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Costco Lake Stevens

DRAFT

Traffic Impact Analysis

Permit No.:

Lake Stevens, WA

August 31, 2018



Prepared for:
Costco Wholesale Corporation
and
the City of Lake Stevens

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Abbreviations

TSI	Transportation Solutions, Inc.
ICE	Intersection Control Evaluation
SR	Washington State Route
US	United States Highway
ITE	Institute of Transportation Engineers
HCM	Highway Capacity Manual
WSDOT	Washington State Department of Transportation
LOS	Level of Service
V/C	Volume-to-Capacity Ratio
App.	Approach
Mvmt.	Movement
EB	Eastbound
WB	Westbound
NB	Northbound
SB	Southbound
CIP	Capital Improvement Plan
TIP	Traffic Impact Fee
RAB	Roundabout
EIS	Environmental Impact Statement
ADT	Average Daily Traffic Volume
EIS	Environmental Impact Statement

DRAFT

1. Executive Summary

This Traffic Impact Analysis summarizes the traffic impacts associated with development of a 170,000 square foot wholesale warehouse and membership fueling station, referred to herein as the “Project”.

The Applicant, Costco Wholesale, is proposing to develop the Project at the northwest corner of SR 9 and South Lake Stevens Road. Occupancy is anticipated by 2022. This traffic analysis forecasts and evaluated future conditions through year 2025.

The Project assumes the following transportation facilities will be in place prior to occupancy of the Project: a section of South Lake Stevens Road will be vacated west of SR 9 and connected to 24th Street SE; 24th Street SE will be completed from SR 9 to the 91st Ave SE; 91st Ave SE will be extended south of 20th Street SE to 24th Street SE; SR 9 will be signalized at 24th Street SE and South Lake Stevens Road; SR 9 will be widened to accommodate the new signal; and 91st Ave SE intersection to be modified at 20th Street SE to accommodate the new south leg. These improvements are consistent with the City of Lake Stevens’ 20th Street SE Corridor Subarea Plan.

91st Ave SE will be a three-lane roadway with a northbound left turn lane and right turn pocket at 20th Street SE. 24th Street SE will be a three-lane roadway that widens at the west Project access and at SR 9 to accommodate turn lanes.

An ICE report was prepared and reviewed by the WSDOT to justify access at SR 9 at 24th Street SE and South Lake Stevens Road.

Four Project accesses are proposed, two off 24th Street SE and two off 91st Ave SE:

- The north access off 91st Ave SE is a primary access and includes two outbound lanes, and 91st Ave SE is recommended to be striped for a 150-foot left turn lane into the site. The site access is forecast to operate at LOS B with the Project.
- The south access off 91st Ave SE provides truck access to the back of the warehouse. Site access impacts are negligible with the Project.
- The west access off 24th Street SE was evaluated with stop-sign and signal control and both configurations show the access operating at LOS D. A signalized intersection is not required for Project build-out, though the signal is forecast to better support Project access and access to and from South Lake Stevens Road of 24th Street SE, with build-out of the 20th Street SE Corridor Subarea Plan which includes redevelopment and more traffic on 24th Street SE. The signalized access is recommended with left turn lanes on all approaches of 150 feet, eastbound and westbound, 100 feet northbound, and with 200 feet of capacity southbound from the site. Vehicle queues on 24th Street SE are not forecast to impede traffic flow between the signalized intersections at SR 9 and at this access and South Lake Stevens Road.
- The east access off 24th Street SE is a right-in/right-out access with a direct route to the fueling station. Site access impacts are negligible with the Project.

With the Project, study intersections are forecast to operate within the City of Lake Stevens, WSDOT and Snohomish County standards except the intersections of: 75th Ave SE and 20th Street SE, SR 9 at the US 2 westbound on-ramp and Bunk Foss Road, and SR 9 at the US 2 eastbound ramps.

- 75th Ave at 20th Street is forecast to operate at LOS F without the Project. The City of Lake Stevens 20th Street SE Corridor Subarea Plan EIS recommends a signal at this intersection. Currently, the signal project is not on the City of Lake Stevens' Transportation Improvement Program. Without the Project, delays from 75th Ave SE to 20th Street SE exceed 2 minutes. With a signal the intersection is forecast to meet the City of Lake Stevens' LOS threshold, and with a signal at 75th Ave SE, the 20th Street SE corridor meets the corridor LOS requirements with the Project. A signal is recommended to be included for in the update of the City of Lake Stevens' Transportation Improvement Program.

A signal at 75th Ave at 20th Street is estimated to cost \$500,000 and the Applicant's share for Project impacts (8.7%) is estimated at \$43,500.

- Without the Project, SR 9 at the US 2 westbound on-ramp and Bunk Foss Road is forecast to operate at LOS E. With the Project intersection delay is computed to increase by 9.3 seconds and the intersection is forecast to continue to operate at LOS E. Signal timing and coordination improvements are recommended at this intersection and at the adjacent and signalized SR 9 intersection with the US 2 eastbound ramps, on the south side of the overpass. With signal timing improvements, the intersection is forecast to operate at LOS D with the Project and meet the WSDOT LOS requirement.
- With the Project, SR 9 at the US 2 eastbound ramps is forecast to operate at LOS E. With the Project intersection delay is computed to increase by 12.8 seconds from without-Project conditions. Signal timing and coordination improvements are recommended at this intersection and at the adjacent and signalized SR 9 intersection with the US 2 westbound on-ramp and Bunk Foss Road, on the north side of the overpass. With signal timing improvements, the intersection is forecast to operate at LOS D with the Project and meet the WSDOT LOS requirement.

Signal timing and coordination improvements at both the US 2 westbound on-ramp and Bunk Foss Road and US 2 eastbound ramps intersections on SR 9 would be an interim phase, prior to WSDOT completing their planned improvements on the SR 9 corridor, which are not yet fully funded. The Applicant should negotiate their fair share cost for optimizing the both signals, the Project's impact share at these intersections is 5.4%.

- With the Project, the stop controlled northbound approach of the US 2 westbound off-ramp at Bunk Foss Road is forecast to operate at LOS E. With the Project intersection delay is forecast to increase by 10.7 seconds from without-Project conditions. With the Project and with stop signs added to the Bunk Foss Road approaches the intersection improves to LOS D. Also, with the Project and with a mini-roundabout replace the existing traffic control, the intersection is forecast to operate at LOS B.

A mini-roundabout at the off-ramp is estimated to cost \$150,000 and the Applicant's share for Project impacts (3.2%) is estimated at \$4,800.

Onsite parking will be provided to support the site, consistent with City of Lake Stevens code requirements.

The Applicant will be responsible for frontage improvements and payment of their traffic impact fee. Traffic impact fee credits include the existing single-family home being removed from the site and the option to recoup a percentage of the traffic impact fee with the Project creating new jobs in the City of Lake Stevens, the latter per City of Lake Stevens Ordinance 1002.

2. Introduction

This Traffic Impact Analysis documents the traffic impacts associated with the development of a wholesale membership warehouse and fueling station in the City of Lake Stevens, WA. The purpose of this report is to identify potentially significant and adverse traffic impacts resulting from development the Project and, where appropriate, outline programmatic and/or physical improvements to minimize or eliminate those impacts. The conclusions and recommendations from this analysis are intended to support the building permit application.

This section provides an outline of the report, introduces the Project, provides contextual characteristics associated with the Project, reviews the Project's consistency with the 20th Street SE Corridor Subarea Plan and identifies the study area.

2.1. *Report Organization*

This analysis is organized in a sequence that is intended to provide review staff an understanding of the purpose of each step in the technical analysis process. The following outlines the following major sections of this report and the purpose of each section:

- **Section 3. Standards and Performance Measures.** This section specifies the analysis period and horizon year and reviews the performance standards used to gauge Project-generated traffic impacts.
- **Section 4. Existing Traffic Conditions.** This section describes the existing transportation system and the its operational characteristics.
- **Section 5. 2025 Future Without-Project Traffic Conditions.** This section describes the future traffic conditions without the Project assuming steady local and regional traffic growth and planned improvements within the study between now and 2025. Future without-Project conditions serve as the future baseline conditions used to evaluate Project-specific impacts.
- **Section 6. Trip Generation, Trip Distribution and Assignment.** This section includes the forecasts for the Project's trip generation and peak hour trip distribution and travel assignment.
- **Section 7. 2025 Future With-Project Traffic Conditions.** This section describes the future traffic conditions with the Project and include the 2025 without-Project conditions plus Project generated trips. This section also includes recommendations for Project-related impacts.

2.2. *Project Location*

Costco Wholesale, the Applicant, is proposing to develop a wholesale membership warehouse and fueling station at the northwest corner of SR 9 and South Lake Stevens Road. A vicinity map is included as Figure 1.

The Project site includes one single-family residence, to be removed with the development.

The property is in the 20th Street SE Corridor Subarea and is in a Commercial District zone. A zoning map of the 20th Street SE Corridor Subarea is included as Figure 2.

2.3. Project Description

The Applicant is proposing a 170,000 square foot membership warehouse and fueling station. Build-out is anticipated by 2022. For this analysis, future traffic impacts without and with the Project were conservatively evaluated for year 2025 traffic conditions.

The fueling station would include up to five fuel islands for 30 vehicle fueling positions. The build-out of the fueling station will be phased and initially four fuel islands will be completed by 2022 in conjunction with build-out of the warehouse. Future fueling station expansion to add one fuel island and six fueling positions, may occur after 2022 based on demand.

A site plan is included as Figure 3.

Four Project accesses are proposed, refer to Figure 3: two off 24th Street SE and two off 91st Ave SE.

- **North Access** on 91st Ave SE serves as a primary access to the parking area north of the warehouse.
- **South Access** on 91st Ave SE serves as access for truck loading at rear of the warehouse.
- **West Access** on 24th Street SE is a signalized access serving the parking area east of the warehouse. The access is about 425 feet west of SR 9 and the south leg connects to South Lake Stevens Road.
- **East Access** on 24th Street SE serves as a direct access to the fueling station. The access is restricted to right-in/right-out movements only and is located about 260 feet west of SR 9.

Development of the site requires vacating a section of South Lake Stevens Road west of SR 9 and connecting South Lake Stevens Road to 24th Street SE; constructing 24th Street SE from SR 9 to 91st Ave SE; extending 91st Ave SE south of 20th Street SE to 24th Street SE; signalizing the SR 9 intersection at 24th Street SE and South Lake Stevens Road; widening on SR 9 to accommodate the new signal; and modifying the 91st Ave SE intersection with 20th Street SE to accommodate the new south leg.

These improvements are consistent with the City of Lake Stevens' 20th Street SE Corridor Subarea Plan and are required for Project access and circulation. Figure 4 illustrates these roadway improvements.

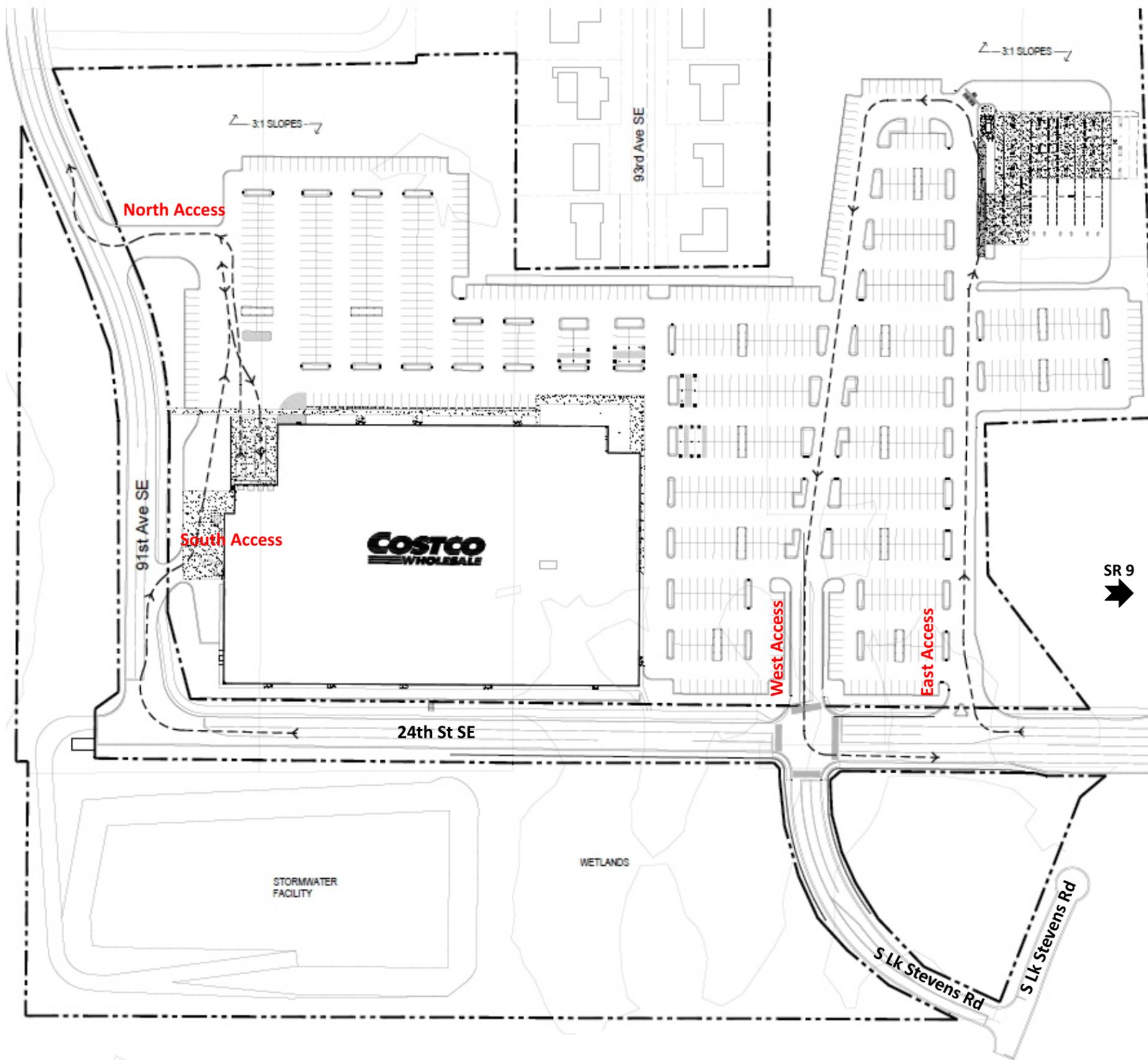
A scoping memorandum was prepared to the City of Lake Stevens on February 20, 2018. Feedback from the City of Lake Stevens and WSDOT is incorporated into the study. In addition, an ICE report was prepared in response to WSDOT comments about future travel-demand forecasting and traffic modelling.

The ICE report justifies full access on a section of SR 9 designated with limited access. The report compares the long-range AM and PM peak hour no-build, signal and roundabout traffic conditions at SR 9 and 24th Street SE. The ICE report concluded that a signal is the preferred intersection control to support the goals of the 20th Street SE Corridor Subarea Plan and future WSDOT plan for SR 9. A copy of the ICE is included in the Appendix.

2.4. Consistency with 20th Street SE Corridor Subarea Plan

The 20th Street SE Corridor Subarea Plan identifies a new regional retail center-commercial district to the west of SR 9, south of 20th Street SE, east of 91st Ave SE and north of the city limits. The Project's location is consistent with the subarea goals and the local area is being rezoned for commercial uses.

The subarea plan envisions 20th Street SE as a "boulevard street" with a 5-lane cross-section, 24th Street SE as 3-lane wide "trail road" from SR 9 to the west of Cavelero Mid High School, and 91st Ave SE extended from 20th Street SE to 24th Street SE. 24th Street SE is planned to widen to 5-lanes at SR 9 to accommodate long-term future traffic growth forecasts and 91st Ave SE south of 20th Street SE will be a 3-lane roadway.



PROJECT DATA

CLIENT: COSTCO WHOLESALE
999 LAKE DRIVE
ISSAQUAH, WA 98027

PROJECT ADDRESS: SWC OF SR 9 & 20TH ST S.E.
LAKE STEVENS, WA

SITE DATA:

COSTCO SITE AREA: 18.45 ACRES (803,718 SF)
CITY ROW AREA: 3.68 ACRES (160,162 SF)
STORMWATER FACILITY AREA: 3.70 ACRES (161,193 SF)
WETLAND/MITIGATION AREA: 6.90 ACRES (300,702 SF)
RESIDUAL DEVELOPMENT AREA: 4.03 ACRES (175,450 SF)
TOTAL SITE AREA: 36.76 ACRES

JURISDICTION: CITY OF LAKE STEVENS

ZONING: TO BE DETERMINED

SETBACKS:	REQUIRED	ACTUAL	TBD	TBD
FRONT:	TBD	FRONT:	TBD	TBD
SIDE:	TBD	SIDE:	TBD	TBD
REAR:	TBD	REAR:	TBD	TBD

BUILDING DATA:

TOTAL BUILDING FOOTPRINT AREA: 169,243 SF

INCLUDES:

WAREHOUSE MAIN LEVEL: 165,266 SF
ENCLOSED CANOPY: 3,977 SF

PARKING DATA:

TOTAL PARKING: 868 STALLS

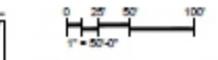
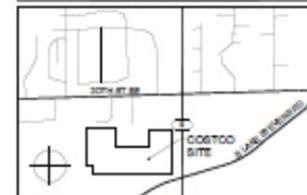
INCLUDES:

MAIN LEVEL PARKING PROVIDED:
 10' WIDE STALLS: 851 STALLS
 ACCESSIBLE STALLS: 17 STALLS

NUMBER OF STALLS PER 1000 SF OF BUILDING AREA: 5.10 STALLS

NOTES:
EXISTING CONDITIONS TO BE FIELD VERIFIED.

VICINITY MAP



REGIONAL MAP



CONCEPT SITE PLAN

D11-02

COSTCO WHOLESALE

LAKE STEVENS, WASHINGTON

CONCEPT SITE PLAN

JULY 18, 2018

Figure 3: Site Plan

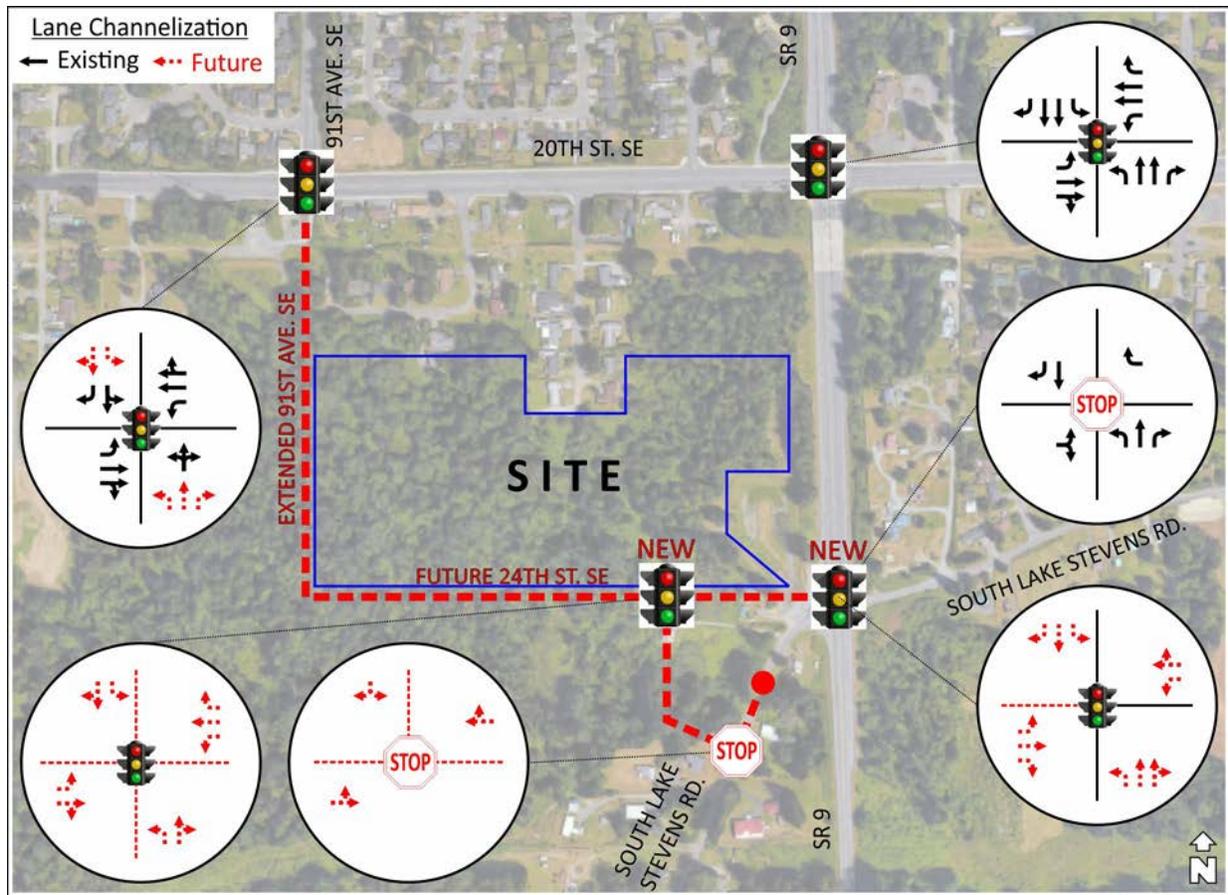


Figure 4: 2025 New Road Connections and Intersections

2.5. Study Area

The following study area intersections are included for traffic analysis:

- | | |
|--|---|
| 1. 75th Ave SE (Cavalero Rd) at 20th St SE | 11. SR 9 at US 2 WB On-Ramp/Bunk Foss Rd |
| 2. 79th Ave SE (Fairview Dr) at 20th St SE | 12. US 2 WB Off-Ramp at Bunk Foss Rd |
| 3. 83rd Ave SE at 20th St SE | 13. SR 9 at US 2 EB Ramps |
| 4. 91st Ave SE at 20th St SE | 14. 99th Ave NE at S Lk Stevens Rd |
| 5. SR 9 at 20th St SE | 15. 103rd Ave NE at S Lk Stevens Rd |
| 6. 99th Ave SE at 20th St SE | 16. S Lk Stevens Rd at S Lk Stevens Rd (future) |
| 7. S Lk Stevens Rd at 20th St SE | 17. 91st Ave SE at North Access (future) |
| 8. SR 9 at 4th St SE | 18. 91st Ave SE at South Access (future) |
| 9. SR 9 at 24th St SE/S Lk Stevens Rd | 19. West Access at 24th St SE (future) |
| 10. SR 9 at 32nd St SE | 20. East Access at 24th St SE (future) |

Figure 5 shows the study area and existing study intersection channelization and controls.

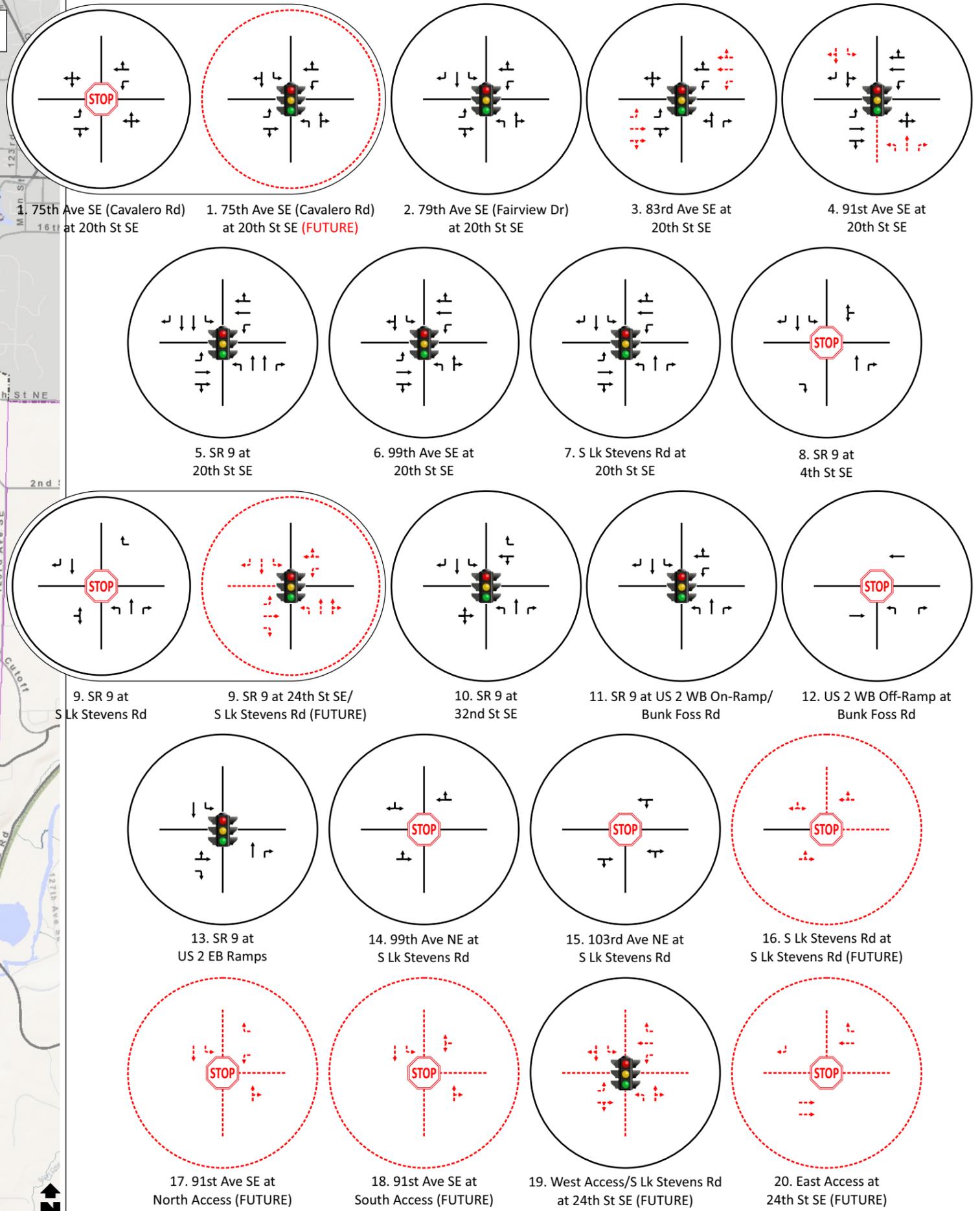
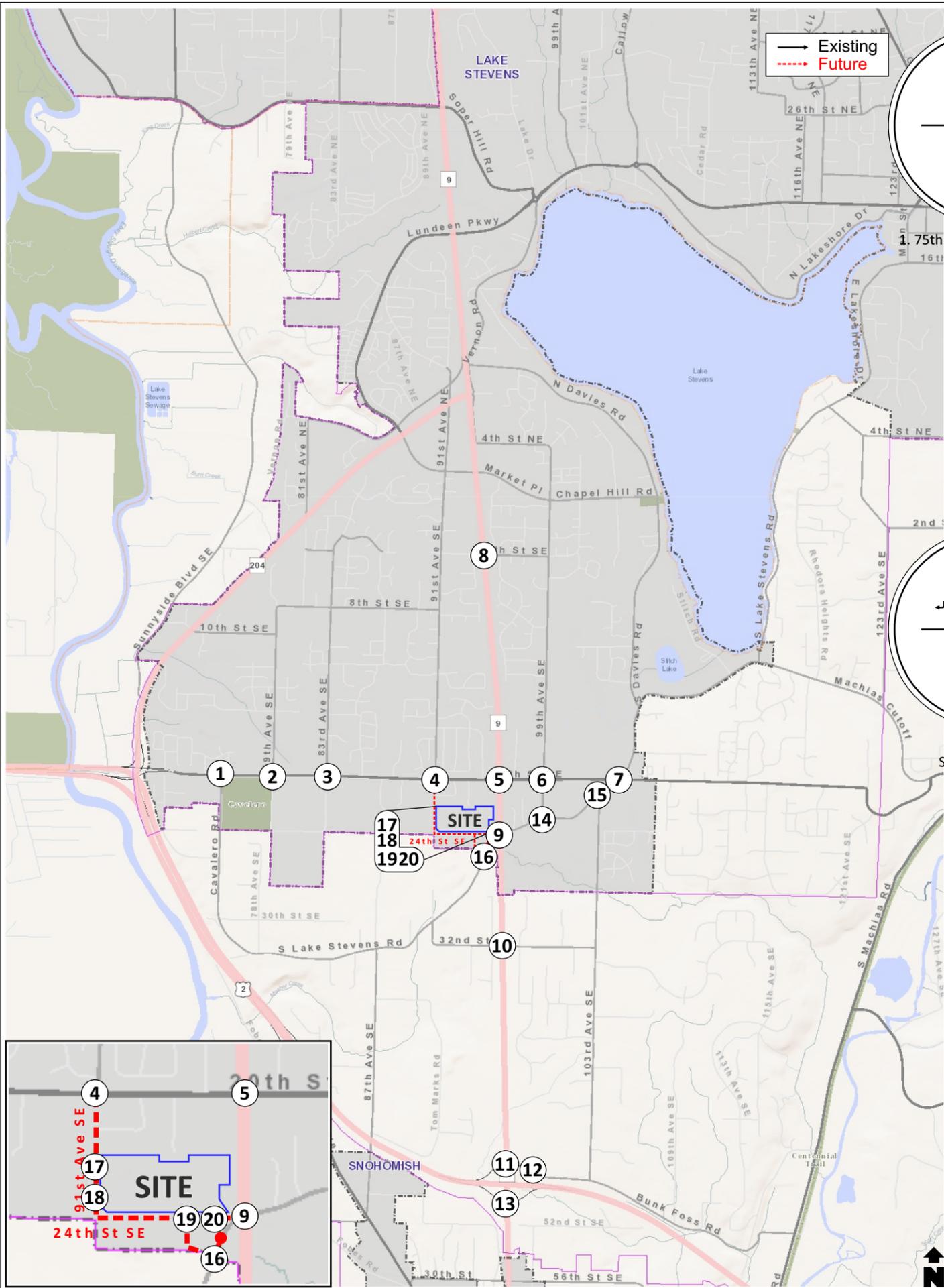


Figure 5: Study Area

3. Standards and Performance Measures

This section specifies the analysis period and horizon year and reviews the performance standards used to gauge Project-generated traffic impacts.

For this traffic study the weekday PM peak hour traffic impacts without and with the Project were evaluated. The PM peak hour is defined as the highest four consecutive 15-minute traffic volume intervals between 4 and 6 PM. This period represents the time interval when the combination of Project generated traffic volumes and volumes on the local roadways adjacent to the site are highest.

Traffic impacts were evaluated using LOS and delay methodology from the 2010 Highway Capacity Manual. LOS is defined from LOS A through LOS F by average (signal and all-way stop controlled intersections) or by worst controlled movement (minor approach stop-sign controlled intersections) delay. The intersection delay categories are defined in Table 1.

Table 1: Intersection LOS and Delay Categories

LOS	Signalized Intersections	Unsignalized Intersections
A	≤ 10 seconds	≤ 10 seconds
B	10-20 seconds	10-15 seconds
C	20-35 seconds	15-25 seconds
D	35-55 seconds	25-35 seconds
E	55-80 seconds	35-50 seconds
F	> 80 seconds	> 50 seconds

The Synchro computer program was used as the primary analysis tools to evaluate intersection operations.

The City of Lake Stevens Comprehensive Plan states that the City of Lake Stevens has a citywide LOS standard of LOS E for major and minor arterials and collector roadways. On the 20th Street SE corridor, LOS is determined as an average of all intersections from South Lake Stevens Roadway to 75th Ave SE (Cavalero Road). And on local access roadways the standard is LOS C.

The WSDOT LOS threshold for SR 9, an Urban Highway of Statewide Significance, is LOS D.

Snohomish County’s utilizes an arterial LOS standard for county roadways. Bunk Foss Road between SR 9 and S Machias Road is classified as a collector arterial, is not identifies as operating near to or in arrears and is noted as a rural arterial with urban traffic volumes. The arterial LOS threshold for Bunk Foss Road is LOS E which represents 1,850 vehicles per hour west of the US 2 westbound off-ramp (3-lane road).

4. Existing Conditions

This section describes the existing transportation system and the its operational characteristics.

4.1. Primary Study Area Roadways

- SR 9 is classified as a Freeway/Expressway in the City of Lake Stevens. SR 9 connects the City of Lake Stevens to the Cities of Snohomish to the south and the Cities of Marysville and Granit Falls to the north. In the study area SR 9 is two to six lanes wide and has a posted speed of 55 mph. Existing signalized intersections include 20th Street SE, 32nd Street SE and the US 2 ramp terminals. SR 9 includes paved shoulders between US 2 and 4th Street SE, except at 20th Street SE where the SR 9 intersection sidewalks.
- 20th Street SE is classified as a major arterial in the City of Lake Stevens. 20th Street SE intersects with the US 2/Hewitt Ave Trestle at the west city limits and extends to the east city limits. In the study area 20th Street SE is two to five lanes wide and has a posted speed of 35 mph. Existing signalized intersections include 79th Ave SE (Fairview Drive), 83rd Ave SE, 91st Ave SE, SR 9, 99th Ave SE, and South Lake Stevens Road. The roadway includes sidewalk and bicycle lanes west of 88th Ave NE. There are sections of sidewalk at major intersections east of 88th Ave NE, but the sections are non-continuous
- South Lake Stevens Road is classified as a collector arterial in the City of Lake Stevens. The arterial extends from the south city limits to the south side of Lake Stevens. The section south of the proposed Project site is in the Snohomish County. South Lake Stevens Road is a two-lane road that widens to accommodate turn lanes at 20th Street SE. The posted speed is 35 mph. The roadway includes a section of sidewalk fronting Dayslala and east of 99th Ave SE.

4.2. Traffic Volumes

For this analysis, the weekday PM peak hour was used for this analysis since it represents the period when traffic volumes on local roadways are at their highest. The PM peak hour is defined as the higher one-hour volume interval between 4 and 6 PM.

Existing PM peak hour traffic volumes were collected at the study intersections on March 6, 2018, May 10, 2018 and August 21, 2018 at the study intersections. Year 2016 volumes were provided by the WSDOT at the US intersections with SR 9, and these were adjusted based on the August 21, 2018 turning movement volumes. Copies of the traffic volumes are included in the Appendix.

Figure 6 illustrates the existing PM peak hour traffic volumes. The volumes are rounded to the nearest multiple of 5 to account for normal fluctuations in the day-to-day traffic volumes.

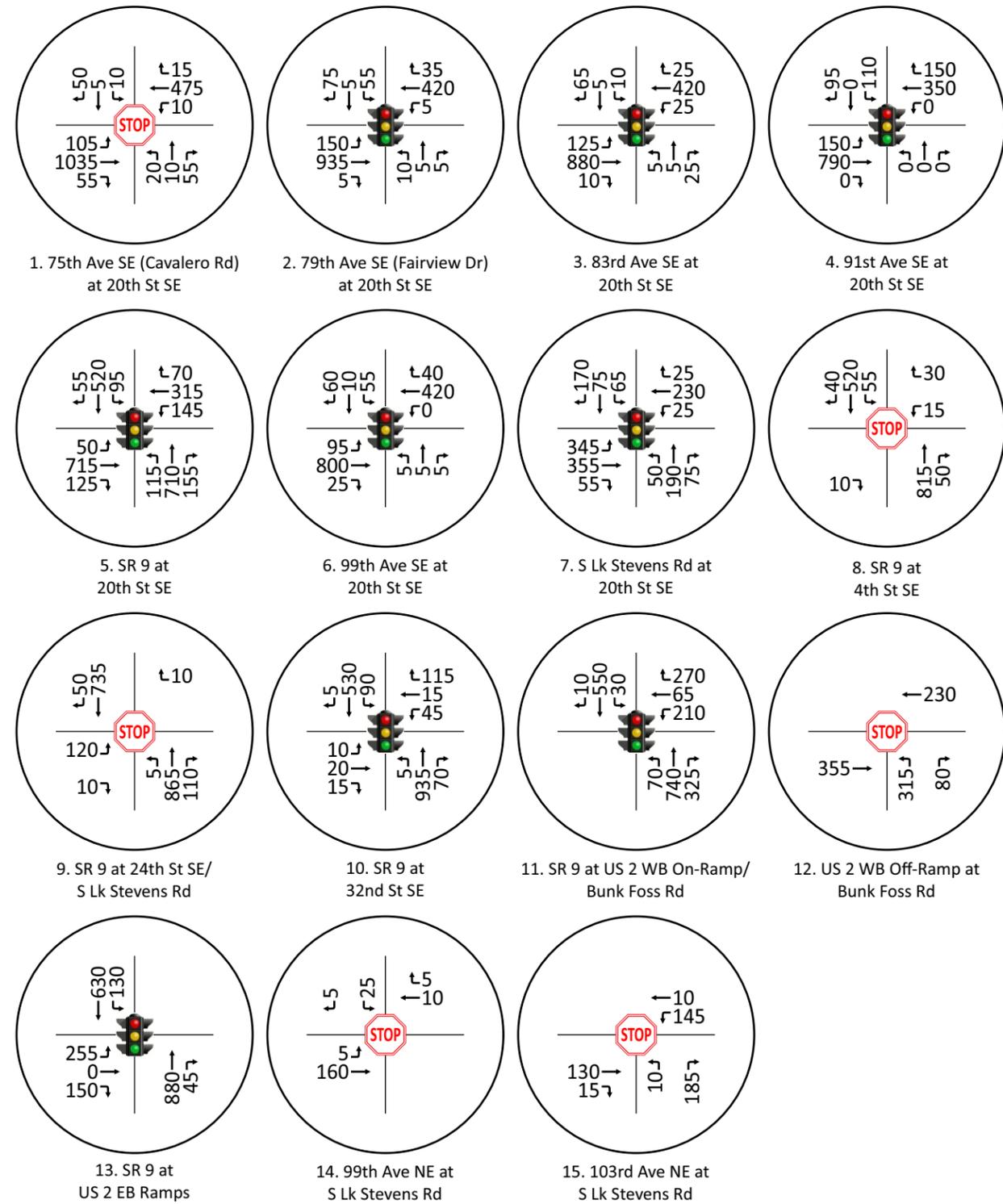
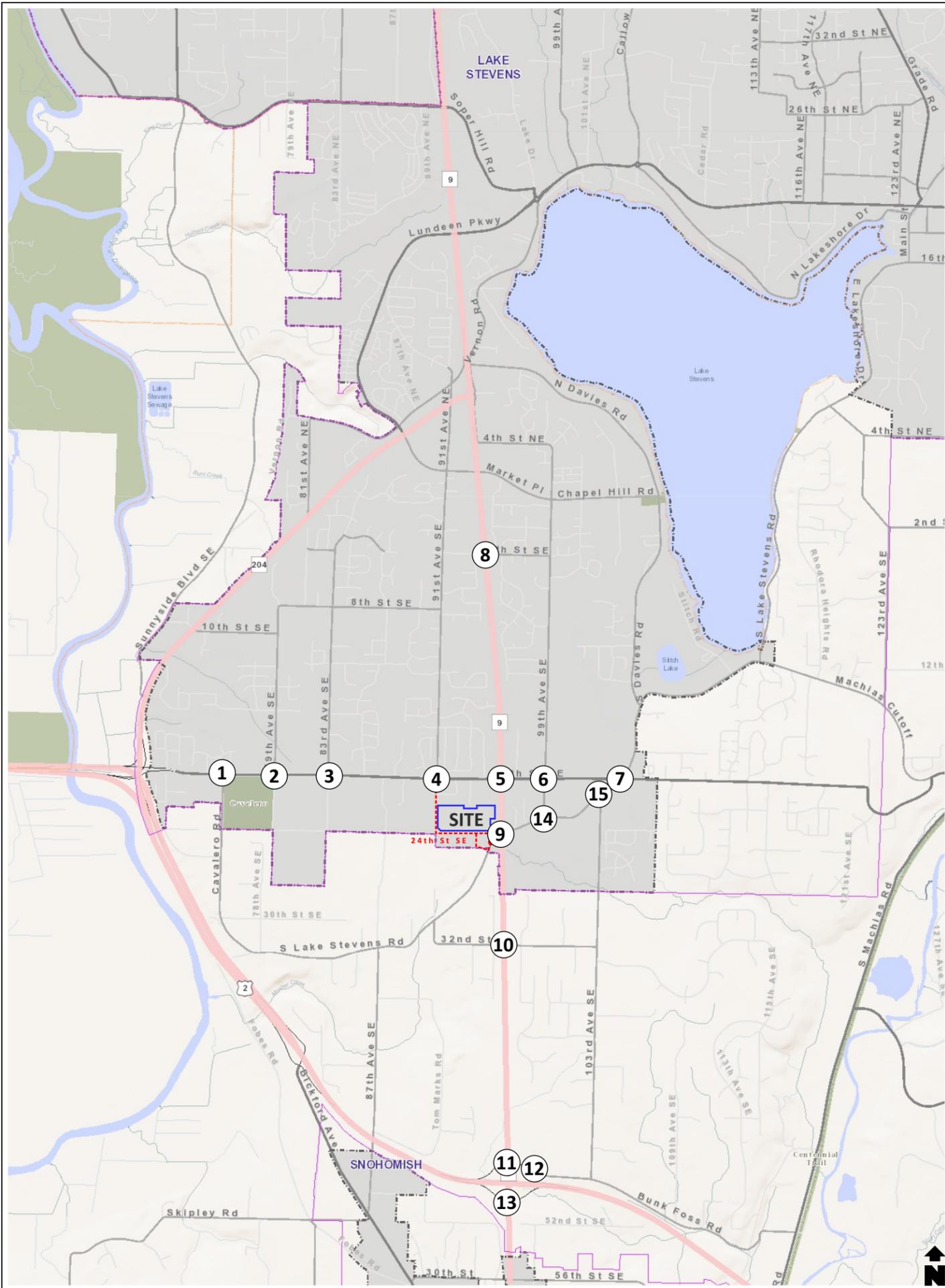


Figure 6: Exiting PM Peak Hour Traffic Volumes

4.3. Traffic Operations Analysis

Table 2 summarizes the existing intersection operations: LOS, delay and V/C ratio. Intersection capacity reports are included in the Appendix. Signal timing information was supplied by the City of Lake Stevens for intersections on 20th Street and by the WSDOT for the intersections on SR 9.

Table 2: Existing Intersection Operations

Intersection	Control	LOS	Delay ¹
75th Ave/20th St	N/S Stop	F	120+
79th Ave/20th St	Signal	B	13.7
83rd Ave/20th St	Signal	A	8.6
91st Ave/20th St	Signal	A	8.5
SR 9/20th St	Signal	C	31.4
99th Ave/20th St	Signal	A	6.4
S Lk Stevens Rd/20th St	Signal	B	14.4
SR 9/ 4th St	EB/WB Stop	C	18.4
SR 9/S Lk Stevens Rd	EB/WB Stop	E	45.4
SR 9/32nd Street	Signal	C	22.3
SR 9/US 2 WB Ramp/Bunk Foss Rd	Signal	D	42.5
US 2 WB Ramp/Bunk Foss Rd	NB Stop	B	13.2
SR 9/US 2 EB Ramps	Signal	C	30.7
99th Ave/S Lk Stevens Rd	SB Stop	A	9.5
103rd Ave/S Lk Stevens Rd	NB Stop	B	10.6

¹ Seconds of control delay

The study intersections meet their respective LOS thresholds, except 75th Ave SE at 20th Street SE (LOS F).

75th Ave SE is stop-sign controlled at 20th Street SE. The northbound stop-controlled approach operates at LOS F and the southbound stop-controlled approach operates at LOS E. The Final 20th Street Corridor Subarea Plan EIS recommends a signal at 75th Ave SE and 20th Street SE to improve traffic operations. Section 5.6 provides more detail and recommendations for this intersection.

South Lake Stevens Road is stop-sign controlled at SR 9. The eastbound stop sign controlled approach operates at LOS E and westbound yield control right turn movement operates at LOS C. SR 9, the major movement is uncontrolled and the delay impacts on the SR 9 are negligible. The WSDOT facility (SR 9) meets the WSDOT’s requirements.

Table 3 summarizes the average intersection delay on the 20th Street SE corridor.

The weighted average delay of the study intersections on the 20th Street SE corridor is calculated to operate at LOS C and meets the City of Lake Stevens corridor threshold.

Table 3: Existing 20th Street SE Corridor LOS

Intersection	Control	LOS	Delay ¹	PM Vol ²
75th Ave/20th St	NB/SB Stop	F	120+	1,845
79th Ave/20th St	Signal	B	13.7	1,705
83rd Ave/20th St	Signal	A	8.6	1,600
91st Ave/20th St	Signal	A	8.5	1,645
SR 9/20th St	Signal	C	31.4	3,110
99th Ave/20th St	Signal	A	6.4	1,520
S Lk Stevens Rd/20th St	Signal	B	14.4	1,660
Corridor LOS ³		C	33.9	

¹ Seconds of control delay (see Table 1)

² Intersection volume (see Figure 6)

³ Corridor Level of Service: Signal LOS based on the weighted average delay

4.4. Transit

Community Transit routes 280 and 425 provide service in the study area. Both routes include stops on 20th Street SE and 91st Ave SE. Route 280 runs between the Cities of Everett and Granit Falls seven days a week. Route 425 is a weekday commuter route between the Cities of Lake Stevens and Seattle, with four buses in the morning and five in the afternoon.

4.5. Safety

A 5-year crash history, from January 1, 2013 through December 31, 2017, was obtained from WSDOT at the following study intersections: 91st Ave SE at SE 20th Street, SR 9 at SE 20th Street, 99th Ave SE at SE 20th Street, South Lake Stevens Road at SE 20th Street, and SR 9 at South Lake Stevens Road.

Table 4 summarizes the crash history.

Table 4: Crash History

Intersection	Number of Crashes							ADT Vol. ¹	Rate MEV ²
	2013	2014	2015	2016	2017	Total	Avg.		
91st Ave / 20th St	3	2	4	1	3	13	2.6	19,050	0.43
SR 9 / 20th St	9	11	11	14	9	54	10.8	31,100	0.95
99th Ave / 20th St	1	1	1	0	2	5	1.0	16,450	0.18
S Lk Stevens Rd / 20th St	5	5	3	7	4	24	4.8	15,200	0.79
SR 9 / S Lk Stevens Rd	1	4	6	2	1	14	2.8	16,600	0.40
Intersection	Crashes by Type (5-year Total)							Report Injury ⁴	Report Fatal ⁵
	Fixed Object	Rear End	Side-Swipe	Opp. Dir. ³	At Angle	Over-Turned	Other		
91st Ave / 20th St	0	4	2	3	0	1	3	3	1
SR 9 / 20th St	3	35	6	2	7	0	1	16	1
99th Ave / 20th St	1	1	0	1	0	0	2	0	0
S Lk Stevens Rd / 20th St	1	7	2	6	6	0	2	9	0
SR 9 / S Lk Stevens Rd	0	3	4	1	0	4	2	9	0

¹ ADT estimated from the PM peak hour intersection volumes (PM volume X 10)

² Crash Rate, crashes per million entering vehicles

³ Opposite Direction

⁴ Number of crashes resulting in a reported injury (possible, evident or severe)

⁵ Number of crashes resulting in a reported fatality

There were 110 total crashes reported at these 5 intersections between 2013 and 2017. Of the total number of reported incidents, 37 resulted in a person sustaining at least a possible injury and 2 resulted in fatalities.

The crash rate compares the number of crashes to the volume of vehicles passing through the intersection. Typically, crash rates exceeding 1.0 identify a high crash location. The intersection crash rates were all computed to be less than 1.0.

At 91st Ave SE and 20th Street SE a fatality was reported in 2017 and drugs were indicated as a contributing factor. Between 2013 and 2017 there were 2.6 crashes per year, and the crash numbers varied between 1 and 4. Rear end collisions were the most common crash type and made up 31% of the reported crashes. Rear ends collisions are most typical at signalized intersections. Opposite direction crashes were the second for frequent crash occurrence (23%) and these included left turn related crashes. The intersection includes permissive left turns and opposite direction incidents can occur with this type of turn phasing.

At SR 9 and 20th Street SE a fatality was reported in 2016 and alcohol was indicated as a contributing factor. Between 2013 and 2017 there were 10.8 crashes per year. Between 2014 and 2017 the number of crashes decreased. Rear end collisions made up 65% of the of the reported crashes, followed by at-angle collisions (13%) and sideswipe collisions (11%). The at-angle collisions were likely a result of the permissive left turn phasing on 20th Street SE. The sideswipes were likely a result of the multiple lanes on both SR 9 and NE 85th Street at this intersection. One pedestrian incident was reported at this intersection, related to a right turning vehicle striking a pedestrian and which resulted in a possible injury.

DRAFT

5. 2025 Future Without-Project Traffic Conditions

This section describes the future traffic conditions without the Project assuming steady local and regional traffic growth and planned improvements within the study between now and 2025. Future without-Project conditions serve as the future baseline conditions used to evaluate Project-specific impacts.

The Project is anticipated to be built-out by 2022. Year 2025 was selected as the analysis year to allow future volumes to mature and for the Applicant to have confidence that the new roadways (24th Street SE and 91st Ave NE) necessary to support the development are adequate.

5.1. *Transportation Facility Improvements*

5.1.1. *Near Term Improvements*

2018-2023 Transportation Improvement Plans for the Cities of Lake Stevens and Snohomish, Snohomish County and WSDOT were reviewed to identify improvement projects planned in the vicinity of the study area. There were no nearby improvements listed in the City of Snohomish's Transportation Improvement Plan.

City of Lake Stevens Improvements:

- 91st Ave NE and Market Place. Remove signal and install an urban compact roundabout. Construction 2018. Funded at \$941,000.
- 20th Street SE Segment 1. Widen roadway to 5 lanes with sidewalk, drainage and lighting upgrades from 83rd Ave SE to 91st Ave SE. Construction start 2022. Funded at \$6,000,000.
- 20th Street SE Segment 2. Widen roadway to 5 lanes with sidewalk, drainage and lighting upgrades from 79th Ave SE to 83rd Ave SE. Construction start 2023. Not fully funded (\$3,948,445).
- 20th Street SE Segment 3. Widen roadway to 5 lanes with sidewalk, drainage and lighting upgrades from west of 75th Ave SE to 79th Ave SE. Construction start 2023. Not fully funded (\$2,770,169).
- 20th Street SE Segment 4. Widen roadway to 5 lanes with sidewalk, drainage and lighting upgrades west city limits to west of 75th Ave SE. Construction start 2023. Not fully funded (\$2,599,205).
- 24th Street SE and 91st Ave SE Extensions. Extend 91st Ave SE to 20th Street SE and construct 24th Street SE west of SR 9. Construction start 2019. Not fully funded (\$7,740,000).
- 79th Ave SE and 24th Street SE intersection. Construction start 2022. Not fully funded (\$8,000,000).

The 20th Street SE Corridor Subarea Plan EIS recommended a traffic signal at 75th Ave SE and 20th Street SE to improve side street access to and from 75th Ave SE. The improvement is not currently identified in the City of Lake Stevens' Transportation Improvement Program. Section 4.3 showed the intersection operating at LOS F currently in PM peak hour and an improvement should be added to the Transportation Improvement Program.

Snohomish County Improvements:

- Machias Cutoff and Williams Road Intersection Improvements. Install left-turn lane on Machias Cutoff to Williams Rd. Construction completed 2018.
- S Machias Road and Machias Cutoff Intersection Improvements. New signal. Planning and engineering start 2021. Not yet funded for construction.

WSDOT Improvements:

- SR 9 at SR 204 Intersection Improvements. Construction start 2019. Funded at \$62,500,000.
- SR 9 Corridor. A corridor planning study, published in January 2011, identified capacity improvements from the Cities of Bothell to Arlington. Refer to Section 5.2 for more information.

Figure 7 highlights the transportation facility improvements in the vicinity of the study area.

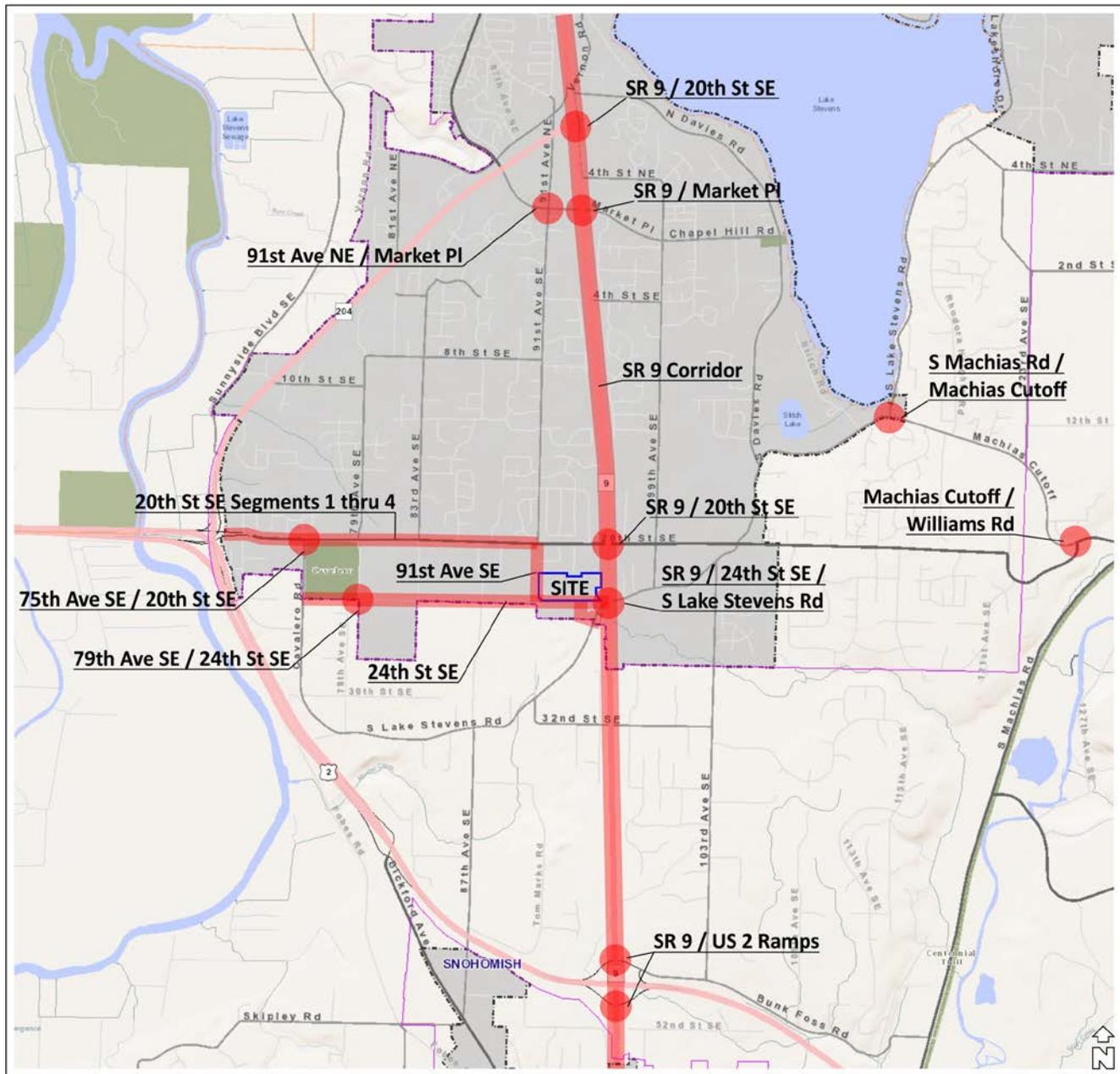


Figure 7: Planned Transportation Facility Improvements

For this study, the 91st Ave NE and Market Place intersection improvement, 20th Street SE Segment 1 widening from 83rd Ave SE to 91st Ave SE, and SR 9 and SR 204 intersection improvement are fully funded and are assumed to be complete prior to Project opening.

In addition to the funded improvements above, 24th Street SE from SR 9 to 91st Ave SE and 91st Ave SE from 20th Street SE to 24th Street SE are required for development of the site and are assumed to be complete.

SR 9 is also assumed to be signalized at 24th Street SE and South Lake Stevens Road. Full access to 24th Street SE is preferred by the Applicant for site operations. A traffic control signal at this intersection was identified as

the preferred improvement option from the ICE report. This study assumes minimal widening on SR 9 between 20th Street SE and 24th Street SE/South Lake Stevens Road with the northbound right turn lane at South Lake Stevens Road restriped as a shared through-right turn lane. No widening is assumed at the 4th Street SE, 32nd Street SE and US 2 ramp terminals.

A traffic control signal was recommended at 75th Ave SE at 20th Street SE, per the 20th Street SE Corridor Subarea Plan EIS, by 2025. This intersection improvement and associated funding are recommended to be added the City of Lake Steven's Transportation Improvement Program. A signal is evaluated as a future without-Project improvement in Section 5.6.

A future signal is assumed at the South Lake Stevens Road intersection with 24th Street SE. This new intersection is created with the construction of 24th Street SE and vacation of a section of South Lake Stevens Road west of SR 9. The intersection connects South Lake Stevens Road to 24th Street SE which provides access to SR 9 and to South Lake Stevens Road east of SR 9. Also, the new intersection allows South Lake Stevens Road traffic to access 91st Ave SE. Analysis of a signal at this intersection is included in the with-Project analysis (Section 6) since the north leg of the intersection is anticipated to provide access to the Project.

5.1.2. Long-Term SR 9 Corridor Improvements

WSDOT's SR 9 Corridor Planning Study, dated January 2011, included short-term and long-term capacity improvements on SR 9. Improvements include widening on SR 9 and intersection improvements. In the vicinity study area, intersection improvements include:

- SR 9 and SR 204. Add departure lane west of intersection and 1 lane northbound and southbound.
- SR 9 and Market Street. Add eastbound right turn lane and 2 lanes northbound and southbound.
- SR 9 and 20th Street SE. Add eastbound right turn lane, 2nd westbound left lane, and 1 lane northbound and southbound.
- SR 9 and US 2 interchange. On June 8, 2018 WSDOT staff identified 2-lane roundabouts at the both interchange ramp terminals as the preferred improvements for this location.

The ICE report includes a 2040 traffic analyses with the full widening on 20th Street SE and on SR 9 and all intersection improvements and the Project.

Section 5.7 includes analyses of analysis of near-term improvements at the SR 9 and US 2 ramp intersections.

5.2. Non-Project Growth Forecast

Non-Project traffic growth between now and 2025 includes both regional and local increases in traffic volumes through the study area. For this analysis a 2.5% annual growth rate was applied to the existing traffic volume to forecast future volumes without the Project. The growth rate assumes regional and local traffic growth in and through the City of Lake Stevens.

In addition to the annual growth rate, PM peak hour trips generated by the Daysala single-family development southeast of 99th Ave SE and 20th Street SE were added to the future traffic volumes without the Project. Daysala was forecast to generate up 60 peak hour trips and these trips were distributed to the study area based on the existing traffic volumes. This development was under construction when the March 2018 turning movement volumes were collected.

5.3. Traffic Redistribution with 24th Street SE and 91st Ave SE

The new 24th Street SE roadway from SR 9 to 91st Ave SE and the 91st Ave SE extension to 24th Street SE will redistribute traffic near the Project site.

With 24th Street SE, South Lake Stevens Road west of SR 9 will be vacated, and a new intersection will be constructed about 425 feet west of SR 9 and off 24th Street SE to reconnect South Lake Stevens Road. The new intersection will initially be stop-sign controlled, until the Project is built out and the intersection is signalized. A separate stop-sign controlled intersection will connect the existing remaining section of South Lake Stevens Road to the north-south connection from 24th Street SE.

Additionally, 24th Street SE will intersect SR 9 at a new signalized intersection. The west-leg of the intersection will be 24th Street SE and the east-leg will be South Lake Stevens Road. The intersection will allow full access to and from the east and west sides of SR 9 at this location.

Traffic was redistributed to the new roadways and intersection from existing roadways and intersections in the study area, based on WSDOT's DYNAMIQ model used for the ICE report.

Figure 8 illustrates the traffic redistribution forecast. The redistributed volumes are superimposed onto the future traffic volumes forecasted in year 2025 without the Project and without the 24th Street SE and 91st Ave SE improvements, discussed above.

5.4. 2025 Future Without-Project Volumes

Figure 9 illustrates the year 2025 PM peak hour without-Project traffic volumes. The forecast includes:

- Regional and local traffic growth between now and 2025;
- Local improvements funded and assumed to be complete between now and 2025; and
- 24th Street SE and 91st Ave SE improvements, including traffic redistribution forecasts.

5.5. Traffic Operations Analysis

Table 5 summarizes the 2025 without-Project intersection operations and compares future operations without the Project to existing operations. Intersection capacity reports are included in the Appendix.

For this study, the new signal at 24th Street SE and SR 9 was coordinated with the existing signal at 20th Street SE and SR 9. Synchro default signal timing settings were used at 24th Street SE and SR 9 and the signal coordination was evaluated using Synchro's network optimization tool. A goal of coordinating the signals at 20th Street SE and 24th Street SE on SR 9 was to minimize capacity constraints on the eastbound approach on 24th Street SE and in the northbound left turn lane on SR 9 while preserving regional through traffic mobility on SR 9.

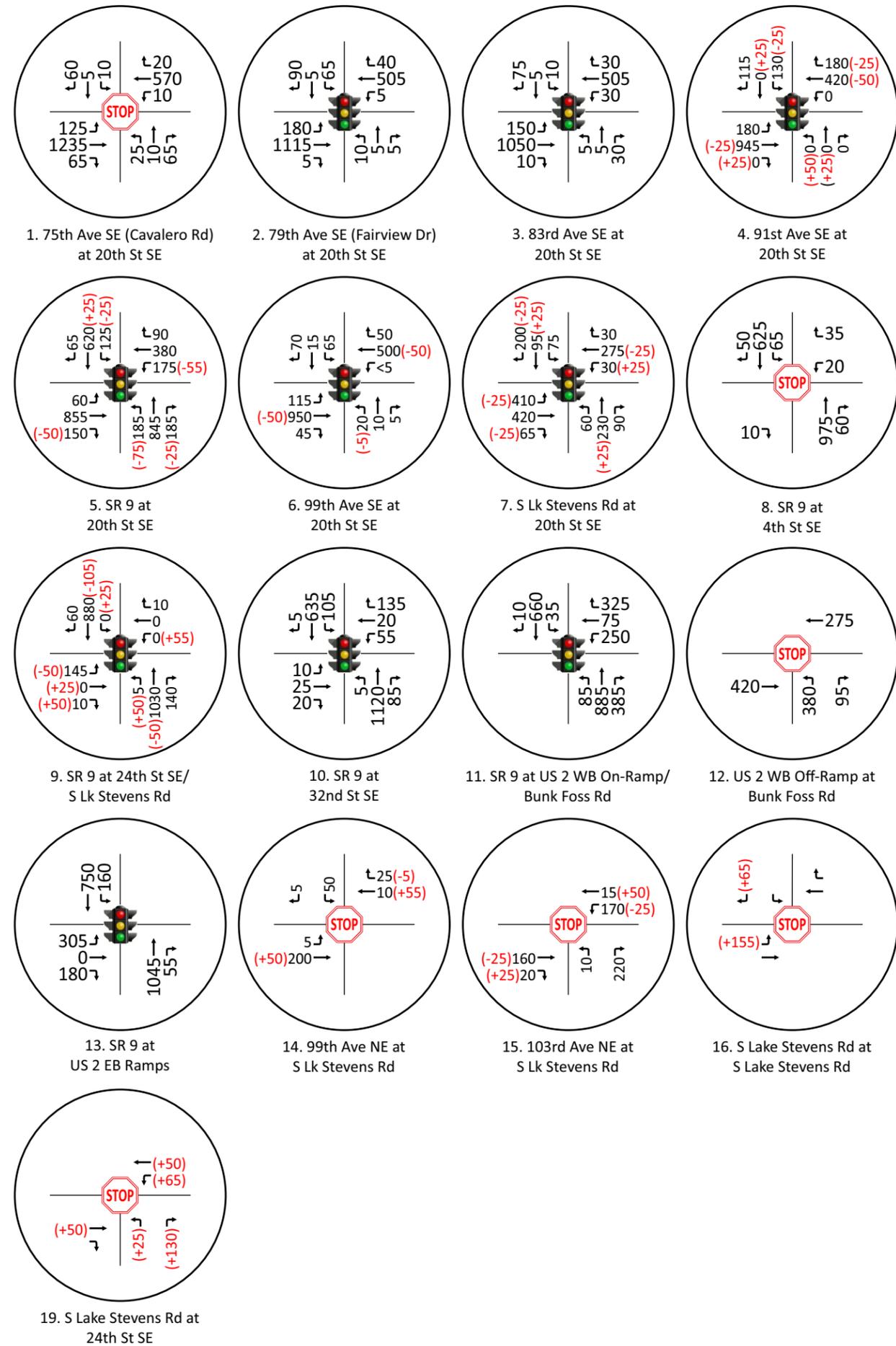
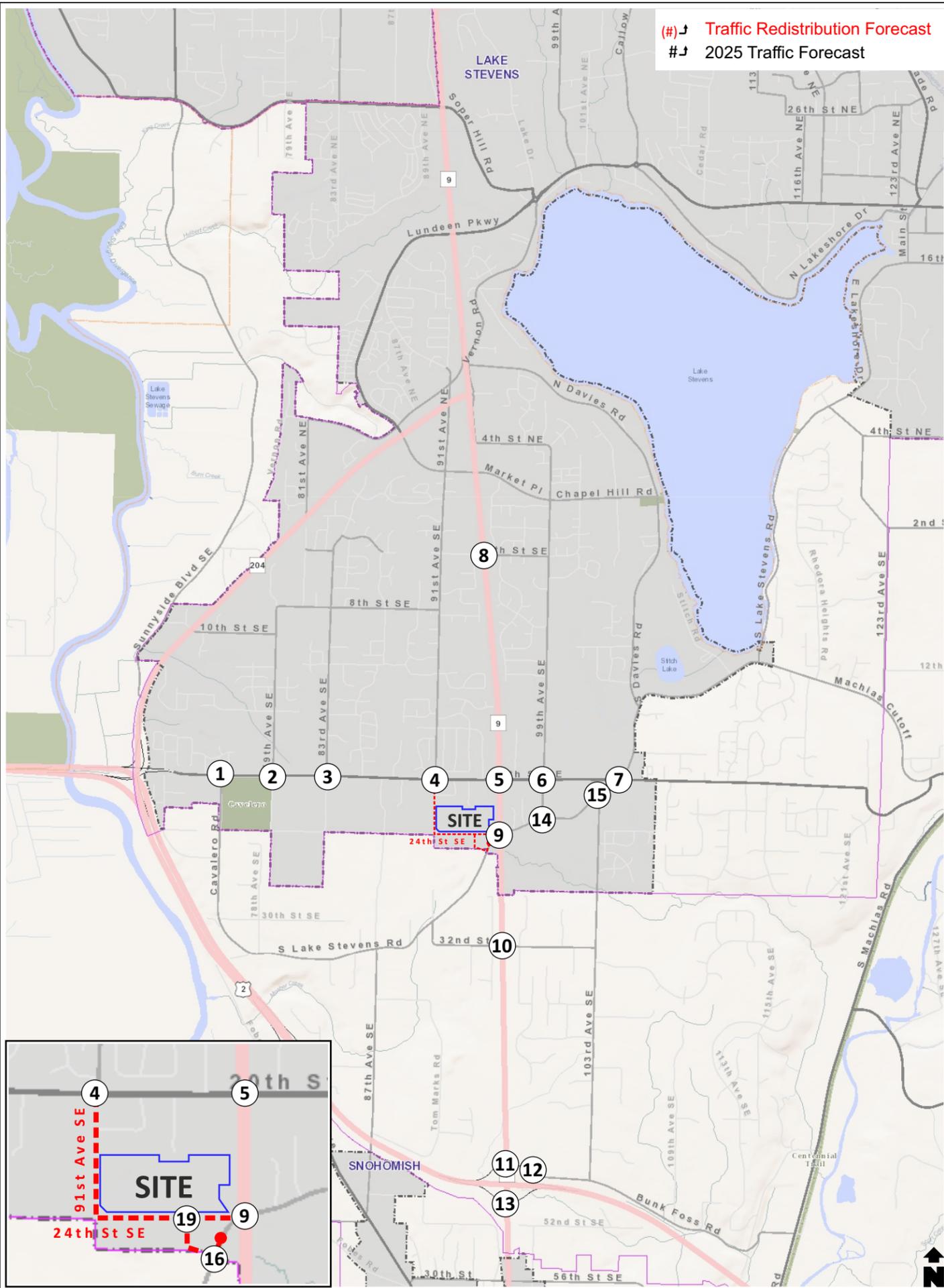
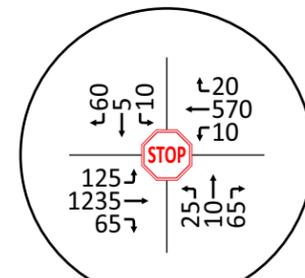
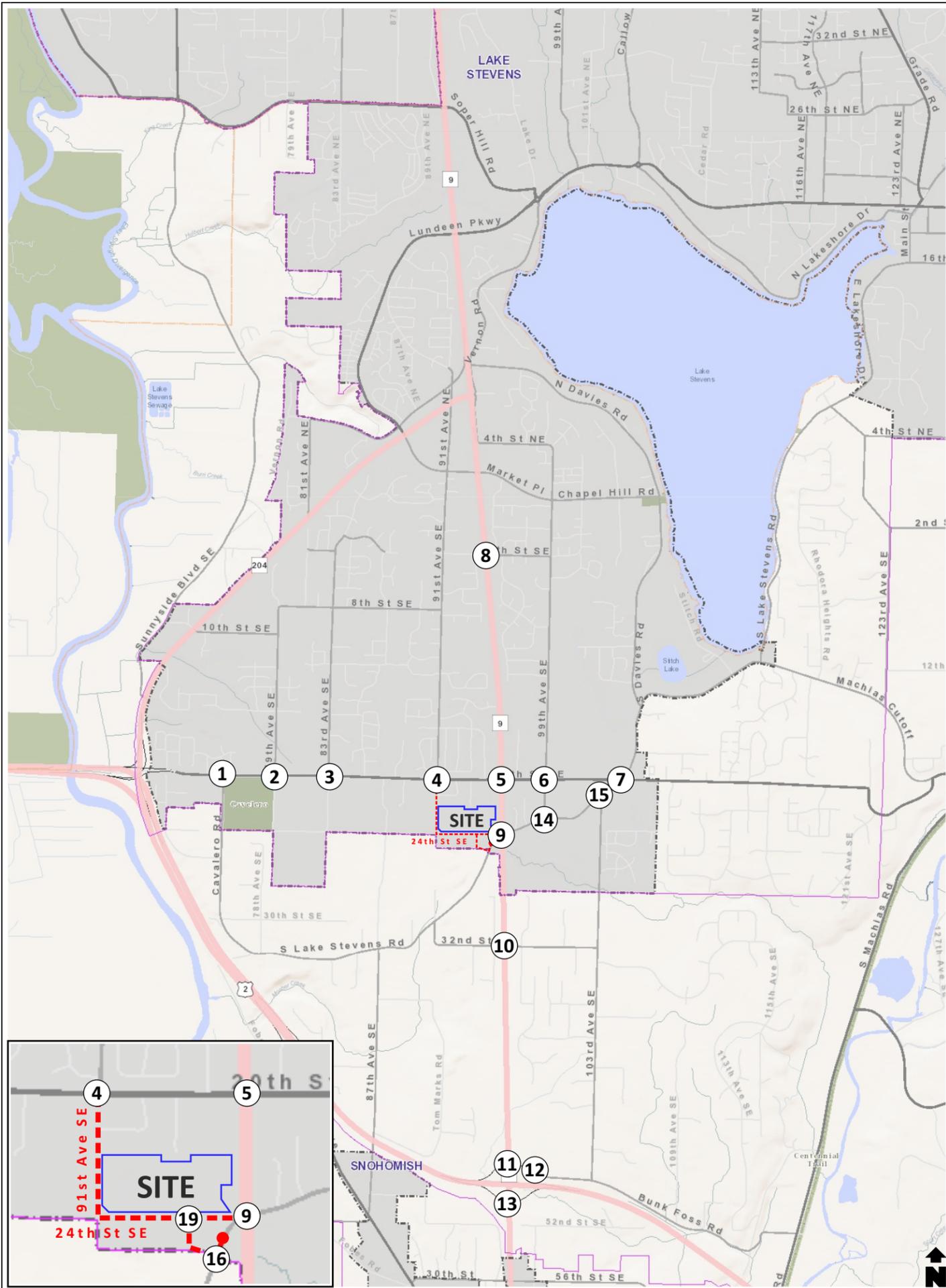
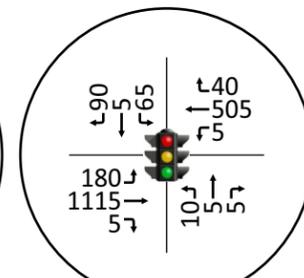


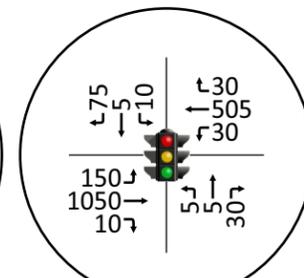
Figure 8: 2025 Without-Project Traffic Redistribution (with 24th Street SE and 91st Ave SE)



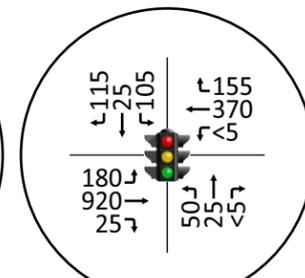
1. 75th Ave SE (Cavalero Rd) at 20th St SE



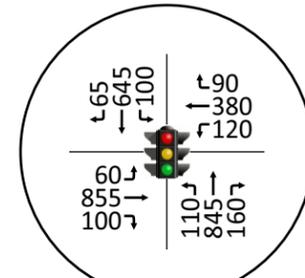
2. 79th Ave SE (Fairview Dr) at 20th St SE



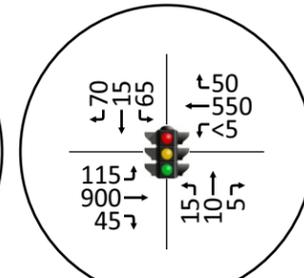
3. 83rd Ave SE at 20th St SE



4. 91st Ave SE at 20th St SE



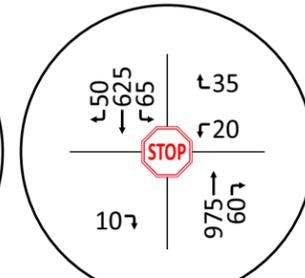
5. SR 9 at 20th St SE



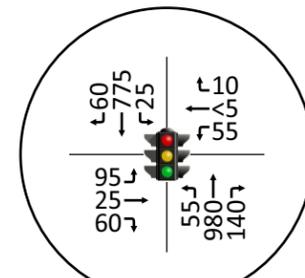
6. 99th Ave SE at 20th St SE



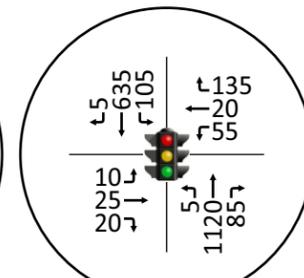
7. S Lk Stevens Rd at 20th St SE



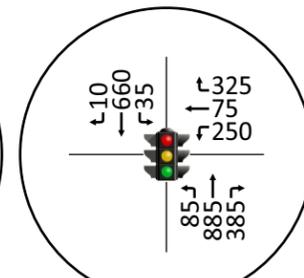
8. SR 9 at 4th St SE



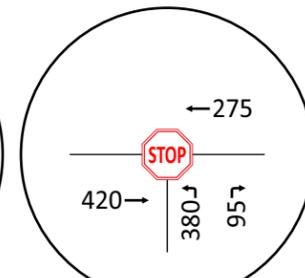
9. SR 9 at 24th St SE/S Lk Stevens Rd



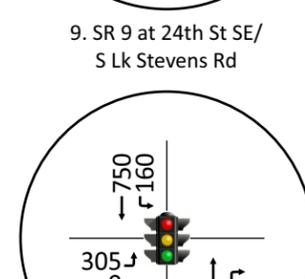
10. SR 9 at 32nd St SE



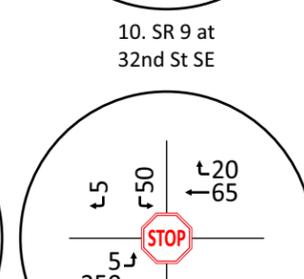
11. SR 9 at US 2 WB On-Ramp/Bunk Foss Rd



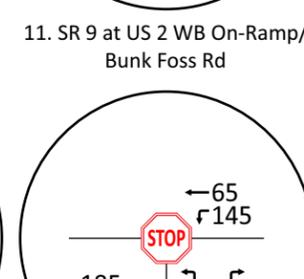
12. US 2 WB Off-Ramp at Bunk Foss Rd



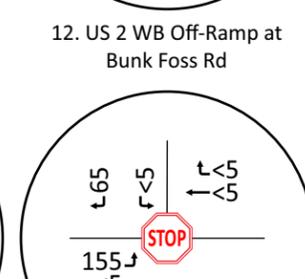
13. SR 9 at US 2 EB Ramps



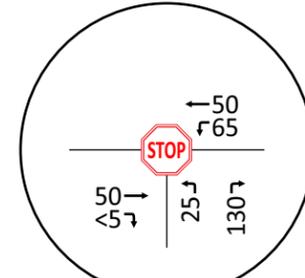
14. 99th Ave NE at S Lk Stevens Rd



15. 103rd Ave NE at S Lk Stevens Rd



16. S Lake Stevens Rd at S Lake Stevens Rd



19. S Lake Stevens Rd at 24th St SE

Figure 9: 2025 Without-Project PM Peak Hour Traffic Volumes

Table 5: Without-Project Intersection Operations

Intersection	2018 Existing			2025 Without-Project		
	Control	LOS	Delay ¹	Control	LOS	Delay ¹
75th Ave/20th St	N/S Stop	F	120+	N/S Stop	F	120+
79th Ave/20th St	Signal	B	13.7	Signal	B	18.0
83rd Ave/20th St	Signal	A	8.6	Signal	A	7.2
91st Ave/20th St	Signal	A	8.5	Signal	A	8.2
SR 9/20th St	Signal	C	31.4	Signal	D	50.7
99th Ave/20th St	Signal	A	6.4	Signal	A	6.9
S Lk Stevens Rd/20th St	Signal	B	14.4	Signal	B	16.7
SR 9/4th St	E/W Stop	C	18.4	E/W Stop	C	23.0
SR 9/S Lk Stevens Rd	E/W Stop	E	45.4	Signal	D	39.8
SR 9/32nd Street	Signal	C	22.3	Signal	D	42.5
SR 9/US 2 WB Ramp/Bunk Foss Rd	Signal	D	42.2	Signal	E	56.5
US 2 WB Ramp/Bunk Foss Rd	NB Stop	B	20.2	NB Stop	D	34.8
SR 9/US 2 EB Ramps	Signal	C	24.6	Signal	D	45.8
99th Ave/S Lk Stevens Rd	SB Stop	A	9.5	SB Stop	B	11.0
103rd Ave/S Lk Stevens Rd	NB Stop	B	10.6	NB Stop	B	11.9
S Lk Stevens Rd/S Lk Stevens Rd	SB Stop	-	-	SB Stop	A	8.6
S Lk Stevens Rd/24th St	NB Stop	-	-	NB Stop	A	9.6

¹ Seconds of control delay

The study intersections meet their respective LOS thresholds, except 75th Ave SE at 20th Street SE (LOS F) and SR 9 at the US 2 westbound on-ramp and Bunk Foss Road (LOS E).

75th Ave SE is stop-sign controlled at 20th Street SE. The northbound approach is forecast to continue to operate at LOS F and the southbound approach is computed to drop from LOS E to LOS F. An improvement is evaluated in Section 5.6.

SR 9 is signalized at the US 2 westbound on-ramp and Bunk Foss Road. The intersection is calculated to operate at LOS E without the Project. An improvement is evaluated in Section 5.6.

The new signalized intersection of SR 9 at 24th Street SE and S Lake Stevens Road is forecast to operate at LOS D and is coordinated with the signal at SR 9 and 20th Street SE. The new intersection meets the WSDOT LOS thresholds and is consistent with the conclusions from the ICE report.

The new unsignalized intersections on S Lake Stevens Road at 24th Street SE and at S Lake Stevens Road are forecast to operate at LOS A and meet the City of Lake Stevens LOS thresholds.

At the US 2 westbound off-ramp, Bunk Foss Road is uncontrolled, and at this location the arterial LOS on Bunk Foss Road is projected to meet Snohomish County’s threshold. The northbound approach on the off-ramp is stop-sign controlled and is forecast to operate at LOS D in the future without the Project compared to LOS B in 2018. The northbound left turn movement is calculated to operate at LOS E and the left turn delay increases by 18 seconds from existing to the future without the Project conditions. WSDOT does not have a LOS requirement for the off-ramp; however, future mitigation is recommended to minimize traffic impacts on US 2.

Table 6 summarizes the average intersection delay on the 20th Street SE corridor based on 2025 without-Project traffic conditions.

Table 6: Without-Project 20th Street SE Corridor LOS

Intersection	Control	LOS	Delay ¹	PM Vol ²
75th Ave/20th St	NB/SB Stop	F	120+	2,200
79th Ave/20th St	Signal	B	18.0	2,030
83rd Ave/20th St	Signal	A	7.2	1,905
91st Ave/20th St	Signal	A	8.2	1,970
SR 9/20th St	Signal	C	50.7	3,530
99th Ave/20th St	Signal	A	6.9	1,740
S Lk Stevens Rd/20th St	Signal	B	16.7	1,955
Corridor LOS ³		F	80+	

¹ Seconds of control delay (see Table 1)

² Intersection volume (see Figure 6)

³ Corridor Level of Service: Signal LOS based on the weighted average delay

The weighted average delay of the study intersections on the 20th Street SE corridor is calculated to operate at LOS F due to the significant delays calculated 75th Ave SE and 20th Street SE. It is noted that the delay at 75th Ave SE is from the side street and that the corridor operates okay.

5.6. Mitigation Analysis

Without-Project intersection mitigation, in addition to the programmed and funded transportation facility improvements, is evaluated at 75th Ave SE at 20th Street SE and at SR 9 and the US 2 westbound on-ramp and Bunk Foss Road intersections.

5.6.1. 75th Ave SE at 20th Street SE

The northbound and southbound approaches at this intersection operate at LOS F.

An option to restrict the north and south legs of the intersection to right turns in and right turns out only will significantly limit access to and from the south leg of the intersection and is not recommended.

The City of Lake Stevens 20th Street SE Corridor Subarea Plan EIS recommends a signal improvement at this intersection. Funding and timing for the improvement are not included in the City of Lake Stevens’ current Transportation Improvement Program.

Table 7 compares 2025 PM peak hour intersection operations without and with a signal at 75th Ave SE and 20th Street SE. The signal improvement presented, does not assume any widening has occurred on 20th Street SE in the vicinity of this intersection and assumes the signal will operate as an actuated-uncoordinated signal.

Table 7: 75th Ave SE at 20th St SE Without-Project Improvement

Without Signal			With Signal		
Avg./Mvmt.	LOS	Delay ¹	Avg./Mvmt.	LOS	Delay ¹
Average	-	33.1	Average	B	17.6
NB	F	120+	NB	D	52.0
SB	F	120+	SB	D	50.9
EB Left	A	9.3	EB Left	A	3.7
WB Left	B	12.2	WB Left	C	20.6

¹ Seconds of control delay

As a signal, the intersection operates at LOS B and the northbound and southbound approach delays are calculated to be reduced by over two and a half minutes. Figure 9 shows a concept of the signal option.

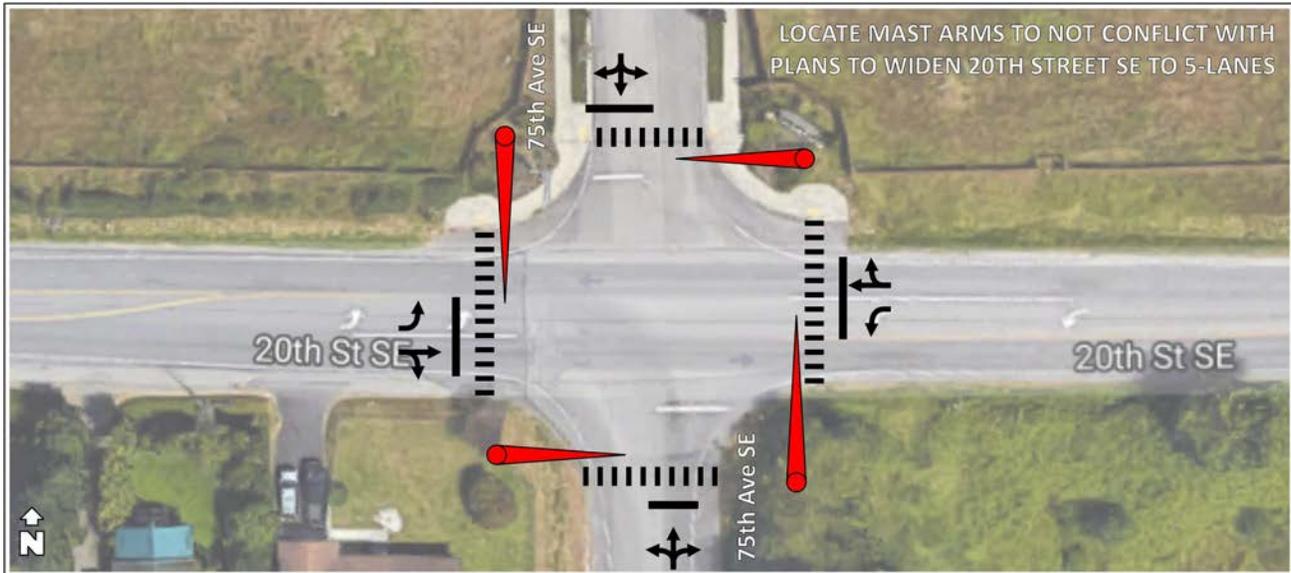


Figure 10: 75th Ave SE and 20th Street SE Signal Improvement

Table 8 updates the average intersection delay on the 20th Street SE corridor without the Project and with the signal option. With the improvement, the 20th Street SE corridor improves from LOS F to LOS C and meets the City of Lake Stevens corridor threshold.

Table 8: Without-Project 20th Street SE Corridor LOS with New Signal

Intersection	Control	LOS	Delay ¹	PM Vol ²
75th Ave/20th St	Signal	B	17.6	2,200
79th Ave/20th St	Signal	B	18.0	2,030
83rd Ave/20th St	Signal	A	7.2	1,905
91st Ave/20th St	Signal	A	8.2	1,970
SR 9/20th St	Signal	C	50.7	3,530
99th Ave/20th St	Signal	A	6.9	1,740
S Lk Stevens Rd/20th St	Signal	B	16.7	1,955
Corridor LOS ³		C	21.5	

¹ Seconds of control delay (see Table 1)

² Intersection volume (see Figure 6)

³ Corridor Level of Service: Signal LOS based on the weighted average delay

75th Ave SE and 20th Street SE is an improvement recommended to support future traffic conditions without the Project. This signal improvement is included in the unimproved With-Project analyses in Section 7.2.

It is recommended that Applicant work with the City of Lake Stevens to identify funding and a schedule for this improvement to include in the next update of the Transportation Improvement Program.

5.6.2. SR 9 at US 2 westbound on-ramp and Bunk Foss Road

SR 9 at the US 2 westbound on-ramp and Bunk Foss Road operates at LOS E. The delay calculations show the intersection operating with 14.3 seconds more delay compared to existing conditions. The future without-Project delay calculations are just beyond the LOS D/E threshold.

For this study WSDOT PM peak hour signal timing information was used.

An option to improve intersection operations includes updating the signal timing to better serve the forecasted peak hour traffic volumes. Signal timing optimization is not unreasonable and signal timing plans are generally updated periodically. The intersection is coordinated with the signal at the eastbound ramps, on the south side of the overpass. Timings (“cycle length and splits”) at both signalized intersections were “optimized” using Synchro goal of having both signalized intersections operate at LOS D or better. Table 9 compares intersection operation without and with signal optimization.

Table 9: SR 9 at US 2 Ramp Terminals Without-Project Improvement

Intersection	Without Optimization			With Optimization		
	Cycle Length	LOS	Delay ¹	Cycle Length	LOS	Delay ¹
SR 9/US 2 WB Ramp/ Bunk Foss Rd	160 seconds	E	56.5	110 seconds	C	34.3
	WB Th/R ²	F	213.1	WB Th/R ²	F	92.0
SR 9/US 2 EB Ramps	160 seconds	D	45.8	110 seconds	D	49.7

¹ Seconds of control delay

² Westbound Through-Right Lane LOS and delay

With the optimized signal timing, the SR 9 intersection with the US 2 westbound on-ramp and Bunk Foss Road operates at LOS C and the SR 9 intersection with the US 2 eastbound ramps operates at LOS D.

The signal timing optimization also shows improvements for the westbound right turn delay at Bunk Foss Road. Optimization reduces the turn delay by 2 minutes.

The overall delay at the SR 9 intersection with the US 2 eastbound ramps is shown to be reduced by 3.9 seconds. This is reasonable considering the intersection continues to operate at LOS D, with the WSDOT threshold.

In 2012 Bunk Foss Road was realigned to its current configuration with the westbound lane alignment (no right turn lane) at SR 9 and with the adjacent US 2 westbound off-ramp intersection. Signal optimization allows the intersection to continue to meet WSDOT standards until funding can be secured by the State for a more comprehensive improvement.

WSDOT’s long-term SR 9 corridor improvements include improving the interchange, and two multi-lane roundabouts are part of the preferred intersection options with widening on SR 9 per WSDOT staff.

The long-term corridor improvement is also anticipated to mitigate non-Project delays at the westbound off-ramp intersection with Bunk Foss Road adjacent to and east of the overpass.

Additional analysis with the Project of the two signalized US 2 ramp terminals at SR 9 and the US 2 westbound off-ramp intersection with Bunk Foss Road is included in Section 7.5.

The signal optimization improvement is not included in the unimproved with-Project analysis in Section 7.2, but optimization is considered as mitigation with the Project.

6. Trip Generation, Distribution and Assignment

This section includes the forecasts for the Project’s trip generation and peak hour trip distribution and travel assignment.

6.1. Trip Generation

Kittelson and Associates, Inc. (KAI) maintains a database of traffic data and travel characteristics for Costco. The databased includes trip rates and trip type percentages for Costco locations throughout the United States and Canada and is updated and refined each time new Costco traffic counts or information become available. KAI provided a trip generation forecast for a 160,000 square foot Costco with 30 vehicle fueling positions on March 28, 2018 and a copy of the memorandum is included in the Appendix.

The KAI data was scaled up proportionately to represent the current 170,000 square foot warehouse proposal. According to KAI their trip generation difference for a 160,000 and 170,000 square foot warehouse is negligible and upscaling is not needed. This analysis, which is consistent with scoping document, is conservative since the KAI data was scaled up.

Table 10 summarizes the PM peak hour trip generation forecast for a 170,000 square foot warehouse with 30 vehicle fueling positions.

Table 10: Trip Generation

Warehouse Trip Measure	Rate ²	%-In	%-Out	In	Out	Total
Pacific NW Costco Data (OR & WA) ¹	7.2375	48%	52%	590	640	1230
Pass-By Trips ³	35%	50%	50%	216	215	431
Net New Trips	4.7044			374	425	799

1 based on 6 sites in Portland, Albany, Medford, and Eugene, OR and Spokane, WA
 2 Expressed as trips per 1,000 square feet
 3 Pass-by Rate based on 16 sites throughout the US

6.2. Trip Distribution and Peak Hour Travel Assignment

The trip distribution was based on the DYNAMIQ travel demand model from the ICE report. Non-pass-by PM peak hour trips were assigned to the local network by multiplying the trip distribution percentage by the non-pass-by PM peak hour trips forecast (Table 10). Pass-by trips were assigned to the 91st Ave SE and 20th Street and SR 9 and 24th Street SE intersections.

Figure 11 illustrates the PM peak hour trip distribution and assignment.

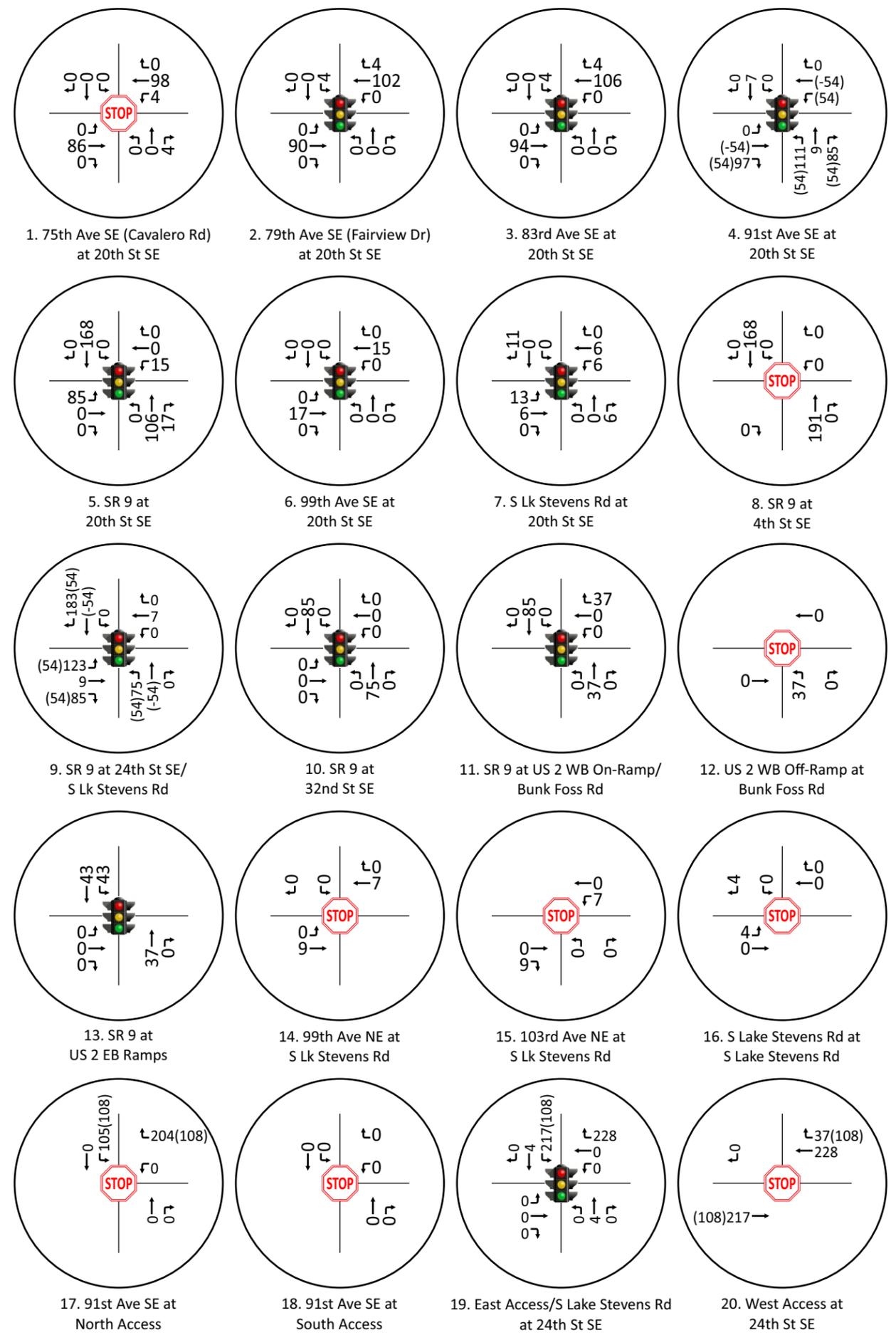
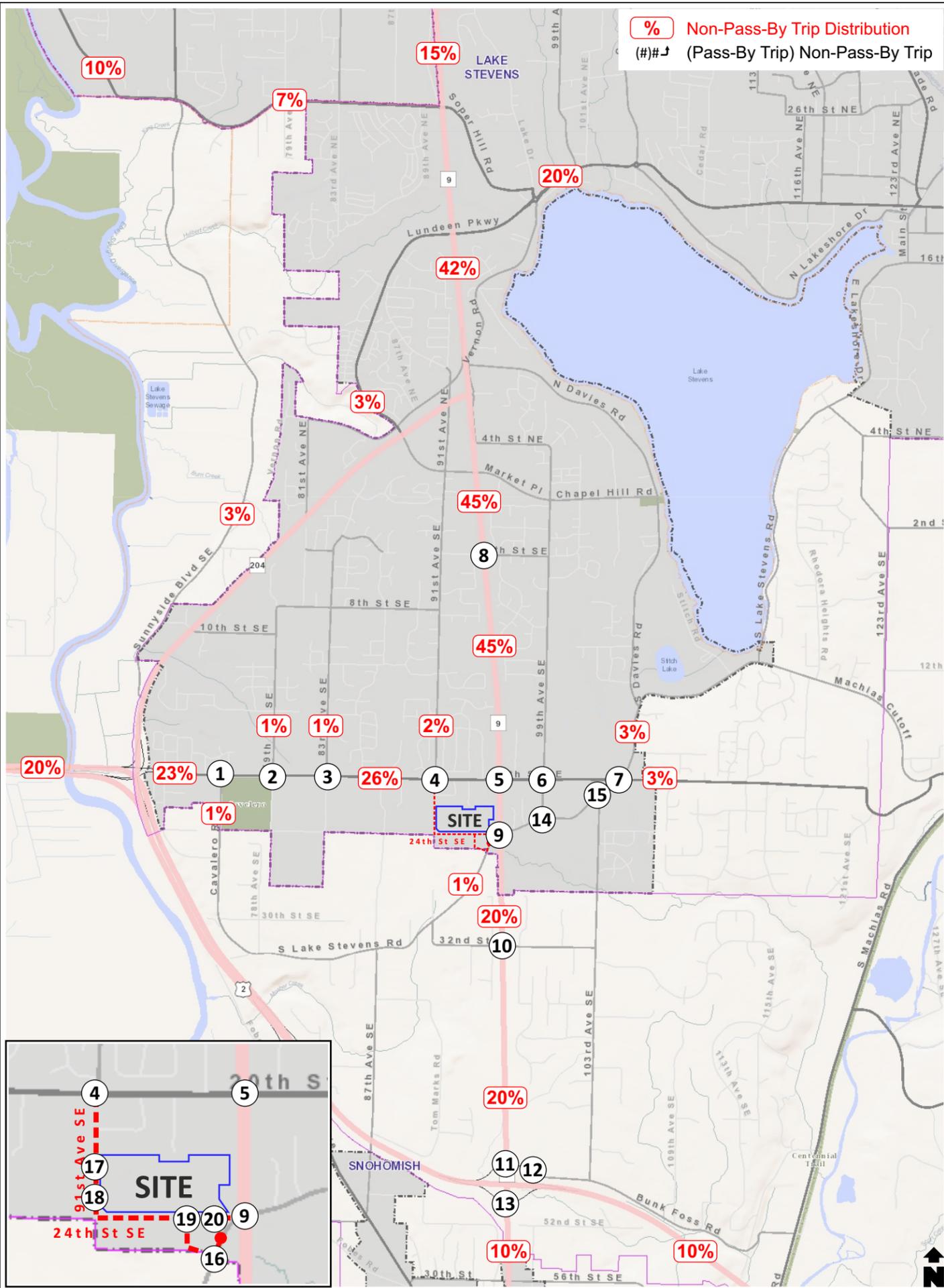


Figure 11: PM Peak Hour Trip Distribution and Travel Assignment

7. 2025 Future With-Project Traffic Conditions

This section describes the future traffic conditions with the Project and include the 2025 without-Project conditions plus Project generated trips. This section also includes recommendations for Project-related impacts.

7.1. 2025 Future With-Project Volumes

Figure 12 illustrates the year 2025 PM peak hour with-Project traffic volumes. The forecast includes:

- 2025 without-Project traffic volumes (Figure 9) and
- PM Peak hour Project generated trips (Figure 11)

7.2. Traffic Operations Analysis

Table 11 summarizes the 2025 with-Project intersection operations and compares future operations with the Project to conditions without the Project. Intersection capacity reports are included in the Appendix.

For the with-Project analysis a signal is assumed at 79th Ave SE and 20th Street SE.

Also, the 24th Street SE intersection with South Lake Stevens Road and the west Project access is signalized. The new signal is in coordination with the signal at SR 9 and 24th Street and S Lake Stevens Road.

Table 11: With-Project Intersection Operations

Intersection	2025 Without-Project			2025 With-Project		
	Control	LOS	Delay ¹	Control	LOS	Delay ¹
75th Ave/20th St	Signal	B	17.6	Signal	C	25.1
79th Ave/20th St	Signal	B	18.0	Signal	C	25.4
83rd Ave/20th St	Signal	A	7.2	Signal	A	7.3
91st Ave/20th St	Signal	A	8.2	Signal	B	16.7
SR 9/20th St	Signal	D	50.7	Signal	D	51.7
99th Ave/20th St	Signal	A	6.9	Signal	A	9.2
S Lk Stevens Rd/20th St	Signal	B	16.7	Signal	B	16.9
SR 9/4th St	E/W Stop	C	23.0	E/W Stop	D	30.2
SR 9/S Lk Stevens Rd	E/W Stop	D	39.8	E/W Stop	D	50.2
SR 9/32nd Street	Signal	D	42.5	Signal	D	53.4
SR 9/US 2 WB Ramp/Bunk Foss Rd	Signal	E	56.5	Signal	E	65.8
US 2 WB Ramp/Bunk Foss Rd	NB Stop	D	34.8	NB Stop	E	45.5
SR 9/US 2 EB Ramps	Signal	D	45.8	Signal	E	58.6
99th Ave/S Lk Stevens Rd	SB Stop	B	11.0	SB Stop	B	11.1
103rd Ave/S Lk Stevens Rd	NB Stop	B	11.9	NB Stop	B	12.0
S Lk Stevens Rd/S Lk Stevens Rd	SB Stop	A	8.6	SB Stop	A	8.9
91st St/North Access	WB Stop	-	-	WB Stop	B	11.2
East Access/S Lk Stevens Rd/24th St	NB Stop	A	9.6	Signal	D	43.5
West Access/24th St	SB Stop	-	-	SB Stop	B	10.0

¹ Seconds of control delay

The study intersections meet their respective LOS thresholds, except SR 9 at the US 2 westbound on-ramp and Bunk Foss Road (LOS E) and SR 9 at the US 2 eastbound ramps (LOS E).

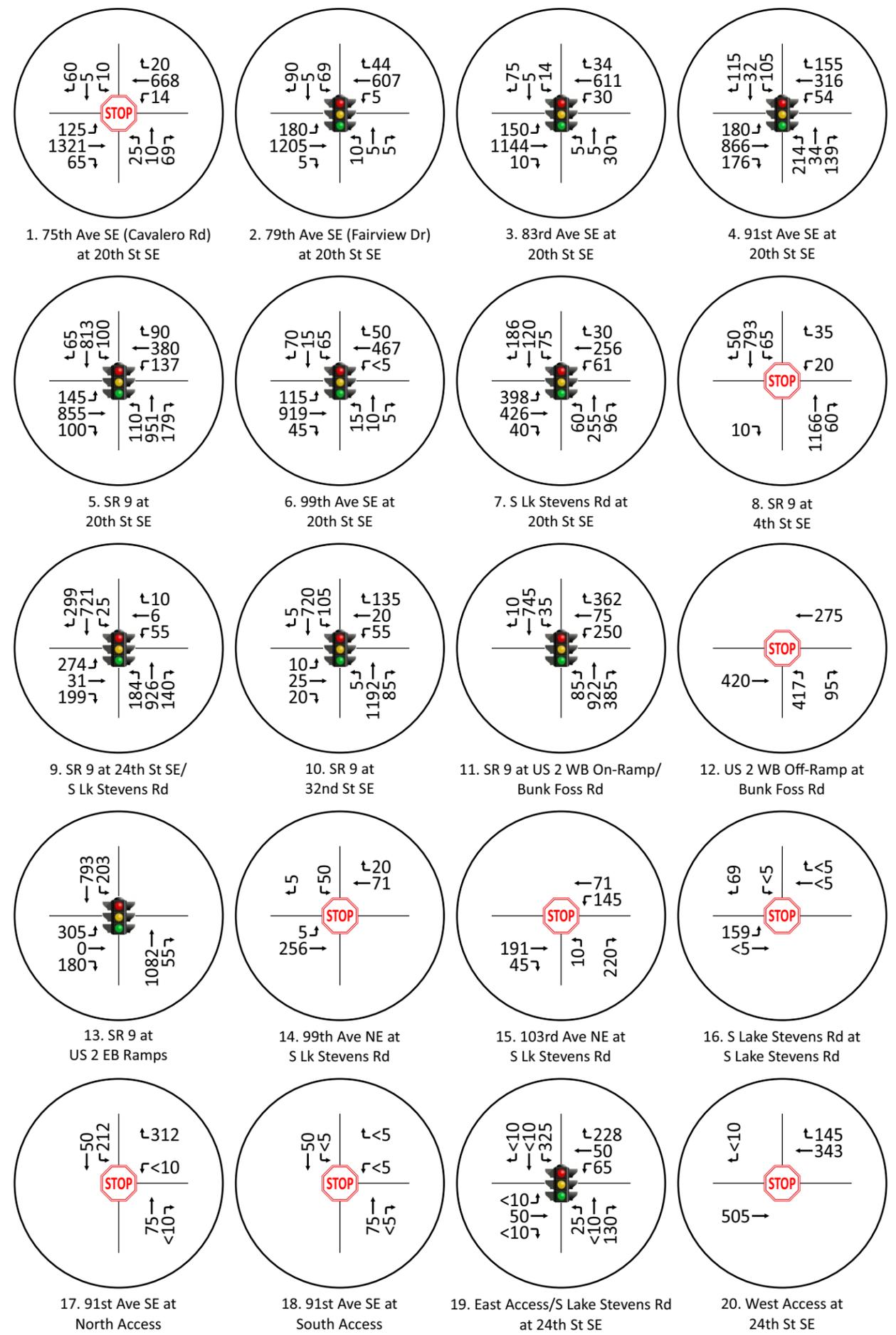
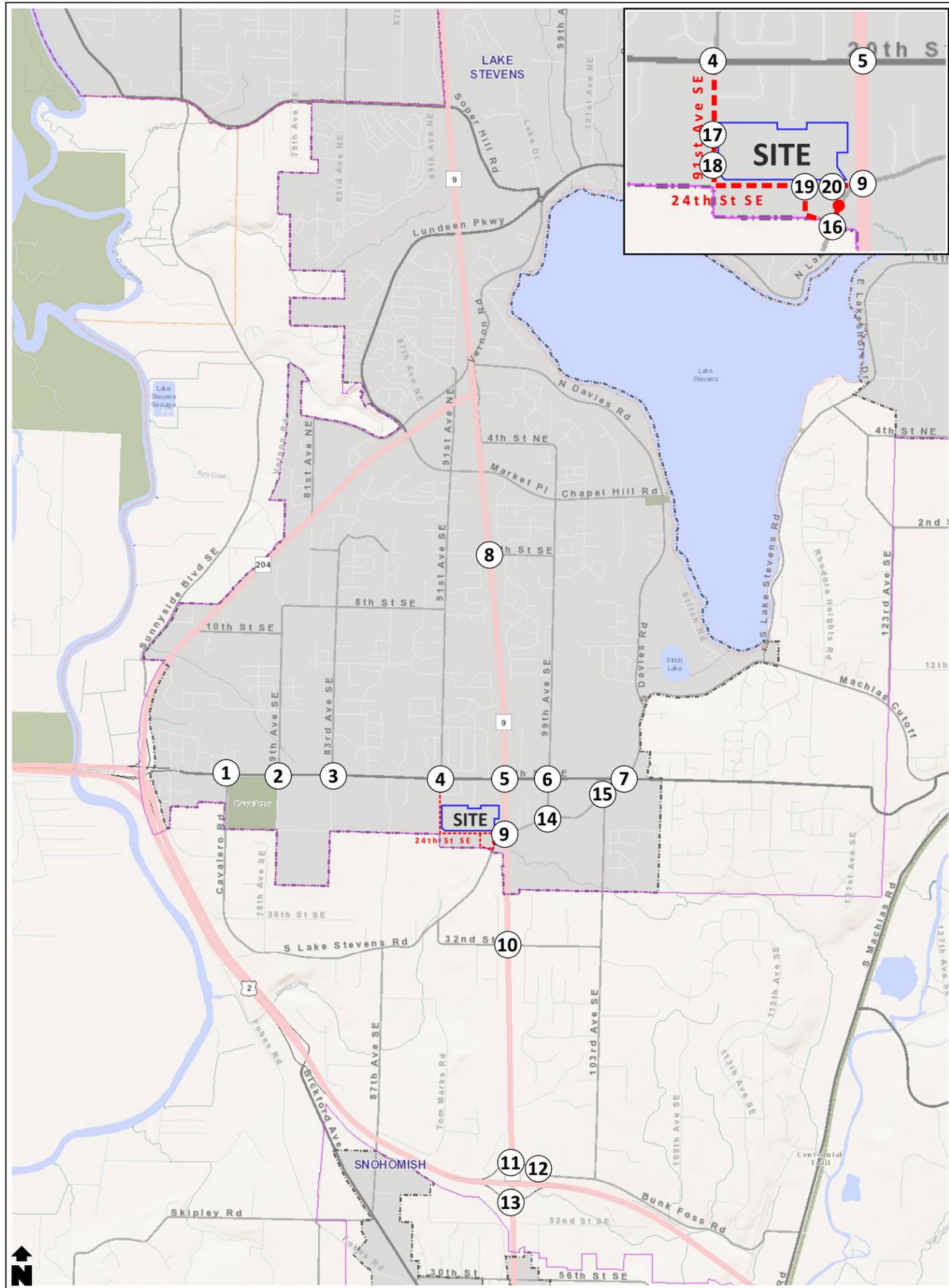


Figure 12: 2025 With-Project PM Peak Hour Traffic Volumes

The SR 9 intersection with the US 2 westbound on-ramp and Bunk Foss Road is forecast to operate at LOS E without and with the Project. Project generated trips are calculated to add 9.3 seconds of delay to the intersection compared to conditions without the Project. The intersection LOS does not meet the WSDOT LOS threshold and an improvement is evaluated in Section 7.5.

The SR 9 intersection with the US 2 eastbound ramps is forecast to operate at LOS E with the Project compared to LOS D without the Project. Project generated trips are calculated to add 12.8 seconds of delay to the intersection compared to conditions without the Project. The intersection LOS does not meet the WSDOT LOS threshold and an improvement is evaluated in Section 7.5.

At the US 2 westbound off-ramp, Bunk Foss Road is uncontrolled, and at this location the arterial LOS on Bunk Foss Road is projected to meet Snohomish County’s threshold. The northbound approach on the off-ramp is forecast to operate at LOS E with the Project compared to LOS D without the Project. The approach delay is calculated to increase by 10.7 seconds of delay from without- to with-Project conditions. The northbound left turn movement is forecast to operate at LOS F with the Project compared to LOS E without the Project. The left turn delay is calculated to increase by 12.6 seconds of delay from without- to with-Project conditions. WSDOT does not have a LOS requirement for the off-ramp; however, future mitigation is recommended to minimize traffic impacts on US 2. An improvement option is evaluated in Section 7.5.

The signalized intersection of SR 9 at 24th Street SE and S Lake Stevens Road is forecast to continue to operate at LOS D with the Project. The intersection meets the WSDOT LOS thresholds and is consistent with the conclusions from the ICE report.

With the Project the S Lake Stevens Road at 24th Street SE is signalized to support access to both the Project (west access) and continued access to S Lake Stevens Road. The signal is coordinated with the SR 9 and 24th Street SE signal and is forecast to operate at LOS D and meets the City of Lake Stevens LOS threshold. More discussions on site access are include in Section 7.3.

Table 12 summarizes the average intersection delay on the 20th Street SE corridor based on 2025 with-Project traffic conditions.

Table 12: With-Project 20th Street SE Corridor LOS

Intersection	Control	LOS	Delay ¹	PM Vol ²
75th Ave/20th St	Signal	B	25.1	2392
79th Ave/20th St	Signal	B	25.4	2,230
83rd Ave/20th St	Signal	A	7.3	2,113
91st Ave/20th St	Signal	A	16.7	2,386
SR 9/20th St	Signal	C	51.7	3,926
99th Ave/20th St	Signal	A	9.2	1,776
S Lk Stevens Rd/20th St	Signal	B	16.9	2,003
Corridor LOS ³		C	25.26	

¹ Seconds of control delay (see Table 1)

² Intersection volume (see Figure 6)

³ Corridor Level of Service: Signal LOS based on the weighted average delay

The weighted average delay of the study intersections on the 20th Street SE corridor is calculated to operate at LOS C and meets the City of Lake Stevens corridor threshold, no corridor mitigation is warranted.

7.3. Project Access Analysis

The **North Access** on 91st Ave SE serves as a primary access to the parking area north of the warehouse. The north access is forecast to operate at LOS B. 39% of the Project traffic is forecast to use this access.

The **South Access** on 91st Ave SE serves as access for truck loading at rear of the warehouse. This access is primarily for trucks and only serves the back of the warehouse. The access is approximately 360 feet south of the north access and approximately 125 feet north of 24th Street SE. There are no PM peak hour Project trips forecast at this access location and the access will operate well.

The **West Access** on 24th Street SE is a signalized access and serves the parking area east of the warehouse. The south leg connects to South Lake Stevens Road. The access is approximately 725 feet east of 91st Ave SE and approximately 425 feet west of SR 9. This signalized access is forecast to operate at LOS D and is coordinated with the new signal at SR 9 and 24th Street SE and S Lake Stevens Road. 56% of the Project traffic is forecast to use this access.

It should be noted that signalization of the west access is not required for Project occupancy. The signal, as stated above is intended to facilitate traffic circulation between the site, South Lake Stevens Road and 24th Street SE. Table 13 compares intersection operation without and with a signal at the west access.

Table 13: West Project Access Intersection Control LOS

NB/SB Stop Control			Signal Control		
Avg./Mvmt.	LOS	Delay	Avg./Mvmt.	LOS	Delay
Average	-	12.8	Average	D	43.5
SB Stop	D	28.1	SB App.	D	49.2
SB Left	D	29.1	SB Left	D	50.0
NB Stop	A	9.7	NB App.	E	74.3
NB Left	B	11.1	NB Left	D	53.4
EB Left	A	7.3	EB Left	B	14.4
WB Left	A	7.5	WB Left	B	15.8

With the Project, the west access operates at LOS D with stop signs controlled the southbound approach from the Project and the northbound approach from South Lake Stevens Road. The unsignalized access configuration is anticipated to support the Project until other major development and growth occurs in the local area and the 20th Street SE Corridor Subarea Plan is built-out.

With the Project, the west access operates at LOS D with a signal. The signalized access configuration is anticipated to support the Project through the build out of the 20th Street SE Corridor Subarea Plan. The circulation analysis that follows includes a signal at the west access.

The **East Access** on 24th Street SE serves as a direct access to the fueling station and is restricted to right-in/right-out movements only. The access is approximately 125 feet east from the west access and 260 feet west of SR 9. The east access is forecast to operate at operates at LOS B.

7.4. Circulation (Queue) Analysis

The SimTraffic computer program was used to evaluate critical movement vehicle queues on 20th Street between 91st Ave SE and SR 9 and SR 9 between 20th Street SE and 24th Street SE and at site accesses. Table 14 summarizes the average and 95th-percentile queues for conditions with the Project. The following reviews the queue output and provides turn lane recommendations based on the forecasted conditions.

Table 14: With-Project Queue Analysis

Intersection (Control)	Lane	Storage (ft)	50-Q (ft)	95-Q (ft)
91st Ave SE / 20th St SE (Signal)	EB L	275	63	109
	WB L	100	35	89
	NB L	100	85	133
	NB T		39	146
	NB R	100	41	78
	SB L	100	60	105
SR 9 / 20th St SE (Signal)	EB L	250	153	320
	WB L	250	102	192
	NB L	450	106	253
	NB T/T	1200	305	506
	NB R	175	103	240
	SB L	200	129	249
	SB R	150	44	141
SR 9 / 24th St SE / S Lk Stevens Rd (Signal)	EB L	425	230	370
	EB T	425	54	201
	EB R	200	100	198
	WB L		53	113
	WB TR		14	42
	NB L	150	135	205
	NB T/TR		206	436
	SB L	200	27	93
	SB T	1200	310	637
	SB R	1200	71	230
91st Ave NE / North Access (WB Stop)	WB LR		61	87
	NB TR		0	5
	SB L		17	45
West Access / S Lk Stevens Rd / 24th St SE (Signal)	EB LT		4	19
	EB TR		25	59
	WB L		31	76
	WB T		18	60
	WB R		45	94
	NB L		19	59
	NB TR		69	125
	SB L		221	280
	SB TR		12	35
East Access / 24th St SE (SB Stop)	SB R		11	34

1 Average queue, represents the forecasted typical back of queue

2 95th-precentile queue, is a statistical queue calculation based on 95th-percentile traffic volumes (which represents 3 minutes of the peak hour), and use generally used for design purposes

- 91st Ave SE at 20th Street SE. The 20th Street SE eastbound left turn pocket supports future left turn queues. With the Project the westbound 95th-percentile left turn queue is calculated at 89 feet and is not forecast to extend to the adjacent 92nd Drive SE intersection. The 95th-percentile northbound left turn queue is calculated at 133 feet and the right turn queue is calculated at 78 feet and turn lanes will be designed accordingly. The 95th-percentile southbound queue is calculated at 105 feet and the adjacent 19th Place SE intersection is about 100 feet to the north of 20th Street. Average southbound queues do not impact the 19th Place SE.

- SR 9 at 20th Street SE. The 95th-percentile eastbound left turn queue on 20th Street SE extends about 70 feet beyond the striped 250-foot turn pocket. 94th Drive SE is located about 300 feet west of SR 9. Impacts on 94th Drive SE from 20th Street SE are mitigated by local residents having access to the signal at 91st Ave SE. No modification to the striped left turn lane storage is recommended.

Westbound left turn vehicle queues are not forecast to extend beyond the left turn pocket on 20th Street SE and northbound vehicle queues do not extend to the new signal at SR 9 and 24th Street SE and South Lake Stevens Road.

The 95th-percentile southbound left turn queue on SR 9 extends about 50 feet beyond the striped 200-foot turn pocket. As right-of-way becomes available, through WSDOT's long-term SR 9 corridor improvements, the southbound left turn pocket could be extended. There are no Project trips forecast in the southbound left turn lane.

- SR 9 / 24th Street SE / South Lake Stevens Road. Average and 95th-percentile left turn lane and through lane queues eastbound on 24th Street at SR 9 extend to 370 feet and do not block the west Project access, which is about 425 feet from SR 9. The 95th-percentile right turn queue extends to 190 feet. Eastbound turn lanes will be designed accordingly.

Westbound queues on S Lake Stevens Road extend to under 115 feet east of SR 9 in the PM peak hour and with the Project. A westbound left turn pocket is recommended to better facilitate signal operations; however, since there are no Project trips forecast to make a westbound left turn, the turn lane should be completed by others.

The northbound left turn pocket on SR 9 should be extended with the signal improvement to support the left turn queue. With the Project, the 95th-percentile left turn queue extends to 205 feet. Northbound through queues in the intersection's through lane and shared through-right turn lane do not impact traffic at the SR 9 and 32nd Street SE intersection and southbound queues also do not extend to 20th Street SE.

- 91st Ave NE at North Access. At the north access queues are forecast to extend to 87 feet into the site. The access will be designed to meet the spacing and sight distance requirements of the City of Lake Stevens. To account for future development potential in the subarea, the north access is recommended with two departure lanes. The southbound left turn queue is forecast to extend to 45 feet and the center lane is recommended to be restriped as a left turn pocket.
- 91st Ave NE at South Access. The south access serves the back of the warehouse. The access will be designed to accommodate delivery trucks and support City of Lake Stevens' access spacing and sightline requirements.
- West Access and South Lake Stevens Road at 24th Street SE. There are no significant queuing deficiencies forecast at this signalized access.

The eastbound left turn queue is forecast to be negligible which is consistent with the 2025 volumes forecast on 24th Street SE. An eastbound left turn lane is recommended to support signal operations. The westbound left turn queue extends to 76 feet on 24th Street SE to South Lake Stevens Road. A westbound left turn pocket is recommended to accommodate future left turning volumes. A northbound left turn lane is recommended to be incorporated into the signal design.

The southbound queue extends to 280 feet into the site and for this study all the Project’s traffic to SR 9 was assigned to this access. The driveway length to the adjacent parking aisle is about 160 feet and can accommodate most of the southbound queue. With the Project, the southbound traffic will distribute itself to the site accesses and will mitigate some of the southbound queue internal to the site. The southbound approach is recommended with a dedicated left turn lane and shared through-right lane.

- East Access at 24th Street SE. This right-in/right-out only access is anticipated as a direct inbound access to the fueling station. The eastbound queue from the west access is not forecast to impact egress at the east access. The access will be designed to meet the spacing and sight distance requirements of the City of Lake Stevens.

7.5. Mitigation Analysis

With-Project intersection mitigation is evaluated at SR 9 and US 2 ramp terminal intersections at the US 2 ramps and at Bunk Foss Road. This subsection also discusses other potential intersection and roadway capacity improvements and design recommendations around the Project site.

7.5.1. SR 9 and US 2 Ramp Terminals

The SR 9 intersections with the US 2 westbound on-ramp and Bunk Foss Road and with the US 2 eastbound ramps are forecast to operate at LOS E with the Project.

The unimproved with-project analyses above incorporated the WSDOT PM peak hour signal timing information at both intersections.

Based on the increase in PM peak hour volumes forecast between now and 2025, it is reasonable to assume that the signal timing could be updated to better serve future traffic volumes. Timings (“cycle length and splits”) at both signalized intersections were “optimized” using Synchro with the goal of having both signalized intersections operate at LOS D or better. Table 15 compares intersection operation without and with the optimization improvement.

Table 15: SR 9 at US 2 Ramp Terminals With-Project Improvement

Intersection	Without Optimization Without-Project			Without Optimization With-Project			With Optimization With-Project		
	Cycle Length	LOS	Delay ¹	Cycle Length	LOS	Delay ¹	Cycle Length	LOS	Delay ¹
SR 9/US 2 WB Ramp/ Bunk Foss Rd	160 seconds	E	56.5	160 seconds	E	65.8	140 seconds	D	54.0
	WB Th/R ²	F	213	WB Th/R ²	F	264	WB Th/R ²	F	114
SR 9/US 2 EB Ramps	160 seconds	D	45.8	160 seconds	E	58.6	140 seconds	D	47.8

¹ Seconds of control delay

² Westbound Through-Right Lane LOS and delay

With the optimized signal timing, SR 9 at the US 2 westbound on-ramp and Bunk Foss Road operates at LOS D and SR 9 at the US 2 eastbound ramps operates at LOS D. The signal timing optimization also shows improvements for the westbound right turn delay at Bunk Foss Road.

In 2012 Bunk Foss Road was realigned to its current configuration with the westbound lane alignment (no right turn lane) at SR 9 and with the adjacent US 2 westbound off-ramp intersection. Signal optimization allows the intersection to continue to meet WSDOT standards until finding can be secured by the State for a more comprehensive improvement.

WSDOT’s long-term SR 9 corridor improvements, per WSDOT staff, include adding lanes northbound and southbound to SR 9 across the overpass and replacing the signalized intersections with multi-lane roundabouts. The long-term improvement should incorporate the US westbound off-ramp at Bunk Foss Road.

There are 160 PM peak hour Project trips forecast through these three intersections (75 in and 85 out). The Project’s impact share was computed by taking the total number of PM peak hour Project trips forecast through the two ramp terminal intersections and dividing it by the future without-Project PM peak hour volumes forecast through the intersections. The Project’s calculated impact to the intersection is 5.4%. The Applicant should negotiate their fair share contribution for WSDOT technicians to optimize the signal timing and coordination.

7.5.2. US 2 Westbound Off-Ramp at Bunk Foss Road

In addition to the signalized ramp terminal intersections on SR 9, the northbound stop-controlled approach at the US 2 westbound off-ramp at Bunk Foss Road is also forecast to operate at LOS E; and the left turn movement is forecast to operate at LOS F.

The Snohomish County arterial LOS is not significantly impacted by the stop-sign controlled off-ramp intersection; however, improvement options at this location were reviewed to (1) minimize non-Project and Project impacts on the off-ramp and (2) identify an interim phase improvement prior to WSDOT’s SR 9 Corridor improvements which are assumed to also include the off-ramp with the two US 2 ramp terminals.

Two improvement options were considered: (a) all-way stop-sign control and (b) mini-roundabout. Table 16 compares conditions without an improvement and with an improvement.

Table 16: US 2 Westbound Off-Ramp and Bunk Foss Road With-Project Improvement

Intersection	Without Improvement With-Project			With Improvement (All-Stop) With-Project			With Improvement (Mini-RAB) With-Project		
	Avg./Mvmt.	LOS	Delay ¹	Avg./Mvmt.	LOS	Delay ¹	Avg./Mvmt.	LOS	Delay ¹
US 2 WB Off-Ramp/ Bunk Foss Rd	Average	-	19.3	Average	D	33.1	Average	B	11.4
	NB Stop	E	45.5	NB Stop	E	43.5	NB App	B	20.0
	NB Left	F	53.1	NB Left	F	51.1	NB Left	C	20.5
	EB Free	-	-	EB Stop	D	30.5	EB App	A	8.4
	WB Free	-	-	WB Stop	C	17.8	WB App	A	3.5

¹Seconds of control delay

- With no improvement, the northbound approach operates at LOS E and the northbound left turn operates at LOS F.
- With all-way stop-sign control, the intersection operates at LOS D, an improvement from the current intersection configuration. All-way stop-controlled intersection operations are based on the intersection’s total average delay, compared to minor-approach stop-sign controlled intersections where the intersection delay is based on the worst controlled movement. The addition of stop-signs to Bunk Foss Road will have a greater impact on the arterial’s LOS compared to the current configuration with Bunk Foss Road operating with free-flow.
- With a mini-roundabout, the intersection operates at LOS B, an improvement from the current intersection configuration. The mini-roundabout was evaluated using the Sidra computer program, and the V/C ratio supports the WSDOT measure of effectiveness policies. A mini-roundabout’s design

is intended to fit within the existing right-of-way. A mini-roundabout has a lesser impact on the arterial's LOS compared the all-way stop-sign control.

The Project is forecast to generate 37 PM peak hour trips to the northbound left turn leg of the off-ramp and the trips make up 3.2% of the future 2025 PM peak hour volume at the off-ramp intersection. The cost for a mini-roundabout is estimated at \$150,000 and the Project's share (3.2%) is \$4,800.

7.5.3. 75th Ave SE and 20th Street SE

As a signalized intersection, 75th Ave SE and 20th Street SE operates at LOS B. Currently, the intersection is stop sign controlled and is forecast to operate at LOS F. A signal is recommended as part of the EIS for the 20th Street SE Corridor Subarea Plan. The Project is forecast to increase the future PM peak hour volume at this intersection by 8.7% over without-Project conditions. A signal is estimated to cost \$500,000 at this intersection and the Applicant's share (8.7%) is \$43,500.

7.5.4. Turn Lane Improvements and Recommendations

At 91st Ave SE at 20th Street SE.

- Restripe the center turn lane east of the intersection for a 100 foot (minimum) left turn lane.
- Provide a northbound left turn lane with a minimum of 150 feet of storage capacity.
- Provide a northbound right turn pocket with a minimum of 100 feet of storage capacity

SR 9 at 20th Street SE no Project improvements are recommended.

SR 9 at 24th Street SE and South Lake Stevens Road.

- Provide an eastbound right turn pocket with a minimum of 200 feet of storage capacity.
- Extend the northbound left turn lane to provide a minimum of 225 feet storage capacity.

91st Ave NE at North Access.

- Incorporate two egress lanes at the driveway.
- Stripe the center lane on 91st Ave NE to provide a minimum of 150 feet of storage capacity to accommodate future volumes.

91st Ave NE at South Access to be designed to accommodate delivery trucks.

West Access and South Lake Stevens Road at 24th Street SE.

- Provide an eastbound left turn lane with a minimum of 150 feet of storage capacity to accommodate future volumes.
- Provide a westbound left turn lane with a minimum of 150 feet of storage capacity to accommodate future volumes.
- Provide a northbound left turn lane with a minimum of 100 feet of storage capacity.
- Provide a left turn lane out from the driveway with a minimum of 200 feet of storage capacity.

East Access at 24th Street SE to be maintained as right-in/right-out only and be able to accommodate fuel trucks from SR 9.