * S 312th St SB off-ramp tunnel will be under groundwater elevation and will need dewatering systems during construction. The tunnel is located under FWLE LRT and Military Rd S.	-	1 LRT overcrossing (requires significant closures); No BPA or Olympic pipeline conflicts * The construction of the S 312th St SPUI and associated SB ramps require large cross rigging structures that will cross over the FWLE and I-5. Construction can not occur during 1 to 4AM ST rail closure window.
Ability to treat stormwater per requirements	D3	Room to treat, detain and maintain	-	Two or more elements might require relocation of existing stormwater facilities to new location and / or reconstruction to more stringent standards. Two or more elements might require underground and/or proprietary treatment BMPs and/or be located below LRT structure.	-	Two or more elements might require relocation of existing stormwater facilities to new location and / or reconstruction to more stringent standards. Two or more elements might require underground and/or proprietary treatment BMPs and/or be located below LRT structure.
Cost	D4	Dollars	-	Estimated at \$345.8M.	-	Estimated at \$314.9M
Compatibility with planned I-5 projects	D5	Consider compatibility with future I-5 expansion projects	-	Not compatible with the Gateway Project when building the SB 312th Off-ramp.	-	Not compatible with the Gateway Project when building the SB 312th Off-ramp.
Environmental Screening						
Impacts to neighborhoods	E1	Residential displacements, traffic and noise impacts (increase in travel lanes, change in travel lane location, change in roadway classification, increases in traffic volumes)	-	Displacement relatively high due to MF and SF impacts west of I-5. One impacted property is a group home. Also clips corner of Belmor.	O	Same as 1B, but also impacts corner of Belmore Park.
Impacts on parks	E2	Property acquisitions, traffic and noise impacts (increase in travel lanes, change in travel lane location, change in roadway classification, increases in traffic volumes)	-		-	
Impacts on Ecological Resources	E3	Proximity to identified resources	-	More potential impacts to wetlands and streams.	-	More potential impacts to wetlands and streams.
Impacts to cultural resources	E4	Proximity to cultural resources	O		O	
Impacts to commercial/industrial properties	E5	Relative potential for acquisition	O	Ramp west of I-5 may encroach on hotel.	+	
Impacts to future land uses	E6	Ability of an alternative to accommodate or be compatible with future roadway improvements to address potential growth	O		O	
Public/stakeholder acceptance	E7	Feedback from outreach process	-		-	

Appendix H

Transportation Data to Support Level 2 Screening



Supporting Data for Alternatives Screening

Nonmotorized Level of Traffic Stress

BASELINE AND CONTEXTUAL NEEDS

Purpose: Improve Economic Vitality and Quality of Life	Issue: Poor multi modal mobility		
	Needs:		Metric
	Improve nonmotorized mobility to increase use of transit facilities. Provide nonmotorized options to circulate within the City Center and at the study area boundaries improve connections to regional or the citywide facilities.		BN8 Level of traffic stress

A	S 320th St between Hwy99 and I-5	
4	NB	<ul style="list-style-type: none"> Median separated and greater than 2 lanes in each direction. Mixed traffic (bikes in traffic lanes, no separate facility provided). 5-8 feet sidewalks.
4	B	<ul style="list-style-type: none"> Same as No Build.

B	S 320th St Across I-5	
4	NB	<ul style="list-style-type: none"> No median separation and greater than 2 lanes in each direction. Mixed traffic (bikes in traffic lanes, no separate facility provided). No sidewalks
1	B	Same as No Build except – <ul style="list-style-type: none"> 10-12 feet sidewalk north side (assumed shared use path for cyclists and peds) Potential 8 feet sidewalk south side (TBD through design refinements)

C	S 320th St between I-5 and Military	
4	NB	<ul style="list-style-type: none"> Painted 12 feet median separated and greater than 2 lanes in each direction Mixed traffic (bikes in traffic lanes, no separate facility provided) 5-10 feet sidewalks on south side
4	B	Same as No Build except <ul style="list-style-type: none"> Additional HOV lane in some sections Raised 6 feet median 8 feet sidewalk path on north side



Note on Methodology

Three key factors in level of traffic stress analysis:

- Posted speed limit
- Number of through vehicle lanes
- Type of bicycle facility

Because of the # of through lanes and roadway speeds, to get to a level 2 rating, we would need to provide:

- Separated bike lane with buffer totaling 6' or more, or
- Shared use path

Supporting Data for Alternatives Screening

Nonmotorized Level of Traffic Stress

BASELINE AND CONTEXTUAL NEEDS

Purpose: Improve Economic Vitality and Quality of Life	Issue: Poor multi modal mobility		
	Needs:	Metric	Target
	Improve nonmotorized mobility to increase use of transit facilities. Provide nonmotorized options to circulate within the City Center and at the study area boundaries improve connections to regional or the citywide facilities.	BN8 Level of traffic stress	LTS <= 2



A S 324th St between Hwy99 and 23rd		
4	NB	<ul style="list-style-type: none"> No median separation and 2 lanes in each direction Mixed traffic (bikes in traffic lanes for half the segment, no separate facility provided) 5 to 10 feet sidewalks
2	B	Same as No build exception - <ul style="list-style-type: none"> 18 foot shared use path north side; 12 feet sidewalk south side. (LTS 1) Shared use path crosses 2-lane RAB at 23rd (LTS 4)

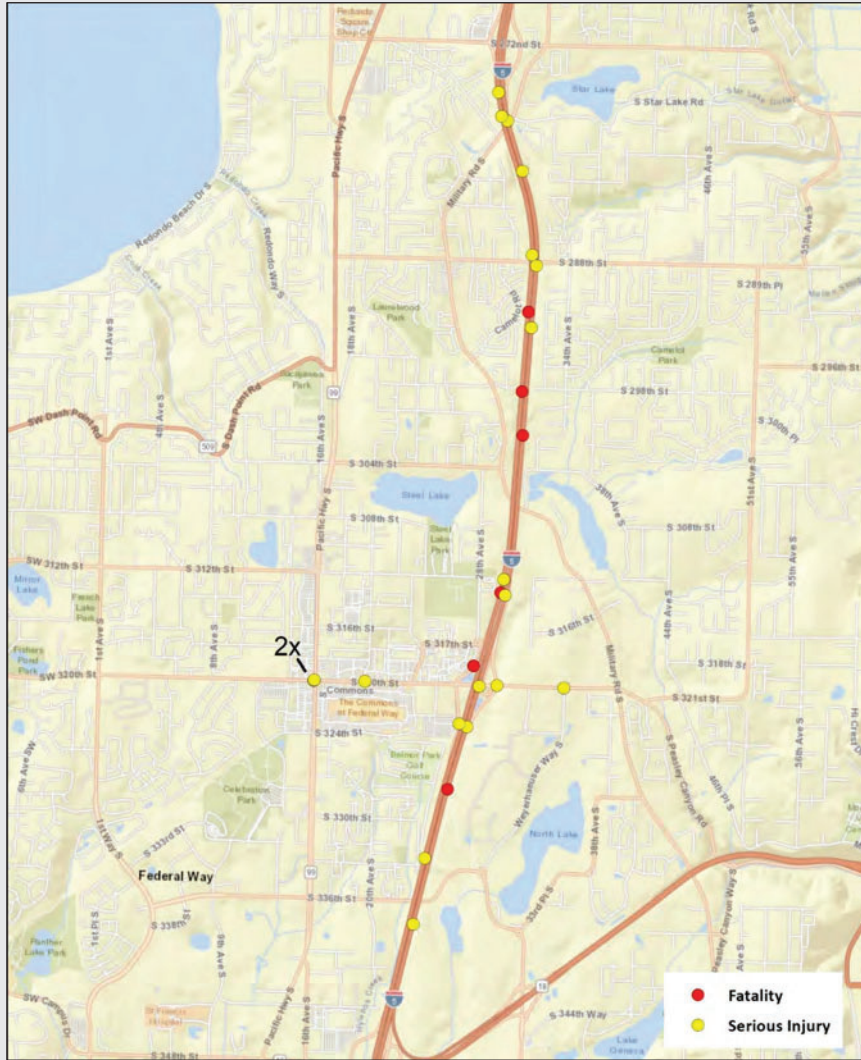
B S 324th St between 23rd to across I-5		
NA	NB	<ul style="list-style-type: none"> Roadway does not exist; no facilities.
2	B	<ul style="list-style-type: none"> No median separation and 2 lanes in each direction. 18 feet bike/ped path north side; 12 feet sidewalk south side. Single lane RAB at I-5 Ramps

C S 324th St between I-5 and Weyerhaeuser		
NA	NB	<ul style="list-style-type: none"> Roadway does not exist; no facilities.
2	B	<ul style="list-style-type: none"> No median separation 1 lane in each direction with center turn lane 18 feet bike/ped path north side; 12 feet sidewalk south side.

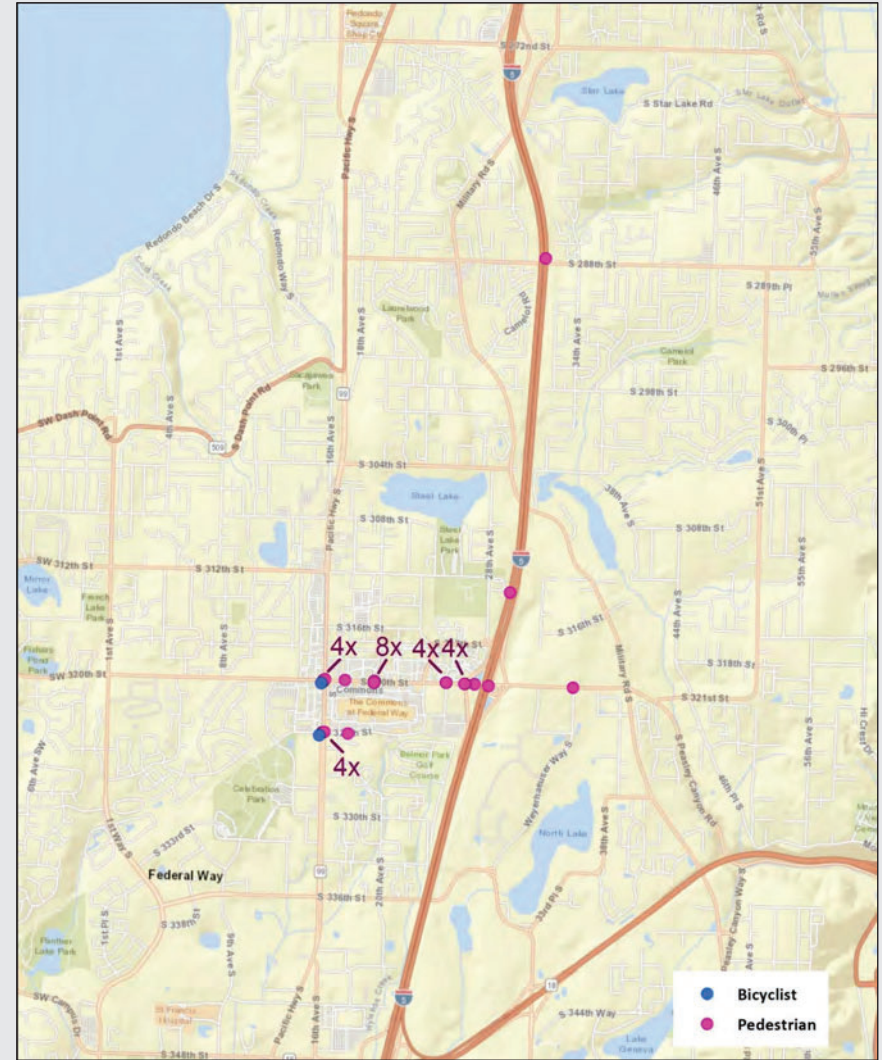
Supporting Data for Alternatives Screening

Safety Analysis

Fatal and Serious Injury Crashes 2013-2017



Pedestrian and Bicyclist Crashes 2013-2017



Supporting Data for Alternatives Screening

Safety Analysis

BASELINE AND CONTEXTUAL NEEDS

Purpose: Maintain Integrity of the Interstate System	Issue: Decreased safety		
	Needs:	Metric	Target
	Improve safety for the general traveling public on the S 320th St corridor and study area	BN11	Collision rates



	Location	Existing/No Build Alternative	Influence of Build Alternatives
C	S 320th St corridor	High frequency of congestion-related crashes. Rear-end crashes are the most common crash type (290).	Extension of S 324th St corridor to I-5 will provide drivers another route for east/west travel and I-5 access. Traffic volumes for 2045 on S 320th St are expected to decrease by 10-20 percent likely resulting in less congestion and fewer crashes on S 320th St.
D		Higher frequency of angle crashes (66) and injury crashes (45) between Pete von Reichbauer Way S and 23rd Ave S than other segments in study area.	Very little influence other than general reduction of traffic volumes on S 320th St. Angle crashes mostly related to left-turn median break on S 320th St which will not be changed by the Build Alternative.
E		Pete von Reichbauer Way S intersection has double the number (8) of pedestrian crashes than other intersections.	Very little influence other than general reduction of traffic volumes on S 320th St. Crashes appear to be related to the north/south protected-permitted phasing which will not be changed by the Build Alternative.
F		Pedestrian crashes (23 total) at multiple locations along the corridor and lack of sidewalks across I-5 bridge.	Addition of sidewalk on north side of S 320th St bridge over I-5 likely to result in fewer pedestrian crashes. Also, east/west shared-use path on S 324th St will provide an alternative route on a less congested corridor.
G	Gateway Ctr S/S 320th St intersection	High frequency of angle crashes (26) at intersection. Half the collisions occur late in the evening when the signal operates with a protected-permitted phasing for the major movements.	Very little influence other than general reduction of traffic volumes on S 320th St. Build alternative will not change phasing at these intersections.
H	SR-99/S 320th St intersections	One bicycle-related crash occurred.	Very little influence. Bicycle was traveling north/south on SR-99. The build alternative will make no changes to SR-99. However, the shared-use path on S 324th St will offer new east/west connectivity.

Supporting Data for Alternatives Screening

Safety Analysis

BASELINE AND CONTEXTUAL NEEDS

Purpose: Maintain Integrity of the Interstate System	Issue: Local Queues Impact Mainline I-5		
	Needs:	Metric	Target
	Improve safety for the general traveling public on the Interstate and ramps	BN14	Collision rates

Note on Methodology

Analysis methodologies follow those outlined in the Methods and Assumptions document developed in collaboration with WSDOT. This includes analyzing crashes by respective facility type and a review of fatal and serious injury crashes, as well as pedestrian-involved and bicycle-involved crashes. Additionally, a quantitative analysis of crash patterns is presented relative to the potential impact of the Build Alternative. Finally, existing safety concerns not impacted by the Build Alternative are also identified.



	Location	Existing/No Build Alternative	Influence of Build Alternatives
A	I-5 mainline between S 320th St ramps	Higher frequency of crashes per mile than other mainline sections (282).	Moving the S 320th St gore points farther south may result in slightly fewer crashes due to increased spacing between the off-ramp gore and the on-ramp gore. Gore point shift not expected to influence mainline section to SR-18 since there will still be over one mile of separation.
B	S 320th St southbound off-ramp and ramp terminal	Highest frequency of crashes of any ramp or ramp terminal in the study area. High frequency of congestion-related crashes. (111)	Addition of S 324th St ramps will divert 25-45 percent of the 2045 traffic volumes from S 320th St likely resulting in less congestion and fewer crashes.

Supporting Data for Alternatives Screening

Safety Analysis

BASELINE AND CONTEXTUAL NEEDS

Purpose: Maintain Integrity of the Interstate System	Issue: Decreased safety		
	Needs:	Metric	Target
	Improve safety for the general traveling public on the S 312 and/or S 324 St corridor and study area	BN18	Collision rates



	Location	Existing/No Build Alternative	Influence of Build Alternatives
I	S 324th St corridor	No significant issues compared to other corridors.	Increased traffic volumes from new connectivity (25-40 percent increase) likely to result in increased crashes. However separating vehicles from bicycles and pedestrians with shared use path will reduce typical collision rate.
J	SR-99/S 324th St intersection	High frequency of angle crashes (36) at intersection with protected-permitted phasing for the major movements. [NOTE: City is implanting signal modifications including restricting the NB/SB flashing yellow]	Very little influence. Build alternative will not change phasing at these intersections. [NOTE: City is implanting signal modifications including restricting the NB/SB flashing yellow]
K	SR-99/S 324th St intersections	One bicycle-related crash	Very little influence. Bicycle was traveling north/south on SR-99. The build alternative will make no changes to SR-99. However, the shared-use path on S 324th St will offer new east/west connectivity.

Synchro Operations Analysis



Supporting Data for Alternatives Screening

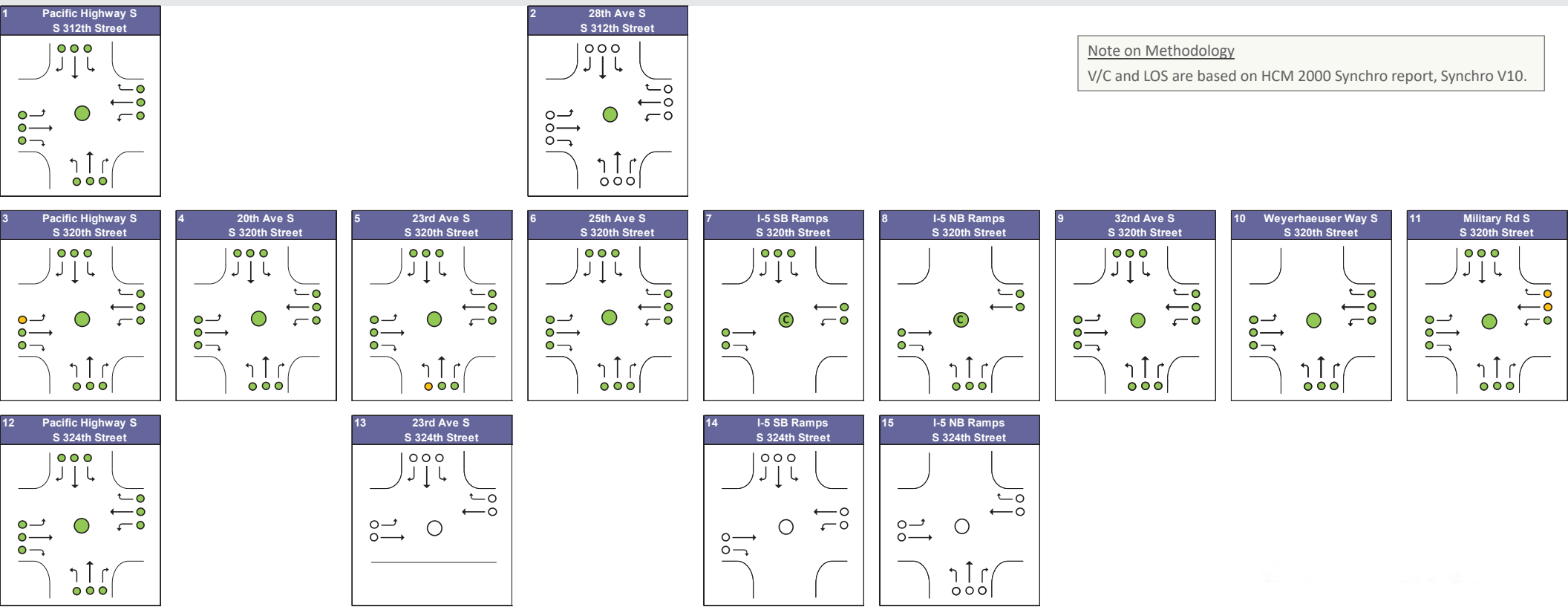
Intersection V/C and LOS – AM Peak Summary

LEGEND	
●	< 1.0
●	≥ 1.0
●	> 1.2

BASELINE AND CONTEXTUAL NEEDS

Purpose: Improve Economic Vitality and Quality of Life	Issue: Increasing roadway congestion on S 320th St		
	Needs:	Metric	Target
	Maintain or improve access to and from City Center	BN4	V/c at study intersections; LOS at WSDOT intersections

Year 2017 Existing Conditions



Supporting Data for Alternatives Screening

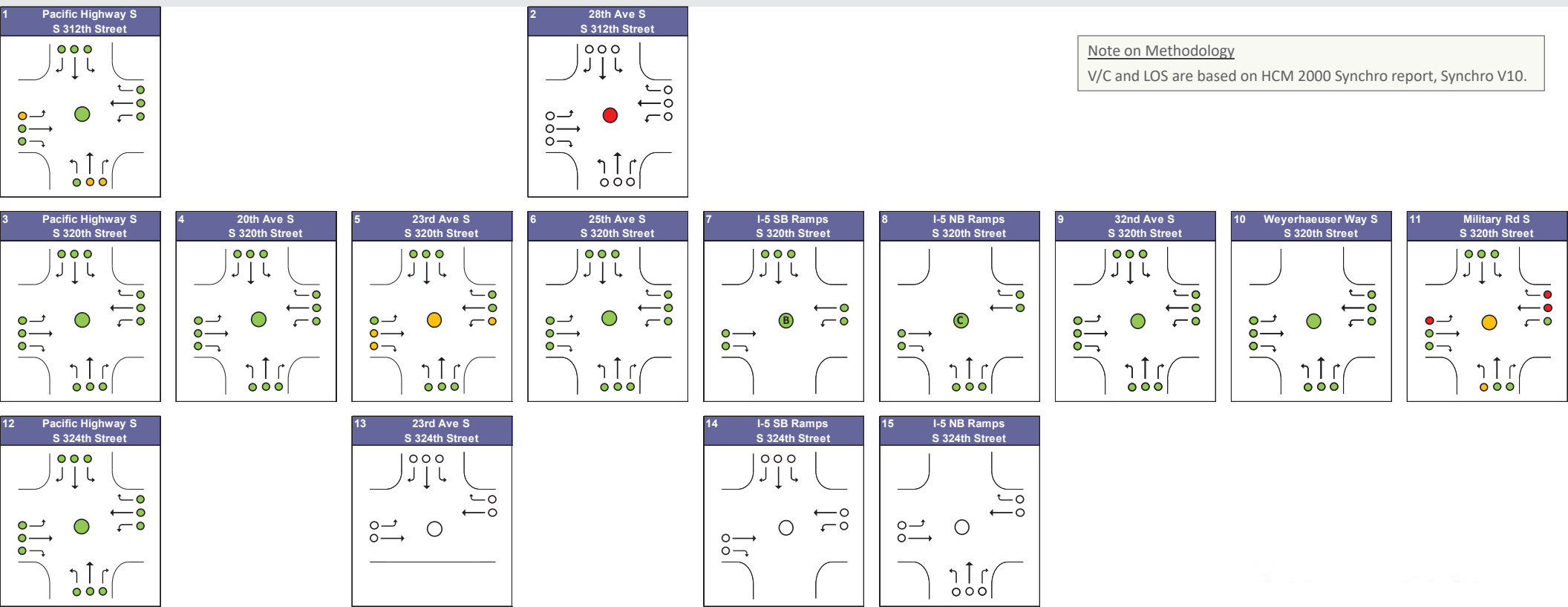
Intersection V/C and LOS – AM Peak Summary

LEGEND
● < 1.0
● >= 1.0
● > 1.2

BASELINE AND CONTEXTUAL NEEDS

Purpose: Improve Economic Vitality and Quality of Life	Issue: Increasing roadway congestion on S 320th St		
	Needs:	Metric	Target
	Maintain or improve access to and from City Center	BN4	V/c at study intersections; LOS at WSDOT intersections

Year 2045 No Build Alternative



Supporting Data for Alternatives Screening

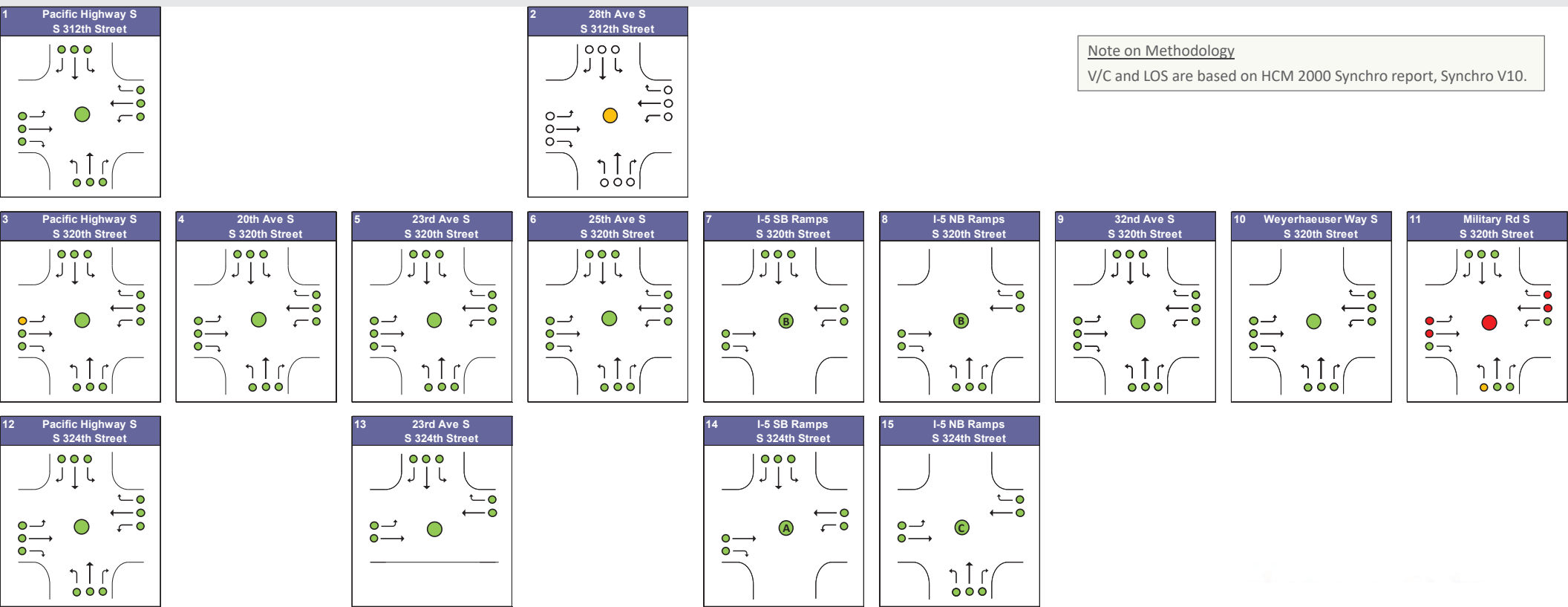
Intersection V/C and LOS – AM Peak Summary

LEGEND	
●	< 1.0
●	≥ 1.0
●	> 1.2

BASELINE AND CONTEXTUAL NEEDS

Purpose: Improve Economic Vitality and Quality of Life	Issue: Increasing roadway congestion on S 320th St		
	Needs:	Metric	Target
	Maintain or improve access to and from City Center	BN4	V/c at study intersections; LOS at WSDOT intersections

Year 2045 Build Alternative



Supporting Data for Alternatives Screening

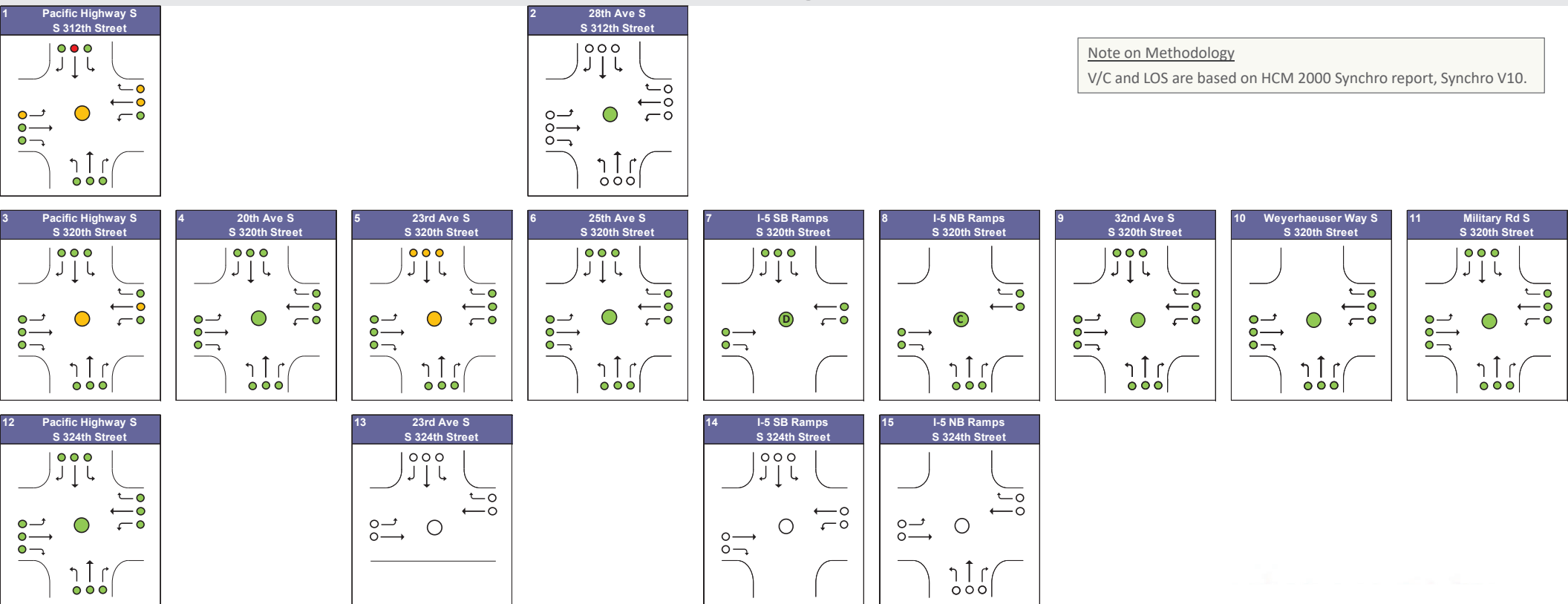
Intersection V/C and LOS – PM Peak Summary

LEGEND
● < 1.0
● >= 1.0
● > 1.2

BASELINE AND CONTEXTUAL NEEDS

Purpose: Improve Economic Vitality and Quality of Life	Issue: Increasing roadway congestion on S 320th St		
	Needs:	Metric	Target
	Maintain or improve access to and from City Center	BN4	V/c at study intersections; LOS at WSDOT intersections

Year 2017 Existing Conditions



Supporting Data for Alternatives Screening

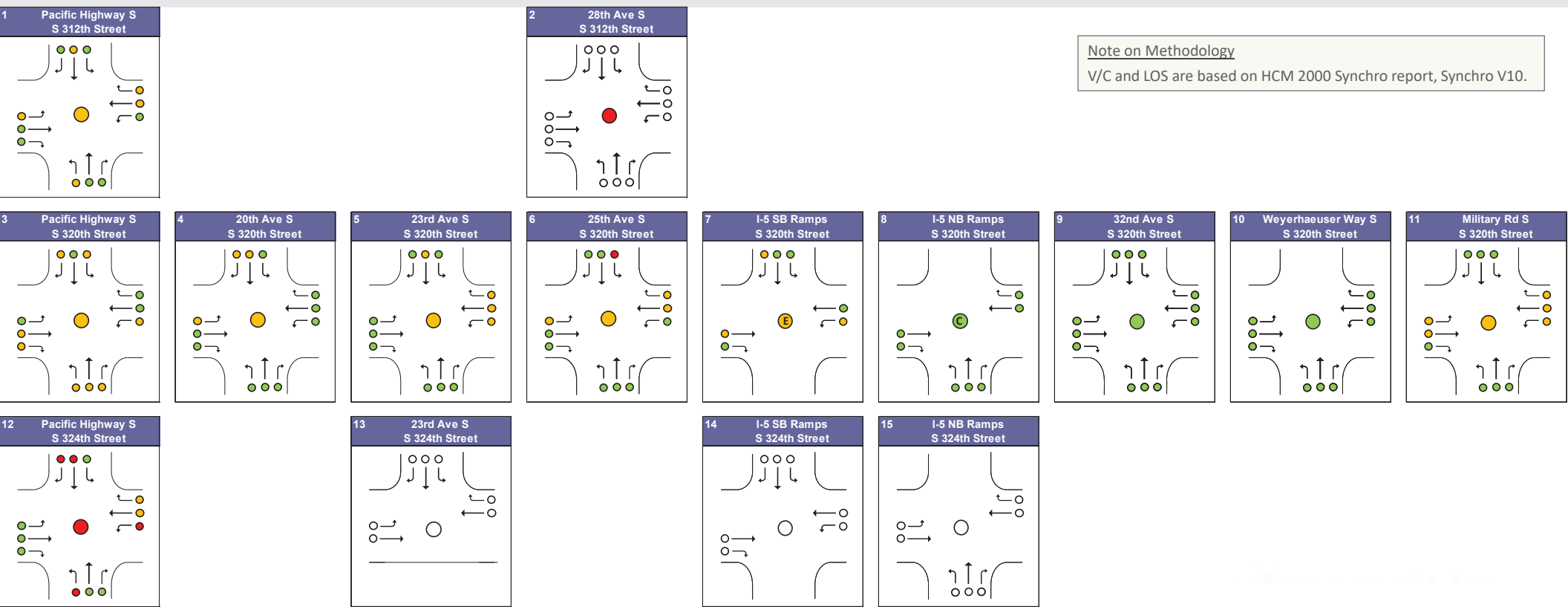
Intersection V/C and LOS – PM Peak Summary

LEGEND
● < 1.0
● >= 1.0
● > 1.2

BASELINE AND CONTEXTUAL NEEDS

Purpose: Improve Economic Vitality and Quality of Life	Issue: Increasing roadway congestion on S 320th St		
	Needs:	Metric	Target
	Maintain or improve access to and from City Center	BN4	V/c at study intersections; LOS at WSDOT intersections

Year 2045 No Build Alternative



Supporting Data for Alternatives Screening

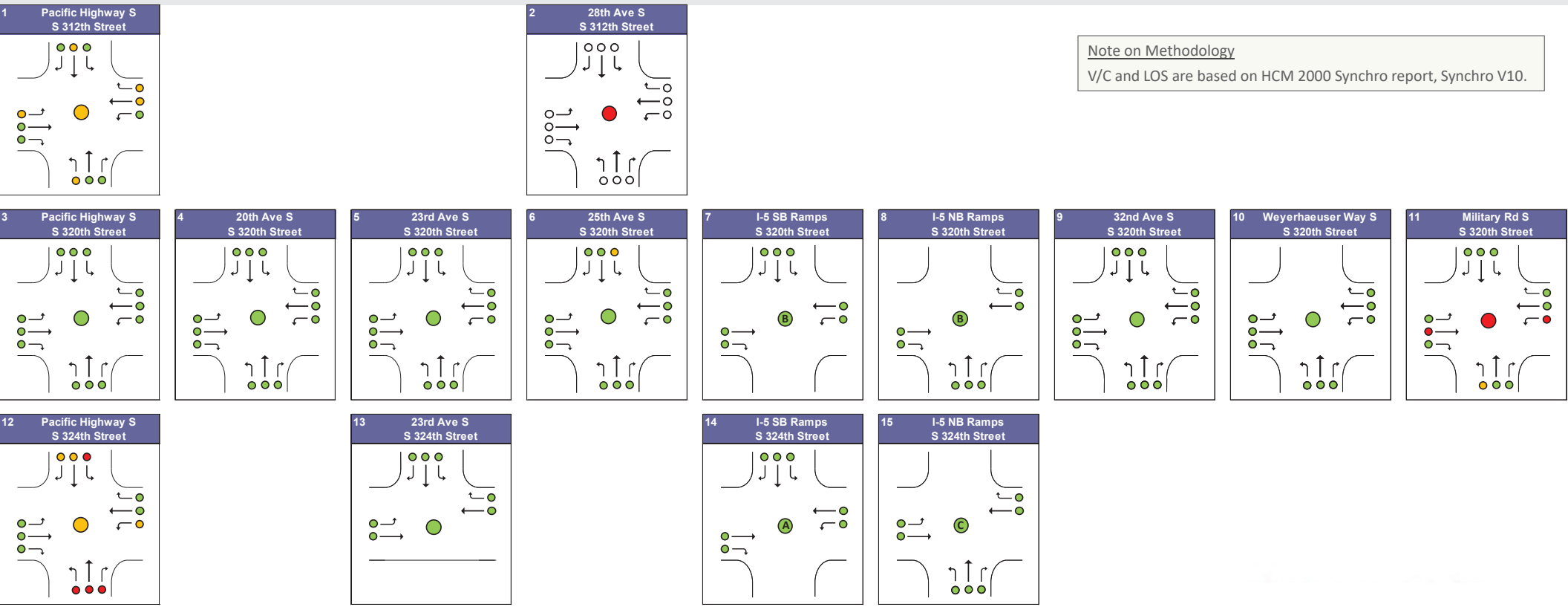
Intersection V/C and LOS – PM Peak Summary

LEGEND
● < 1.0
● >= 1.0
● > 1.2

BASELINE AND CONTEXTUAL NEEDS

Purpose: Improve Economic Vitality and Quality of Life	Issue: Increasing roadway congestion on S 320th St		
	Needs:	Metric	Target
	Maintain or improve access to and from City Center	BN4 V/c at study intersections; LOS at WSDOT intersections	v/c < 1.0 on every lane group; LOS D at ramp terminals

Year 2045 Build Alternative

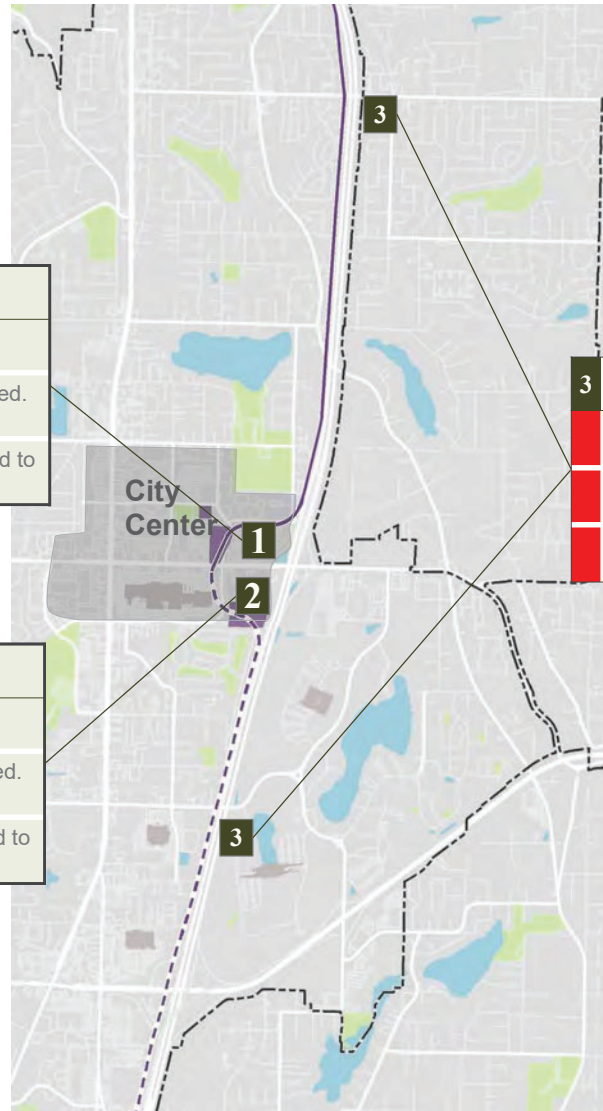


VISSIM Operations Analysis - AM Peak



Supporting Data for Alternatives Screening

VISSIM Operations Analysis - AM Peak Summary



LEGEND	
As observed in operations analyses	
■	No congestion
■	Approaching capacity
■	Exceeds capacity

1 WB S 320th St between I-5 and 23rd Ave S	
■ Existing	
■ Year 2045 No Build Alternative	<ul style="list-style-type: none"> Demand exceeds capacity; corridor is congested.
■ Year 2045 Build Alternative	<ul style="list-style-type: none"> With reduced demand, operations are improved to similar to todays conditions.

2 EB S 320th St between I-5 and 23rd Ave S	
■ Existing	
■ Year 2045 No Build Alternative	<ul style="list-style-type: none"> Demand exceeds capacity; corridor is congested.
■ Year 2045 Build Alternative	<ul style="list-style-type: none"> With reduced demand, operations are improved to similar to todays conditions.

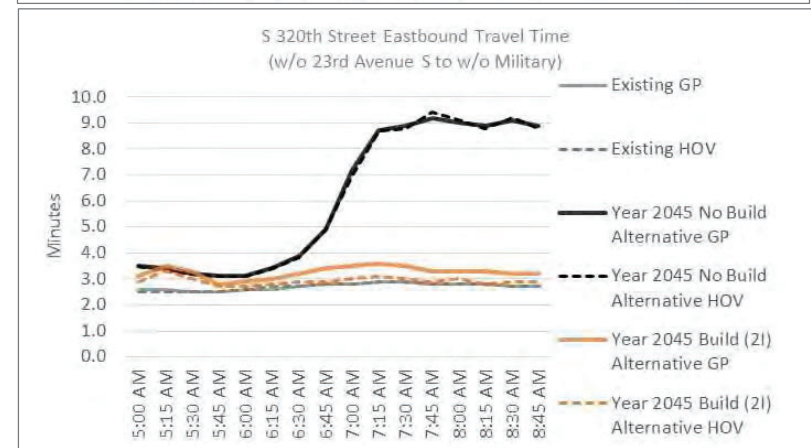
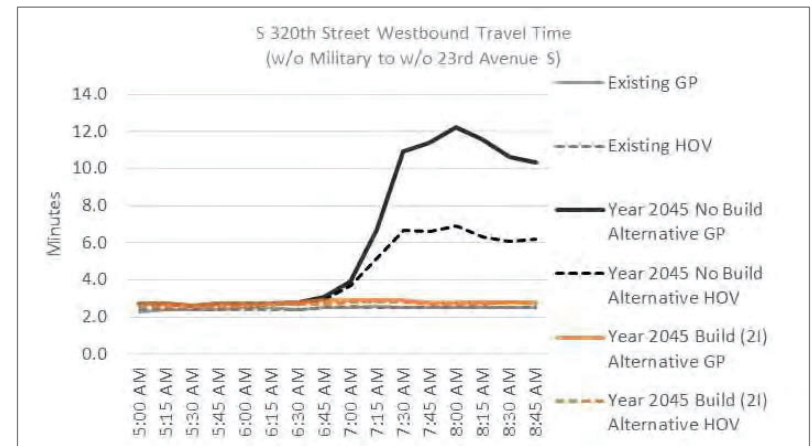
3 NB I-5 through study area	
■ Existing	<ul style="list-style-type: none"> I-5 is at congested due to volume exceeding demand through most the study area.
■ Year 2045 No Build Alternative	<ul style="list-style-type: none"> Traffic demand increases thus increasing congestion at the on ramp merges and duration of congestion.
■ Year 2045 Build Alternative	<ul style="list-style-type: none"> Same as No Build.

Supporting Data for Alternatives Screening

VISSIM Operations Analysis - AM Peak Summary

BASELINE AND CONTEXTUAL NEEDS

Purpose: Improve Economic Vitality and Quality of Life	Issue: Increasing roadway congestion on S 320th St		
	Needs:		Metric
	Decrease roadway congestion on S 320th St	BN3	Travel time between Pacific Highway S and Military Road S and number of people (by mode)
	Maintain or improve access to and from City Center	BN5	Transit delay
			Target
			Travel time <= today
			Delay <= today



Supporting Data for Alternatives Screening

VISSIM Operations Analysis - AM Peak Summary

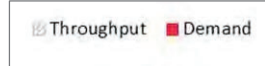
BASELINE AND CONTEXTUAL NEEDS

Purpose: Improve Economic Vitality and Quality of Life	Issue: Increasing roadway congestion on S 320th St			
	Needs:		Metric	Target
	Decrease roadway congestion on S 320th St	BN3	Travel time between Pacific Highway S and Military Road S and number of people (by mode)	Travel time <= today



Access to City Center

- Year 2045 Build (2I) Alternative serves 4,000 vph on S 320th and S 324th Street (west of I-5) compared to the No Build Alternative which serves 3,550 vph. 10% improvement in throughput.
- This means more trips are able to get to and from the City Center compared to the No Build Alternative.

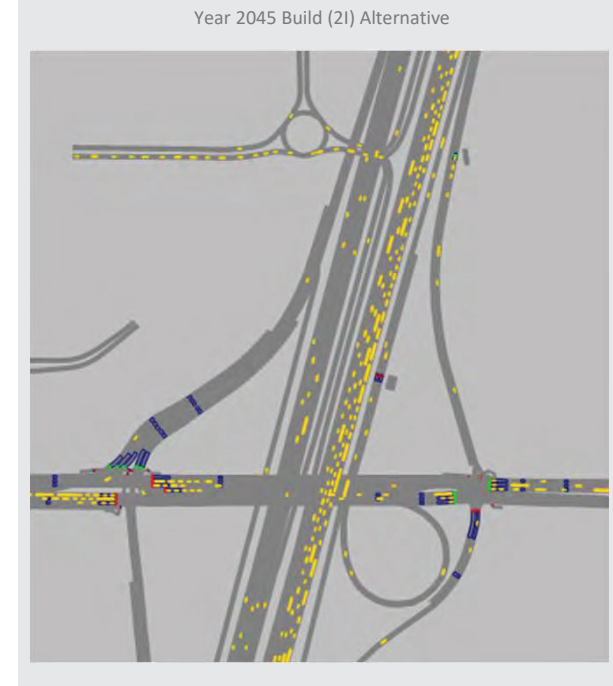
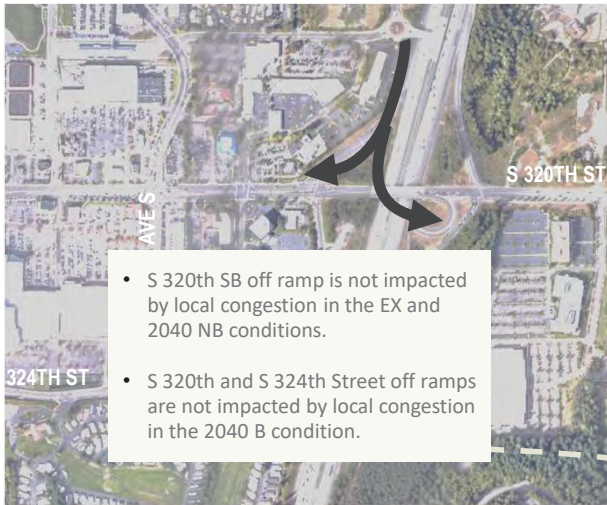


Supporting Data for Alternatives Screening

VISSIM Operations Analysis - AM Peak Summary

BASELINE AND CONTEXTUAL NEEDS

Purpose: Maintain Integrity of the Interstate System	Issue: Local Queues Impact Mainline I-5		
	Needs:		Metric
	Improve safety for the general traveling public on the Interstate and ramps	BN12	Local queue spillback on I-5 off-ramps (length and duration) at S 272nd, S 320th, and S 348th Streets
			Target
Issue: Regional Congestion on I-5			
Needs:		Metric	Target
Maintain or improve I-5 mobility for persons and freight trucks	BN15	Local queue spillback on I-5 off ramps (length and duration) at S 272nd, S 320th, and S 348th Streets	Local queues do not extend into ramp deceleration area

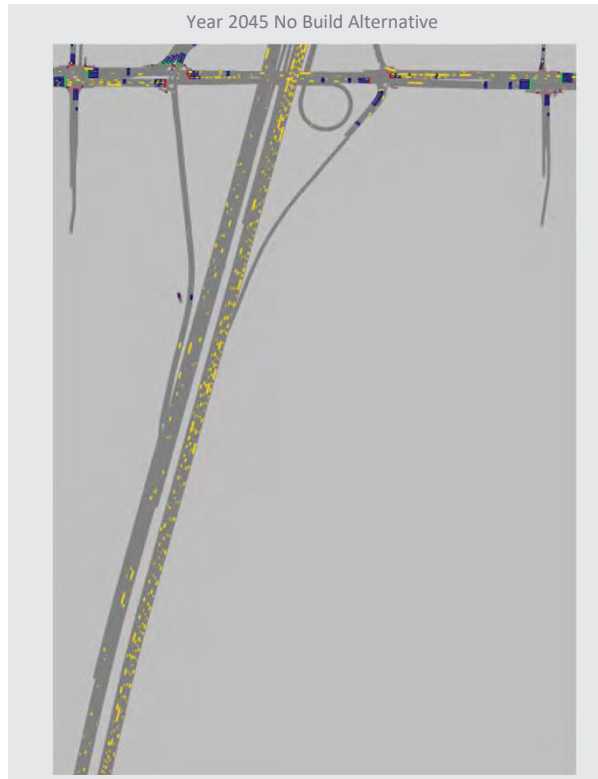


Supporting Data for Alternatives Screening

VISSIM Operations Analysis - AM Peak Summary

BASELINE AND CONTEXTUAL NEEDS

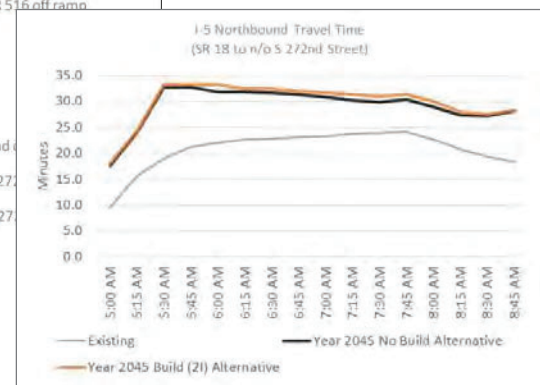
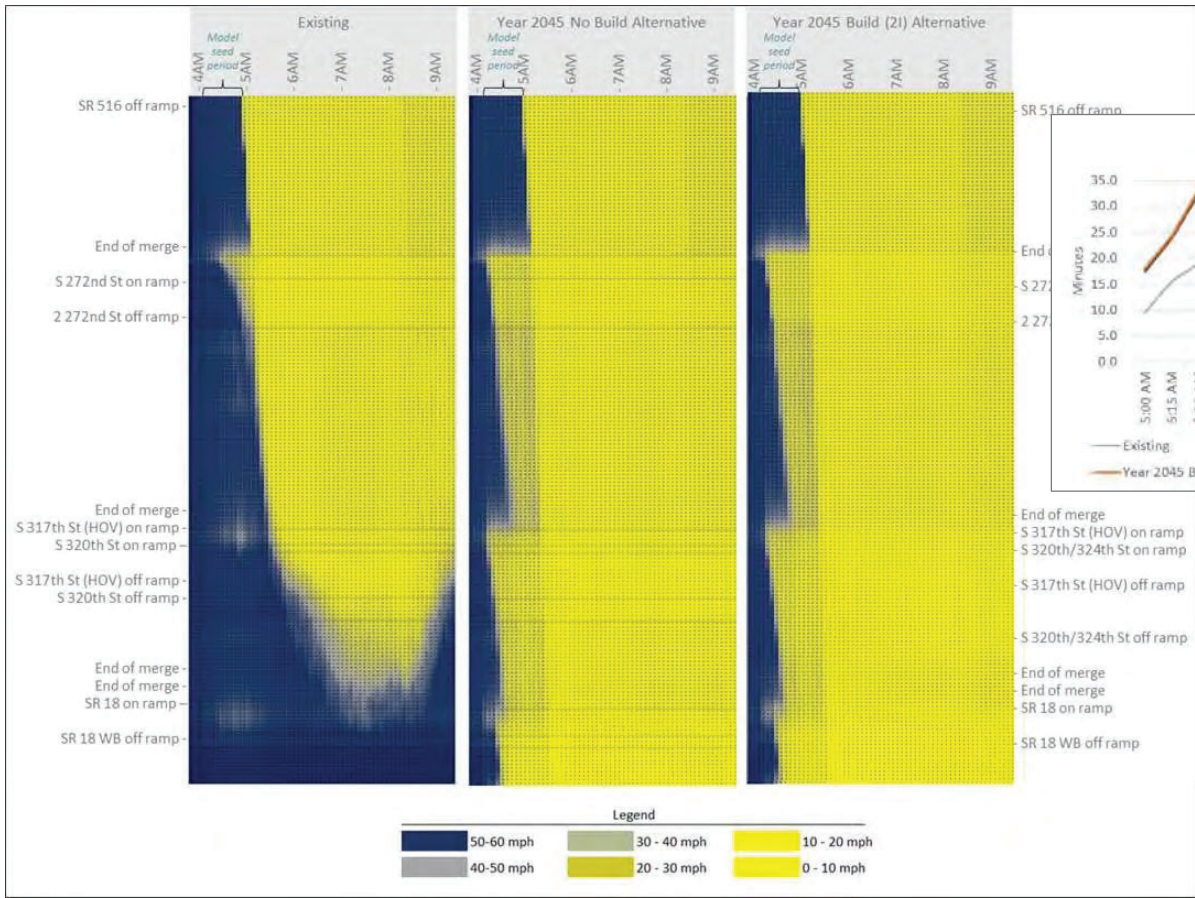
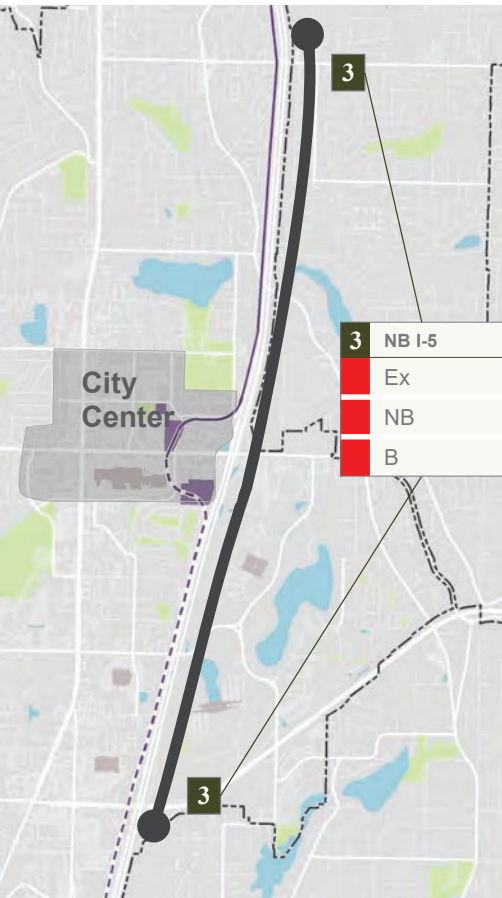
Purpose: Maintain Integrity of the Interstate System	Issue: Local Queues Impact Mainline I-5			
	Needs:		Metric	Target
	Improve safety for the general traveling public on the Interstate and ramps	BN12	Local queue spillback on I-5 off-ramps (length and duration) at S 272nd, S 320th, and S 348th Streets	Local queues do not extend into ramp deceleration area
	Issue: Regional Congestion on I-5			
	Needs:		Metric	Target
	Maintain or improve I-5 mobility for persons and freight trucks	BN15	Local queue spillback on I-5 off ramps (length and duration) at S 272nd, S 320th, and S 348th Streets	Local queues do not extend into ramp deceleration area



Supporting Data for Alternatives Screening

VISSIM Operations Analysis - AM Peak Summary

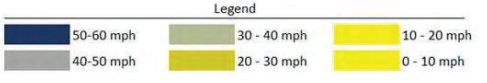
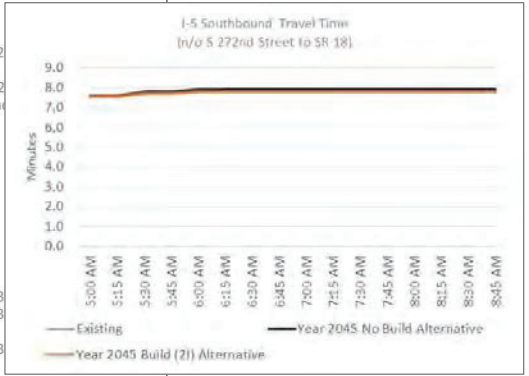
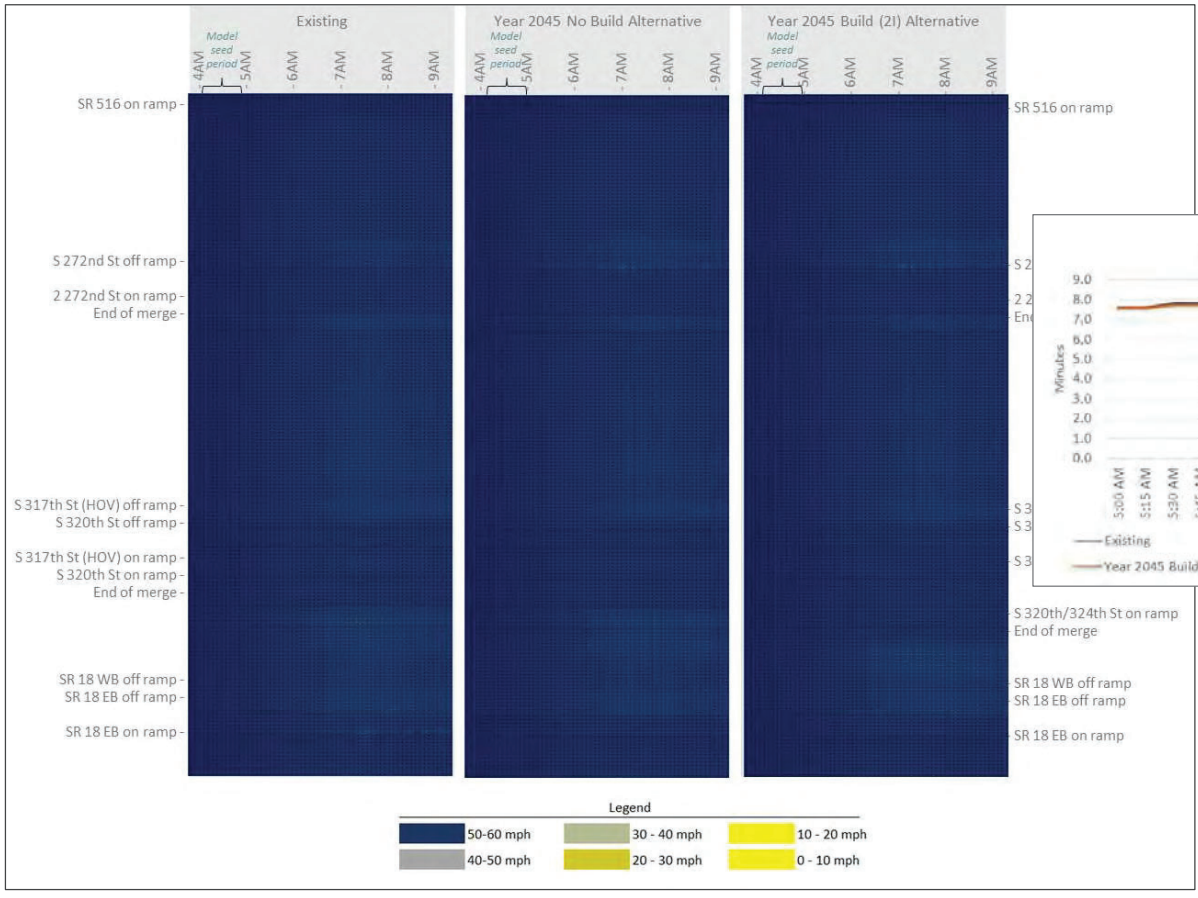
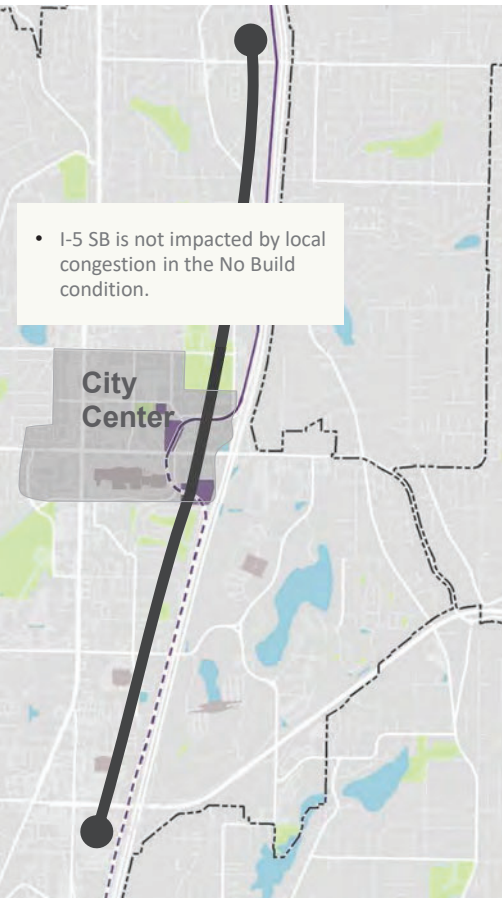
BASELINE AND CONTEXTUAL NEEDS				
Purpose: Maintain Integrity of the Interstate System	Issue: Regional Congestion on I-5			
	Needs:		Metric	Target
	Maintain or improve I-5 mobility for persons and freight trucks	BN16	Travel time on I-5 between S 272nd Street and SR 18/S 348th Street	Better than No Build



Supporting Data for Alternatives Screening

VISSIM Operations Analysis - AM Peak Summary

BASELINE AND CONTEXTUAL NEEDS				
Purpose: Maintain Integrity of the Interstate System	Issue: Regional Congestion on I-5			
	Needs:		Metric	Target
	Maintain or improve I-5 mobility for persons and freight trucks	BN16	Travel time on I-5 between S 272nd Street and SR 18/S 348th Street	Better than No Build

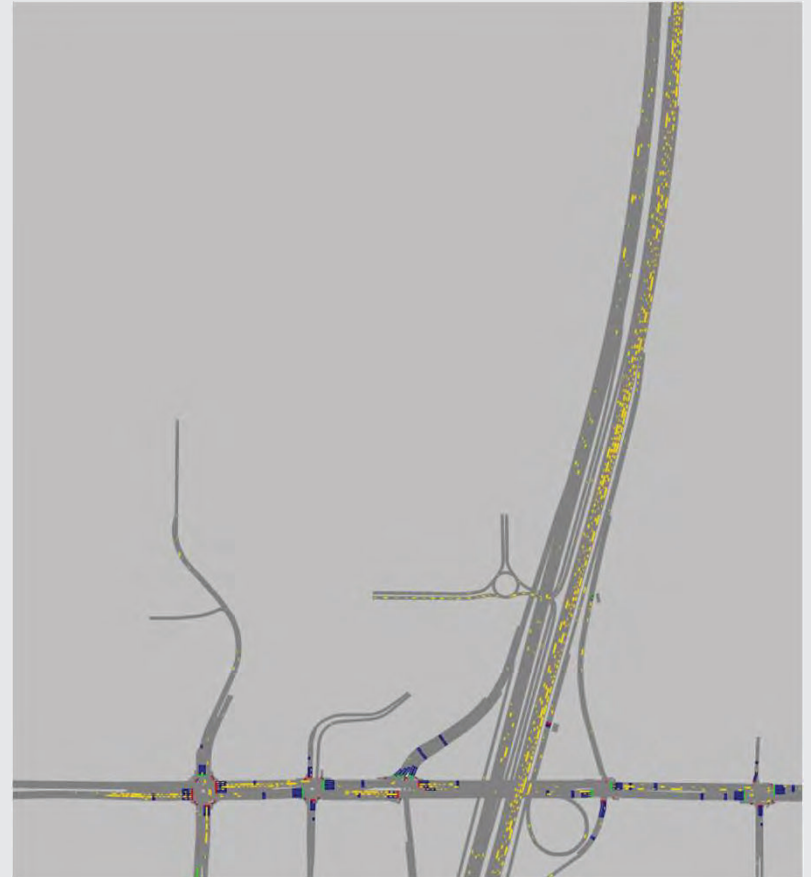


Supporting Data for Alternatives Screening
VISSIM Operations Analysis - AM Peak Summary

Year 2045 No Build Alternative



Year 2045 Build (2I) Alternative

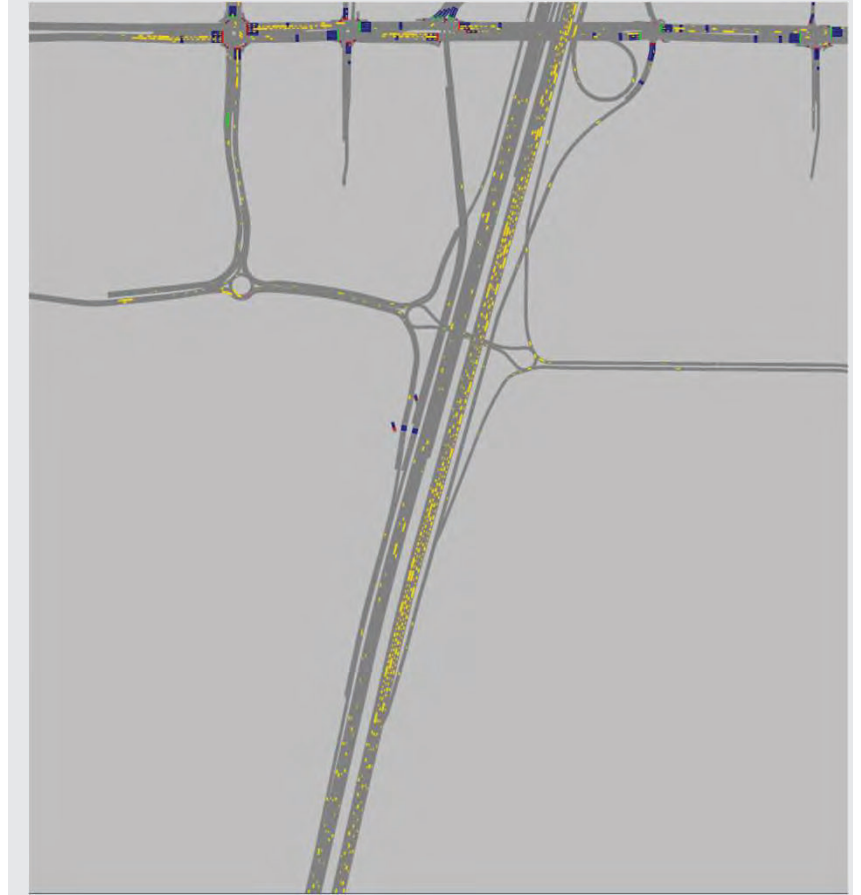


Supporting Data for Alternatives Screening
VISSIM Operations Analysis - AM Peak Summary

Year 2045 No Build Alternative



Year 2045 Build (2I) Alternative

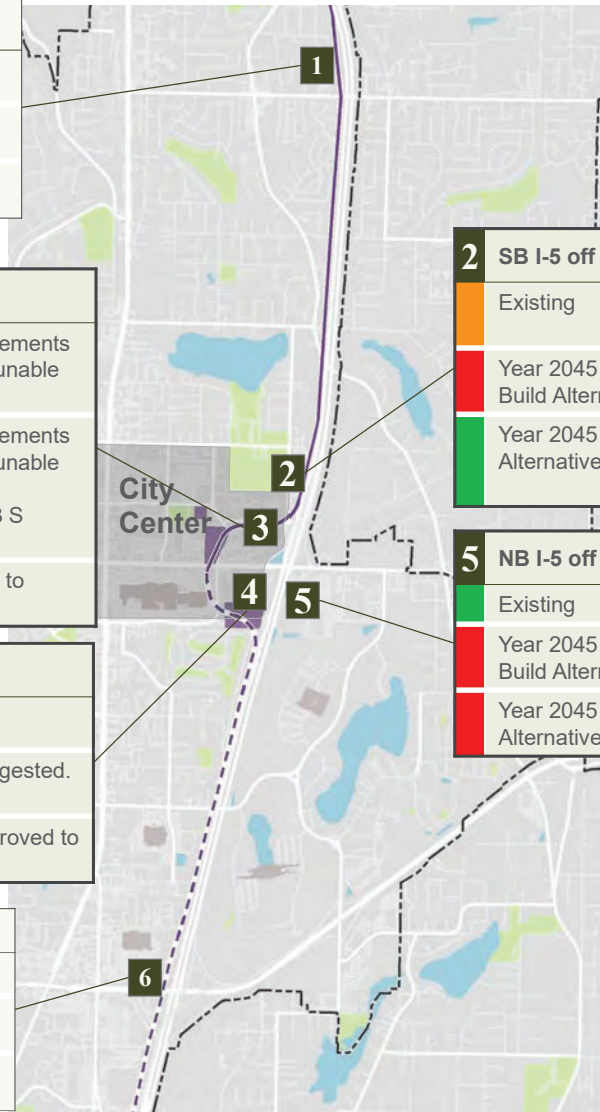


VISSIM Operations Analysis - PM PEAK



Supporting Data for Alternatives Screening

VISSIM Operations Analysis - PM Peak Summary



LEGEND	
	As observed in operations analyses
■	No congestion
■	Approaching capacity
■	Exceeds capacity

1 SB I-5 North End approaching S 272nd St off ramp	
■ Existing	• Outside lanes approaching off ramp are overcapacity.
■ Year 2045 No Build Alternative	• Same as Existing.
■ Year 2045 Build Alternative	• Same as Existing.

3 WB S 320th St between I-5 and 23rd Ave S	
■ Existing	• Impacts I-5 SB off ramp. SB and WB movements at ramps intersection have green but are unable to progress.
■ Year 2045 No Build Alternative	• Impacts I-5 SB off ramp. SB and WB movements at ramps intersection have green but are unable to progress. • Queue spills onto I-5 NB off ramp and WB S 320th east of the freeway.
■ Year 2045 Build Alternative	• Traffic volumes and operations are similar to existing conditions.

4 EB S 320th St between I-5 and 23rd Ave S	
■ Existing	
■ Year 2045 No Build Alternative	• Demand exceeds capacity; corridor is congested.
■ Year 2045 Build Alternative	• With reduced demand, operations are improved to similar to todays conditions.

2 SB I-5 off ramp to S 320th St	
■ Existing	• Queues impact outside lane of I-5 mainline at times.
■ Year 2045 No Build Alternative	• Traffic queues from the off ramp onto I-5 mainline due to congestion at S 320th St.
■ Year 2045 Build Alternative	• Off ramp is clear of stop and go vehicles. Congestion in this area on the mainline is due to downstream constraints.

5 NB I-5 off ramp to S 320th St	
■ Existing	
■ Year 2045 No Build Alternative	• Queues from WB S 320th St and I-5 SB ramp spill back onto I-5 mainline.
■ Year 2045 Build Alternative	• Similar to No Build, queues spill back and impact I-5 but with lesser severity.

6 SB I-5 South End approaching SR 18	
■ Existing	• Exiting study area is congested.
■ Year 2045 No Build Alternative	• Exiting study area is congested. • Outside lanes exiting to SR 18 are also congested.
■ Year 2045 Build Alternative	• Same as No Build.

Supporting Data for Alternatives Screening

VISSIM Operations Analysis - PM Peak Summary

BASELINE AND CONTEXTUAL NEEDS

Purpose: Improve Economic Vitality and Quality of Life

Issue: Increasing roadway congestion on S 320th St			
Needs:		Metric	Target
Decrease roadway congestion on S 320th St	BN3	Travel time between Pacific Highway S and Military Road S and number of people (by mode)	Travel time <= today
Maintain or improve access to and from City Center	BN5	Transit delay	Delay <= today

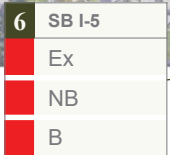
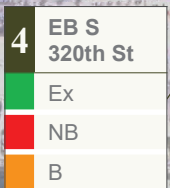
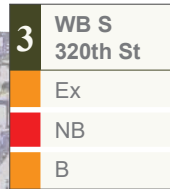


Supporting Data for Alternatives Screening

VISSIM Operations Analysis - PM Peak Summary

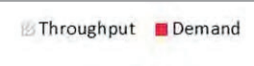
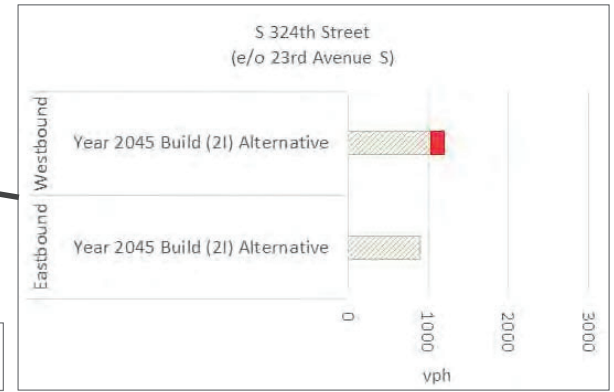
BASELINE AND CONTEXTUAL NEEDS

Purpose: Improve Economic Vitality and Quality of Life	Issue: Increasing roadway congestion on S 320th St			
	Needs:		Metric	Target
	Decrease roadway congestion on S 320th St	BN3	Travel time between Pacific Highway S and Military Road S and number of people (by mode)	Travel time <= today



Access to City Center

- Year 2045 Build (2I) Alternative serves 5,500 vph on S 320th and S 324th Street (west of I-5) compared to the No Build Alternative which serves 4,150 vph. 33% improvement in throughput.
- This means more trips are able to get to and from the City Center compared to the No Build Alternative.

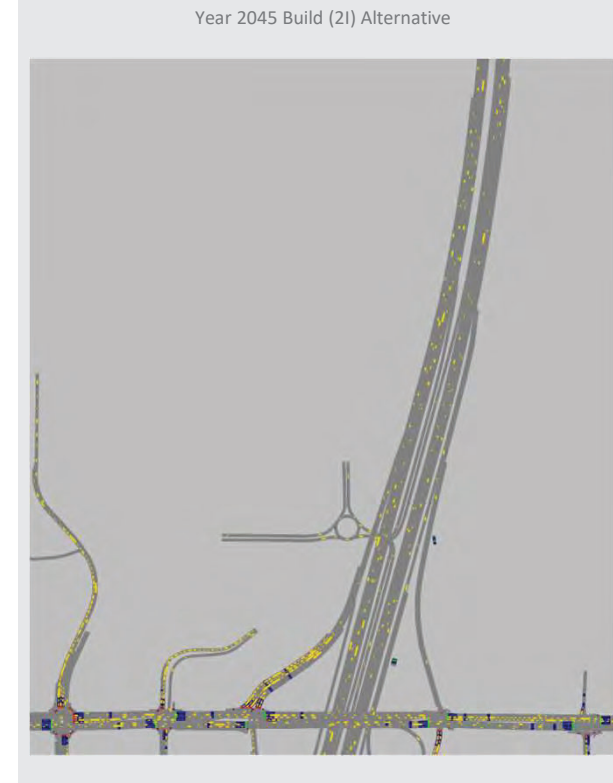


Supporting Data for Alternatives Screening

VISSIM Operations Analysis - PM Peak Summary

BASELINE AND CONTEXTUAL NEEDS

Purpose: Maintain Integrity of the Interstate System	Issue: Local Queues Impact Mainline I-5		
	Needs:		Metric
	Improve safety for the general traveling public on the Interstate and ramps	BN12	Local queue spillback on I-5 off-ramps (length and duration) at S 272nd, S 320th, and S 348th Streets
			Target
Issue: Regional Congestion on I-5			
Needs:		Metric	Target
Maintain or improve I-5 mobility for persons and freight trucks	BN15	Local queue spillback on I-5 off ramps (length and duration) at S 272nd, S 320th, and S 348th St	Local queues do not extend into ramp deceleration area

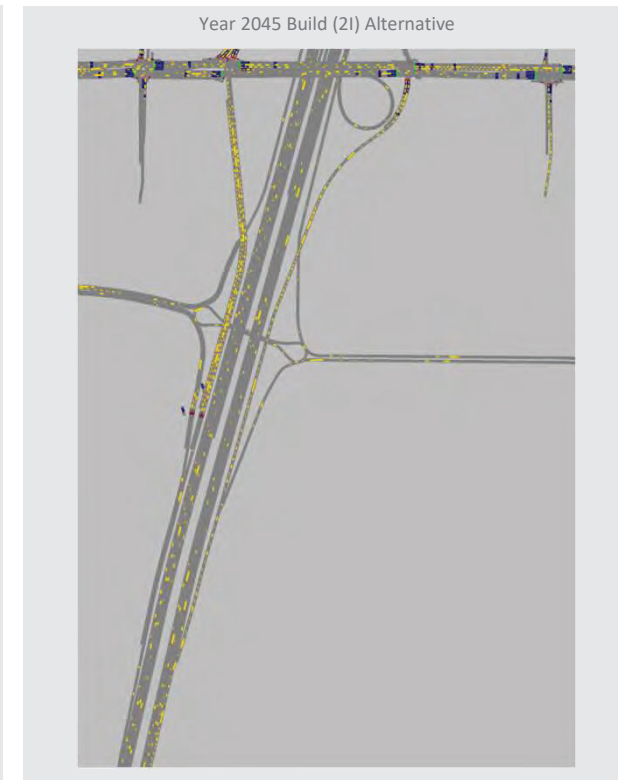
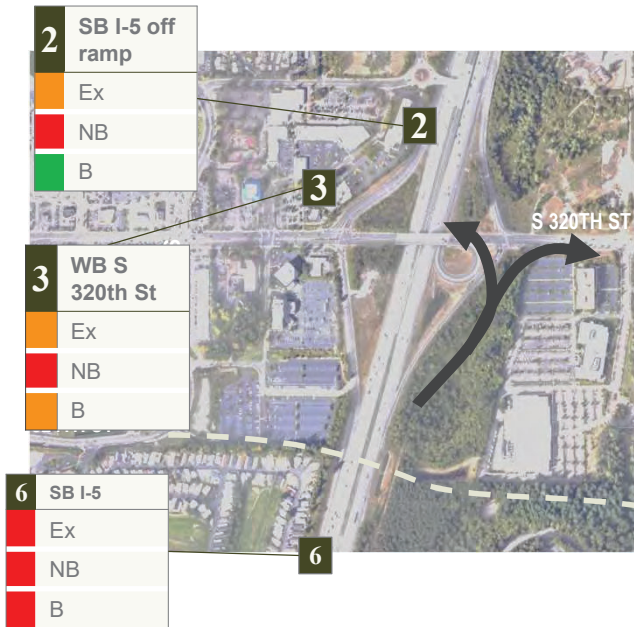


Supporting Data for Alternatives Screening

VISSIM Operations Analysis - PM Peak Summary

BASELINE AND CONTEXTUAL NEEDS

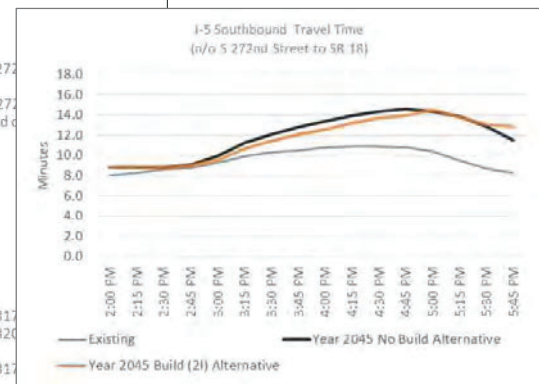
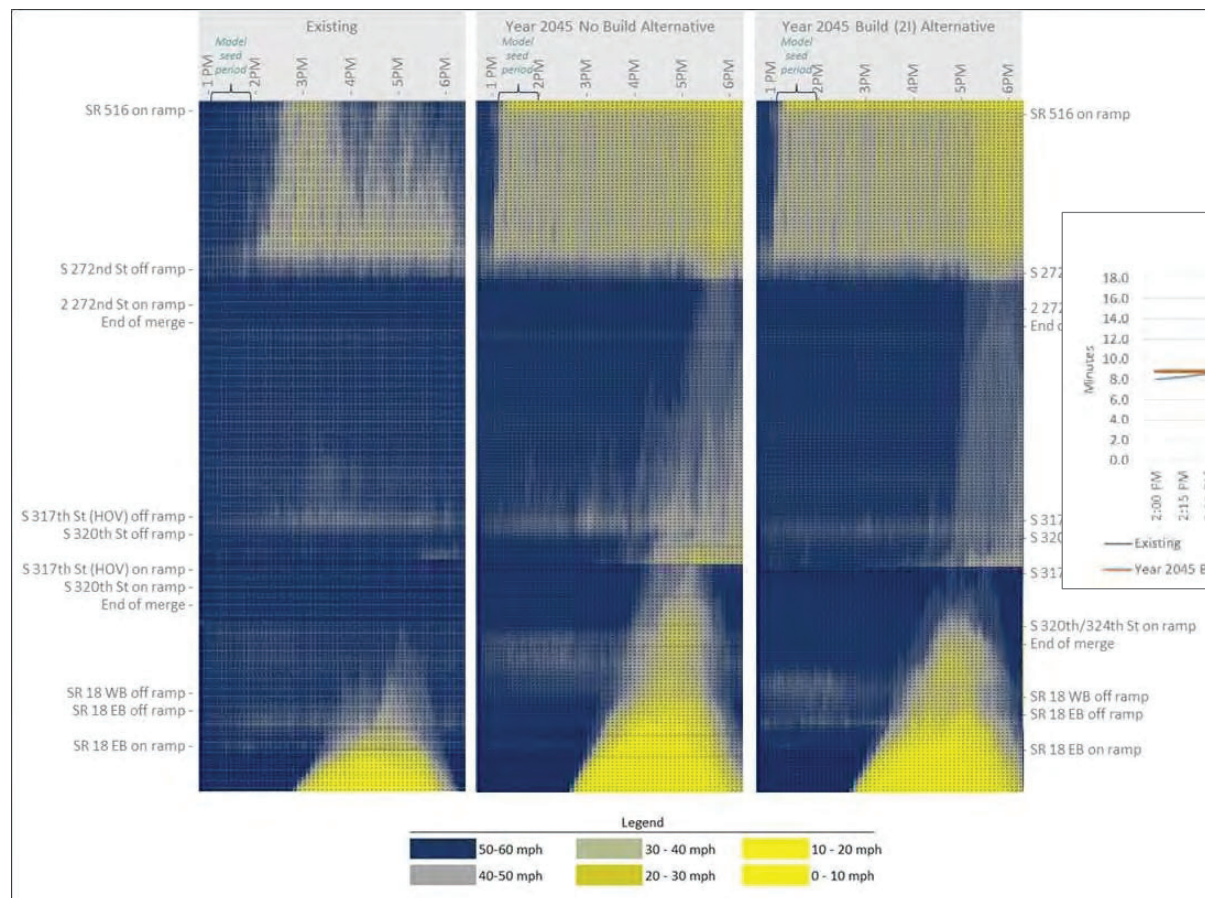
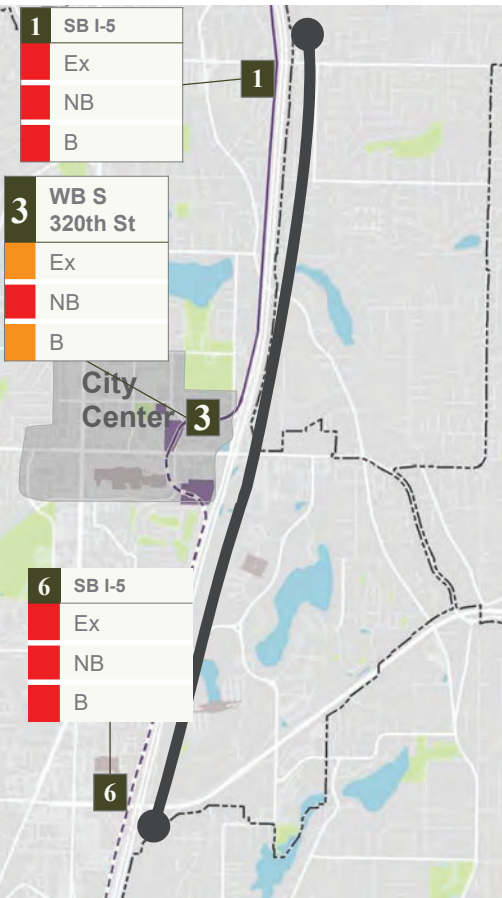
Purpose: Maintain Integrity of the Interstate System	Issue: Local Queues Impact Mainline I-5		
	Needs:		Metric
	Improve safety for the general traveling public on the Interstate and ramps	BN12	Local queue spillback on I-5 off-ramps (length and duration) at S 272nd, S 320th, and S 348th Streets
			Target
			Local queues do not extend into ramp deceleration area
	Issue: Regional Congestion on I-5		
Needs:		Metric	Target
Maintain or improve I-5 mobility for persons and freight trucks	BN15	Local queue spillback on I-5 off ramps (length and duration) at S 272nd, S 320th, and S 348th St	Local queues do not extend into ramp deceleration area



Supporting Data for Alternatives Screening

VISSIM Operations Analysis - PM Peak Summary

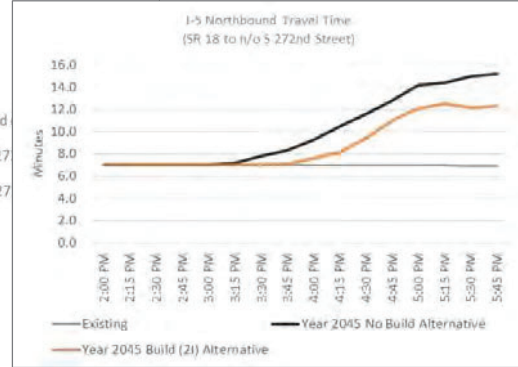
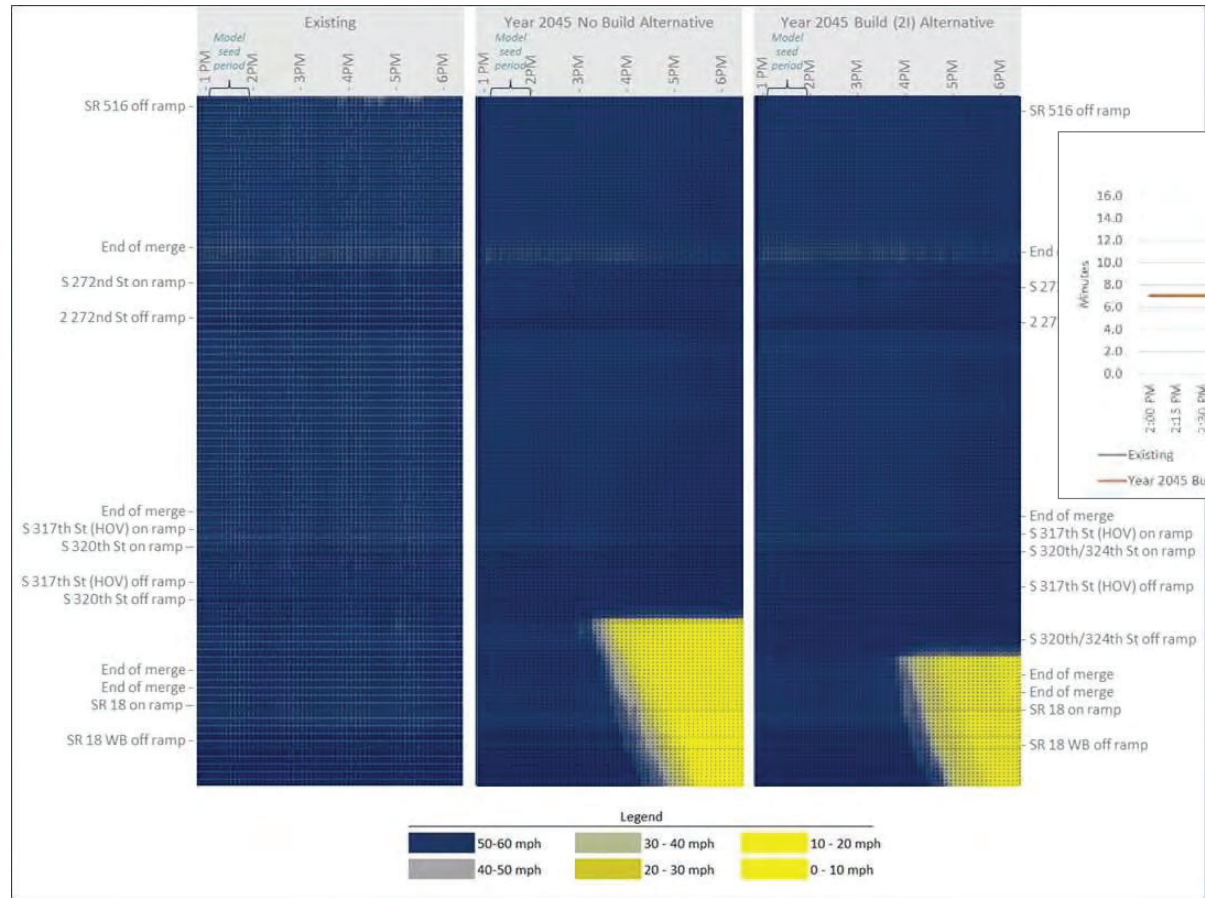
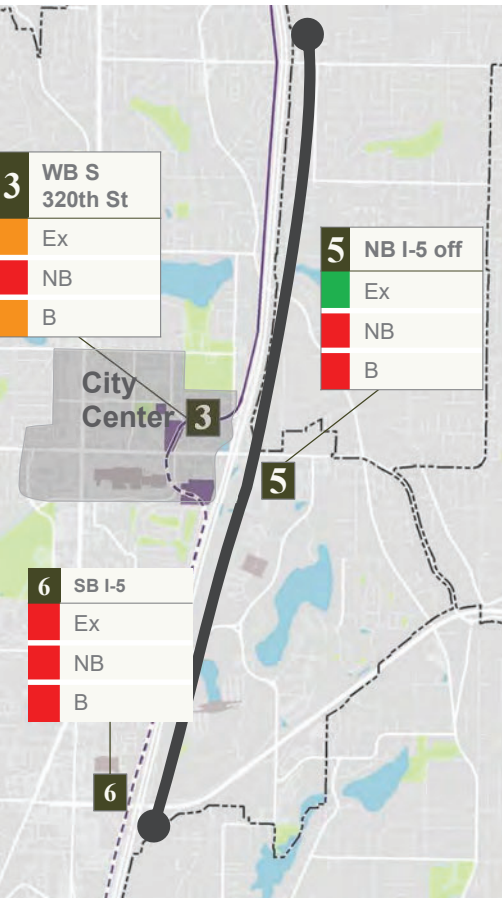
BASELINE AND CONTEXTUAL NEEDS			
Purpose: Maintain Integrity of the Interstate System	Issue: Regional Congestion on I-5		
	Needs:		Metric
	Maintain or improve I-5 mobility for persons and freight trucks	BN16	Travel time on I-5 between S 272nd Street and SR 18/S 348th Street
			Better than No Build



Supporting Data for Alternatives Screening

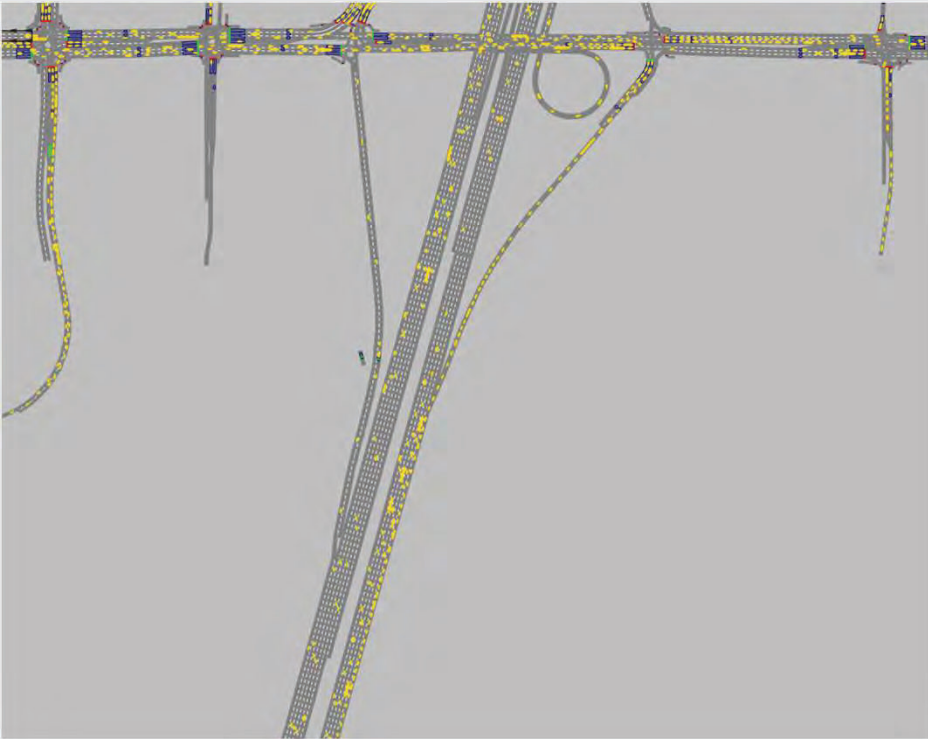
VISSIM Operations Analysis - PM Peak Summary

BASELINE AND CONTEXTUAL NEEDS				
Purpose: Maintain Integrity of the Interstate System	Issue: Regional Congestion on I-5			
	Needs:		Metric	Target
	Maintain or improve I-5 mobility for persons and freight trucks	BN16	Travel time on I-5 between S 272nd St and SR 18/S 348th St	Better than No Build



Supporting Data for Alternatives Screening
VISSIM Operations Analysis - PM Peak Summary

Year 2045 No Build Alternative

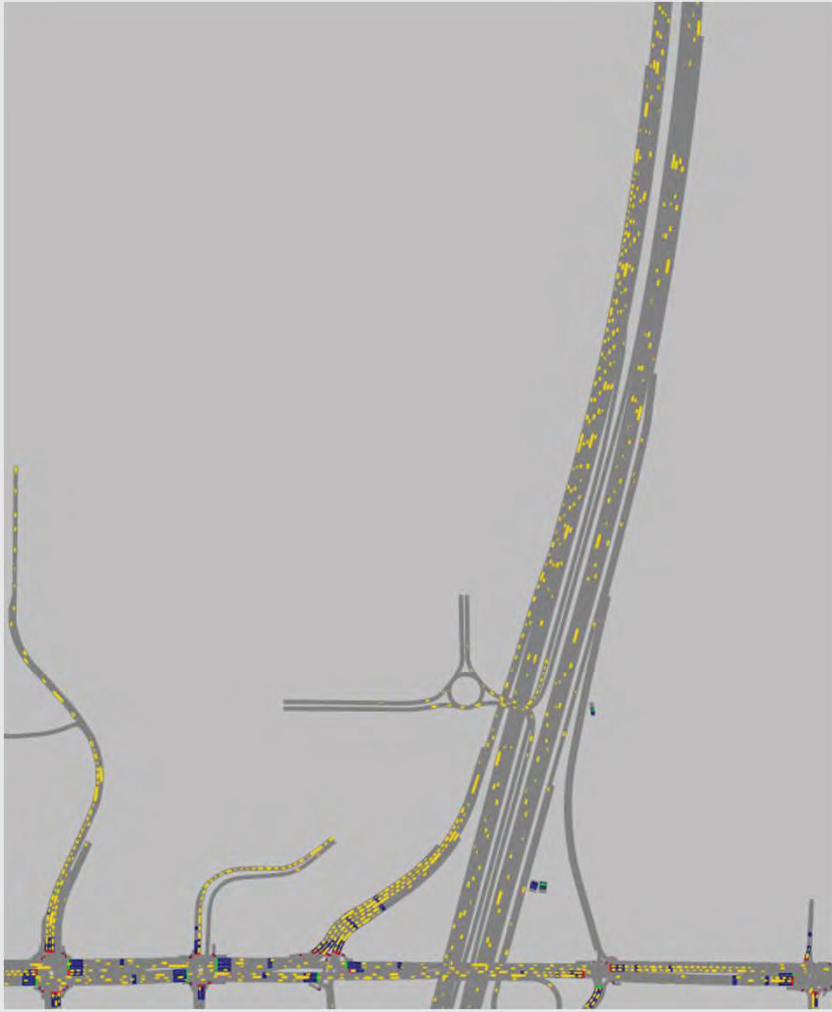


Year 2045 Build (2I) Alternative



Supporting Data for Alternatives Screening
VISSIM Operations Analysis - PM Peak Summary

Year 2045 No Build Alternative



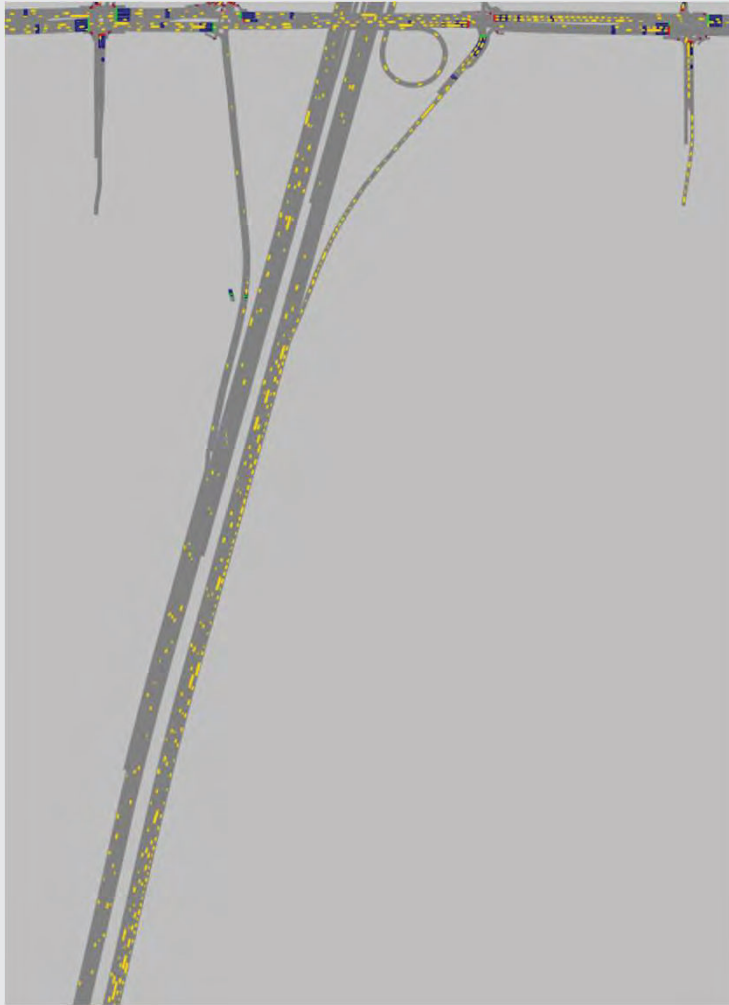
Year 2045 Build (2I) Alternative



Supporting Data for Alternatives Screening

VISSIM Operations Analysis - PM Peak Summary

Year 2045 No Build Alternative



Year 2045 Build (2I) Alternative



City of Federal Way CCA
 Interchange Concepts Level 2 Screening
 PM Peak Hour Volumes and Operations Summary

Notes: Results are from Synchro 10. Queues shown are 50th percentile Synchro queues. HCM2000 for signals; HCM2010 for AWSC.

INTERSECTION OPERATIONS	Existing ** Metrics and targets are based on existing conditions			Year 2045 No Build Alternative ¹			Year 2045 Interchange Access Modification Alternatives														
	Max v/c	LOS	Queue	Max v/c	LOS	Queue	S 324th Street Interchange Access Concepts														
							2A Split Diamond ²			2B Grade Separated Ramps			2C Arterial Couplet			2D Grade Separated Ramps + S 324th St SE Quadrant Loop Ramp			2E Split Diamond + Compatible with S 324th St SE Quadrant Loop Ramp		
Max v/c	LOS	Queue	Max v/c	LOS	Queue	Max v/c	LOS	Queue	Max v/c	LOS	Queue	Max v/c	LOS	Queue	Max v/c	LOS	Queue				
Study Intersections																					
S 272nd Street/I-5 SB Ramps	2.24	-		2.15	-		Same as 2B	> 1.00	-		Same as 2B	Same as 2B			Same as 2B		Same as 2A				
S 272nd Street/I-5 NB Ramps	0.89	-		0.92	-		Same as 2B	0.90 - 0.99	-		Same as 2B	Same as 2B			Same as 2B		Same as 2A				
S 304th Street/Pac Highway	0.89	-		1.52	-		Same as 2B	> 1.00	-		Same as 2B	Same as 2B			Same as 2B		Same as 2A				
S 304th Street/Military Road S	1.50	-		0.79	-		Same as 2B	< 0.90	-		Same as 2B	Same as 2B			Same as 2B		Same as 2A				
S 312th Street/Pac Highway	1.88	-		1.13	-		Same as 2B	> 1.00	-		> 1.00	-			Same as 2B		Same as 2A				
S 312th Street/28th Avenue S ²	0.84	-		1.36	-		Same as 2B	> 1.00	-		> 1.00	-			Same as 2B		Same as 2A				
WB S 312th approach	0.07	-	NA ³	0.10	-	NA ³	Same as 2B	< 0.90	-	NA ³	< 0.90	-	NA ³		Same as 2B		Same as 2A				
SB 28th approach	0.84	-	NA ³	1.36	-	NA ³	Same as 2B	> 1.00	-	NA ³	> 1.00	-	NA ³		Same as 2B		Same as 2A				
S 316th Street/Pac Highway	0.84	-		0.96	-		Same as 2B	0.90 - 0.99	-		> 1.00	-			Same as 2B		Same as 2A				
S 317th Street/28th Avenue S	0.48	-		0.74	-		Same as 2B	< 0.90	-		< 0.90	-			Same as 2B		Same as 2A				
S 320th Street Vicinity																					
S 320th Street/Pac Highway	1.10	-		1.13	-		Same as 2B	0.90 - 0.99	E		0.90 - 0.99	-			Same as 2B		Same as 2A				
S 320th Street/20th Avenue S	0.87	-		1.06	-		Same as 2B	< 0.90	C		> 1.00	-			Same as 2B		Same as 2A				
S 320th Street/23rd Avenue	1.17	E		1.18	F		Same as 2B	0.90 - 0.99	D		0.90 - 0.99	C			Same as 2B		Same as 2A				
WB S 320th approach	0.95	E	725'	1.18	F	1,100 ⁺	Same as 2B	0.90 - 0.99	C	600'	< 0.90	C	600'		Same as 2B		Same as 2A				
SB 23rd approach	1.17	F	525 ⁺	1.17	F	775 ⁺	Same as 2B	0.90 - 0.99	E	525'	0.90 - 0.99	D	550'		Same as 2B		Same as 2A				
EBL							Same as 2B	0.90 - 0.99						Not applicable.	Same as 2B		Same as 2A				
EBT							Same as 2B	< 0.90						Not applicable.	Same as 2B		Same as 2A				
EBR							Same as 2B	< 0.90						Not applicable.	Same as 2B		Same as 2A				
WBL							Same as 2B	0.90 - 0.99			< 0.90				Same as 2B		Same as 2A				
WBT							Same as 2B	< 0.90			< 0.90				Same as 2B		Same as 2A				
WBR							Same as 2B	< 0.90			< 0.90				Same as 2B		Same as 2A				
NBL							Same as 2B	< 0.90			< 0.90				Same as 2B		Same as 2A				
NBT							Same as 2B	0.90 - 0.99			< 0.90				Same as 2B		Same as 2A				
NBR							Same as 2B	< 0.90						Not applicable.	Same as 2B		Same as 2A				
SBL							Same as 2B	< 0.90						Not applicable.	Same as 2B		Same as 2A				
SBT							Same as 2B	0.90 - 0.99			0.90 - 0.99				Same as 2B		Same as 2A				
SBR							Same as 2B	< 0.90			< 0.90				Same as 2B		Same as 2A				
S 320th Street/25th Avenue S	0.74	C		1.42	D		Same as 2B	< 0.90	C		< 0.90	B			Same as 2B		Same as 2A				
WB S 320th approach	0.74	C	400'	1.00	D	975'	Same as 2B	< 0.90	B	250'	< 0.90	B	400'		Same as 2B		Same as 2A				
SB 25th approach	0.71	E	150'	1.42	F	300 ⁺	Same as 2B	> 1.00	F	250'	< 0.90	F	100'		Same as 2B		Same as 2A				
EBL							Same as 2B	< 0.90						Not applicable.	Same as 2B		Same as 2A				
EBT							Same as 2B	< 0.90						Not applicable.	Same as 2B		Same as 2A				
EBR							Same as 2B	< 0.90						Not applicable.	Same as 2B		Same as 2A				
WBL							Same as 2B	< 0.90			< 0.90				Same as 2B		Same as 2A				
WBT							Same as 2B	< 0.90			< 0.90				Same as 2B		Same as 2A				
WBR							Same as 2B	< 0.90			< 0.90				Same as 2B		Same as 2A				
NBL							Same as 2B	< 0.90			< 0.90				Same as 2B		Same as 2A				
NBT							Same as 2B	< 0.90			< 0.90				Same as 2B		Same as 2A				
NBR							Same as 2B	< 0.90						Not applicable.	Same as 2B		Same as 2A				
SBL							Same as 2B	> 1.00						Not applicable.	Same as 2B		Same as 2A				
SBT							Same as 2B	< 0.90			< 0.90				Same as 2B		Same as 2A				
SBR							Same as 2B	< 0.90			< 0.90				Same as 2B		Same as 2A				

City of Federal Way CCA

Interchange Concepts Level 2 Screening

PM Peak Hour Volumes and Operations Summary

Notes: Results are from Synchro 10. Queues shown are 50th percentile Synchro queues. HCM2000 for signals; HCM2010 for AWSC.

INTERSECTION OPERATIONS	Existing ** Metrics and targets are based on existing conditions			Year 2045 No Build Alternative ¹			Year 2045 Interchange Access Modification Alternatives														
	Max v/c	LOS	Queue	Max v/c	LOS	Queue	S 324th Street Interchange Access Concepts														
							2A Split Diamond ²			2B Grade Separated Ramps			2C Arterial Couplet			2D Grade Separated Ramps + S 324th St SE Quadrant Loop Ramp			2E Split Diamond + Compatible with S 324th St SE Quadrant Loop Ramp		
Max v/c	LOS	Queue	Max v/c	LOS	Queue	Max v/c	LOS	Queue	Max v/c	LOS	Queue	Max v/c	LOS	Queue	Max v/c	LOS	Queue				
S 320th Street/I-5 SB Ramps																					
Signal	0.88	D		1.04	E				< 0.90	D		< 0.90	B		< 0.90	C					
EB S 320th approach	0.81	D	900'	1.00	D	1,100'			< 0.90	C	750'	< 0.90	A	150'	< 0.90	Not applicable.					
WB S 320th approach	0.63	B	275'	1.04	D	900'			< 0.90	C	500'	< 0.90	B	150'	< 0.90	C	600'				
SB Off ramp approach	0.88	E	350'	1.02	F	600'			< 0.90	D	450'	< 0.90	E	225'	< 0.90	D	500'				
EBT									< 0.90			< 0.90			< 0.90						
EBR									< 0.90			< 0.90			< 0.90						
WBL									< 0.90			< 0.90			< 0.90						
WBT									< 0.90			< 0.90			< 0.90						
SBL									< 0.90			< 0.90			< 0.90						
SBT									< 0.90			< 0.90			< 0.90						
SBR									< 0.90			< 0.90			< 0.90						
S 320th Street/I-5 NB Ramps																					
Signal	0.93	C		0.88	C				< 0.90	C		< 0.90	B		< 0.90	C					
EB S 320th approach	0.66	B	625'	0.80	B	850'			< 0.90	C	550'	< 0.90	A	225'	< 0.90	A	200'				
WB S 320th approach	0.5	B	100'	0.68	C	400'			< 0.90	B	300'	< 0.90	A	225'	< 0.90	A	300'				
NB Off ramp approach	0.93	E	350'	0.88	E	350'			< 0.90	E	400'	< 0.90	E	175'	< 0.90	E	450'				
EBT									< 0.90			< 0.90			< 0.90						
EBR									< 0.90			< 0.90			< 0.90						
WBT									< 0.90			< 0.90			< 0.90						
WBR									< 0.90			< 0.90			< 0.90						
NBL									< 0.90			< 0.90			< 0.90						
NBT									< 0.90			< 0.90			< 0.90						
NBR									< 0.90			< 0.90			< 0.90						
S 320th Street/32nd Avenue S																					
	0.79	-		0.79	-				Same as 2B			< 0.90	B		< 0.90	-		Same as 2B			
S 320th Street/Weyehauser Way S																					
	0.78	-		0.93	-				Same as 2B			0.90 - 0.99	C		< 0.90	-		Same as 2B			
S 320th Street/Military Rd S																					
	0.91	-		1.10	-				Same as 2B			> 1.00	F		0.90 - 0.99	-		Same as 2B			
S 324th Street Vicinity																					
S 324th Street/Pac Highway																					
	0.94	D		1.48	F				Same as 2B			> 1.00	F		> 1.00	E		Same as 2B			
S 324th Street/23rd Ave S																					
WB S 324th approach	0.13	B	NA ²	0.44	D	NA ²			Same as 2B			< 0.90	C	275'	< 0.90	B		Same as 2B			
EBL												< 0.90	C		< 0.90	Not applicable.		Same as 2B			
EBT												< 0.90			< 0.90			Same as 2B			
WBT												< 0.90			< 0.90	Not applicable.		Same as 2B			
WBR												< 0.90			< 0.90	Not applicable.		Same as 2B			
SBL												< 0.90			< 0.90	Not applicable.		Same as 2B			
SBR												< 0.90			< 0.90	Not applicable.		Same as 2B			
RAB												< 0.90			< 0.90	A		Same as 2B			
EB S 324th approach												< 0.90			< 0.90	A	200'	Same as 2B			
WB S 324th approach												< 0.90			< 0.90	Not applicable.		Same as 2B			
SB 23rd Ave S approach												< 0.90			< 0.90	A	0'	Same as 2B			
S 324th Street/I-5 SB Ramps																					
Signal									< 0.90	C		< 0.90	A		< 0.90	A		Same as 2B			
EB S 324th approach									< 0.90	C	150'	< 0.90	A	150'	< 0.90	A	200'	Same as 2B			
WB S 324th approach									< 0.90	C	200'	< 0.90	A	50'	< 0.90	Not applicable.		Same as 2B			
SB Off ramp approach									< 0.90	C	200'	< 0.90	B	150'	< 0.90	C	100'	Same as 2B			
EBT									< 0.90			< 0.90			< 0.90			Same as 2B			
EBR									< 0.90			< 0.90			< 0.90			Same as 2B			
WBL									< 0.90			< 0.90			< 0.90	Not applicable.		Same as 2B			
WBT									< 0.90			< 0.90			< 0.90	Not applicable.		Same as 2B			
SBL									< 0.90			< 0.90			< 0.90			Same as 2B			
SBT									< 0.90			< 0.90			< 0.90			Same as 2B			
SBR									< 0.90			< 0.90			< 0.90	Not applicable.		Same as 2B			

City of Federal Way CCA
 Interchange Concepts Level 2 Screening
 PM Peak Hour Volumes and Operations Summary

Notes: Results are from Synchro 10. Queues shown are 50th percentile Synchro queues. HCM2000 for signals; HCM2010 for AWSC.

INTERSECTION OPERATIONS	Existing ** Metrics and targets are based on existing conditions						Year 2045 No Build Alternative ¹						Year 2045 Interchange Access Modification Alternatives																	
													S 324th Street Interchange Access Concepts																	
													2A Split Diamond ²			2B Grade Separated Ramps			2C Arterial Couplet			2D Grade Separated Ramps + S 324th St SE Quadrant Loop Ramp			2E Split Diamond + Compatible with S 324th St SE Quadrant Loop Ramp					
	Max v/c	LOS	Queue	Max v/c	LOS	Queue	Max v/c	LOS	Queue	Max v/c	LOS	Queue	Max v/c	LOS	Queue	Max v/c	LOS	Queue	Max v/c	LOS	Queue	Max v/c	LOS	Queue	Max v/c	LOS	Queue			
RAB																														
EB S 324th approach																														
WB S 324th approach																														
SB Off ramp approach																														
Diverging Diamond																														
EB S 324th approach																														
WB S 324th approach																														
SB Off ramp approach																														
S 324th Street/I-5 NB Ramps																														
Signal																														
EB S 324th approach																														
WB S 324th approach																														
NB Off ramp approach																														
EBL																														
EBT																														
WBT																														
WBR																														
NBL																														
NBT																														
NBR																														
RAB																														
EB S 324th approach																														
WB S 324th approach																														
NB Off ramp approach																														
Diverging Diamond																														
EB S 324th approach																														
WB S 324th approach																														
NB Off ramp approach																														
Study Intersections																														
S 336th Street/Pac Highway	0.92	-		1.23	-								Same as 2B	> 1.00	-															
S 348th Street/Pac Highway	1.11	-		1.42	-								Same as 2B	> 1.00	-															
S 348th Street/16th Avenue S	1.17	-		1.08	-								Same as 2B	> 1.00	-															
SR 18 EB Ramps/Weyerhauser Way S	0.95	-		0.98	-								Same as 2B	0.90 - 0.99	-															
SR 18 WB Ramps/Weyerhauser Way S	0.87	-		0.87	-								Same as 2B	0.90 - 0.99	-															
SR 18/I-5 SB Ramps		Not applicable.		0.96	-								Same as 2B	0.90 - 0.99	-															

NOTES:
¹ No Build compared to Existing at S 320th/I-5 NB Ramps: Added capacity on westbound approach (HOV lane east of interchange) allows more time allocated to northbound off, reducing v/c ratio.
² AWSC in existing and year 2045 No Build conditions. Build conditions assume a signal. 2 lane RAB with right turn pockets on some approaches is feasible.
³ Queues are not included in the AWSC output.
 Values outlined in a thick black border are worse than the values reported in version 1 of the Level 2 Screening results and values outlined in a thick blue border are better. Version 2 was updated on 3/31/20 with updated pedestrian phases and flash don't walk times.

² 2A: SB Ramp/S 320th has 2 SB L/2 SB T/2 SB R.

City of Federal Way CCA
Interchange Concepts Level 2 Screening
PM Peak Hour Volumes and Operations Summary

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	Existing ** Metrics and targets are based on existing conditions			Year 2045 No Build Alternative ¹		
	Max v/c	LOS	Queue	Max v/c	LOS	Queue
INTERSECTION OPERATIONS						
RAB						
EB S 324th approach						
WB S 324th approach						
SB Off ramp approach						
Diverging Diamond						
EB S 324th approach						
WB S 324th approach						
SB Off ramp approach						
S 324th Street/-5 NB Ramps						
Signal						
EB S 324th approach						
WB S 324th approach						
NB Off ramp approach						
EBL						
EBT						
WBT						
WBR						
NBL						
NBT						
NBR						
RAB						
EB S 324th approach						
WB S 324th approach						
NB Off ramp approach						
Diverging Diamond						
EB S 324th approach						
WB S 324th approach						
NB Off ramp approach						
Study Intersections						
S 336th Street/Pac Highway	0.92	-		1.23	-	
S 348th Street/Pac Highway	1.11	-		1.42	-	
S 348th Street/16th Avenue S	1.17	-		1.08	-	
SR 18 EB Ramps/Weyerhaeuser Way S	0.95	-		0.98	-	
SR 18 WB Ramps/Weyerhaeuser Way S	0.87	-		0.87	-	
SR 18/-5 SB Ramps		Not applicable.		0.96	-	

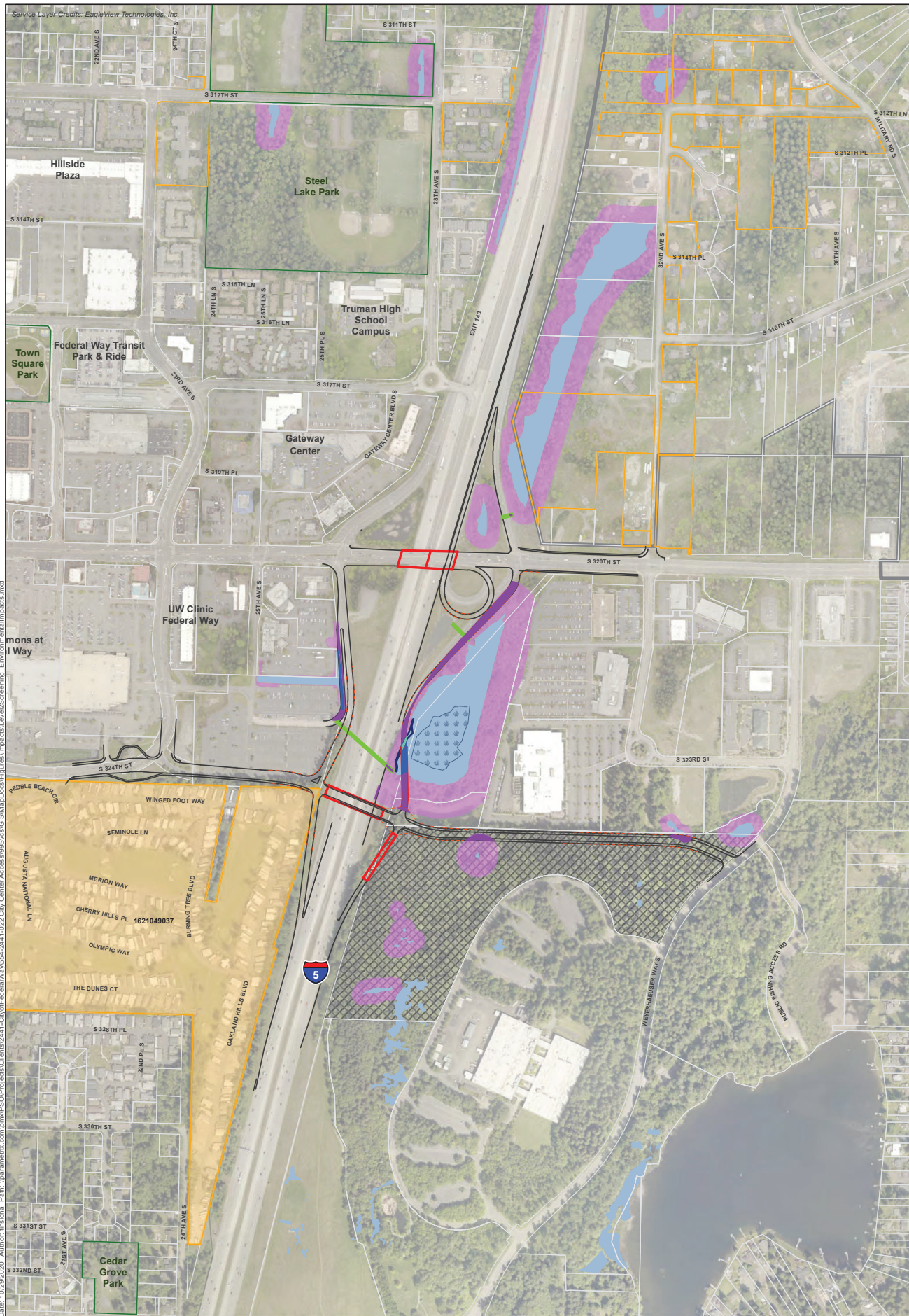
Year 2045 Interchange Access Modification Alternatives														
S 324th Street Interchange Access Concepts														
2F Grade Separated Ramps + Diverging Diamond Interchanges at 320th and 324th			2G Split Diamond + Roundabout at 324th			2H Split Diamond/Grade Separated Ramps Hybrid			2I Grade Separated Ramps + Roundabout at 324th			2J Hybrid + Roundabout at 324th		
Max v/c	LOS	Queue	Max v/c	LOS	Queue	Max v/c	LOS	Queue	Max v/c	LOS	Queue	Max v/c	LOS	Queue
			< 0.90	B					< 0.90	A				
			< 0.90	B	300'				< 0.90	A	100'			
			< 0.90	A	0'				< 0.90	A	0'			
			< 0.90	B	250'				< 0.90	A	125'			
< 0.90	B		Not applicable.						Not applicable.			Not applicable.		
< 0.90	A	100'												
< 0.90	C	100'												
< 0.90	-	0'												
			Not applicable.						Not applicable.			Not applicable.		
			< 0.90	B					< 0.90	A				
			< 0.90	A	0'				< 0.90	A	0'			
			< 0.90	C	200'				< 0.90	A	75'			
			< 0.90	C	350'				< 0.90	B	125'			
< 0.90	B		Not applicable.						Not applicable.			Not applicable.		
< 0.90	A	150'												
< 0.90	C	100'												
< 0.90	-	0'												
Same as 2B			Same as 2A			Same as 2B			Same as 2B			Same as 2B		
Same as 2B			Same as 2A			Same as 2B			Same as 2B			Same as 2B		
Same as 2B			Same as 2A			Same as 2B			Same as 2B			Same as 2B		
Same as 2B			Same as 2A			Same as 2B			Same as 2B			Same as 2B		
Same as 2B			Same as 2A			Same as 2B			Same as 2B			Same as 2B		
Same as 2B			Same as 2A			Same as 2B			Same as 2B			Same as 2B		

NOTES:
¹ No Build compared to Existing at S 320th/-5 NB Ramps: Added capacity on westbound approach (HOV lane east of interchange) allows more time allocated to northbound off, reducing v/c ratio.
² AWSC in existing and year 2045 No Build conditions. Build conditions assume a signal. 2 lane RAB with right turn pockets on some approaches is feasible.
³ Queues are not included in the AWSC output.
 Values outlined in a thick black border are worse than the values reported in version 1 of the Level 2 Screening results and values outlined in a thick blue border are better. Version 2 was updated on 3/31/20 with updated pedestrian phases and flash don't walk times.

Appendix I

Environmental and Design Data to Support Level 2 Screening





Date: 10/29/2020 Author: linsha Path: \\paramatrix.com\jcm\PSO\Projects\Clients\2441-CityCenterAccess\GIS\MapDocs\Figures\ImpactLevel\Screening_EnvironmentalImpacts.mxd

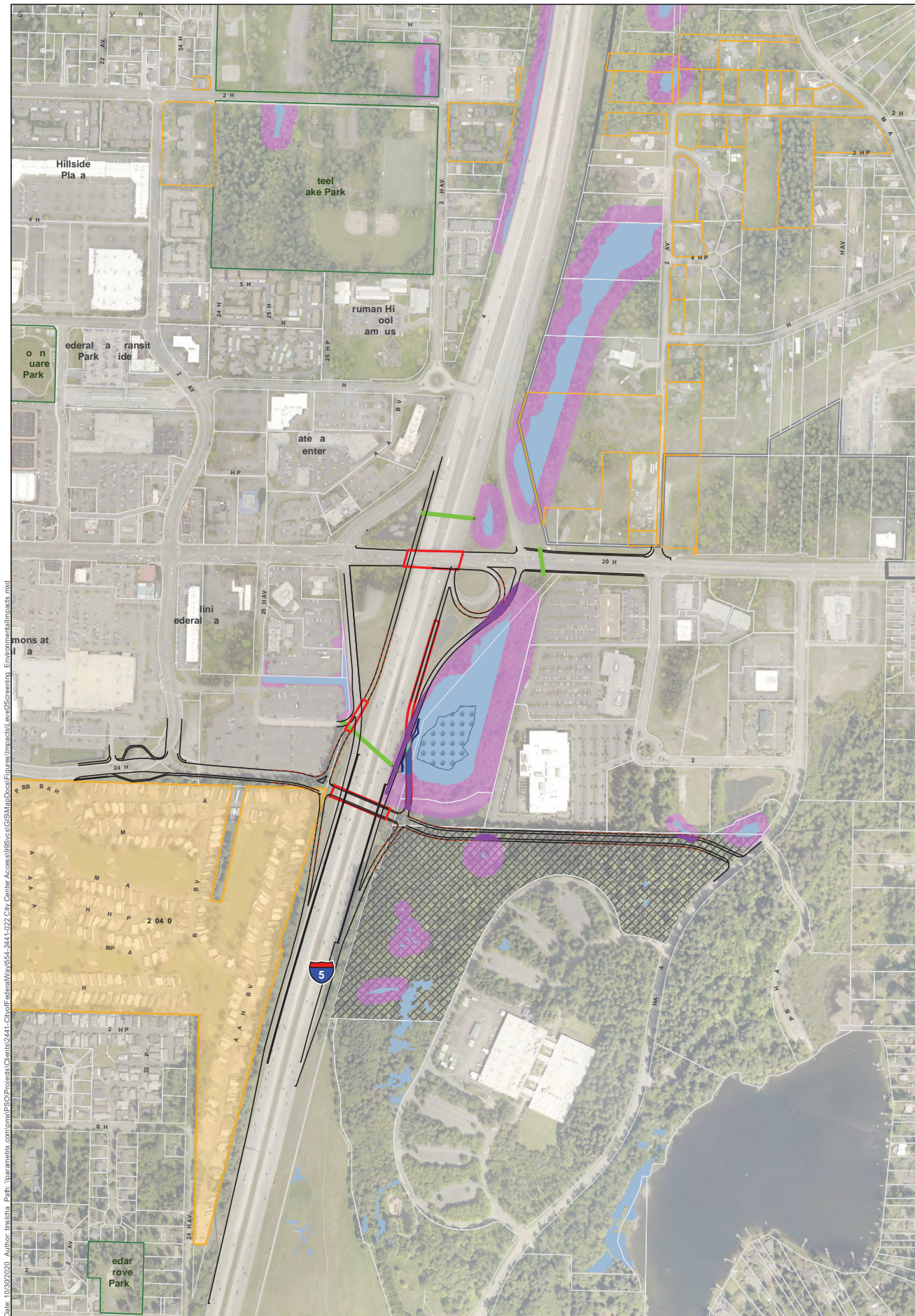
Source: King County, Federal Way, Paramatrix

- | | | |
|--|--|---|
| <p>Proposed Alternative 2A</p> <ul style="list-style-type: none"> — Bridge/Elevated Structure — Culvert — Wall — Roadway/Shoulder/Sidewalk/Curbface — Surveyed OHWM | <ul style="list-style-type: none"> Tax Lot City Limit Park Parcels Neighborhood Parcels Impacted Neighborhood Parcel Impacted Industrial Parcel | <ul style="list-style-type: none"> Wetlands Wetland Bog Wetland Buffers Wetland Wetland Buffer Stream <p>Wetland/Stream Impacts</p> |
|--|--|---|

**Alt 2A - Level 2 Screening:
Environmental Impacts
City Center Access Project**



Federal Way, King County, WA



Date: 10/30/2020 Author: Inischa Path: \\paramatrix.com\jmx\PSO\Projects\Clients\2441-CityCenterAccess\GIS\MapDocs\Figures\ImpactLevel\Screening_EnvironmentalImpacts.mxd

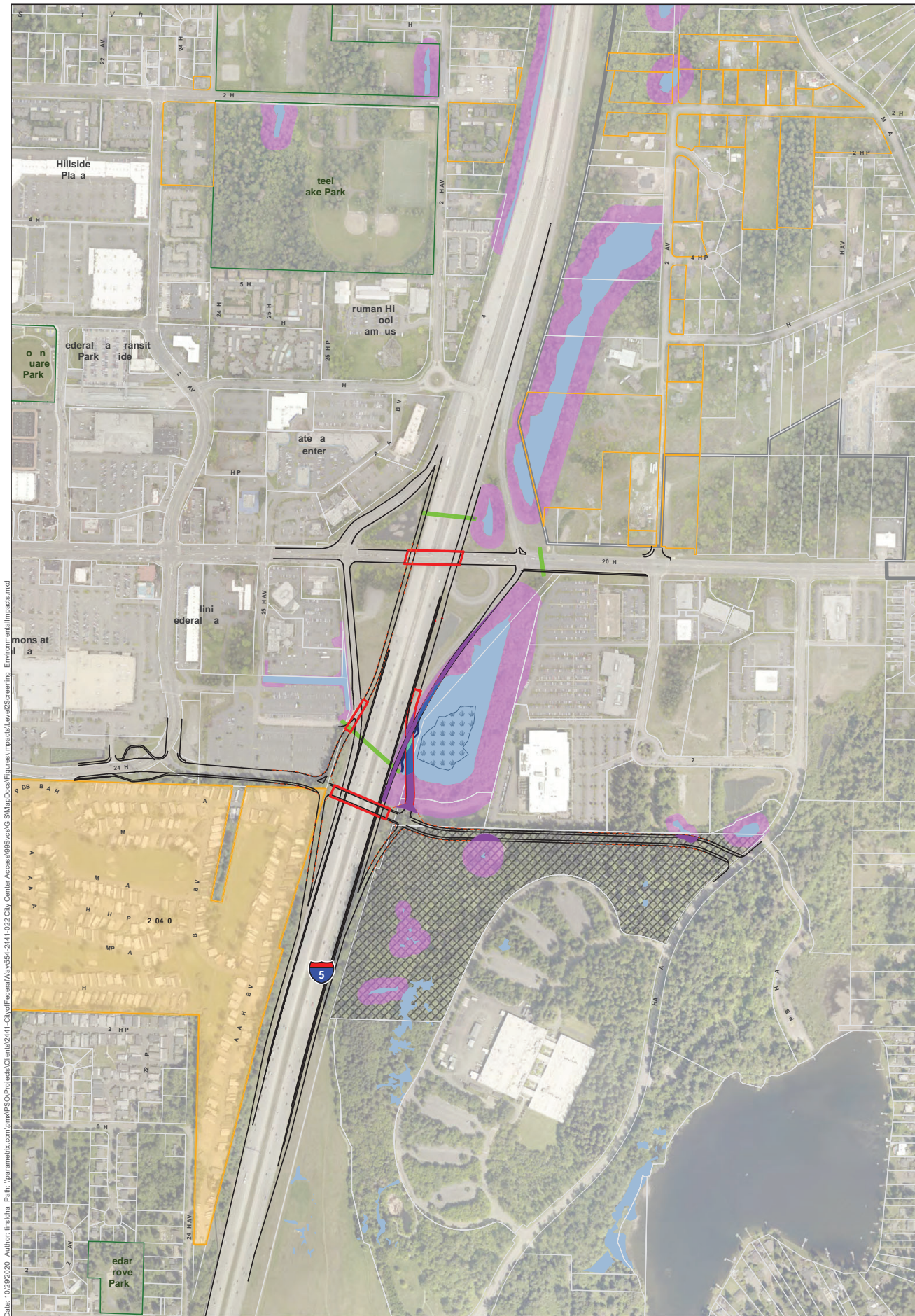
Source: King County, Federal Way, Paramatrix

- | | | |
|------------------------------------|------------------------------|-------------------------------|
| Proposed Alternative 2B | Tax Lot | Wetlands |
| Bridge/Elevated Structure | City Limit | Wetland Bog |
| Culvert | Park Parcels | Wetland Buffers |
| Wall | Neighborhood Parcels | Wetland stream m a t s |
| Roadway/Shoulder/Sidewalk/Curbface | Impacted Neighborhood Parcel | Wetland |
| Surveyed OHWM | Impacted Industrial Parcel | Wetland Buffer |
| | | Stream |

**Alt 2B - Level 2 Screening:
Environmental Impacts
City Center Access Project**



Federal Way, King County, WA



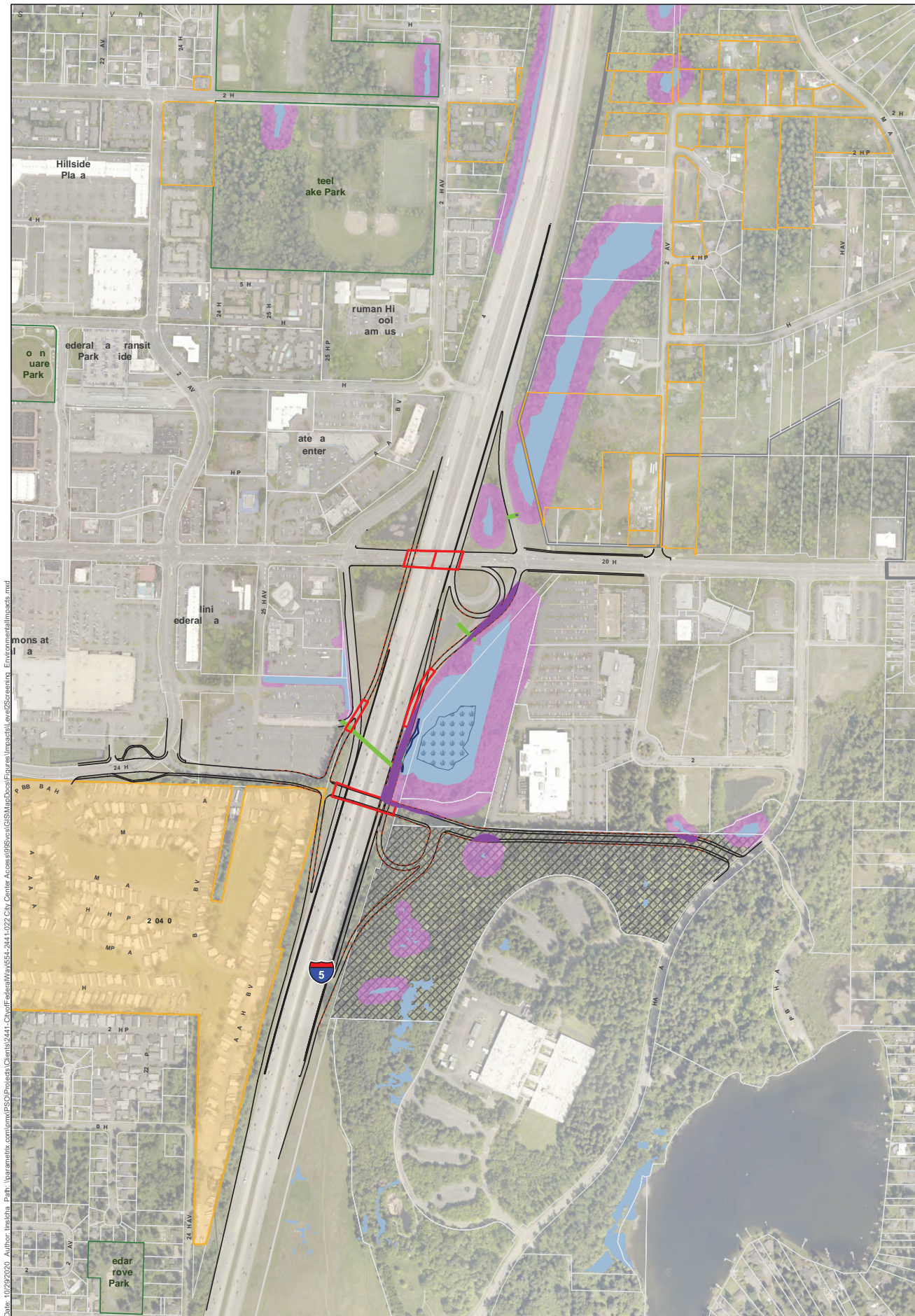
Date: 10/29/2020 Author: Inischa Path: \\paramatrix.com\jcm\PSO\Projects\Clients\2441-CityCenterAccess\GIS\MapDocs\Figures\ImpactLevel\Screening_EnvironmentalImpacts.mxd

Source: King County, Federal Way, Paramatrix

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|------------------------------------|------------------------------|-----------------|
| Proposed Alternative 2 | Tax Lot | Wetlands |
| Bridge/Elevated Structure | City Limit | Wetland Bog |
| Culvert | Park Parcels | Wetland Buffers |
| Wall | Neighborhood Parcels | Wetland Stream |
| Roadway/Shoulder/Sidewalk/Curbface | Impacted Neighborhood Parcel | Wetland |
| Surveyed OHWM | Impacted Industrial Parcel | Wetland Buffer |
| | | Stream |

Alt 2C - Level 2 Screening:
Environmental Impacts
 City Center Access Project

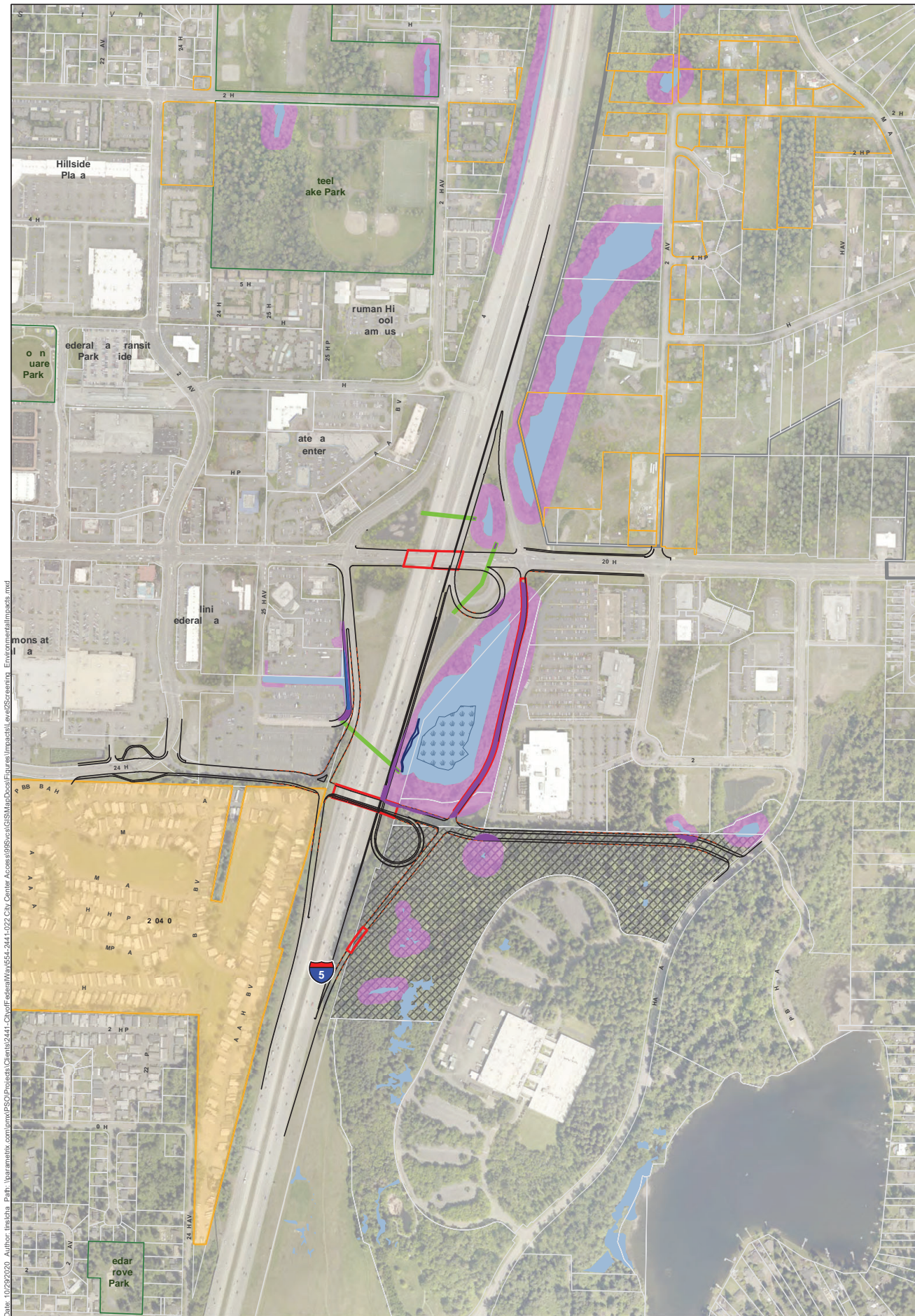
Federal Way, King County, WA



Date: 10/29/2020 Author: Initech Path: \\paramatrix.com\jmc\PSO\Projects\Clients\2441-CityCenterAccess\GIS\MapDocs\Figures\ImpactLevel\Screening_EnvironmentalImpacts.mxd
 Source: King County, Federal Way, Paramatrix

- | | | |
|------------------------------------|------------------------------|---------------------|
| Proposed Alternative 2 | Tax Lot | Wetlands |
| Bridge/Elevated Structure | City Limit | Wetland Bog |
| Culvert | Park Parcels | Wetland Buffers |
| Wall | Neighborhood Parcels | Wetland Stream Mats |
| Roadway/Shoulder/Sidewalk/Curbface | Impacted Neighborhood Parcel | Wetland |
| Surveyed OHWM | Impacted Industrial Parcel | Wetland Buffer |
| | | Stream |

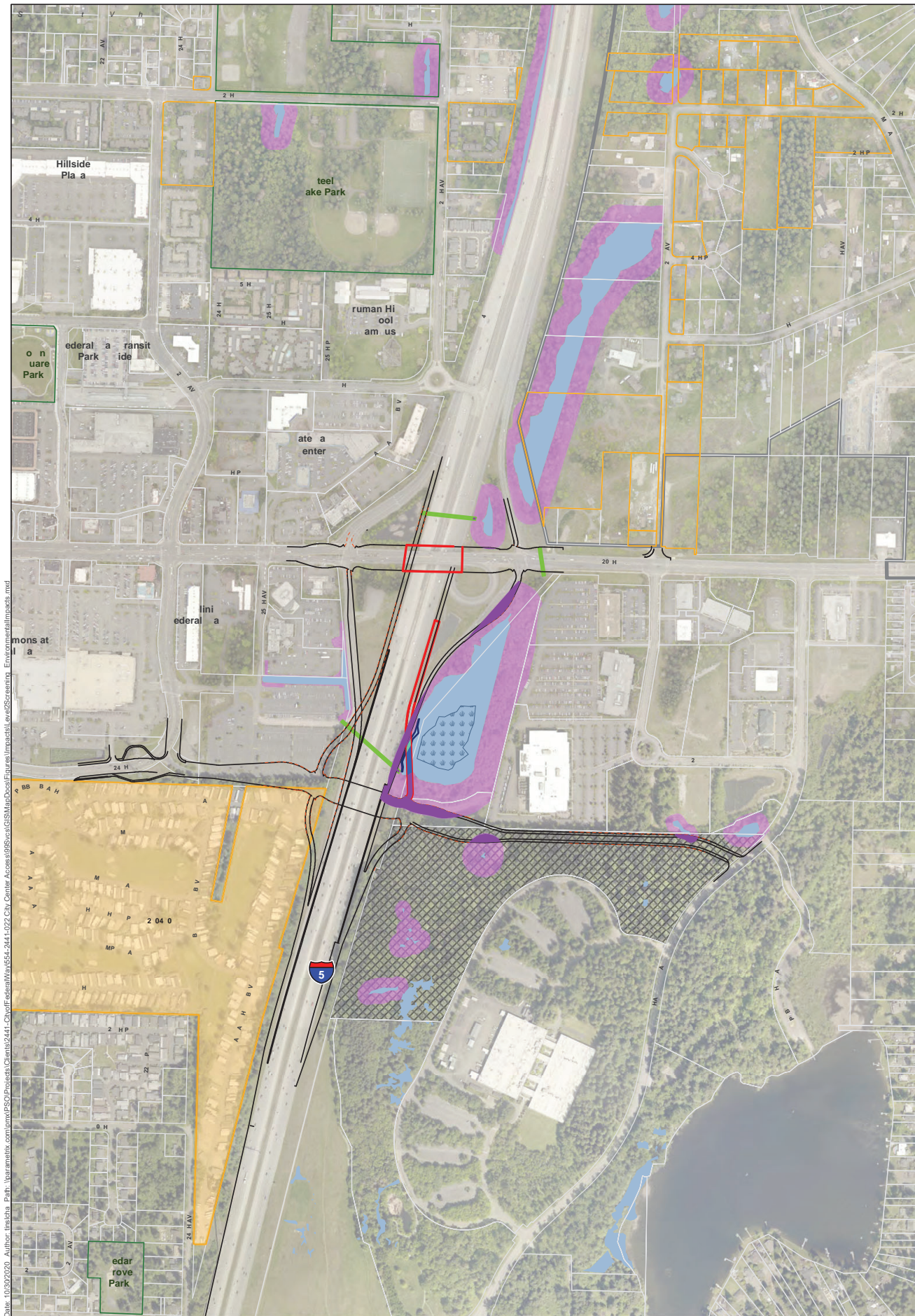
**Alt 2D - Level 2 Screening:
Environmental Impacts
City Center Access Project**



Date: 10/29/2020 Author: Initech Path: \\paramatrix.com\jmc\PSO\Projects\Clients\2441-CityCenterAccess\GIS\MapDocs\Figures\ImpactLevel\Screening_EnvironmentalImpacts.mxd
 Source: King County, Federal Way, Paramatrix

- | | | |
|------------------------------------|------------------------------|-------------------------------|
| Proposed Alternative 2 | Tax Lot | Wetlands |
| Bridge/Elevated Structure | City Limit | Wetland Bog |
| Culvert | Park Parcels | Wetland Buffers |
| Wall | Neighborhood Parcels | Wetland Stream Impacts |
| Roadway/Shoulder/Sidewalk/Curbface | Impacted Neighborhood Parcel | Wetland |
| Surveyed OHWM | Impacted Industrial Parcel | Wetland Buffer |
| | | Stream |

**Alt 2E - Level 2 Screening:
Environmental Impacts
City Center Access Project**



Date: 10/30/2020 Author: Initech Path: \\paramatrix.com\jmc\PSO\Projects\Clients\2441-CityCenterAccess\GIS\MapDocs\Figures\ImpactLevel\Screening_EnvironmentalImpacts.mxd

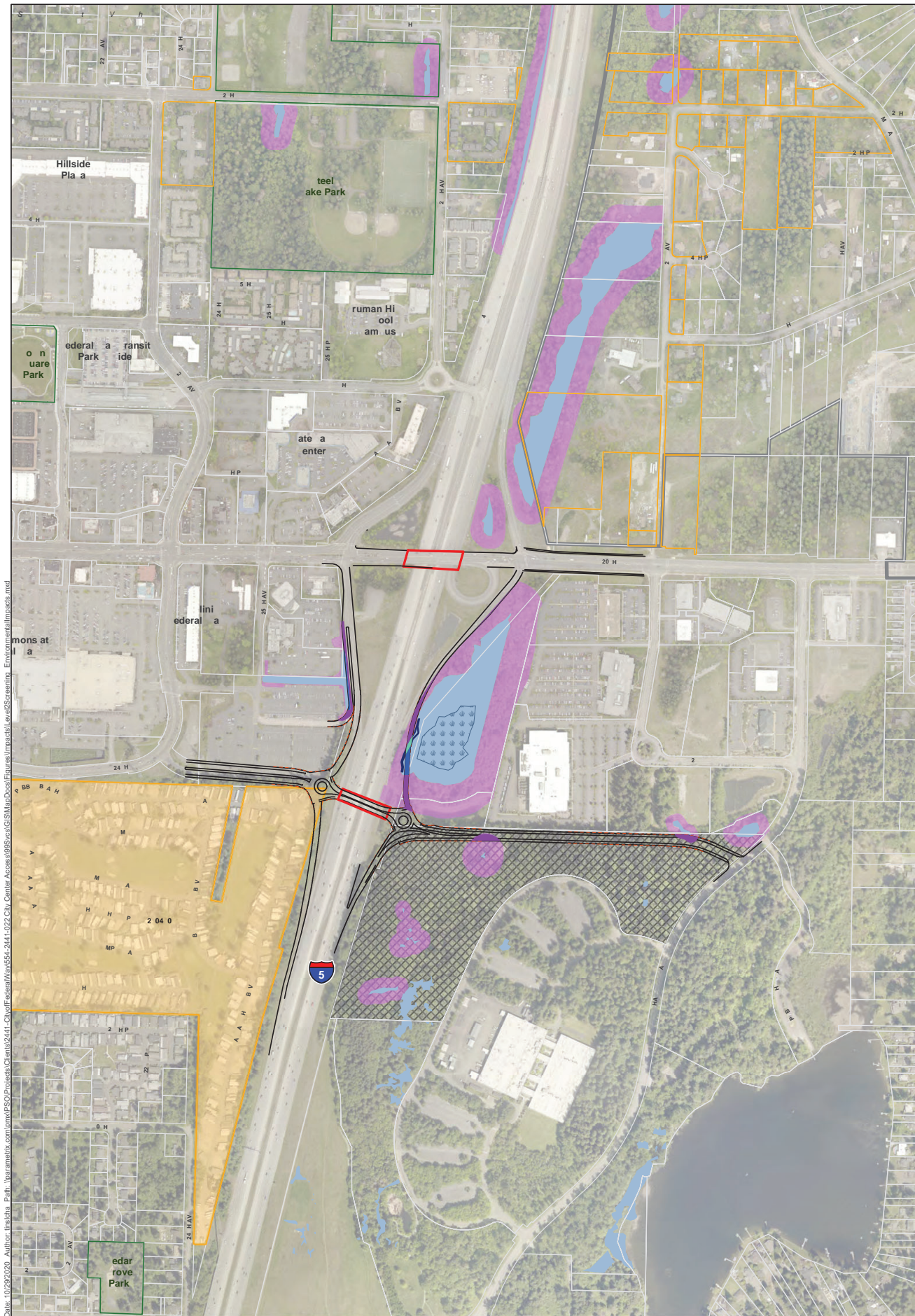
Source: King County, Federal Way, Paramatrix

- | | | |
|------------------------------------|------------------------------|-------------------------------|
| Proposed Alternative 2 | Tax Lot | Wetlands |
| Bridge/Elevated Structure | City Limit | Wetland Bog |
| Culvert | Park Parcels | Wetland Buffers |
| Wall | Neighborhood Parcels | Wetland Stream Impacts |
| Roadway/Shoulder/Sidewalk/Curbface | Impacted Neighborhood Parcel | Wetland |
| Surveyed OHWM | Impacted Industrial Parcel | Wetland Buffer |
| | | Stream |

**Alt 2F - Level 2 Screening:
Environmental Impacts
City Center Access Project**



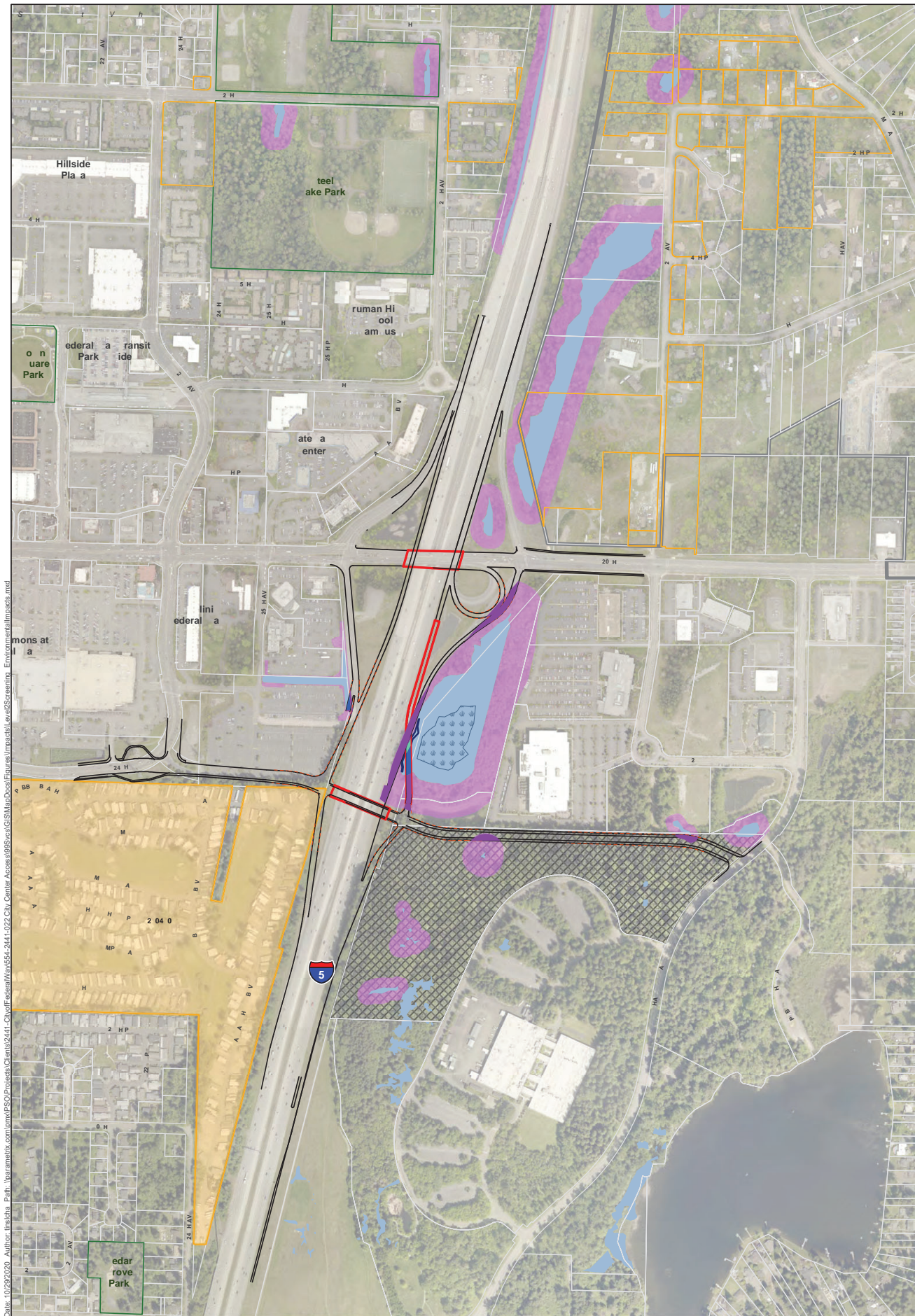
Federal Way, King County, WA



Date: 10/29/2020 Author: Inischa Path: \\paramatrix.com\jcmx\PSO\Projects\Clients\2441-CityCenterAccess\GIS\MapDocs\Figures\ImpactLevel\Screening_EnvironmentalImpacts.mxd
 Source: King County, Federal Way, Paramatrix

- | | | |
|---|--|---|
| <p>Proposed Alternative 2</p> <ul style="list-style-type: none"> — Bridge/Elevated Structure --- Wall — Roadway/Shoulder/Sidewalk/Curbface — Surveyed OHWM | <ul style="list-style-type: none"> Tax Lot City Limit Park Parcels Neighborhood Parcels Impacted Neighborhood Parcel Impacted Industrial Parcel | <ul style="list-style-type: none"> Wetlands Wetland Bog Wetland Buffers Wetland Stream Wetland Wetland Buffer Stream |
|---|--|---|

**Alt 2G - Level 2 Screening:
Environmental Impacts
City Center Access Project**



Date: 10/29/2020 Author: Inesha Pathi \paramatrix.com\jmx\PSO\Projects\Clients\2441-CityCenterAccess\GIS\MapDocs\Figures\ImpactLevel\Screening_EnvironmentalImpacts.mxd

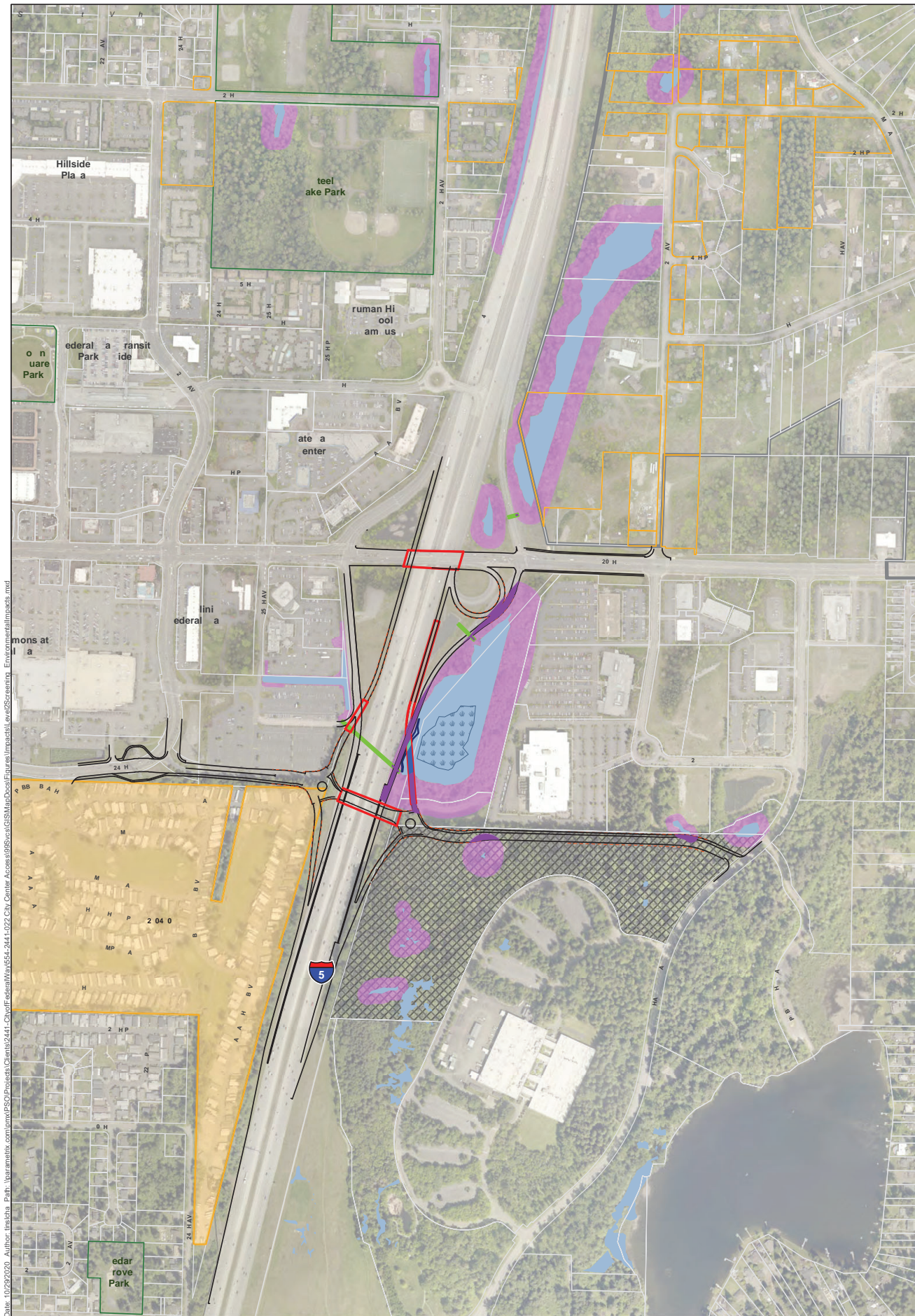
Source: King County, Federal Way, Paramatrix

- | | | |
|--|--|--|
| <p>Proposed Alternative 2H</p> <ul style="list-style-type: none"> — Bridge/Elevated Structure --- Wall — Roadway/Shoulder/Sidewalk/Curbface — Surveyed OHWM | <ul style="list-style-type: none"> Tax Lot City Limit Park Parcels Neighborhood Parcels Impacted Neighborhood Parcel Impacted Industrial Parcel | <ul style="list-style-type: none"> Wetlands Wetland Bog Wetland Buffers Wetland Stream Wetland Wetland Buffer Stream |
|--|--|--|

**Alt 2H - Level 2 Screening:
Environmental Impacts
City Center Access Project**



Federal Way, King County, WA

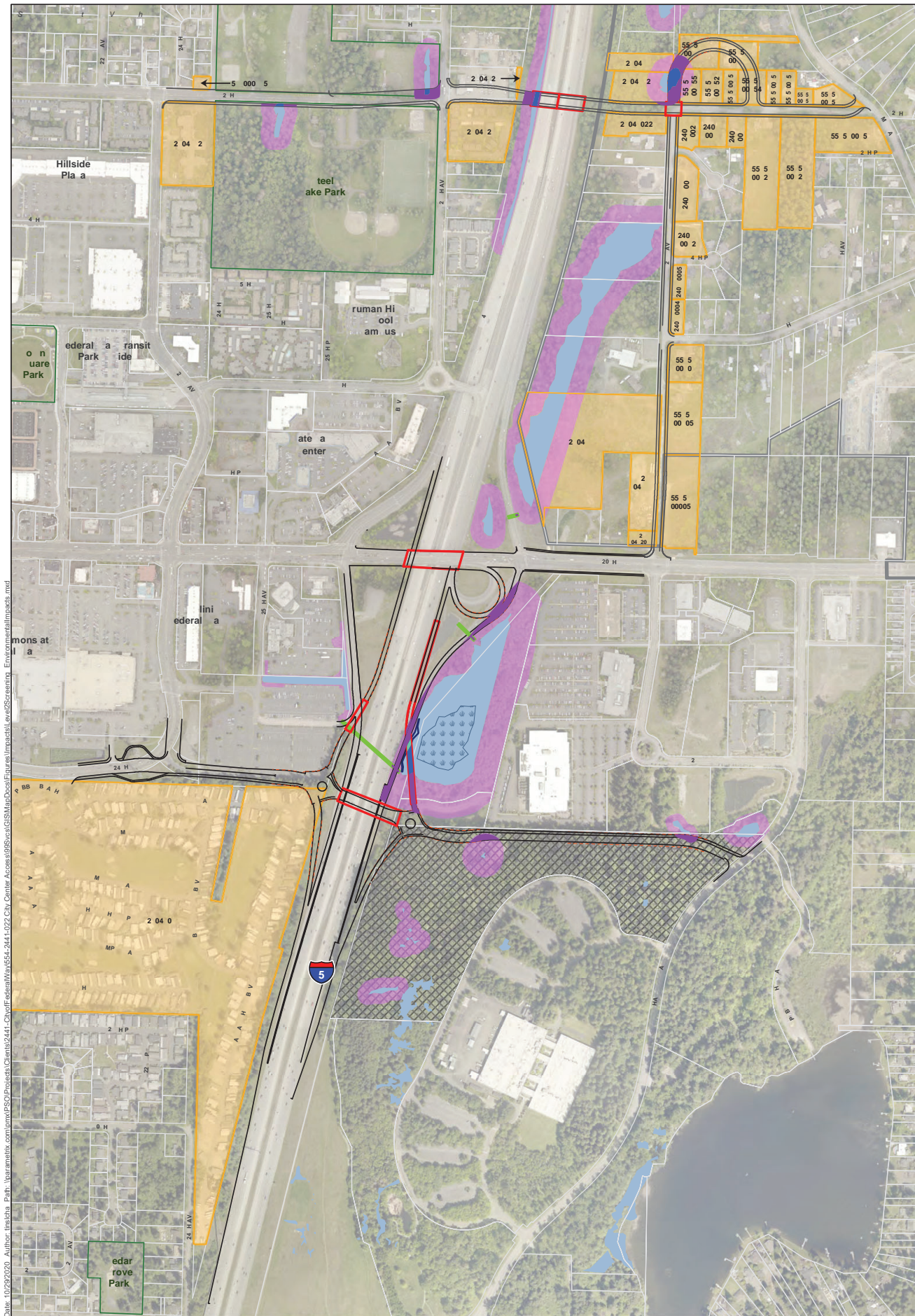


Date: 10/29/2020 Author: linsha Path: \\paramatrix.com\jmc\PSO\Projects\Clients\2441-CityCenterAccess\GIS\MapDocs\Figures\ImpactLevel\Screening_EnvironmentalImpacts.mxd
 Source: King County, Federal Way, Paramatrix

- | | | |
|------------------------------------|------------------------------|---------------------|
| Proposed Alternative 2 | Tax Lot | Wetlands |
| Bridge/Elevated Structure | City Limit | Wetland Bog |
| Culvert | Park Parcels | Wetland Buffers |
| Wall | Neighborhood Parcels | Wetland Stream Mats |
| Roadway/Shoulder/Sidewalk/Curbface | Impacted Neighborhood Parcel | Wetland |
| Surveyed OHWM | Impacted Industrial Parcel | Wetland Buffer |
| | | Stream |

**Alt 2I - Level 2 Screening:
Environmental Impacts
City Center Access Project**





Date: 10/29/2020 Author: Inesha Pathi \paramatrix.com\jmx\PSO\Projects\Clients\2441-CityCenterAccess\GIS\MapDocs\Figures\ImpactLevel2Screening_EnvironmentalImpacts.mxd
 Source: King County, Federal Way, Paramatrix

Proposed Alts 2 and 3 and Local Alts

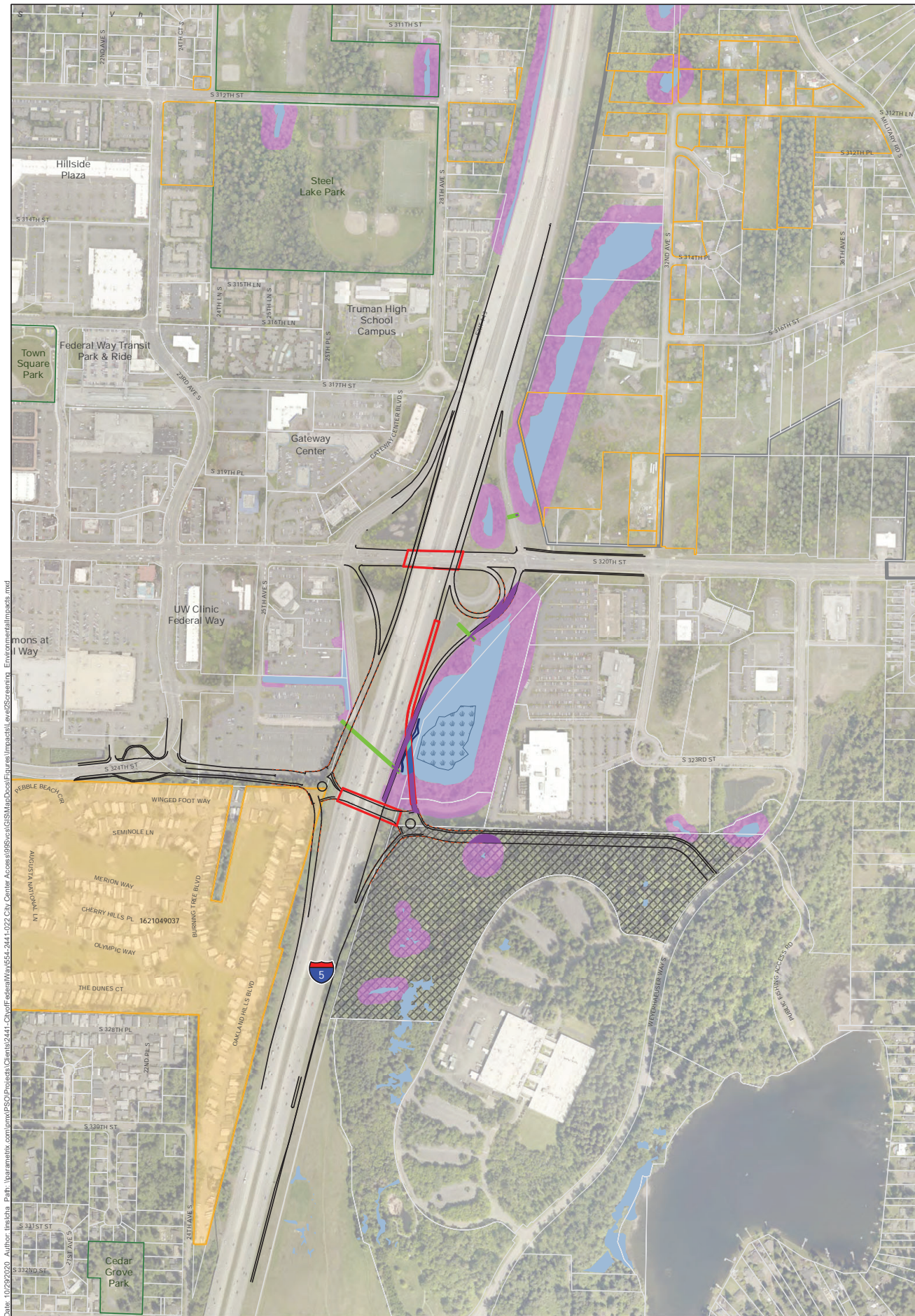
- Bridge/Elevated Structure
- Culvert
- Wall
- Roadway/Shoulder/Sidewalk/Curbface
- Surveyed OHWM

- Tax Lot
- City Limit
- Park Parcels
- Neighborhood Parcels
- Impacted Neighborhood Parcel
- Impacted Industrial Parcel

- Wetlands
- Wetland Bog
- Wetland Buffers
- Wetland Stream
- Wetland
- Wetland Buffer
- Stream

Alt 21 and 312th/32nd Local Alts - Level 2 Screening: Environmental Impacts
City Center Access Project





Date: 10/29/2020 Author: linacha Path: \\paramatrix.com\jcm\PSO\Projects\Clients\2441-CityCenterAccess\GIS\MapDocs\Figures\ImpactLevel\Screening_EnvironmentalImpacts.mxd

Source: King County, Federal Way, Paramatrix

- | | | |
|--|--|---|
| <ul style="list-style-type: none"> — Proposed Alternative 2J — Bridge/Elevated Structure — Culvert — Wall — Roadway/Shoulder/Sidewalk/Curbface — Surveyed OHWM | <ul style="list-style-type: none"> Tax Lot City Limit Park Parcels Neighborhood Parcels Impacted Neighborhood Parcel Impacted Industrial Parcel | <ul style="list-style-type: none"> Wetlands Wetland Bog Wetland Buffers Wetland/Stream Impacts Wetland Wetland Buffer Stream |
|--|--|---|

**Alt 2J - Level 2 Screening:
Environmental Impacts
City Center Access Project**



Appendix J

Level 2 Screening Results



City of Federal Way CCA
Interchange Concepts Level 2 Screening

List of acronyms: RAB - roundabouts BMPS - best management practices vph - vehicles per hour RW - right of way	BPA - Bonneville Power Administration LTS - level of traffic stress v/c - volume to capacity ratio LOS - level of service
--	--

BASELINE AND CONTEXTUAL NEEDS

Issue/Needs Statements	BN/CN	Metric	Target
------------------------	-------	--------	--------

Issue: Address City of Federal Way Comprehensive Plan goals

Needs:

Provide opportunities for traffic to travel around the core

BN1	Roadway network	Yes	
-----	-----------------	-----	--

Protect views within the City Center

CN1	Preservation of views	Yes	
-----	-----------------------	-----	--

Maintain roadway cross section consistent with City standards

BN2	Roadway cross sections and City standards	Yes	
-----	---	-----	--

Issue: Increasing roadway congestion on S 320th Street

Needs:

Decrease roadway congestion on S 320th Street

BN3	Travel time between Pacific Highway S and Military Road S and number of people (by mode)	Travel time <= today	
-----	--	----------------------	--

Maintain or improve access to and from City Center

BN4	V/c at study intersections	v/c < 1.0 on every lane group	
-----	----------------------------	-------------------------------	--

BN4
 LOS at WSDOT intersections | LOS D at ramp terminals (overall intersection report) | |

BN5
 Transit delay | Delay <= today | |

BN6
 Access management standards | Standards are maintained | |

BN17
 Business access and property impacts | Business access is maintained and property impacts are minimized | |

Issue: Poor multi modal mobility

Needs:

Improve nonmotorized mobility to increase use of transit facilities. Provide nonmotorized options to circulate within the City Center and at the study area boundaries improve connections to regional or the citywide facilities.

BN7	Nonmotorized system gap analysis	Better than No Build	
-----	----------------------------------	----------------------	--

BN8
 Level of traffic stress (LTS) criteria | LTS <= 2 | |

BN9
 Roadway crossing widths | Consistent with City's street design standards and minimize crossing widths | |

BASELINE NEEDS SCORE	3.0	15.6
CONTEXTUAL NEEDS SCORE	5.0	5.0
DESIGN SCORE	3.9	3.7
ENVIRONMENTAL SCORE	3.8	3.7
# of Criteria with a "1" Rating	3	2

SCREENING ANALYSIS DEFINITIONS

Rating Scale	Discussion
--------------	------------

Rating Scale

Discussion

No Build	2A Spill Diamond	2B Grade Separated Ramps	2C Arterial Couplet	2D Grade Separated Ramps + Compatible with S 324th Street SE Quadrant Loop Ramp	
3.0	15.6	4.0	15.1	3.8	16.0
5.0	5.0	3.0	5.0	5.0	5.0
3.9	3.7	3.5	3.7	3.4	3.4
3.8	3.7	3.7	2.7	3.8	3.8
3	2	0	5	2	2
Discussion	Discussion	Discussion	Discussion	Discussion	Discussion
3	4.5	4.5	1	4.5	4.5
3	5	5	5	5	5
1	5	5	5	5	5
3	3.5	5	5	5	5
3	4	5	5	5	5
3	4	5	5	5	5
3	4	5	5	5	5
3	5	5	5	5	5
3	5	5	1	5	1
3	4.5	4.5	4.5	4.5	4.5
3	4	4.5	4.5	3.5	3.5
3	3	3	3	3	3

1 - Restricts existing routes
3 - No change
5 - New or improved alternate routes

1 - Views not preserved
3 - Views are preserved

1 - Standards not met
5 - Standards are met

1 - Worse than No Build
3 - Similar to No Build
5 - Similar to today

1 - Worse than No Build
3 - Similar to No Build
5 - Most v/c < 1.0 and better than No Build

1 - Worse than No Build
3 - Similar to No Build
5 - LOS D or better and better than No Build

1 - Worse than No Build
3 - Similar to No Build
5 - Similar to today

1 - Standards are not maintained
3 - Standards are maintained

1 - Access worsens and/or property impacts occur
3 - Access is maintained and property impacts are minimized

1 - Worse than No Build
3 - Similar to No Build
5 - Better than No Build

1 - Standards are not maintained
3 - Standards are maintained

1 - Worse than No Build
3 - Similar to No Build
5 - Better than No Build

1 - Standards are not maintained
3 - Standards are maintained

1 - Standards are not maintained
3 - Standards are maintained

1 - Standards are not maintained
3 - Standards are maintained

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3 - Standards are maintained

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1 - Standards are not maintained
3 - Standards are maintained

1 - Standards are not maintained
3 - Standards are maintained

1 - Standards are not maintained
3 - Standards are maintained

Extension of S 324th Street creates an E-W route that extends through the City Center from 11th Avenue S to Weyerhaeuser Way S.

Extension of S 324th Street creates an E-W route that extends through the City Center from 11th Avenue S to Weyerhaeuser Way S.

Standards are met.

Intersection of S 320th Street/I-5 southbound is capacity constrained; any changes in travel patterns would negatively impact operations.

Intersection of S 320th Street/I-5 southbound is capacity constrained; any changes in travel patterns would negatively impact operations.

Intersection of S 320th Street/I-5 southbound is capacity constrained; any changes in travel patterns would negatively impact operations.

Queue spillback from I-5 southbound impacts S 320th Street operations worse than as modeled in Alt 2i. Traffic exiting I-5 to S 324th Street is also intermixed in the traffic entering I-5 from S 320th Street and will lengthen the queue spillback onto S 320th Street.

Standards are maintained.

Business access is maintained.

Allows potential connection to BPA trail via S 324th Street overcrossing and Weyerhaeuser Way S.

S 324th Street operates with a LTS 2. Rating is further adjusted negative to account for the signals and on/off-ramp through trips at S 324th Street to/from S 320th Street.

S 320th Street has a LTS of 4 except for across I-5 (LTS 1), however S 320th Street is not a bike/pedestrian designated corridor.

Rating negatively affected by S 324th Street cross sections with a signal and to accommodate the on/off-ramp through trips at S 324th Street to/from S 320th Street.

Extension of S 324th Street creates an E-W route that extends through the City Center from 11th Avenue S to Weyerhaeuser Way S.

Extension of S 324th Street creates an E-W route that extends through the City Center from 11th Avenue S to Weyerhaeuser Way S.

Standards are met.

Intersection of S 320th Street/I-5 southbound is capacity constrained; any changes in travel patterns would negatively impact operations.

Intersection of S 320th Street/I-5 southbound is capacity constrained; any changes in travel patterns would negatively impact operations.

Intersection of S 320th Street/I-5 southbound is capacity constrained; any changes in travel patterns would negatively impact operations.

Queue spillback from I-5 southbound impacts S 320th Street operations worse than as modeled in Alt 2i. Traffic exiting I-5 to S 324th Street is also intermixed in the traffic entering I-5 from S 320th Street and will lengthen the queue spillback onto S 320th Street.

Standards are maintained.

Business access is maintained.

Allows potential connection to BPA trail via S 324th Street overcrossing and Weyerhaeuser Way S.

S 324th Street operates with a LTS 2. Rating is further adjusted positive to account for the grade separation of ramps (no on/off-ramp through trips at S 324th Street to/from S 320th Street). Rating is further adjusted negative to account for the signal.

S 320th Street has a LTS of 4 except for across I-5 (LTS 1), however S 320th Street is not a bike/pedestrian designated corridor.

Rating negatively affected by S 324th Street cross sections with a signal.

Extension of S 324th Street creates an E-W route that extends through the City Center from 11th Avenue S to Weyerhaeuser Way S.

Extension of S 324th Street creates an E-W route that extends through the City Center from 11th Avenue S to Weyerhaeuser Way S.

Standards are met.

Intersection of S 320th Street/I-5 southbound is capacity constrained; any changes in travel patterns would negatively impact operations.

Intersection of S 320th Street/I-5 southbound is capacity constrained; any changes in travel patterns would negatively impact operations.

Intersection of S 320th Street/I-5 southbound is capacity constrained; any changes in travel patterns would negatively impact operations.

Queue spillback from I-5 southbound impacts S 320th Street operations worse than as modeled in Alt 2i. Traffic exiting I-5 to S 324th Street is also intermixed in the traffic entering I-5 from S 320th Street and will lengthen the queue spillback onto S 320th Street.

Standards are maintained.

Business access is maintained.

Allows potential connection to BPA trail via S 324th Street overcrossing and Weyerhaeuser Way S.

S 324th Street operates with a LTS 2. Rating is further adjusted positive to account for the grade separation of ramps (no on/off-ramp through trips at S 324th Street to/from S 320th Street). Rating is further adjusted negative to account for the signal.

S 320th Street has a LTS of 4 except for across I-5 (LTS 1), however S 320th Street is not a bike/pedestrian designated corridor.

Rating negatively affected by S 324th Street cross sections with a signal.

Eastbound route via S 320th Street from 11th Avenue S to east of I-5 becomes circuitous. Does not create new westbound route through City.

Eastbound route via S 320th Street from 11th Avenue S to east of I-5 becomes circuitous. Does not create new westbound route through City.

Standards are met.

Travel times and person throughput are improved compared to No Build.

Targets are met within the City intersections. Issues likely at S 320th Street/Military Road S (County).

Targets are met within the City intersections. Issues likely at S 320th Street/Military Road S (County).

Targets are met within the City intersections. Issues likely at S 320th Street/Military Road S (County).

Targets are met within the City intersections. Issues likely at S 320th Street/Military Road S (County).

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Targets are met within the City intersections. Issues likely at S 320th Street/Military Road S (County).

Targets are met within the City intersections. Issues likely at S 320th Street/Military Road S (County).

Targets are met within the City intersections. Issues likely at S 320th Street/Military Road S (County).

Extension of S 324th Street creates an E-W route that extends through the City Center from 11th Avenue S to Weyerhaeuser Way S.

Extension of S 324th Street creates an E-W route that extends through the City Center from 11th Avenue S to Weyerhaeuser Way S.

Standards are met.

Travel times and person throughput are improved compared to No Build.

Targets are met within the City intersections. Issues likely at S 320th Street/Military Road S (County).

Targets are met within the City intersections. Issues likely at S 320th Street/Military Road S (County).

Targets are met within the City intersections. Issues likely at S 320th Street/Military Road S (County).

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Targets are met within the City intersections. Issues likely at S 320th Street/Military Road S (County).

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Targets are met within the City intersections. Issues likely at S 320th Street/Military Road S (County).

Targets are met within the City intersections. Issues likely at S 320th Street/Military Road S (County).

Targets are met within the City intersections. Issues likely at S 320th Street/Military Road S (County).

Extension of S 324th Street creates an E-W route that extends through the City Center from 11th Avenue S to Weyerhaeuser Way S.

Extension of S 324th Street creates an E-W route that extends through the City Center from 11th Avenue S to Weyerhaeuser Way S.

Standards are met.

Travel times and person throughput are improved compared to No Build.

Targets are met within the City intersections. Issues likely at S 320th Street/Military Road S (County).

Targets are met within the City intersections. Issues likely at S 320th Street/Military Road S (County).

Targets are met within the City intersections. Issues likely at S 320th Street/Military Road S (County).

Targets are met within the City intersections. Issues likely at S 320th Street/Military Road S (County).

List of acronyms: RAB - roundabouts BMP5 - best management practices vph - vehicles per hour R/W - right of way	BPA - Bonneville Power Administration LTS - level of traffic stress v/c - volume to capacity ratio LOS - level of service
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BASELINE AND CONTEXTUAL NEEDS

Issue/Needs Statements	BN/CN	Metric	Target
Issue: Impaired freight truck movement			
Needs:			
Improve freight truck mobility to support the City Center and regional service	BN10	Travel time between Pacific Highway S and Military Road S and number of people (by mode)	Travel time <= today
Issue: Delayed emergency response			
Needs:			
Improve emergency response	CN2	Queues in front of Fire Department driveway	Maintain clear roadway in front of Fire Department driveway
Issue: Decreased safety			
Needs:			
Improve safety for the general traveling public on the S 320th Street corridor and study area	BN11	Review historic collision rates	Better than No Build
Improve safety for the general traveling public on the S 312th and/or S 324th Street corridor and study area	BN18	Review historic collision rates	Better than No Build
Issue: Local Queues Impact Mainline I-5			
Needs:			
Improve safety for the general traveling public on the Interstate and ramps	BN12	Local queue spillback on I-5 off-ramps (length and duration) at S 272nd, S 320th, and S 348th Streets	Local queues do not extend into ramp deceleration area
	BN13	Number of gore points	No change in number of gore points
	BN14	Review historic collision rates	Better than No Build
Issue: Regional Congestion on I-5			
Needs:			
Maintain or improve I-5 mobility for persons and freight trucks	BN15	Local queue spillback on I-5 off-ramps (length and duration) at S 272nd, S 320th, and S 348th Streets	Local queues do not extend into ramp deceleration area
	BN16	Travel time on I-5 between S 272nd Street and SR 18/S 348th Street	Better than No Build

SCREENING ANALYSIS DEFINITIONS

Rating Scale
1 - Worse than No Build
3 - Similar to No Build
5 - Better than No Build

No Build		2A Split Diamond		2B Grade Separated Ramps		2C Arterial Couplet		2D Grade Separated Ramps + Compatible with S 324th Street SE Quadrant Loop Ramp	
3.0	15.6	3.5	15.9	4.0	14.1	3.8	15.1	3.8	16.0
5.0		5.0		3.0		5.0		5.0	
3.9		3.7		3.5		3.7		3.4	
3.8		3.7		3.7		2.7		3.8	
3		2		0		5		2	
Discussion		Discussion		Discussion		Discussion		Discussion	
3	See BN3.	3.5	See BN3.	5	See BN3.	2	Indirect routes/longer travel distance due to block spacing with the couplet.	5	See BN3.
5		5		3	Recommend maintaining a "do not block intersection" type striping to manage evening peak hour queues.	5		5	
3		3.5	Decrease in travel demand on S 320th Street; no new elements that would decrease safety such as unprotected left turns or new signals. More traffic through S 320th Street/I-5 southbound compared to Alt 2B. Would have slightly worse crash factors per HCM.	4	Decrease in travel demand on S 320th Street; no new elements that would decrease safety such as unprotected left turns or new signals.	4.5	Decrease in travel demand on S 320th Street; Decreased conflicts with one way street system. No new elements that would decrease safety such as unprotected left turns or new signals.	4	Decrease in travel demand on S 320th Street; no new elements that would decrease safety such as unprotected left turns or new signals.
3		1	Increase in travel demand on S 324th Street. Rating is adjusted negative to account for the signals and on/off ramp through trips at S 324th Street to/from S 320th Street.	1.5	Increase in travel demand on S 324th Street. Rating is adjusted negative to account for the signals.	2.5	Increase in travel demand on S 324th Street however one way traffic reduces collision rates compared to two way roadway alternatives.	1.5	Increase in travel demand on S 324th Street. Rating is adjusted positive to account for SE quadrant loop ramp (reduces left turn conflicts). Rating is adjusted negative to account for the signals.
3		3.5	Queue spillbacks improved compared to No Build; however they are not eliminated. I-5 southbound mainline queue spillback will affect S 320th Street and the northbound I-5 off-ramp worse than as modeled in Alt 2i. Traffic exiting I-5 to S 324th Street is also intermixed in the traffic entering from S 320th Street and will lengthen the queue spillback onto S 320th Street.	4.5	See Alt 2i.	4.5	Queue spillbacks improved compared to No Build; however they are not eliminated.	4.5	See Alt 2i.
3		3	No change in gore points.	3	No change in gore points.	3	No change in gore points.	3	No change in gore points.
3		3	Traffic volumes and number of gore points similar to No Build (I-5 mainline).	3	Traffic volumes and number of gore points similar to No Build (I-5 mainline).	3	Traffic volumes and number of gore points similar to No Build (I-5 mainline).	3	Traffic volumes and number of gore points similar to No Build (I-5 mainline).
3		3.5	See BN12.	4.5	See BN12.	4.5	See BN12.	4.5	See BN12.
3		3.5	Travel times are similar to the No Build Alternative except for in the northbound direction, PM peak hour. Travel times are reduced due to reductions in the queue spillback.	3.5	Travel times are similar to the No Build Alternative except for in the northbound direction, PM peak hour. Travel times are reduced due to reductions in the queue spillback.	3.5	Travel times are similar to the No Build Alternative except for in the northbound direction, PM peak hour. Travel times are reduced due to reductions in the queue spillback.	3.5	Travel times are similar to the No Build Alternative except for in the northbound direction, PM peak hour. Travel times are reduced due to reductions in the queue spillback.

List of acronyms: RAB - roundabouts BMPs - best management practices vph - vehicles per hour R/W - right of way	BPA - Bonneville Power Administration LTS - level of traffic stress v/c - volume to capacity ratio LOS - level of service
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BASELINE AND CONTEXTUAL NEEDS			
Issue/Needs Statements	BN/CN	Metric	Target
OTHER SCREENING CRITERIA			
Criteria	Criteria #	Metric	

Design Considerations/Issues (Feasibility)			
Operations and Maintenance	D1	O&M costs, such as for tunnels (life safety systems, pumping), additional signal systems vs roundabouts, landscaping, structures	Not applicable
Constructability	D2	Ability to construct without major impacts to the traveling public without major ROW acquisitions and no relocation of major utilities	No high risk issues identified and minimal construction traffic impacts
Ability to treat stormwater per requirements	D3	Room to treat, detain and maintain per stormwater targets	Target is met
Cost	D4	Relative comparison of alternatives based on presence of high cost elements	Not applicable
Compatibility with planned I-5 projects	D5	Compatibility with future I-5 expansion projects and LRT (Federal Way Link Extension, Tacoma Link Extension)	Compatible

SCREENING ANALYSIS DEFINITIONS	
Rating Scale	
1 - Significant increase	
3 - Normal increase	
5 - Least cost	
*Scale relative to other alternatives	

BASELINE NEEDS SCORE
CONTEXTUAL NEEDS SCORE
DESIGN SCORE
ENVIRONMENTAL SCORE
of Criteria with a "1" Rating

No Build		2A Split Diamond		2B Grade Separated Ramps		2C Arterial Couplet		2D Grade Separated Ramps + Compatible with S 324th Street SE Quadrant Loop Ramp	
3.0	15.6	3.5	15.9	4.0	14.1	3.8	15.1	3.8	16.0
5.0		5.0		3.0		5.0		5.0	
3.9		3.7		3.5		3.7		3.4	
3.8		3.7		3.7		2.7		3.8	
3		2		0		5		2	
Discussion		Discussion		Discussion		Discussion		Discussion	
5		4	Rating accounts for maintenance of a new bridge over I-5 at S 324th Street and signals at the interchange.	3.5	Rating accounts for maintenance of a new bridge over I-5 at S 324th Street, new bridges for the braided ramps, and signals.	3.5	Rating accounts for maintenance of a new bridge over I-5 at S 324th Street, new bridges for the braided ramps, and signals.	3	Rating accounts for maintenance of a new bridge over I-5 at S 324th Street, new bridges for the braided ramps, loop ramp structure, and signals.
5		2.5	Rating accounts for potential conflict of new northbound off-ramp to S 320th Street and the pipeline (located outside of pipe R/W but within 30' buffer of pipe), and new S 324th Street interchange has three bridged crossings over pipe.	2.5	Rating accounts for potential conflict of new northbound off-ramp to S 320th Street and the pipeline (located outside of pipe R/W but within 30' buffer of pipe), and new S 324th Street interchange has three bridged crossings over pipe.	3	Rating accounts for new S 324th Street interchange has three bridged crossings over pipe. Additional constructability issues with reconstructing arterial to one-way couplet.	2.5	Rating accounts for potential conflict of new northbound off-ramp to S 320th Street and the pipeline (located outside of pipe R/W but within 30' buffer of pipe), and new S 324th Street interchange has three bridged crossings over pipe.
3		3	Target anticipated to be met for all project elements with R/W acquisition. Underground storm water management facilities and/or proprietary treatment BMPs acceptable to City.	3	Target anticipated to be met for all elements with R/W acquisition. Underground storm water management facilities and/or proprietary treatment BMPs acceptable to City.	3	Target anticipated to be met for all elements with R/W acquisition. Underground storm water management facilities and/or proprietary treatment BMPs acceptable to City.	3	Target anticipated to be met for all elements with R/W acquisition. Underground storm water management facilities and/or proprietary treatment BMPs acceptable to City.
5		3	Rating considers lower costs associated with fill walls, ramps at grade, and S 324th Street local improvements; moderate costs associated with ramp lengths and cut walls; and higher costs associated with the bridges.	3	Rating considers lower costs for cut walls and S 324th Street local improvements; moderate costs associated with ramp lengths and the bridges; and higher costs for fill walls and grade separated ramps.	3.5	Rating considers lower costs associated with cut walls, ramp lengths, and S 324th Street local improvements; moderate costs associated with the bridges; and higher costs associated with fill walls and grade separated ramps.	3	Rating considers lower costs associated with the bridges; and higher costs associated with fill walls, cut walls, grade separated ramps, ramp lengths, and S 324th Street local improvements.
2	Existing S 320th Street bridge does not accommodate future I-5.	5	Compatible with all future projects.	4.5	Compatible with all future projects. Requires the LRT alignment to move west.	4.5	Compatible with all future projects. Requires the LRT alignment to move west.	4.5	Compatible with all future projects. Requires the LRT alignment to move west.

S 324th Street Interchange Access Concepts															
2E Split Diamond + Compatible with S 324th Street SE Quadrant Loop Ramp		2F Grade Separated Ramps + Diverging Diamond Interchanges S 324th Street		2G Split Diamond + Roundabout at S 324th Street		2H - 2A + 2B Hybrid		2I - Grade Separated Ramps + RAB		2J - Grade Separated Ramps + RAB + 321th + 32nd		2J - 2A + 2B Hybrid + RAB			
3.4	15.5	4.0	15.9	3.6	16.0	3.6	16.1	4.1	16.5	4.2	14.5	3.7	16.0		
5.0		5.0		5.0		5.0		5.0		5.0		5.0			
3.5		3.3		3.8		3.7		3.7		2.8		3.8			
3.7		3.6		3.9		3.9		3.7		2.5		3.5			
3		1		1		1		0		3		0			
Discussion		Discussion		Discussion		Discussion		Discussion		Discussion		Discussion			
4.5	Extension of S 324th Street creates an E-W route that extends through the City Center from 11th Avenue S to Weyerhaeuser Way S.	4.5	Extension of S 324th Street creates an E-W route that extends through the City Center from 11th Avenue S to Weyerhaeuser Way S.	4.5	Extension of S 324th Street creates an E-W route that extends through the City Center from 11th Avenue S to Weyerhaeuser Way S.	4.5	Extension of S 324th Street creates an E-W route that extends through the City Center from 11th Avenue S to Weyerhaeuser Way S.	4.5	Extension of S 324th Street creates an E-W route that extends through the City Center from 11th Avenue S to Weyerhaeuser Way S.	5	Extension of S 312th Street and 32nd Avenue S creates new E-W and N-S routes around City Center. Extension of S 324th Street creates an E-W route that extends through the City Center from 11th Avenue S to Weyerhaeuser Way S.	4.5	Extension of S 324th Street creates an E-W route that extends through the City Center from 11th Avenue S to Weyerhaeuser Way S.		
5	Ramp connections are not elevated above LRT or existing roadways.	5	Ramp connections are not elevated above LRT or existing roadways.	5	Ramp connections are not elevated above LRT or existing roadways.	5	Ramp connections are not elevated above LRT or existing roadways.	5	Ramp connections are not elevated above LRT or existing roadways.	4.5	S 312th Street and 32nd Avenue S arterial connections are elevated above LRT and adjacent residents but are not anticipated to affect views beyond adjacent homes.	5	Ramp connections are not elevated above LRT or existing roadways.		
5	Standards are met.	5	Standards are met.	5	Standards are met.	5	Standards are met.	5	Standards are met.	5	Standards are met.	5	Standards are met.		
3.5	See Alt 2A.	5	See Alt 2I.	3.5	See Alt 2A.	4	Forecasts do not account for potential diversion from S 320th to S 324th Street using the frontage road/ramps CD as a local arterial, which would worsen conditions. I-5 southbound mainline queue spillback will affect S 320th Street worse than as modeled in Alt 2I. Traffic exiting I-5 to S 324th Street is also intermixed in the traffic entering from S 320th Street and will lengthen the queue spillback onto S 320th Street.	5	Travel times and person throughput are improved compared to No Build.	5	See Alt 2I.	4	Forecasts do not account for potential diversion from S 320th to S 324th Street using the frontage road/ramps CD as a local arterial, which would worsen conditions. I-5 southbound mainline queue spillback will affect S 320th Street worse than as modeled in Alt 2I. Traffic exiting I-5 to S 324th Street is also intermixed in the traffic entering from S 320th Street and will lengthen the queue spillback onto S 320th Street.		
4	See Alt 2A.	5	Targets are met within the City intersections. Issues likely at S 320th Street/Military Road S (County).	4	See Alt 2A.	4.5	Forecasts do not account for potential diversion from S 320th to S 324th Street using the frontage road/ramps CD as a local arterial, which would worsen conditions.	5	Targets are met within the City intersections. Issues likely at S 320th Street/Military Road S (County).	5	Targets are met within the City intersections. Issues likely at S 320th Street/Military Road S (County).	4.5	Forecasts do not account for potential diversion from S 320th to S 324th Street using the frontage road/ramps CD as a local arterial, which would worsen conditions.		
4	See Alt 2A.	5	WSDOT ramp terminals meet criteria.	4	See Alt 2A.	4.5	Forecasts do not account for potential diversion from S 320th to S 324th Street using the frontage road/ramps CD as a local arterial, which would worsen conditions.	5	WSDOT ramp terminals meet criteria.	5	WSDOT ramp terminals meet criteria.	4.5	Forecasts do not account for potential diversion from S 320th to S 324th Street using the frontage road/ramps CD as a local arterial, which would worsen conditions.		
4	See Alt 2A.	5	See Alt 2I.	4	See Alt 2A.	4	See Alt 2A.	5	Queue spillback from I-5 southbound impacts S 320th operations; however with the HOV lane completed, transit would receive a benefit compared to No Build.	5	See Alt 2I.	4	See Alt 2A.		
5	Standards are maintained.	5	Standards are maintained.	5	Standards are maintained.	5	Standards are maintained.	5	Standards are maintained.	5	Standards are maintained.	5	Standards are maintained.		
1	Impacts the warehouse building in the SE quadrant of the S 324th Street/I-5 intersection. Impacts the private detention pond in the NE quadrant of the S 324th Street/I-5 intersection.	2	Impacts the private detention pond in the NE quadrant of the S 324th Street/I-5 intersection.	5	Business access is maintained.	5	Business access is maintained.	5	Business access is maintained.	5	Business access is maintained.	5	Business access is maintained.		
4.5	Allows potential connection to BPA trail via S 324th Street overcrossing and Weyerhaeuser Way S.	4.5	Allows potential connection to BPA trail via S 324th Street overcrossing and Weyerhaeuser Way S.	4.5	Allows potential connection to BPA trail via S 324th Street overcrossing and Weyerhaeuser Way S.	4.5	Allows potential connection to BPA trail via S 324th Street overcrossing and Weyerhaeuser Way S.	4.5	Allows potential connection to BPA trail via S 324th Street overcrossing and Weyerhaeuser Way S.	5	Allows potential connection to BPA trail via S 324th Street overcrossing and Weyerhaeuser Way S. Allows connection via S 312th Street to Military Road S.	4.5	Allows potential connection to BPA trail via S 324th Street overcrossing and Weyerhaeuser Way S.		
3.5	S 324th Street operates with a LTS 2. Rating is further adjusted negative to account for the signal, loop ramp and on/off-ramp through trips at S 324th Street to/from S 320th Street. S 320th Street has a LTS of 4 except for across I-5 (LTS 1), however S 320th Street is not a bike/pedestrian designated corridor.	5	S 324th Street operates with a LTS 2. Rating is further adjusted positive to account for the grade separation of ramps (no on/off-ramp through trips at S 324th to/from S 320th) and DDI. S 320th Street has a LTS of 4 except for across I-5 (LTS 1), however S 320th Street is not a bike/pedestrian designated corridor.	4.5	S 324th Street operates with a LTS 2. Rating is further adjusted positive to account for the RAB. Rating is further adjusted negative to account for the on/off-ramp through trips at S 324th Street to/from S 320th Street. S 320th Street has a LTS of 4 except for across I-5 (LTS 1), however S 320th Street is not a bike/pedestrian designated corridor.	4	S 324th Street operates with a LTS 2. Rating is further adjusted negative to account for the on/off-ramp through trips at S 324th Street to/from S 320th Street and signals. S 320th Street has a LTS of 4 except for across I-5 (LTS 1), however S 320th Street is not a bike/pedestrian designated corridor.	5	S 324th Street operates with a LTS 2. Rating is further adjusted positive to account for the RAB and grade separation of ramps (no on/off-ramp through trips at S 324th Street to/from S 320th Street). S 320th Street has a LTS of 4 except for across I-5 (LTS 1), however S 320th Street is not a bike/pedestrian designated corridor.	5	S 324th Street operates with a LTS 2. Rating is further adjusted positive to account for the RAB and grade separation of ramps (no on/off-ramp through trips at S 324th Street to/from S 320th Street). S 320th Street has a LTS of 4 except for across I-5 (LTS 1), however S 320th Street is not a bike/pedestrian designated corridor.	5	S 324th Street operates with a LTS 2. Rating is further adjusted positive to account for the RABs. Rating is further adjusted negative to account for the on/off-ramp through trips at S 324th Street to/from S 320th Street. S 320th Street has a LTS of 4 except for across I-5 (LTS 1), however S 320th Street is not a bike/pedestrian designated corridor.	4.5	S 324th Street operates with a LTS 2. Rating is further adjusted positive to account for the RABs. Rating is further adjusted negative to account for the on/off-ramp through trips at S 324th Street to/from S 320th Street. S 320th Street has a LTS of 4 except for across I-5 (LTS 1), however S 320th Street is not a bike/pedestrian designated corridor.
3	Rating negatively affected by S 324th Street cross sections with a signal.	4	Similar to other options outside the S 324th Street interchange. Through the interchange, minimized crossing widths with DDI.	5	Similar to other options outside the S 324th Street interchange. Through the interchange, minimized crossing widths if RAB designed with refuge areas on splitter islands.	3	Rating negatively affected by S 324th Street cross sections with a signal.	5	Similar to other options outside the S 324th Street interchange. Through the interchange, minimized crossing widths if RAB designed with refuge areas on splitter islands.	5	Similar to other options outside the S 324th Street interchange. Through the interchange, minimized crossing widths if RAB designed with refuge areas on splitter islands.	5	Similar to other options outside the S 324th Street interchange. Through the interchange, minimized crossing widths if RAB designed with refuge areas on splitter islands.		

S 324th Street Interchange Access Concepts													
2E Split Diamond + Compatible with S 324th Street SE Quadrant Loop Ramp		2F Grade Separated Ramps + Diverging Diamond Interchanges S 324th Street		2G Split Diamond + Roundabout at S 324th Street		2H - 2A + 2B Hybrid		2I - Grade Separated Ramps + RAB		2J - Grade Separated Ramps + RAB + 312th + 32nd		2J - 2A + 2B Hybrid + RAB	
3.4	15.5	4.0	15.9	3.6	16.0	3.6	16.1	4.1	16.5	4.2	14.5	3.7	16.0
5.0		5.0		5.0		5.0		5.0		5.0		5.0	
3.5		3.3		3.8		3.7		3.7		2.8		3.8	
3.7		3.6		3.6		3.9		3.7		2.5		3.5	
3		1		1		1		0		3		0	
Discussion		Discussion		Discussion		Discussion		Discussion		Discussion		Discussion	
4	Rating accounts for maintenance of a new bridge over I-5 at S 324th Street, loop ramp structure, and signals at the interchange.	3.5	Rating accounts for maintenance of a new bridge over I-5 at S 324th Street, new bridges for the braided ramps, and signals.	4.5	Rating accounts for maintenance of a new bridge over I-5 at S 324th Street.	3.5	Rating accounts for maintenance of a new bridge over I-5 at S 324th Street, new bridges for the braided ramps, and signals at the interchange.	4.5	Rating accounts for maintenance of a new bridge over I-5 at S 324th Street and new bridges for the braided ramps.	3.5	Rating accounts for maintenance of a new bridge over I-5 at S 324th Street and new bridges for the braided ramps. GBM for S 312th bridge over ST LRT complicates bridge maintenance windows.	4.5	Rating accounts for maintenance of a new bridge over I-5 at S 324th Street.
2	Rating accounts for potential conflict of new northbound off-ramp to S 320th Street and the pipeline (located outside of pipe R/W but within 30' buffer of pipe). The new S 324th Street interchange has three bridged crossings over pipeline, and a new future pipeline crossing due to the S 324th Street northbound on loop ramp.	3	Rating accounts for potential conflict of new northbound off-ramp to S 320th Street and the pipeline (located outside of pipe R/W but within 30' buffer of pipe), and new S 324th Street interchange has three bridged crossings over pipe.	3	Rating accounts for potential conflict of new northbound off-ramp to S 320th Street and the pipeline (located outside of pipe R/W but within 30' buffer of pipe), and new S 324th Street interchange has three bridged crossings over pipe.	3	Rating accounts for potential conflict of new northbound off-ramp to S 320th Street and the pipeline (located outside of pipe R/W but within 30' buffer of pipe), and new S 324th Street interchange has three bridged crossings over pipe.	3	Rating accounts for potential conflict of new northbound off-ramp to S 320th Street and the pipeline (located outside of pipe R/W but within 30' buffer of pipe), and new S 324th Street interchange has three bridged crossings over pipe.	2	Rating accounts for potential conflict of new northbound off-ramp to S 320th Street and the pipeline (located outside of pipe R/W but within 30' buffer of pipe), and new S 324th Street interchange has three bridged crossings over pipe. S 312th Street passes over ST LRT requiring construction to occur during 1 to 4 AM window or coordinate other closures.	3	Rating accounts for potential conflict of new northbound off-ramp to S 320th Street and the pipeline (located outside of pipe R/W but within 30' buffer of pipe), and new S 324th Street interchange has three bridged crossings over pipe.
3	Target anticipated to be met for all elements with R/W acquisition. Underground storm water management facilities and/or proprietary treatment BMPs acceptable to City.	3	Target anticipated to be met for all elements with R/W acquisition. Underground storm water management facilities and/or proprietary treatment BMPs acceptable to City.	3	Target anticipated to be met for all elements with R/W acquisition. Underground storm water management facilities and/or proprietary treatment BMPs acceptable to City.	3	Target anticipated to be met for all elements with R/W acquisition. Underground storm water management facilities and/or proprietary treatment BMPs acceptable to City.	3	Target anticipated to be met for all elements with R/W acquisition. Underground storm water management facilities and/or proprietary treatment BMPs acceptable to City.	3	Target anticipated to be met for all elements with R/W acquisition. Underground storm water management facilities and/or proprietary treatment BMPs acceptable to City.	3	Target anticipated to be met for all elements with R/W acquisition. Underground storm water management facilities and/or proprietary treatment BMPs acceptable to City.
2.5	Rating considers lower costs associated with fill walls and ramps at grade; moderate costs associated with cut walls, and higher costs associated with ramp lengths, ramp bridges, and S 324th Street local improvements.	2	Rating considers lower costs for cut walls; moderate costs associated with ramp lengths and the bridges; and higher costs for fill walls, grade separated ramps, 324th St local improvements, private detention pond impacts, and 324th bridge.	3	Rating considers lower costs associated with fill walls, ramps at grade, signals, and S 324th Street local improvements; moderate costs associated with ramp lengths, cut walls, and the bridges.	3	Rating considers lower costs for cut walls and S 324th Street local improvements; moderate costs associated with ramp lengths and the bridges; and higher costs for fill walls and northbound grade separated ramps.	3	Rating considers lower costs for cut walls, S 324th Street local improvements, and signals; moderate costs associated with ramp lengths and the bridges; and higher costs for fill walls and grade separated ramps.	1	Rating considers lower costs for cut walls, S 324th Street local improvements, and signals; moderate costs associated with ramp lengths and the bridges; and higher costs for fill walls and grade-separated ramps. Additional cost over other alternatives for S 312th Street and 32nd Avenue S roadway construction and RDW acquisition.	3	Rating considers lower costs for cut walls, S 324th Street local improvements, and signals; moderate costs associated with ramp lengths and the bridges; and higher costs for fill walls and northbound grade separated ramps.
5	Compatible with all future projects.	4.5	Compatible with all future projects. Requires the LRT alignment to move west.	5	Compatible with all future projects.	5	Compatible with all future projects.	4.5	Compatible with all future projects. Requires the LRT alignment to move west.	4.5	Compatible with all future projects. Requires the LRT alignment to move west.	5	Compatible with all future projects.






S 324th Street Interchange Access Concepts													
2E Split Diamond + Compatible with S 324th Street SE Quadrant Loop Ramp		2F Grade Separated Ramps + Diverging Diamond Interchanges S 324th Street		2G Split Diamond + Roundabout at S 324th Street		2H - 2A + 2B Hybrid		2I - Grade Separated Ramps + RAB		2J - Grade Separated Ramps + RAB + 312th + 32nd		2J - 2A + 2B Hybrid + RAB	
3.4	15.5	4.0	15.9	3.6	16.0	3.6	16.1	4.1	16.5	4.2	14.5	3.7	16.0
5.0		5.0		5.0		5.0		5.0		5.0		5.0	
3.5		3.3		3.8		3.7		3.7		2.8		3.8	
3.7		3.6		3.6		3.9		3.7		2.5		3.5	
3		1		1		1		0		3		0	
Discussion		Discussion		Discussion		Discussion		Discussion		Discussion		Discussion	
4	Impacts to Belmor (approximately 0.10 acres) including potential residential displacements.	1	Impacts to Belmor (approximately 0.25 acres) including potential residential displacements. However, location of the southbound on-ramp pushes ST further west, potentially displacing a row of residences (cumulative effect).	3	Impacts to Belmor (approximately 0.25 acres) including residential displacements.	4	Impacts to Belmor (approximately 0.10 acres) including potential residential displacements.	3	Impacts to Belmor (approximately 0.25 acres) including residential displacements.	1	Impacts to Belmor (approximately 0.25 acres) including residential displacements. Residents along future alignment of S 312th Street and 32nd Ave impacted with property takes, increased traffic, and local access revisions. Thirty-three (33) properties would be intersected (Mobile Home-1, Park -1, Retirement Facility -1, Residential Duplex-1, Residential Apt.-1, Single Family -17, Single Family/Vacant -8, Vacant/Commercial -2, Vacant/Industrial -1)	3	Impacts to Belmor (approximately 0.25 acres) including residential displacements.
5	No impacts to parks	5	No impacts to parks	5	No impacts to parks	5	No impacts to parks	5	No impacts to parks.	2	ROW takes from Steele Lake Park, added traffic, noise, pedestrian concerns and conflicts with traffic, and roadway/pavement width.	5	No impacts to parks
4,5	Wetland/Stream Impacts At-Grade: 0 sf Wetland/Stream Elevated: 0 sf Wetland/Stream Total: 61,900 sf Buffer Total: 61,900 sf	4	Wetland/Stream Impacts At-Grade: 0 sf Wetland/Stream Elevated: 4,700 sf Wetland/Stream Total: 4,700 sf Buffer Total: 73,200 sf	4	Wetland/Stream Impacts At-Grade: 5,100 sf Wetland/Stream Elevated: 4,700 sf Wetland/Stream Total: 5,100 sf Buffer Total: 23,000 sf	4	Wetland/Stream Impacts At-Grade: 0 sf Wetland/Stream Elevated: 4,800 sf Wetland/Stream Total: 4,800 sf Buffer Total: 51,300 sf	2,5	Wetland/Stream Impacts At-Grade: 8,100 sf Wetland/Stream Elevated: 4,700 sf Wetland/Stream Total: 12,800 sf Buffer Total: 41,000 sf	1	Wetland/Stream Impacts At-Grade: 16,200 sf Wetland/Stream Elevated: 6,900 sf Wetland/Stream Total: 23,100 sf Buffer Total: 72,000 sf	2,5	Wetland/Stream Impacts At-Grade: 6,800 sf Wetland/Stream Elevated: 4,700 sf Wetland/Stream Total: 11,600 sf Buffer Total: 39,700 sf
4	No archaeological resources identified. Inventoried properties were determined ineligible for National Register of Historic Places	4	No archaeological resources identified. Inventoried properties were determined ineligible for National Register of Historic Places	4	No archaeological resources identified. Inventoried properties were determined ineligible for National Register of Historic Places	4	No archaeological resources identified. Inventoried properties were determined ineligible for National Register of Historic Places	4	No archaeological resources identified. Inventoried properties were determined ineligible for National Register of Historic Places	4	No archaeological resources identified. Inventoried properties were determined ineligible for National Register of Historic Places	4	No archaeological resources identified. Inventoried properties were determined ineligible for National Register of Historic Places
1	The SE loop ramp at intersection of I-5/S 324th Street pushed out off-ramp and potentially affects proposed building on Parcel #1621049056. Affects private detention pond.	2	Although the DDI configuration pushes the off-ramp further onto commercial property (parcel #1621049056), the building is still avoided. Affects private detention pond.	3	S 324th Street extension takes northern edge of Parcel #1621049056, but the extension and the I-5 off-ramp avoid the proposed building.	3	S 324th Street extension takes northern edge of Parcel #1621049056, but the extension and the I-5 off-ramp avoid the proposed building.	3	S 324th Street extension takes northern edge of Parcel #1621049056, but the extension and the I-5 off-ramp avoid the proposed building.	3	S 324th Street extension takes northern edge of Parcel #1621049056, but the extension and the I-5 off-ramp avoid the proposed building.	3	S 324th Street extension takes northern edge of Parcel #1621049056, but the extension and the I-5 off-ramp avoid the proposed building.
1	Does not accommodate future land uses (S 320th Street)/I-5 southbound ramps intersection is constrained).	5	I-5 ramp terminal intersections at S 324th Street can serve 50 percent or more trips if widened to a 4 lane cross section between 32nd Avenue S to Weyerhaeuser Way S; S 320th Street corridor can serve a 15 percent increase in trips with some turn lane capacity improvements.	1	Does not accommodate future land uses (S 320th Street)/I-5 southbound ramps intersection is constrained).	2	I-5 ramp terminal intersections at S 324th Street can serve up to 35 percent more trips if widened to a 4 lane section from 23rd Avenue S to Weyerhaeuser Way S and other intersection capacity improvements. S 320th Street corridor can serve a 15 percent increase in trips. Weave section on I-5 southbound ramps CD likely a future constraint in operations.	4	I-5 ramp terminal intersections at S 324th Street can serve 50 percent or more trips with RAB capacity improvements; S 320th Street corridor can serve a 15 percent increase in trips.	5	I-5 ramp terminal intersections at S 324th Street can serve 50 percent or more trips with RAB capacity improvements; S 320th Street corridor can serve a 15 percent increase in trips.	2	I-5 ramp terminal intersections at S 324th Street can serve 50 percent or more trips with RAB capacity improvements; S 320th Street corridor can serve a 15 percent increase in trips. Weave section on I-5 southbound ramps CD likely a future constraint in operations.
4	See Alt 2A.	3	See Alt 2B.	4	See Alt 2A.	4	See Alt 2A.	3	See Alt 2B.	2	See Alt 2B. Also, property owners along S 312th Street (particularly east of the freeway) and along S 32nd Avenue S view the new roadway construction negatively as it will have direct property impacts or increase traffic in their neighborhood.	4	See Alt 2A.

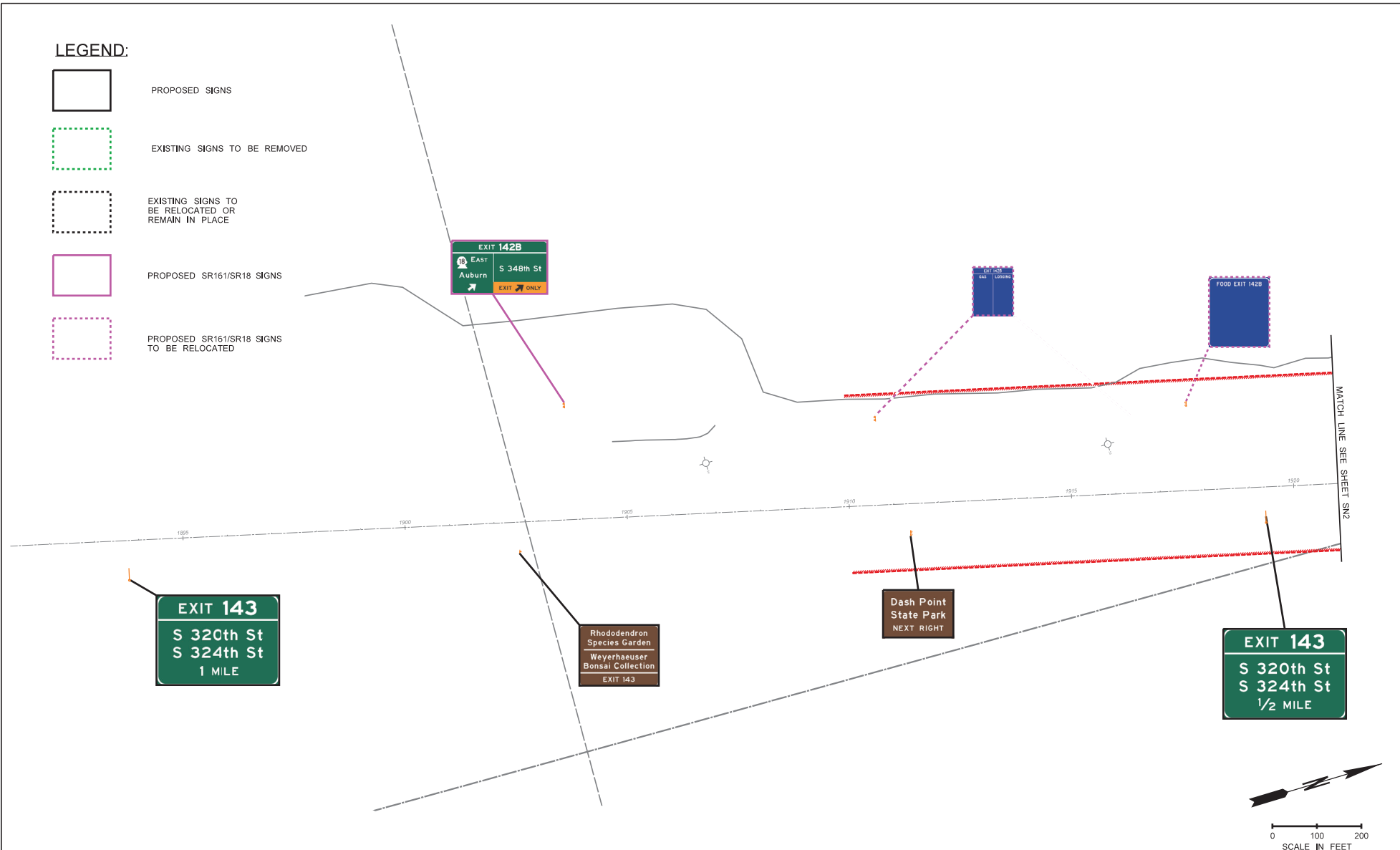
Appendix K

Signing Plan



LEGEND:

-  PROPOSED SIGNS
-  EXISTING SIGNS TO BE REMOVED
-  EXISTING SIGNS TO BE RELOCATED OR REMAIN IN PLACE
-  PROPOSED SR161/SR18 SIGNS
-  PROPOSED SR161/SR18 SIGNS TO BE RELOCATED



PRELIMINARY DESIGN SUBMITTAL (10%)



Parametrix

CITY CENTER ACCESS PROJECT

LINE 1: Conceptual Signing Plan
 LINE 2:

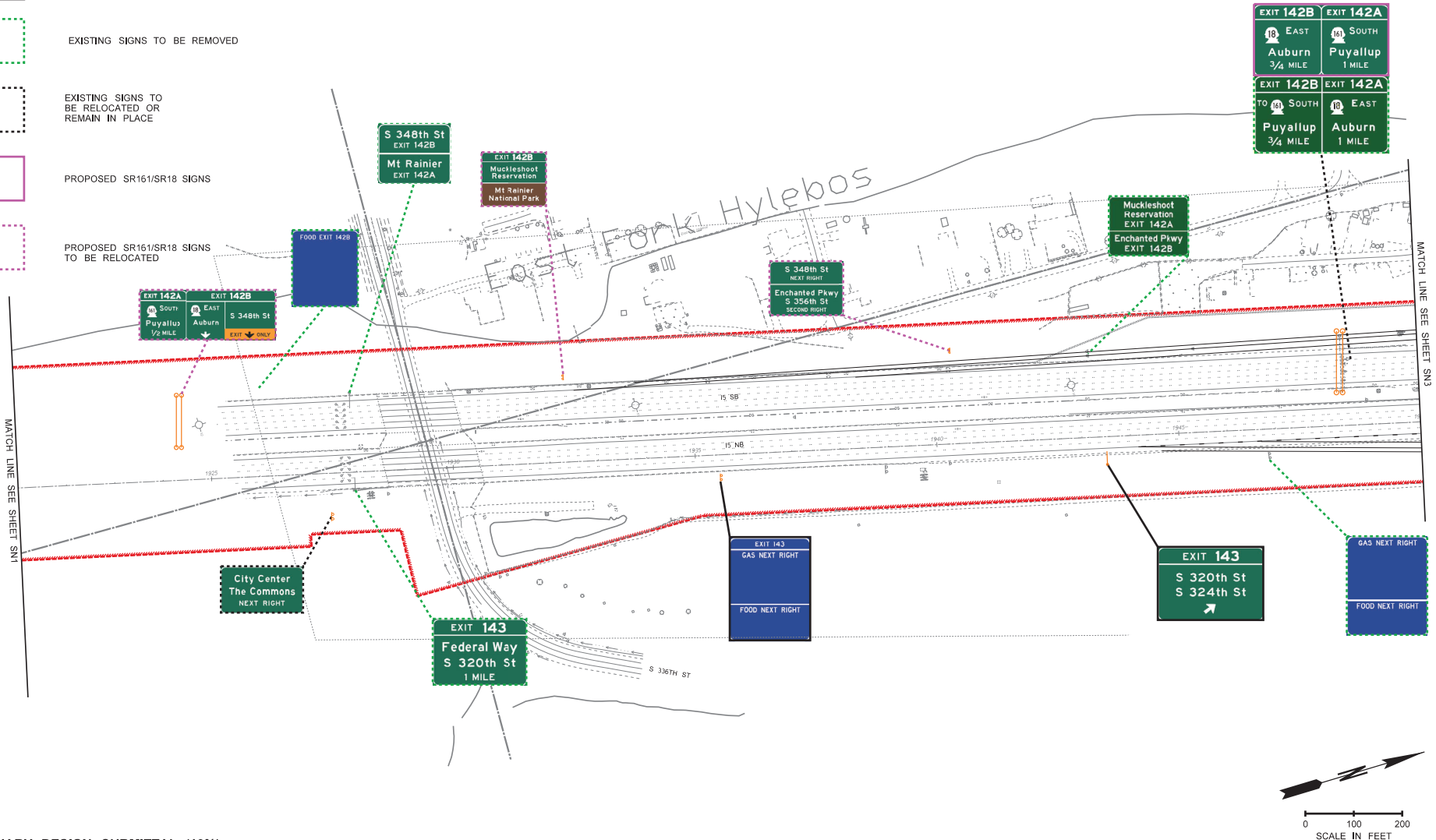
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TIME: 7:38:31 AM

DRAWING NO. SN1
 SHEET 1 OF 6

LEGEND:

- PROPOSED SIGNS
- EXISTING SIGNS TO BE REMOVED
- EXISTING SIGNS TO BE RELOCATED OR REMAIN IN PLACE
- PROPOSED SR161/SR18 SIGNS
- PROPOSED SR161/SR18 SIGNS TO BE RELOCATED



PRELIMINARY DESIGN SUBMITTAL (10%)



Parametrix

CITY CENTER ACCESS PROJECT

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 LINE 2:

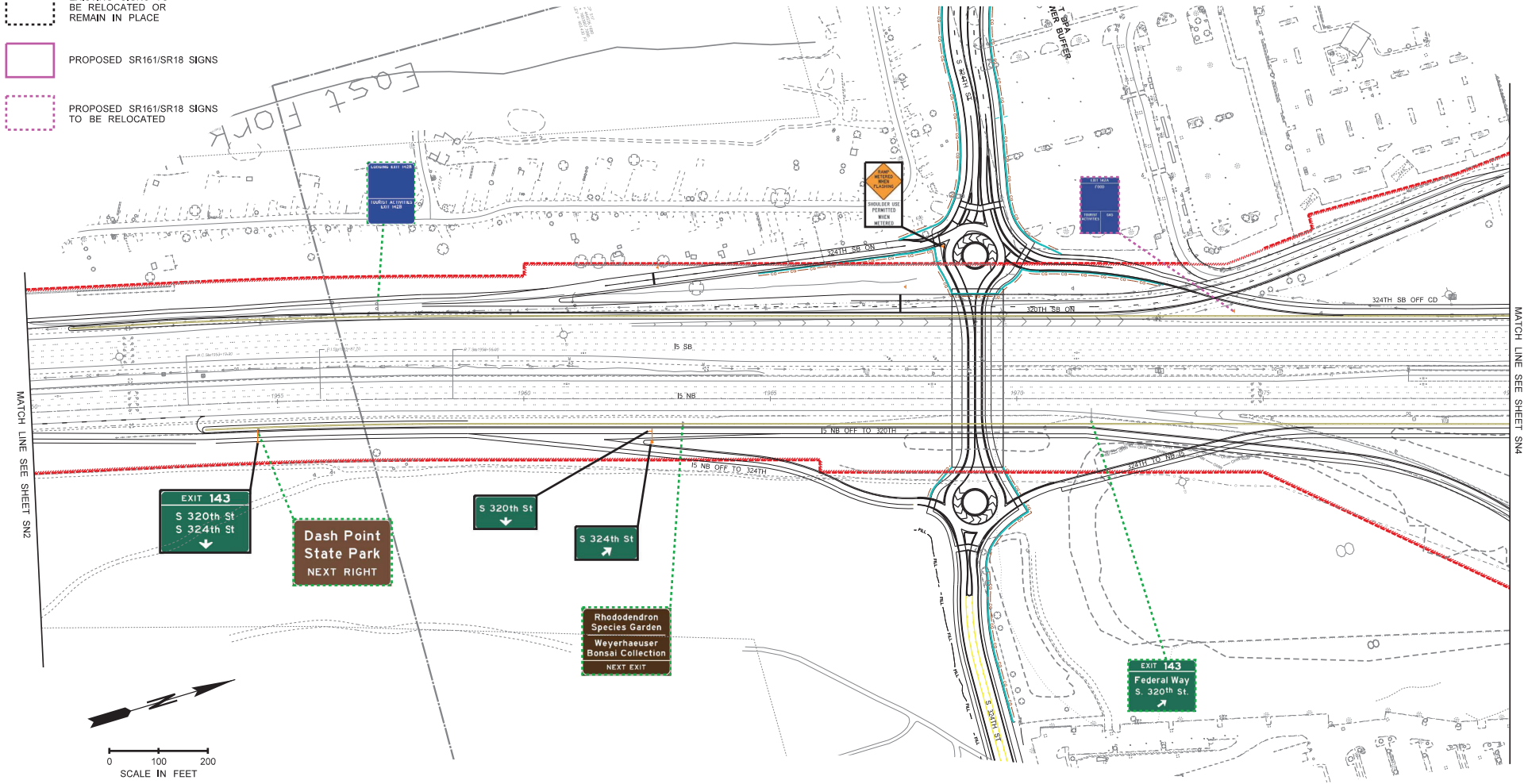
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 SHEET 2 OF 6

LEGEND:

- PROPOSED SIGNS
- EXISTING SIGNS TO BE REMOVED
- EXISTING SIGNS TO BE RELOCATED OR REMAIN IN PLACE
- PROPOSED SR161/SR18 SIGNS
- PROPOSED SR161/SR18 SIGNS TO BE RELOCATED



PRELIMINARY DESIGN SUBMITTAL (10%)



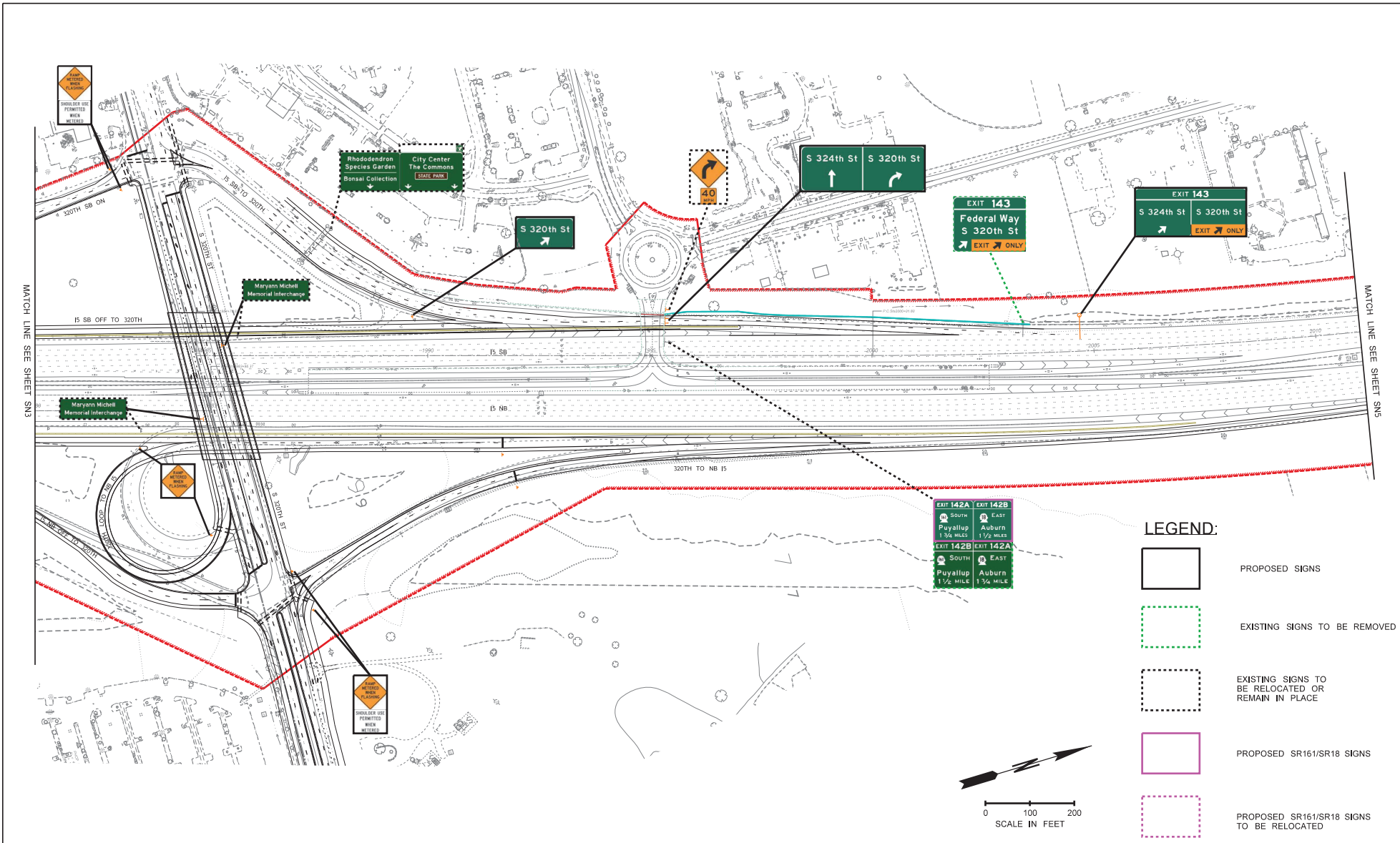
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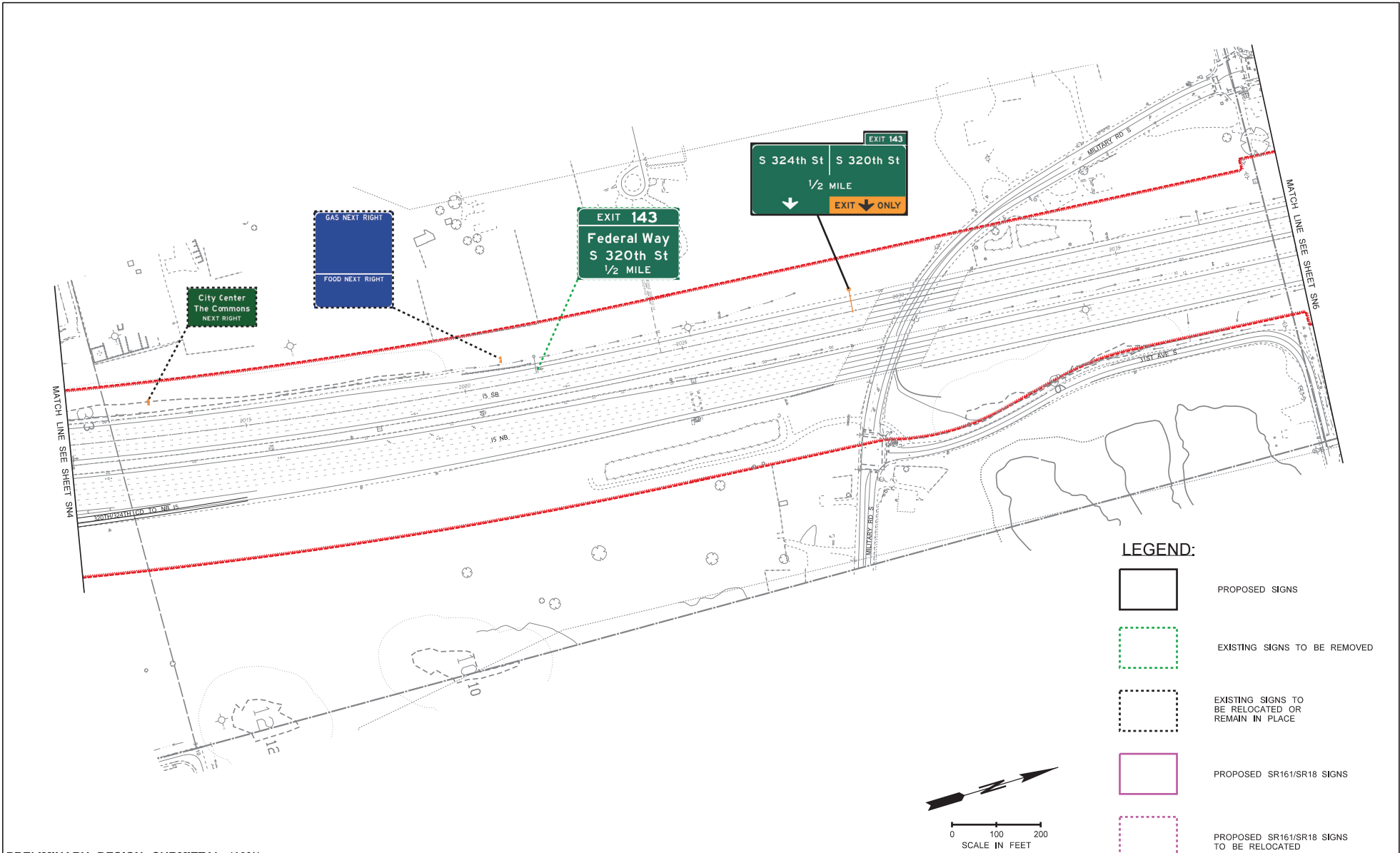
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CITY CENTER ACCESS PROJECT

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PRELIMINARY DESIGN SUBMITTAL (10%)



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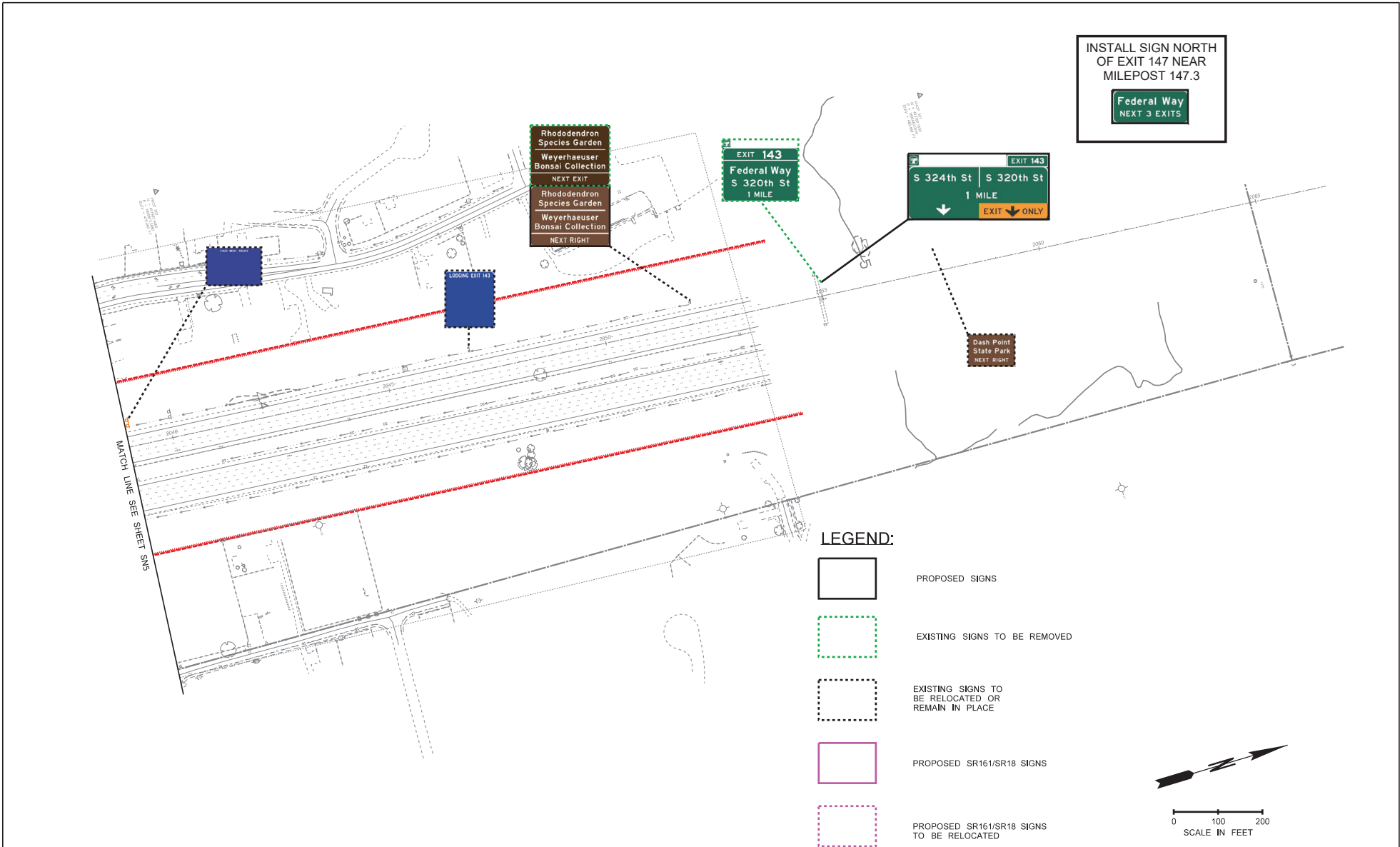
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 LINE 2:

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 DATE: 3/23/2021

TIME: 7:49:35 AM

DRAWING NO. SN5
 SHEET 5 OF 6



PRELIMINARY DESIGN SUBMITTAL (10%)



Parametrix

CITY CENTER ACCESS PROJECT

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DRAWING NO. SN6
 SHEET 6 OF 6