TRAFFIC TECHNICAL REPORT

SR 167 - 8th Street E Vicinity to 15th Street SW Vicinity

Northbound HOT Lane

June *2009*

Prepared By:

Perteet
505 Fifth Avenue, Suite 210
Seattle, WA 98104
206-436-0515

Washington State
Department of Transportation

THIS PAGE LEFT BLANK INTENTIONALLY

LIST OF ACRONYMS

/mev	Collisions per million entering vehicles
/mvm	Collisions per million vehicle miles
ADT	Average Daily Traffic
BNSF	Burlington Northern Santa Fe
CFR	Code of Federal Regulations
EB	Eastbound
EMME	Equilibre Multimodal, Multimodal Equilibrium
FHWA	Federal Highway Administration
GP	General Purpose
HCM	Highway Capacity Manual
HOT	High Occupancy Toll
HOV	High Occupancy Vehicle
LOS	Level of Service
MP	Milepost
MPH	Miles Per Hour
MUTCD	Manual on Uniform Traffic Control Devices
NB	Northbound
NEPA	National Environmental Policy Act
PDO	Property Damage Only
PSRC	Puget Sound Regional Council
SB	Southbound
SEPA	State Environmental Policy Act
ST	Sound Transit
UPRR	Union Pacific Railroad
V/C	Volume-to-Capacity ratio
WB	Westbound
WSDOT	Washington State Department of Transportation

TABLE OF CONTENTS

LIST OF EXHIBITS

LIST OF APPENDICES

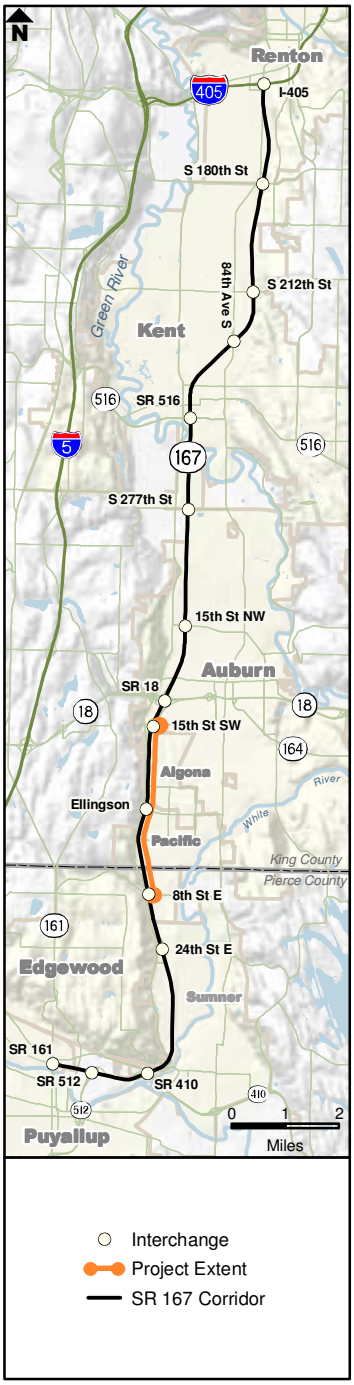
THIS PAGE LEFT BLANK INTENTIONALLY

EXECUTIVE SUMMARY

Project Description

The Washington State Department of Transportation (WSDOT) plans to widen the State Route (SR) 167 roadway to construct a new northbound High-Occupancy/Toll (HOT) lane from the vicinity of 8th Street E in Pacific (MP 10.2), Pierce County, Washington to the vicinity of 15th Street SW in Auburn (MP 14.26), King County, Washington (**Exhibit 1**). A ramp meter will be installed at the northbound on-ramp at Ellingson Road. SR 167 is an important thoroughfare for cars, trucks, and transit in the Green River Valley. This additional capacity will relieve congestion and improve safety related to congested traffic conditions, especially for commuters traveling northbound on SR 167.

Exhibit 1
Vicinity Map



Benefits of the Proposed Project

The proposed project has a number of benefits.

- Improved traffic flow for motorists
- Faster and more reliable travel times for high occupancy vehicles using the new HOT lane
- Faster trips and more reliable travel times for single occupant vehicles using the HOT lanes
- A reduction, in general, of the time all people and freight will spend in traffic
- Improved safety related to the relief of congested traffic conditions.
- Improved traffic on I-5 as people choose different travel options and/or patterns
- Accommodation of future population and employment growth in the region

Purpose of this Traffic Report

This report describes the existing conditions and analyzes transportation effects related to the construction and operation of a northbound HOT lane on SR 167 from the vicinity of 8th Street E in Pacific (MP 10.2), Pierce County, Washington to the vicinity of 15th Street SW in Auburn (MP 14.26), King County, Washington. This report summarizes the travel demand forecasts and operations of the SR 167 corridor between 24th Street E and 15th Street NW and adjacent intersections with and without the project. The report also includes study of traffic safety and non-motorized transportation on SR 167 in the project area.

Evaluation of Project Effects on Traffic

The project effects on traffic are measured relative to the No Build scenario, in which the proposed project would not be built. The existing traffic conditions are established using field surveys, and WSDOT data to build freeway (VISSIM) and intersection (SYNCHRO) traffic operations models. The models are extended to the future years of 2020 and 2040 using traffic forecasts from the Puget Sound Regional Council (PSRC) Travel Demand Model. The project effects are measured in terms of travel speeds, traffic density on mainline SR 167, and traffic levels of service (LOS) at intersections. The project effects on safety and non-motorized travel are also evaluated.

Effects of the Proposed Project on Traffic

Adding a lane northbound to tie in with the existing HOT lane will provide the opportunity for approximately 900 vehicles per hour during the morning peak to travel safer and faster for an additional 4 miles. By 2020, congestion during the three hour morning peak period (6-9 AM) will increase to the extent that traffic speeds in the general purpose lanes are projected to be as low as 20 miles per hour (mph) and the travel time will increase from the current 3.75 minutes to approximately 4.5 minutes from 8th Street East to 15th Street SW. Vehicles in the HOT lane in 2020 would traverse this same section at an

average speed of 55 mph. The travel time for vehicles in the HOT lane would be a minute lower than the current travel time in the general purpose lanes. The project in 2020 is expected to maintain travel times in the general purpose lanes comparable to existing travel times in the general purpose lanes.

By 2040, travel time for the general purpose traffic in this stretch of SR 167 is expected to increase to 6 minutes without the project. The project is expected to improve speeds in the general purpose and HOT lane, similar to that of 2020. It is predicted that more than 4,000 vehicles per day will benefit from the HOT lane project with a savings of nearly 10 minutes per vehicle or more than 700 hours per day saved by vehicles in the managed lane.

Disproportionately Adverse Effects on Traffic

There are no identified unavoidable adverse effects to transportation created by the Project.

THIS PAGE LEFT BLANK INTENTIONALLY

1.0 INTRODUCTION

The proposed SR 167/8th St E to 15th St SW - Northbound HOT Lane Project will extend a northbound High Occupancy Toll (HOT) lane approximately three miles along the northern portion of State Route 167 (SR 167), between Pacific and Auburn. The purpose of this traffic analysis is to support the design and environmental documentation for the project.

This report summarizes the travel demand forecasts and operations of the SR 167 corridor between 24th Street E and 15th Street NW and adjacent intersections for the following scenarios:

- Existing (2007)
- 2020 and 2040 No Build alternative
- 2020 (Year of Opening) and 2040 (Horizon Year) SR 167/8th St E to 15th St SW - Northbound HOT Lane Project (Build alternative)

This report will provide the results of traffic analysis conducted to analyze the impact of not building any improvements compared to how traffic will flow if the HOT lane is built between 8th Street E and 15th Street SW.

1.1 Purpose and Need for the Project

The Washington State Department of Transportation (WSDOT) plans to widen the State Route (SR) 167 roadway to construct a new northbound High Occupancy Toll (HOT) lane from the vicinity of 8th Street E in Pacific (MP 10.2), Pierce County, Washington to the vicinity of 15th Street SW in Auburn (MP 14.26), King County, Washington. A ramp meter will be installed at the northbound on-ramp at Ellingson Road. SR 167 is an important thoroughfare for cars, trucks, and transit in the Green River Valley. This additional capacity will relieve congestion and improve safety for commuters traveling northbound on SR 167. This new lane will extend the northbound HOT lane that was constructed for the HOT Lane

Pilot Project. The lane will extend approximately three miles in the northbound direction. It will provide buses, carpools, and vanpools with improved travel speeds and reliability along this part of the corridor.

The purpose of the proposed project is to provide a transportation alternative to alleviate congestion and facilitate mobility through the corridor. The number of vehicles traveling through the SR 167 corridor is expected to increase over the next several years. Once this project is operational, the HOT lane will likely improve traffic flow by moving approximately ten percent more vehicles and people through the corridor during the peak period. Speeds in the general-purpose lanes are expected to remain the same or increase by 5-10 mph, depending on the location and time of day.

1.2 Purpose of this Report

This report was prepared consistent with the National Environmental Policy Act (NEPA) which requires all actions sponsored, funded, permitted, or approved by a federal agency to consider the environmental effects of the proposed project. The Washington State Environmental Policy Act (SEPA) requires a similar evaluation of environmental effects of proposed state and local projects. The proposed project will comply with both NEPA and SEPA, including a review of potential effects and possible mitigation measures. When potential effects to traffic occur as a result of the proposed project, a review of those potential effects and possible mitigation measures is required by both NEPA and SEPA.

This report describes the existing conditions and potential range of effects to traffic operations that may be attributed to the construction and operation of a northbound HOT lane on SR 167, between 8th Street E and 15th Street SW.

1.3 Evaluation of Project Effects on Traffic

The project effects on traffic are measured relative to the No Build scenario, in which the proposed project would not be built. The existing traffic conditions are established using field surveys, and WSDOT data to build freeway (VISSIM) and

intersection (SYNCHRO) traffic operations models. The models are extended to the future years of 2020 and 2040 using traffic forecasts from the Puget Sound Regional Council (PSRC) Travel Demand Model. The project effects are measured in terms of travel speeds, traffic density on mainline SR 167, and traffic levels of service (LOS) at intersections. The project effects on safety and non-motorized travel are also evaluated.

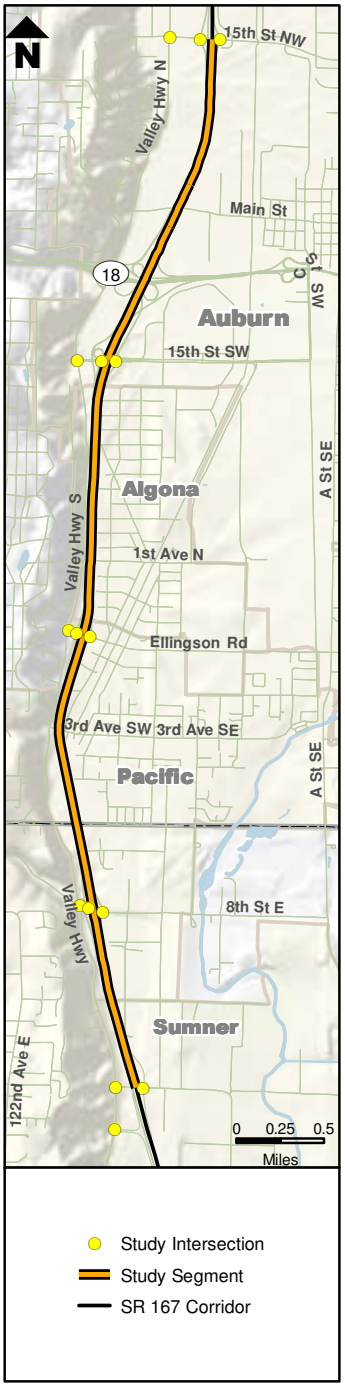
THIS PAGE LEFT BLANK INTENTIONALLY

2.0 METHODOLOGY

2.1. Study Area

The traffic analysis includes two components, the analysis of the SR 167 mainline and ramp operations and the analysis of the local intersection operations. **Exhibit 2** depicts this project area and the area studied for the traffic report. Freeway operations are analyzed from 24th Street E south of the project area to 15th Street NW in the north. The project extends from 8th Street E to 15th Street SW; hence the study area extends to include one interchange on either side of the project limits.

Exhibit **2**
Study Area



Fifteen intersections in the vicinity are included for operational analysis:

- 15th Street NW at W Valley Highway
- 15th Street NW at SR 167 southbound ramps
- 15th Street NW at SR 167 northbound ramps
- 15th Street SW at W Valley Highway
- 15th Street SW at SR 167 southbound ramps
- 15th Street SW at SR 167 northbound ramps
- Ellingson at W Valley Highway
- Ellingson at SR 167 southbound ramps
- Ellingson/SR 167 northbound ramps
- 8th Street at W Valley Highway
- 8th Street at SR 167 southbound ramps
- 8th Street at SR 167 northbound ramps
- 24th Street E at W Valley Highway
- 24th Street E at SR 167 northbound ramps
- W Valley Highway at SR 167 southbound ramps

2.2 Definition of Study Alternatives and Scenarios

The Build and No Build alternatives use 2007 as the base year to represent existing conditions in the study area. Analysis is conducted for two future study years: 2020 and 2040. 2020 is chosen as the year of opening for the SR 167 - 8th Street E Vicinity to 15th Street SW Vicinity Northbound HOT Lane project, and 2040 was chosen as the design year. Traffic conditions on the SR 167 mainline are analyzed for morning (AM) peak duration, since the morning commute is the critical direction of travel for the northbound lanes. The peak period of 6-9 AM is used to evaluate freeway traffic operations, since a single peak hour would not completely capture the peaking nature of traffic on SR 167. The local intersections are analyzed for levels of service under both morning (AM) and afternoon (PM) peak hour conditions. Traffic conditions for the following scenarios will be reported:

- 2007 Existing AM and PM peak periods
- 2020 No Build AM and PM peak periods
- 2020 Build AM and PM peak periods
- 2040 No Build AM and PM peak periods
- 2040 Build AM and PM peak periods

2.3. Traffic Forecasting Methodology

The traffic forecasts for this study used the most recent Puget Sound Regional Council (PSRC) EMME travel demand model. The model was validated for the study area based on the existing year traffic counts in the vicinity. The 2020 and 2040 No Build scenarios were developed by modeling the land use growth and future planned transportation projects. The assumptions for 2020 and 2040 No Build highway and transit service assumptions are presented in **Appendix A: 2020 No Build and 2040 No Build Highways and Transit Service Assumptions Technical Memorandum**.

For 2020 and 2040, only the highway projects that are funded were assumed to be built under the No Build alternative. Also, the HOV definition for the highway system is assumed to be HOV2+ in 2020 and HOV3+ in 2040. But for SR 167, it is assumed that HOV2 would pay tolls in both 2020 and 2040,

and that only HOV3+ would be allowed to use the HOT lanes free of charge in 2020 and 2040.

It is important when forecasting to use the travel demand model volumes at a detail or level of accuracy. The Regional Travel Demand Model typically forecasts volumes accurately across screenlines but the actual volume on individual links can vary significantly from actual field counts. Therefore, for this study, growth patterns from the Regional Forecast Model are used rather than the actual volume. The following steps describe the traffic forecast methodology:

1. Group Arterials into Sub Areas and Develop Growth Rates

Arterials that serve similar land uses were grouped together. For this analysis, three areas were established. The northern area is north of 15th Street NW. The middle section is between 15th Street SW and Ellingson. The southern section is south of 24th Street E.

The three subareas are defined by three screenlines.

Growth rates were developed for the sub areas by summing volumes entering and exiting the area in the demand model for the horizon years divided by demand model volumes for existing conditions.

2. Develop Freeway Mainline Traffic Forecasts

The freeway mainline forecasts were developed for the sections bounding the sub areas by extracting growth from the demand model and adding this volume to existing traffic countdata. The assumption for HOV lanes was that all highways will be 3+ HOV by 2040. By 2020, all highways will continue to operate as HOV2+. But for this study, SR 167 HOT lanes area were assumed to be free for HOV3+, and HOV2 are assumed to be required to pay. Two demand model scenarios were modeled for each alternative. The first scenario modeled the HOT lane as 3+ HOV vehicles only; the second scenario modeled the HOV/HOT lane as if it were open to general purpose trips. The actual function of the HOT lane will likely be somewhere between these two scenarios. The purpose of the two scenarios is to establish “bookends” and to confirm that

the travel demand will be adequate to fill the HOT lane. The post processed total traffic volume at the three screenlines was then distributed to the HOT lane and General Purpose (GP) Lanes. The principle of distributing the volumes was to keep the Volume to Capacity (V/C) ratio of the HOT lane at less than 1.0 and less than the V/C ratio of the GP lane.

3. Develop Freeway Ramp Traffic Forecasts

Ramp traffic volumes were balanced to meet the freeway mainline volumes north and south of the sub areas. There are infinite combinations of on and off ramp volumes to match freeway forecasts. Regional Demand Model growth rates on the ramps and the local arterials are used as a guide for the on and off ramp growth resulting is a single solution.

4. Forecast Local Turn Movements and Arterial Volumes

The existing arterial volumes were spliced into two trip types – freeway related and non-freeway related. Horizon year arterial and turn movement volumes were forecast based on these trip type patterns. The forecasted freeway ramps were distributed using the existing freeway related trip distribution. Then a growth rate was applied to the non-freeway related trips (through trips) so that the total volume entering and exiting the sub area matched the growth developed in the first step.

Count data from WSDOT collected in the last 3 years was used for this study.

2.4 Traffic Operations Analysis Methodology

Various tools were used to determine how well the transportation system operates today, and how well it will operate in the future. The traffic analysis for this study used the VISSIM microsimulation tool and Synchro, to evaluate the effectiveness of the transportation improvement project WSDOT is considering.

2.4.1 VISSIM Microsimulation Model

Microsimulation determines how the traffic on the SR 167 mainline and interchanges affect each other in the study area. For example, if a merge point on a freeway is congested, a microsimulation model will indicate how this affects the freeway upstream. The microsimulation model includes roadway characteristics such as number of lanes, ramp merge and diverge locations, intersection channelization and stop control, traffic volumes by mode, posted speed limits, and vertical grades.

VISSIM is a microscopic, driver behavior based simulation model used to model urban traffic and public transit operations. The program models auto and transit operations under different configurations of geometry, traffic signals, transit routes and stops, and other parameters to help evaluate alternatives based on transportation engineering and planning measures of effectiveness. The model is calibrated so that travel speeds, travel time, and queues represent field observations and traffic volume throughput matches within about plus or minus ten percent of existing count data. The travel speeds in the study area under the existing conditions are measured from a field survey. **Exhibits 3** and **4** depict the VISSIM model output compared to field data for SR 167 mainline volumes and travel times between segments, respectively.

Exhibit 3
VISSIM Calibration of SR 167 Mainline Volumes

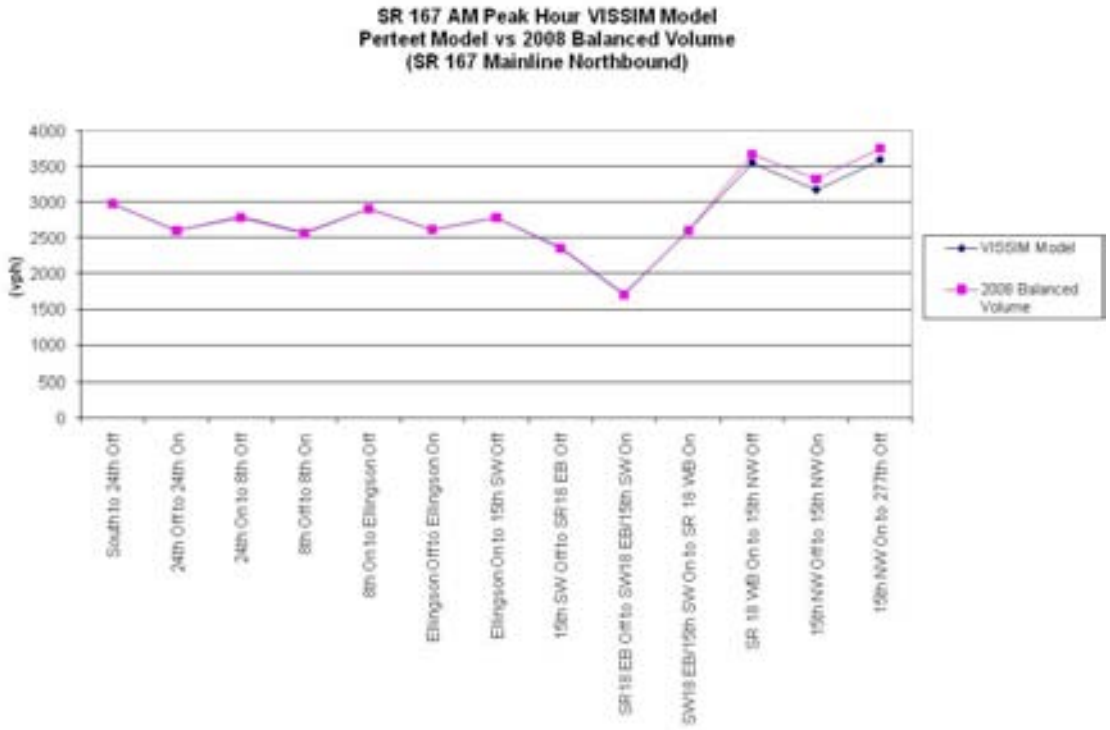
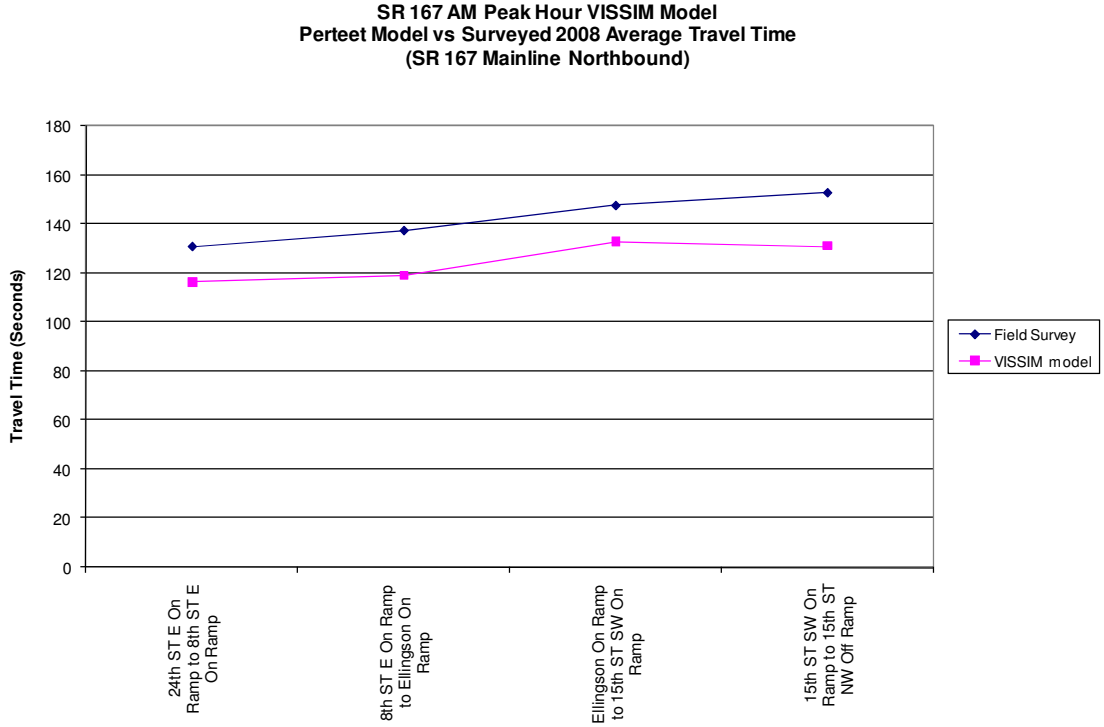


Exhibit 4
VISSIM Calibration of SR 167 Mainline Travel times (in seconds)



Using the VISSIM model for the existing year (2007), models for No Build and Build alternatives of future years (2020 and 2040) were developed in order to evaluate the travel speeds to measure the effect of the Project on the traffic conditions in the study area.

2.4.2. SYNCHRO Model

Local street operations were modeled with the Synchro software Build 761. Synchro is a traffic operations model that evaluates the performance of individual intersections and coordinated systems of traffic signals. WSDOT and FHWA frequently use this operations analysis software for local street analysis. Primary data inputs to SYNCHRO are lane geometry, vehicular traffic volumes, signal phasing and signal timing information. SYNCHRO calculates the level of service (LOS) based on average delay for vehicles passing the intersection. The intersection delay for a signalized intersection takes into account the delay caused by the signal control and the queue delay caused by spilling and storage blockage from the adjacent intersections in the network. The average intersection delay for unsignalized intersections, based on the Highway Capacity Manual (HCM) method, is estimated as an average of each traffic movement's delay and does not include delays caused by queuing. LOS is a measurement that serves as an indicator of the quality of traffic flow at an intersection. The LOS grading ranges from A to F, as shown in **Exhibit 5**, with LOS A assigned when vehicles experience minimal delays. LOS F indicates stop-and-go conditions with frequent and lengthy delays. The 95th percentile queue length (in feet) for the worst approach at an intersection is estimated. This means that 95 times out of 100, the queue at the intersection would not exceed the estimated length. Queues for the intersection approaches whose volumes for the 95th percentile cycle exceeds capacity are designated with a # sign.

Exhibit 5
Level of Service Criteria for Signalized and Unsignalized Intersections

Level of Service	Signalized Stopped Delay per	Unsignalized Average Total Delay	Description

	Vehicle (seconds)	per Vehicle (seconds)	
A	0-10	0-10	Little or no delay
B	>10-20	>10-15	Short delays
C	>20-35	>15-25	Average delays
D	>35-55	>25-35	Long delays
E	>55-80	>35-50	Very long delays
F	>80	>50	Failure – extreme congestion

Source: Highway Capacity Manual, 2000

THIS PAGE LEFT BLANK INTENTIONALLY

3.0. AFFECTED ENVIRONMENT

3.1. Freeway Traffic Operations

More than 52,000 vehicles per day travel northbound on SR 167 within the project area. About 7 percent of the daily total, or 3,000 vehicles, travel on northbound SR 167 during the AM peak hour.

The morning peak commute (northbound) period lasts from 6 AM to 9 AM, with the peak hour lasting from 6:30 to 7:30 AM. The PM peak commute period (southbound) lasts for about four hours, from 2 PM to 6 PM. Weekend traffic volumes typically peak from about 12 PM to 6 PM with less peak directional flow. **Exhibits 6** and **7** illustrate the current hourly traffic volumes on SR 167 in the study area in the AM and PM peaks, respectively.

Exhibit 6
Existing 2007 AM Peak Hour SR 167 Traffic Volumes

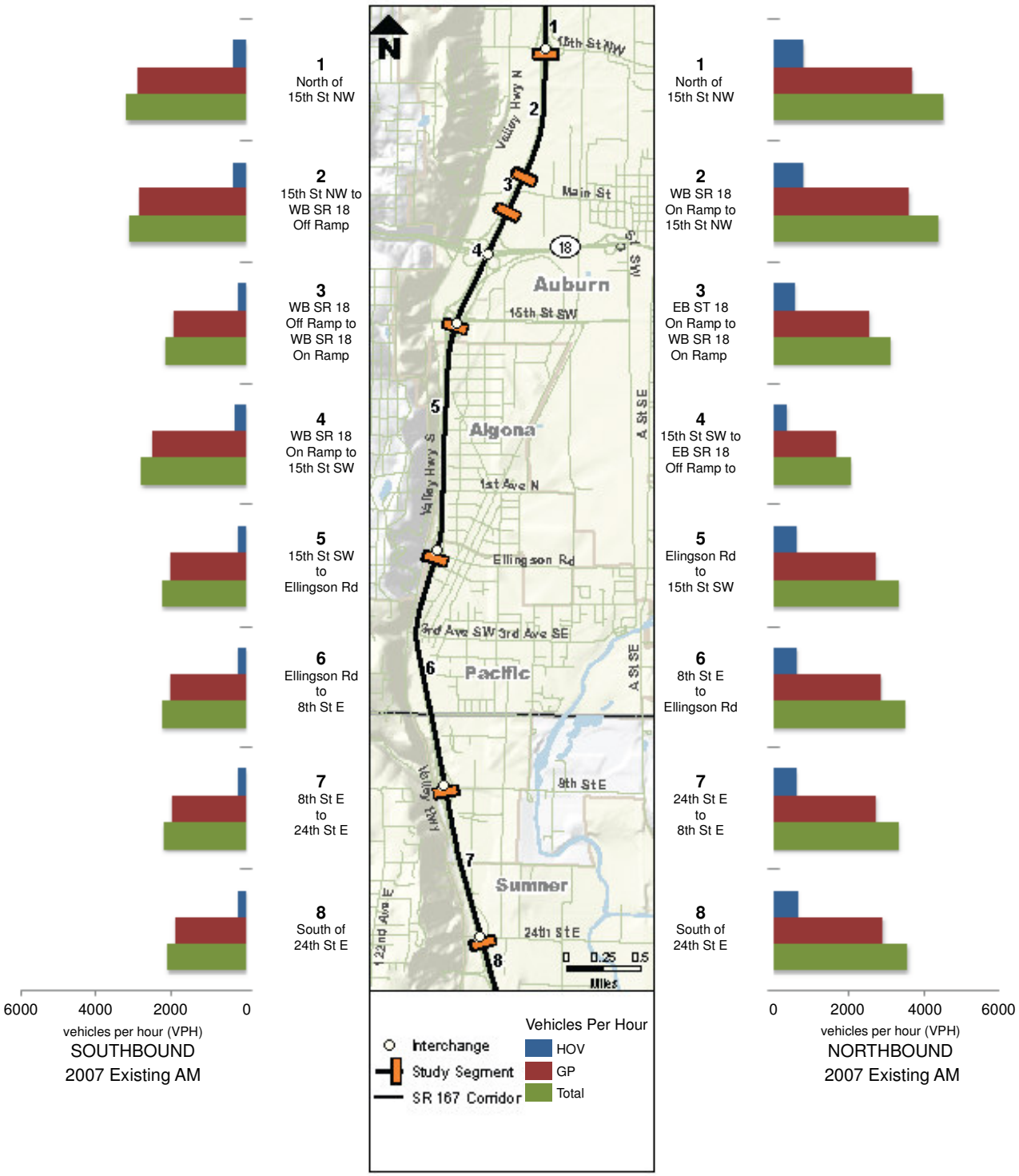
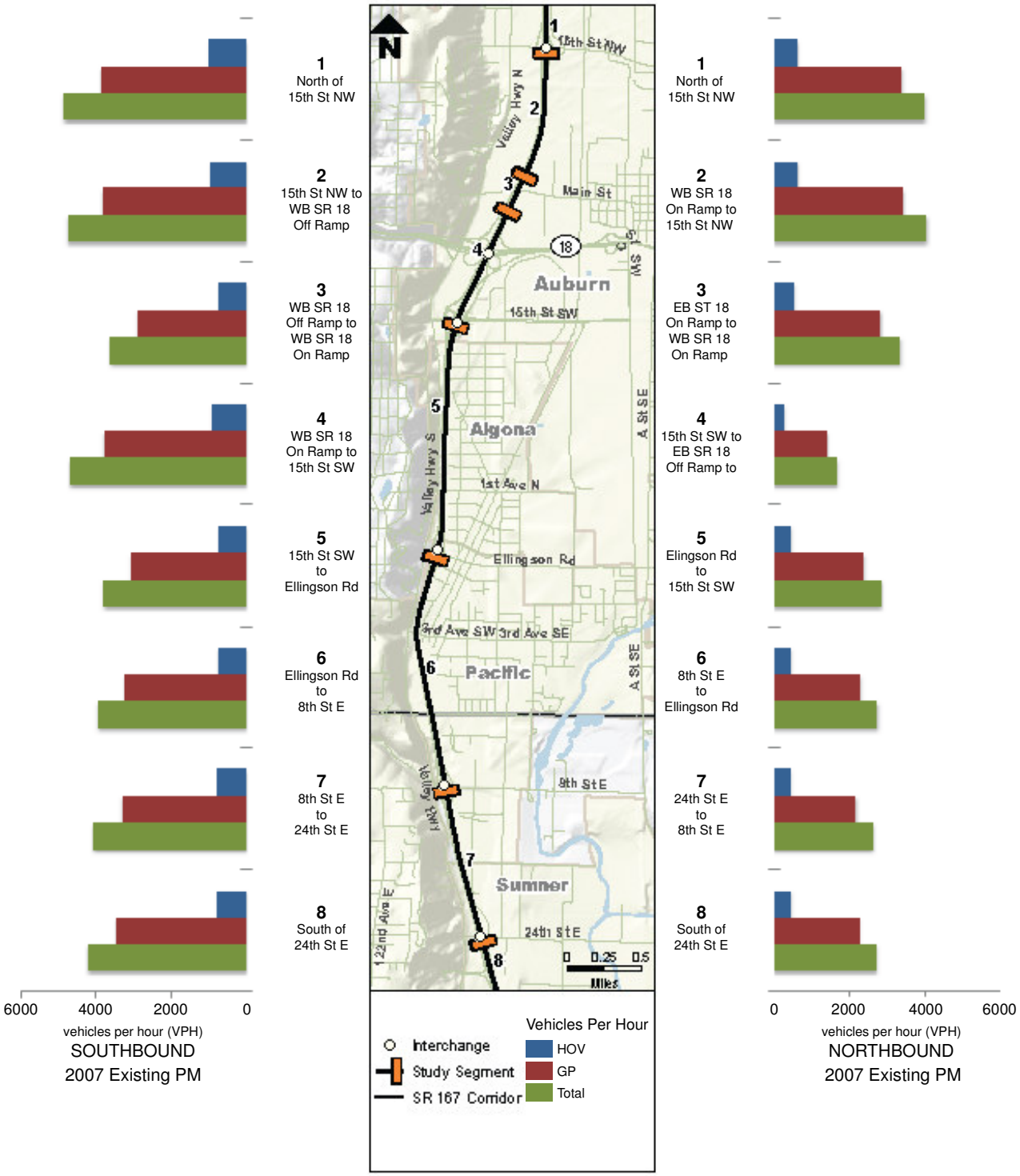


Exhibit 7
Existing 2007 PM Peak Hour SR 167 Traffic Volumes



Travel speeds are significantly below the posted speeds along many sections of the corridor during peak travel periods. On typical weekdays, traffic congestion in the morning commute occurs primarily in the northbound direction, with speeds dropping below 20 mph for some sections.

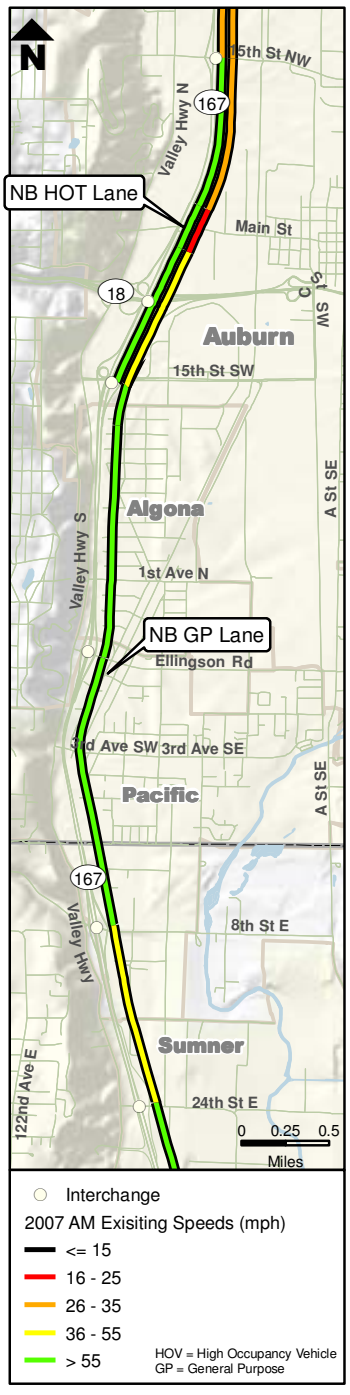
Exhibit 8 illustrates the existing traffic speeds on SR 167 for an average weekday in 2007 based upon the VISSIM simulation of a 3-hour AM peak period. Traffic speeds at or near the posted speed limit of 60 mph are illustrated in green. Yellow indicates moderate congestion with traffic flow at 35 to 55 mph. Orange and red indicates heavy congestion with traffic flows at 25-35 mph and 15 to 25 mph, respectively and black indicates "stop-and-go" traffic flow below 15 mph.

The following are the significant traffic operational characteristics for northbound SR 167 within the study area:

- **SR 167, 8th Street off ramp to 8th Street on ramp**: Due to the significant on ramp volume at 8th Street, the slowdown at the merge point causes traffic on mainline SR 167 to experience lower than average speeds.
- **SR 18 EB/15th SW on ramp to SR 18 WB on ramp**: Traffic entering from WB SR 167 enters SR 167 mainline, while SR 18 EB on and 15th Street SW traffic is merging with mainline SR 167 traffic. The conflicting volumes are significant, thus resulting in speeds between 20-30 miles per hour. This segment is immediately north of the project; hence extending the HOT lane further south should help alleviate congestion in the future.
- **SR 167, south of SR 18:** Traffic volumes on northbound SR 167 south of SR 18 are lower than on the segment north of SR 18. Congestion from the heavily congested part of SR 167 to the north currently causes reduced speeds for traffic in the study area.

These problem areas reduce operating speeds and increase travel time. The travel time from 24th Street E to 15th Street NW is typically six minutes when there is no congestion. During the morning commute period it takes 11 minutes, or almost twice

Exhibit 8
Existing 2007 AM Peak Traffic Speeds on SR 167

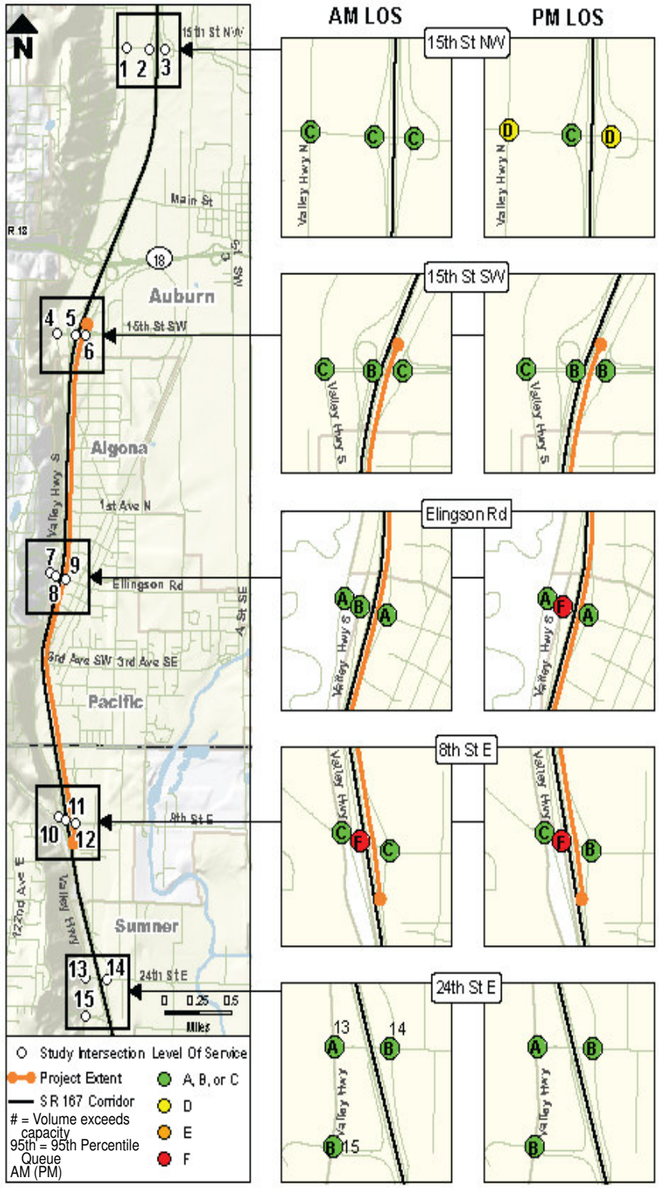


as long as free flow conditions, to travel this section. The travel time from 8th Street E to 15th Street SW is typically three minutes when there is no congestion. It takes almost 4 minutes to travel this section during the morning commute. The section of SR 167 near the SR 18 interchange experiences the highest level of congestion with operating speeds of 20 to 25 mph. About 4,000 vehicles per hour use the section of SR 167 near SR 18 during the PM peak hour.

3.2. Local Intersection Traffic Operations

Exhibit 9 illustrates existing intersection volumes and LOS at the study intersections.

Exhibit 9
Existing 2007 Local Intersection Traffic Volumes and LOS



① 15th St NW at West Valley Highway

21 (73) 61 (517) 155 (480) — 270 (245) 188 (354) 85 (192) — (24) 45 (315) 246 (36) 7 — (25) 70 (122) 872 (161) 193

Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	C (D)	30 (39)	95th	NB (EB)	568 (#526)

② 15th St NW at SR167 Southbound Ramps

152 (172) 1 (0) 397 (688) — 371 (619) 306 (505) — (691) 401 (265) 193

Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	C (C)	27 (34)	95th	SB (SB)	234 (#429)

③ 15th St NW at SR167 Northbound Ramps

402 (525) 535 (929) — (175) 114 (1,204) 684 — (195) 142 (0) 0 (545) 274

Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	C (D)	21 (42)	95th	WB (WB)	327 (#821)

④ 15th St SW at West Valley Highway

158 (1,126) 561 (623) — 438 (602) 59 (354) — (247) 648 (55) 67

Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	C (C)	27 (34)	95th	NB (SB)	606 (#1,264)

⑤ 15th St SW at SR167 Southbound Ramps

30 (245) 0 (0) 270 (365) — 457 (711) — (423) 344 (255) 284

Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	B (C)	12 (17)	95th	SB (SB)	160 (366)

⑥ 15th St SW at SR167 Northbound Ramps

172 (589) — (19) 31 (769) 583 — (267) 341 (0) 33 (152) 146

Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	F (F)	66 (1,321)	95th	SB (SB)	412 (Er)

⑦ Ellingson Road at West Valley Highway

40 (495) 85 (371) — 259 (108) 26 (56 — STOP — (78) 521 (49) 89

Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	A (A)	7 (9)	95th	WB (WB)	89 (70)

⑧ Ellingson Road at SR167 Southbound Ramps

18 (44) 5 (0) 207 (276) — 221 (120) 205 (340) — STOP — (282) 144 (138) 30

Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	C (F)	23 (163)	95th	SB (SB)	211 (705)

⑨ Ellingson Road at SR167 Northbound Ramps

185 (289) 419 (447) — (21) 20 (537) 331 — (13) 53 (0) 0 (210) 297

Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	A (A)	7 (7)	95th	WB (WB)	59 (56)

⑩ 8th St E at West Valley Highway

31 (69) 22 (308) 27 (230) — 159 (37) 434 (461) 8 (67) — (39) 86 (508) 275 (135) 30 — (56) 158 (18) 331 (15) 28

Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	C (C)	23 (33)	95th	NB (EB)	#299 (#455)

⑪ 8th St E at SR167 Southbound Ramps

96 (236) 0 (0) 204 (254) — 505 (329) 165 (358) — STOP — (511) 245 (242) 85

Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	F (F)	66 (1,321)	95th	SB (SB)	412 (Er)

⑫ 8th St E at SR167 Northbound Ramps

293 (270) 552 (602) — (170) 111 (595) 338 — (85) 118 (0) 6 (215) 136

Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	C (B)	23 (11)	95th	WB (WB)	#632 (316)

⑬ 24th St E at West Valley Highway

82 (424) 36 (121) — 295 (70) 157 (220) — (37) 243 (140) 245

Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	A (A)	7 (10)	95th	WB (SB)	60 (99)

⑭ 24th St E at SR167 Northbound Ramps

177 (140) 361 (190) — (40) 43 (221) 238 — (100) 91 (0) 0 (180) 368

Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	B (B)	14 (13)	95th	WB (WB)	131 (72)

⑮ 24th St E at SR167 Southbound Ramps

93 (364) 146 (280) — 231 (105) 49 (35) — (72) 257 (10) 39

Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	B (B)	13 (13)	95th	SB (SB)	120 (191)

Analysis indicates that only one of the study intersections operates at LOS F today during the AM peak hour:

- 8th Street E. and SR 167 southbound ramps

Two of the study intersections currently operate at LOS F during the PM peak hour:

- 8th Street E. and SR 167 southbound ramps
- Ellingson Road and the SR 167 southbound ramps

Both of these locations are stop controlled for the minor approaches, which are the ramps. Both intersections operate worse during the PM peak hour as compared to the AM peak hour.

3.3. Safety Conditions

Historical collision data for SR 167 was collected for the years 2006 through 2008 from WSDOT. This is the most recent data available at the time of the study. Over the three year period, 605 collisions occurred on the SR 167 mainline between 24th Street E. and 15th Street NW, representing an average of 302 collisions per year. Southbound SR 167 had a higher number of collisions than northbound SR 167.

There were no fatalities in the study area during this period. Extension of the HOT lane from 15th Street SW to the south would improve traffic operations and could potentially decrease the likelihood of a collision related to congested traffic conditions.

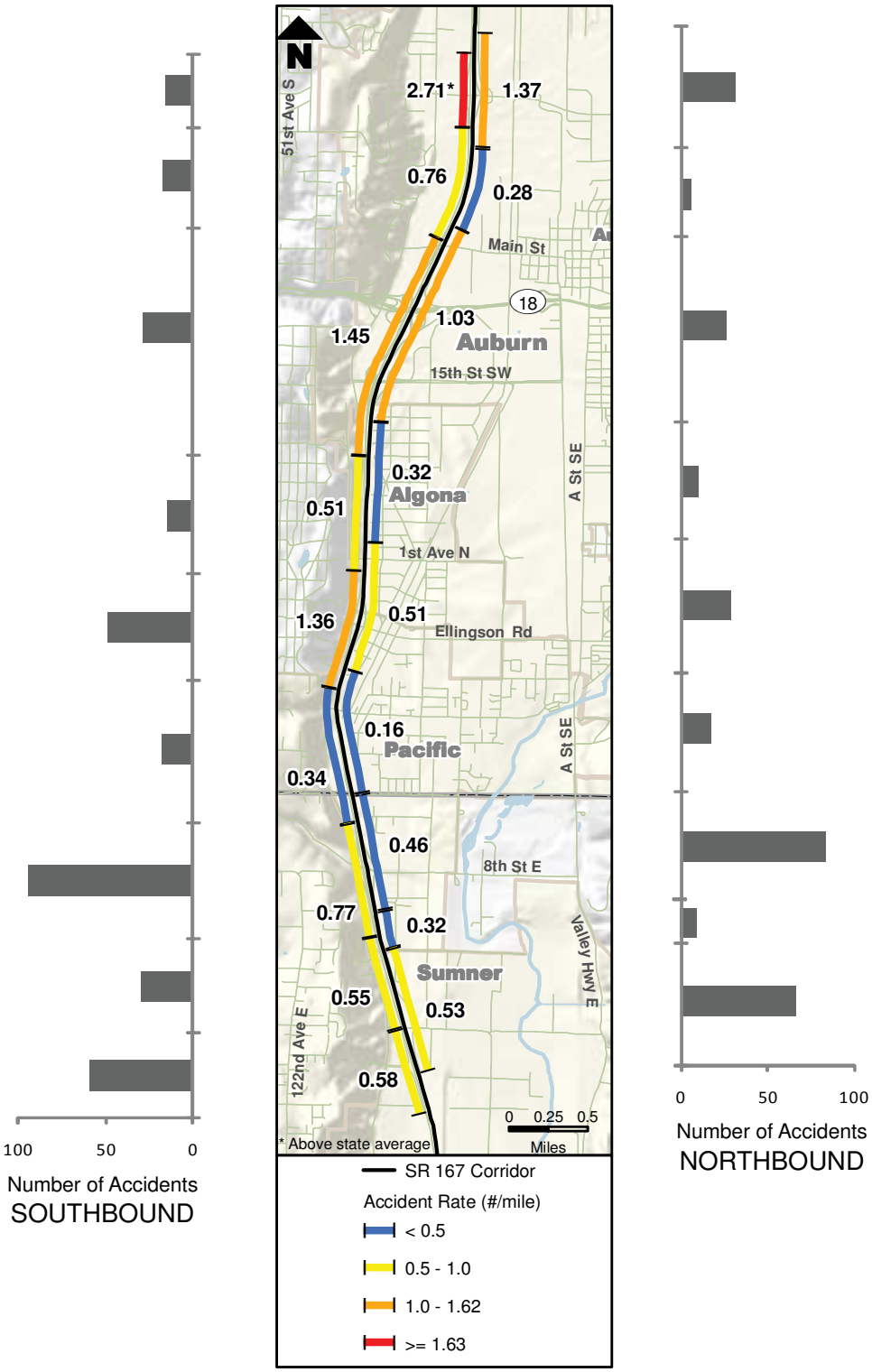
Safety conditions are quantified in terms of collision rates along SR 167. Corridor collision rates are calculated using the following formula:

> Corridor Collision Rate = (Total Collisions per year*1 million)/(365*ADT*Segment Length)

The Corridor Collision Rate is measured in collisions per million vehicle miles (/mvm). The Collision Rate normalizes the number of collisions for the length of the segment and the number of vehicles traveling the segment.

Exhibit 10 illustrates the number of collisions and collision rates along SR 167. The corridor is divided into segments between on and off ramps in the study area. Collisions and collision rates are summarized by these segments.

Exhibit 10
Collision Frequency and Rates along SR 167



A strong relationship exists between collision rates and traffic congestion. Collision rates for SR 167 between 8th Street E and 15th Street SW were less than 1.0/mvm. The collision rate for the 15th Street SW/SR 18 interchange was 1.03/mvm. The State's average for all highways is 1.63/mvm. Only one segment of SR 167 in the study area (southbound SR 167 at the 15th Street NW interchange) had a collision rate (2.71/mvm) that exceeded the State's average.

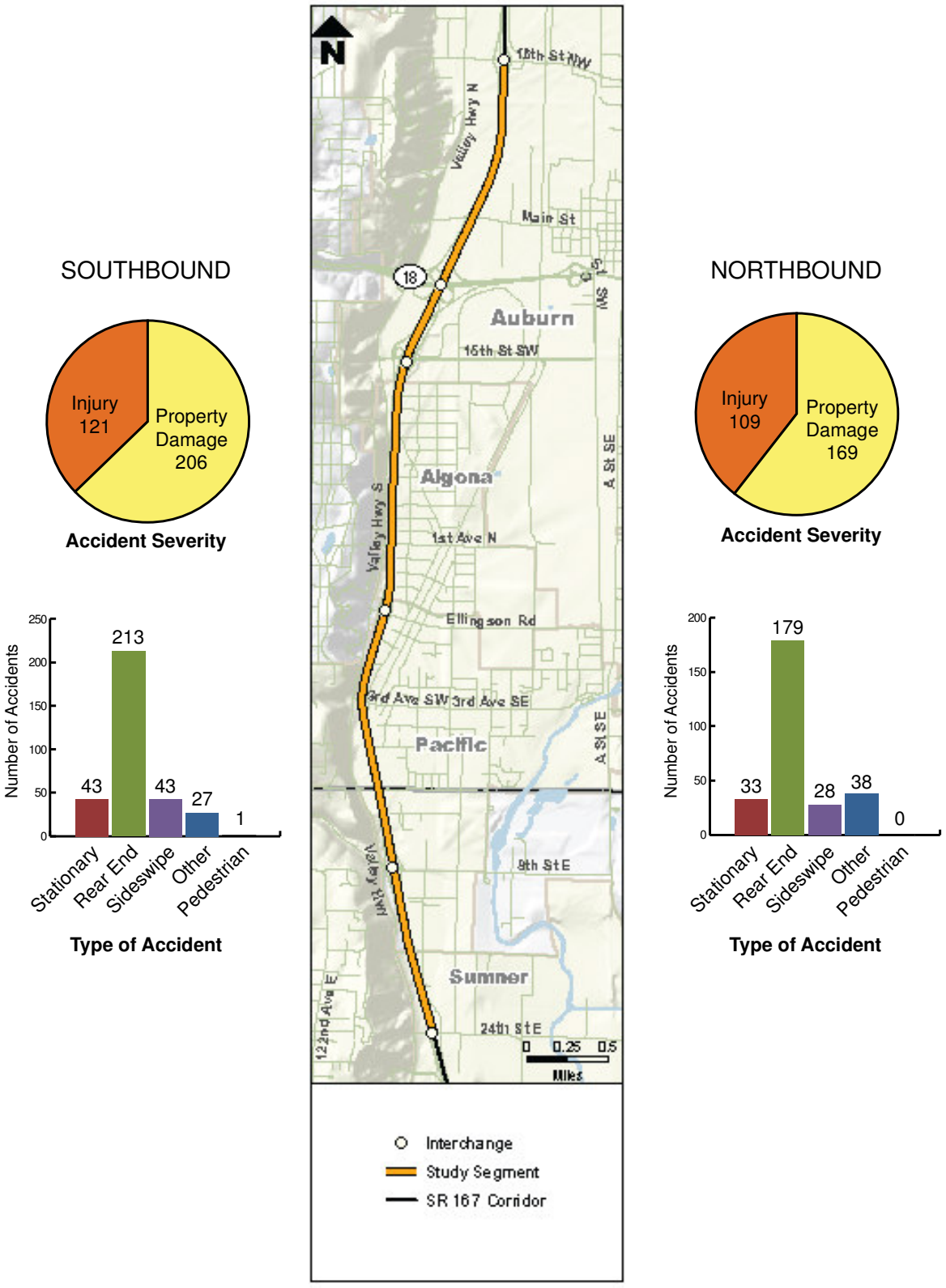
Today, some travel speeds are significantly below the posted speeds along many sections of the corridor. The fluctuation in speeds creates unreliable conditions for the driver leading to rear-end collisions.

The project would not significantly increase the demand on SR 167. The HOT lane would improve the travel speeds and reduce congestion in the GP lanes. Hence, it could potentially improve safety on SR 167 related to congested traffic conditions. The project would not have any negative effects on safety in the study area.

Exhibit 11 illustrates the collision types and severity of collisions. A majority of the collisions on northbound SR 167 (64%) and southbound SR 167 (65%) were rear-end collisions, which is typically associated with congested operating conditions. Other common types were stationary and sideswipe collisions.

Approximately 35-40 percent of all collisions resulted in injury. The rest of them resulted in property damage only **(PDO).** There were no fatalities.

Exhibit 11
Collision Severity and Type along SR 167



3.4. Non-motorized Transportation

Maintaining bicycle and pedestrian access across the SR 167 corridor is important, particularly in urbanized centers where good access to transit stations can encourage commuters to use buses and commuter rail. It is also important to provide the ability for pedestrians and bicyclists to access schools and community facilities on either side of SR 167. **Exhibit 12** depicts bicycle and pedestrian crossings of SR 167 in the study area.

Pedestrians and bicycle riders can use two regional trails in the SR 167 corridor - the Green River Trail and the Interurban Trail. Both trails have paved surfaces with gravel shoulders. The trails intersect the SR 167 corridor right-of-way at under crossings of the highway.

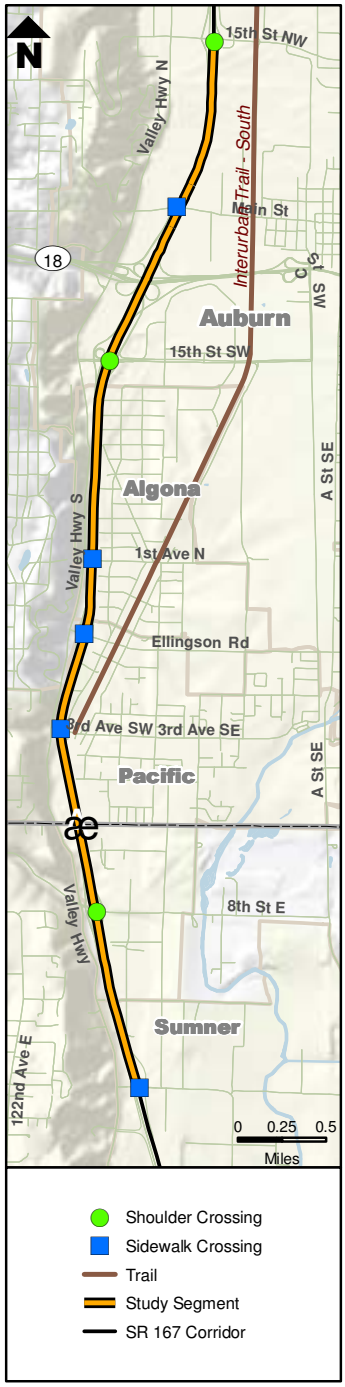
The Green River Trail is 30 miles long and runs from King County's Auburn Narrows Park along the Green River, then crosses under SR 167 near SR 516, and continues north to Alki Point in Seattle. The trail primarily serves the communities of Kent and Tukwila west of SR 167 and the communities of south Kent and Auburn east of SR 167.

The Interurban Trail is 14 miles long from 3rd Avenue SW just south of Pacific to I-405 in Tukwila. The trail parallels the BNSF and UPRR rail tracks and connects to the Green River Trail. The Interurban Trail intersects SR 167 just north of the SR 516 interchange in Kent.

Most pedestrian and bicycle crossings on arterials across SR 167 are spaced one mile apart, which is acceptable for bicyclists but considered too far apart for most pedestrians. Most of the crossings north of 24th Street E. include sidewalks.

The proposed improvements associated with the Build alternative have no impact on existing non-motorized facilities.

Exhibit 12
Pedestrian and Bicycle Facilities on SR 167



4.0. POTENTIAL EFFECTS

As explained earlier in the report, the Washington State Department of Transportation (WSDOT) plans to widen the State Route (SR) 167 roadway to construct a new northbound high-occupancy vehicle (HOV) and high-occupancy toll (HOT) lane from the vicinity of 8th Street E in Pacific (MP 10.2), Pierce County, Washington to the vicinity of 15th Street SW in Auburn (MP 14.26), King County, Washington. A ramp meter will be installed at the northbound on-ramp at Ellingson Road.

The following sections describe possible direct, indirect, and cumulative effects of the Project.

Direct effects are defined as effects that have a direct, cause-and-effect relationship to the proposed action.

Indirect effects are defined as effects that are "caused by an action and are later in time or farther removed in distance but are still reasonably foreseeable" (Federal Regulation on the Protection of the Environment - 40 CFR 1508.8). These effects, which usually result from the initial action, include changes in land use, water quality, social issues, and population density.

Cumulative effects are those that "result from incremental consequences of an action when added to other past, present, and reasonably foreseeable future actions." The cumulative effects of a project may be undetectable when viewed in the individual context of direct or indirect effects. However, cumulative effects can add to other disturbances and eventually lead to a measurable environmental change.

This report describes only the direct effects of the proposed project on the transportation system of the study area.

4.1. Freeway Operations

Congestion on SR 167 is highest in the northbound direction in the morning and southbound in the afternoon. The corridor operates under near free-flow conditions in the study area northbound in the PM peak and southbound in the AM peak.

Since the proposed improvements address northbound operational issues, traffic analysis for the freeway is focused on northbound and AM peak conditions only. SR 167 traffic volumes are presented for the PM peak.

The freeway operations for the Build alternative were evaluated against the No Build alternative, under which the HOT lanes on northbound SR 167 from 8th Street to 15th Street SW would not be built.

Exhibit 13 illustrates freeway traffic forecasts and operations on northbound SR 167 during the AM peak hour. **Exhibit 14** illustrates freeway traffic forecasts and operations on northbound SR 167 averaged over the 3-hour AM peak period. These results are summarized by three major subareas – south of 8th Street E, between 8th Street E and 15th Street SW, and north of 15th Street SW. The results presented under individual alternative discussion are more detailed; they are summarized by segments between interchanges in the study area.

Exhibit 13
Northbound SR 167 Forecast and Operations - AM Peak Hour

All Lanes	2007 Existing	2020 No Build	2020 Build	2040 No Build	2040 Build
Average volume demand (vph)	3,400	4,000	4,100	4,000	4,100
s/o 8th Street E	3,300	3,500	3,700	3,700	3,800
s/o 15th Street SW	3,000	3,300	3,600	3,400	3,600
n/o 15th Street SW	4,000	5,100	4,900	4,900	4,900
Average volume served (vph)	3,200	3,200	3,400	3,400	3,500
s/o 8th Street E	3,300	3,300	3,500	3,500	3,500
s/o 15th Street SW	2,900	2,800	3,400	3,000	3,300
n/o 15th Street SW	3,400	3,500	3,400	3,600	3,600
Volume Served / Demand Ratio	94%	80%	83%	85%	85%
s/o 8th Street E	100%	94%	95%	95%	92%
s/o 15th Street SW	97%	85%	94%	88%	92%
n/o 15th Street SW	85%	69%	69%	73%	73%

Exhibit 13
Northbound SR 167 Forecast and Operations - AM Peak Hour (Cont.)

GP Lanes	2007 Existing	2020 No Build	2020 Build	2040 No Build	2040 Build
Average speed (24th Street E to 15th Street NW), miles per hour	32	27	30	27	34
Average volume demand (vph)	3,200	3,500	3,600	3,500	3,500
s/o 8th Street E	3,300	3,500	3,700	3,700	3,800
s/o 15th Street SW	2,900	3,100	3,500	3,200	3,400
n/o 15th Street SW	3,300	3,700	3,600	3,700	3,500
Average volume served (vph)	3,000	2,900	3,100	3,100	3,200
s/o 8th Street E	3,300	3,300	3,500	3,500	3,500
s/o 15th Street SW	2,800	2,600	3,200	2,800	3,100
n/o 15th Street SW	3,000	2,800	2,700	3,000	2,800
Volume Served / Demand Ratio	94%	83%	86%	89%	91%
s/o 8th Street E	100%	94%	95%	95%	92%
s/o 15th Street SW	97%	84%	91%	88%	91%
n/o 15th Street SW	91%	76%	75%	81%	80%

HOT Lanes	2007 Existing	2020 No Build	2020 Build	2040 No Build	2040 Build
Average speed (24th Street E to 15th Street NW), miles per hour	42	45	44	42	43
Average volume demand (vph)	700	1,200	1,100	1,100	1,200
s/o 15th Street SW			1,000		1,100
n/o 15th Street SW	700	1,200	1,200	1,100	1,300
Average volume served	400	600	800	600	800
s/o 15th Street SW			900		900
n/o 15th Street SW	400	600	700	600	800

Exhibit 14
Northbound SR 167 Forecast and Operations – 3-Hour AM Peak Period

All Lanes	2007 Existing	2020 No Build	2020 Build	2040 No Build	2040 Build
Average volume demand (vph)	2,900	3,300	3,400	3,300	3,400
s/o 8th Street E	2,700	2,900	3,100	3,100	3,200
s/o 15th Street SW	2,500	2,700	3,000	2,800	3,000
n/o 15th Street SW	3,300	4,200	4,100	4,000	4,100
Average volume served (vph)	2,800	3,000	3,100	3,200	3,200
s/o 8th Street E	2,700	2,900	3,100	3,100	3,100
s/o 15th Street SW	2,500	2,600	3,000	2,800	3,000
n/o 15th Street SW	3,200	3,500	3,400	3,600	3,600
Volume Served / Demand Ratio	97%	91%	91%	97%	94%
s/o 8th Street E	100%	100%	100%	100%	97%
s/o 15th Street SW	100%	96%	100%	100%	100%
n/o 15th Street SW	97%	83%	83%	90%	88%

GP Lanes	2007 Existing	2020 No Build	2020 Build	2040 No Build	2040 Build
Average speed (24th Street E to 15th Street NW), miles per hour	36	30	33	30	38
Average volume demand (vph)	2,600	2,900	3,000	2,900	3,000
s/o 8th Street E	2,700	2,900	3,100	3,100	3,200
s/o 15th Street SW	2,400	2,600	2,900	2,700	2,800
n/o 15th Street SW	2,700	3,100	3,000	3,000	2,900
Average volume served (vph)	2,600	2,800	2,900	2,900	2,900
s/o 8th Street E	2,700	2,900	3,100	3,100	3,100
s/o 15th Street SW	2,400	2,500	2,900	2,700	2,800
n/o 15th Street SW	2,700	2,900	2,700	3,000	2,800
Volume Served / Demand Ratio	100%	97%	97%	100%	97%
s/o 8th Street E	100%	100%	100%	100%	97%
s/o 15th Street SW	100%	96%	100%	100%	100%

Exhibit 14
Northbound SR 167 Forecast and Operations – 3-Hour AM Peak Period (Cont.)

n/o 15th Street SW	100%	94%	90%	100%	97%
HOT Lanes	**2007 Existing**	**2020 No Build**	**2020 Build**	**2040 No Build**	**2040 Build**
Average speed (24th Street E to 15th Street NW), miles per hour	42	45	44	42	44
Average volume demand (vph)	500	1,000	900	900	1,000
s/o 15th Street SW			800		900
n/o 15th Street SW	500	1,000	1,000	900	1,100
Average volume served	400	600	700	600	800
s/o 15th Street SW			800		800
n/o 15th Street SW	400	600	700	600	800

The traffic operations for the peak hour are, in general, slightly worse than those averaged over the 3-hour peak period. For the comparison of freeway operations between No Build and Build alternatives, the reference to the peak traffic operations would generally apply to both peak hour and the peak period, unless specifically noted.

4.1.1 2020 No Build Alternative

Exhibits 15 and **16** illustrate the hourly traffic volumes on SR 167 for the 2020 No Build alternative, compared to the Build alternative, during the AM and PM peaks, respectively.

Exhibit 15
2020 No Build and Build AM Peak Hour SR 167 Traffic Volumes

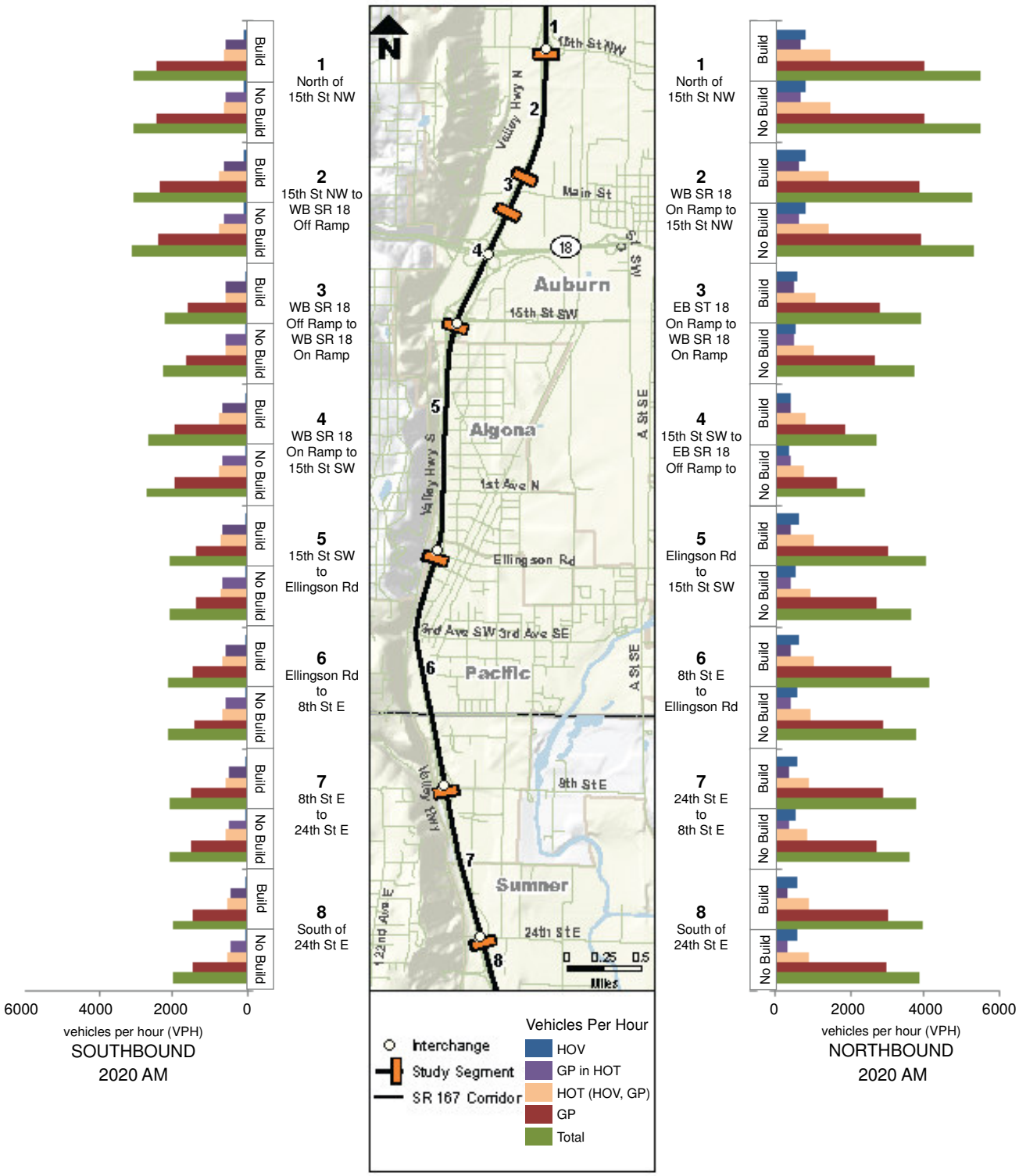
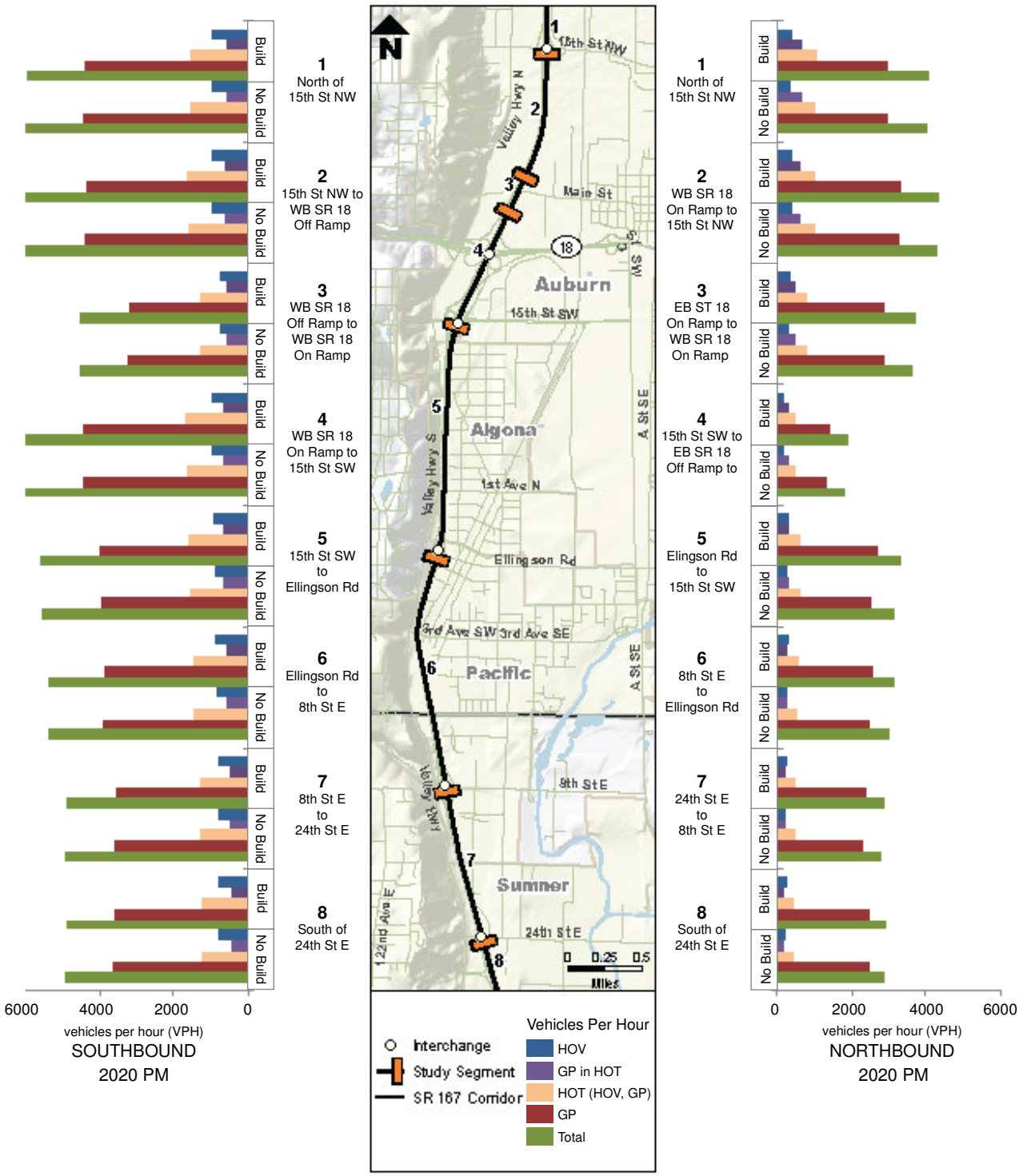


Exhibit 16
2020 No Build and Build PM Peak Hour SR 167 Traffic Volumes

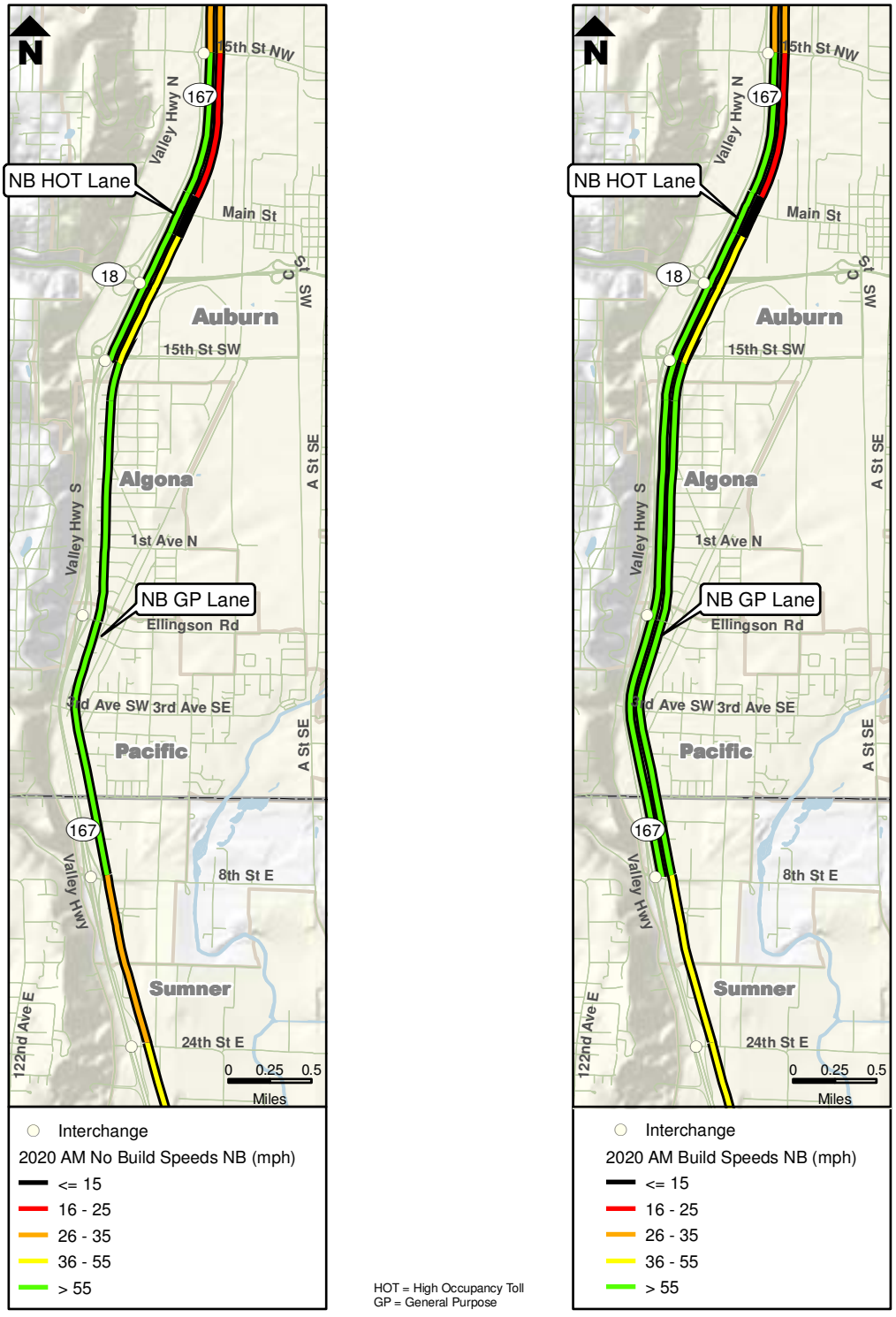


Detailed traffic forecasts are provided in **Appendix B**. The volumes are classified into general purpose (GP) volume, and HOT lane volume. In the year 2020, under the No Build alternative, the AM peak travel demand on SR 167 northbound mainline between 8th Street E and 15th Street SW would increase by 9 percent compared to existing conditions. The peak hour on-ramp traffic from 8th Street E and Ellingson Road would each increase by 17%. The increase in mainline SR 167 traffic volumes between 2007 and the year 2020 would be higher north of 15th Street SW than south of 15th Street SW. This is because the traffic from SR 18 and 15th Street SW to northbound SR 167 is expected to grow by 25%.

The growth in traffic demand is expected to result in greater congestion than what occurs today. The traffic demand between 8th Street E and 15th Street SW would grow by 9%, however, the limited capacity will constrain throughput (compared to existing conditions). Throughput on northbound SR 167 between 8th Street E and 15th Street SW is expected to decrease from 95% of the demand in existing conditions to 83% of the demand in the 2020 No Build alternative due to insufficient capacity in this segment, and also due to the effect of congestion downstream around the SR 18 interchange.

Exhibit 17 illustrates the AM peak period traffic speeds on SR 167 for the year 2020, under the No Build alternative, as compared to the Build alternative.

Exhibit 17
2020 No Build and Build AM Peak SR 167 Traffic Speeds



The travel time from 24th Street E to 15th Street NW is expected to increase from 11 minutes under existing conditions to more than 14 minutes in 2020, during the morning commute. The travel time for GP traffic from 8th Street E to 15th Street SW is expected to increase from 4 minutes under existing conditions to 5 minutes in 2020 during the morning commute. The section of SR 167 near the SR 18 interchange will experience the highest level of congestion with operating speeds of 20 to 25 mph. The traffic demand on mainline SR 167 around the SR 18 interchange is expected to increase from 4,000 vehicles per hour today, to 5,000 vehicles per hour in 2020, during the morning commute. The travel time does not completely capture delays experienced by vehicles in queue outside the study area, since the VISSIM model only extends one interchange beyond the project. In 2020, approximately 1500 vehicles per hour are in queue on northbound SR 167 north of 15th Street SW.

Travel speeds at the 8th Street E interchange are expected to decrease from 35 miles per hour during the AM peak period today, to 23 miles per hour in 2020 (a 33% decrease). The speeds south of the 8th Street E interchange are expected to be about half of the existing speeds; they would drop from 51 miles per hour today to 29 miles per hour in 2020. The speeds at the 15th Street SW/SR18 interchange are expected to decrease by about half of existing speeds, from 15-25 miles per hour today to 10-15 miles per hour in 2020.

4.1.2. 2020 Build Alternative

The Build alternative would provide relief for about 900 vehicles per hour (vph) with an average speed of 60 mph in the HOT lane. The use of the HOT lane therefore results in improved traffic operations in the GP lanes.

The travel speeds at the 8th Street E interchange are expected to increase from 25 miles per hour without the project to 42 miles per hour with the project. Speeds south of the 8th Street E interchange are expected to increase about twofold, from 29 miles per hour to 54 miles per hour. The VISSIM simulation

showed that extending the starting point of the HOT lane south of the on ramp from 8th Street E would mitigate the disruption to mainline traffic caused due to aggressive lane changing by traffic from the 8th Street E on ramp accessing the HOT lane. If the HOT lane is extended a few hundred feet south of the on ramp, the mainline SR 167 traffic will have an opportunity to enter the HOT lane before the 8th Street E on ramp traffic enters SR 167.

Traffic speed and density at the 15th Street SW and SR 18 interchanges are expected to improve marginally with the provision of a continuous HOT lane at that location. The travel speeds in the rest of the study area would not change significantly from the No Build alternative.

The throughput on northbound SR 167 between 8th Street E and 15th Street SW is expected to increase from 83% of the demand in the No Build to 92% of the demand in the Build alternative.

4.1.3. 2040 No Build Alternative

Exhibits 18 and **19** illustrate the hourly traffic volumes on SR 167 for 2040 No Build and Build alternatives during the AM and PM peaks, respectively. Detailed traffic forecasts are provided in **Appendix B**.

Exhibit 18
2040 No Build and Build AM Peak Hour SR 167 Traffic Volumes

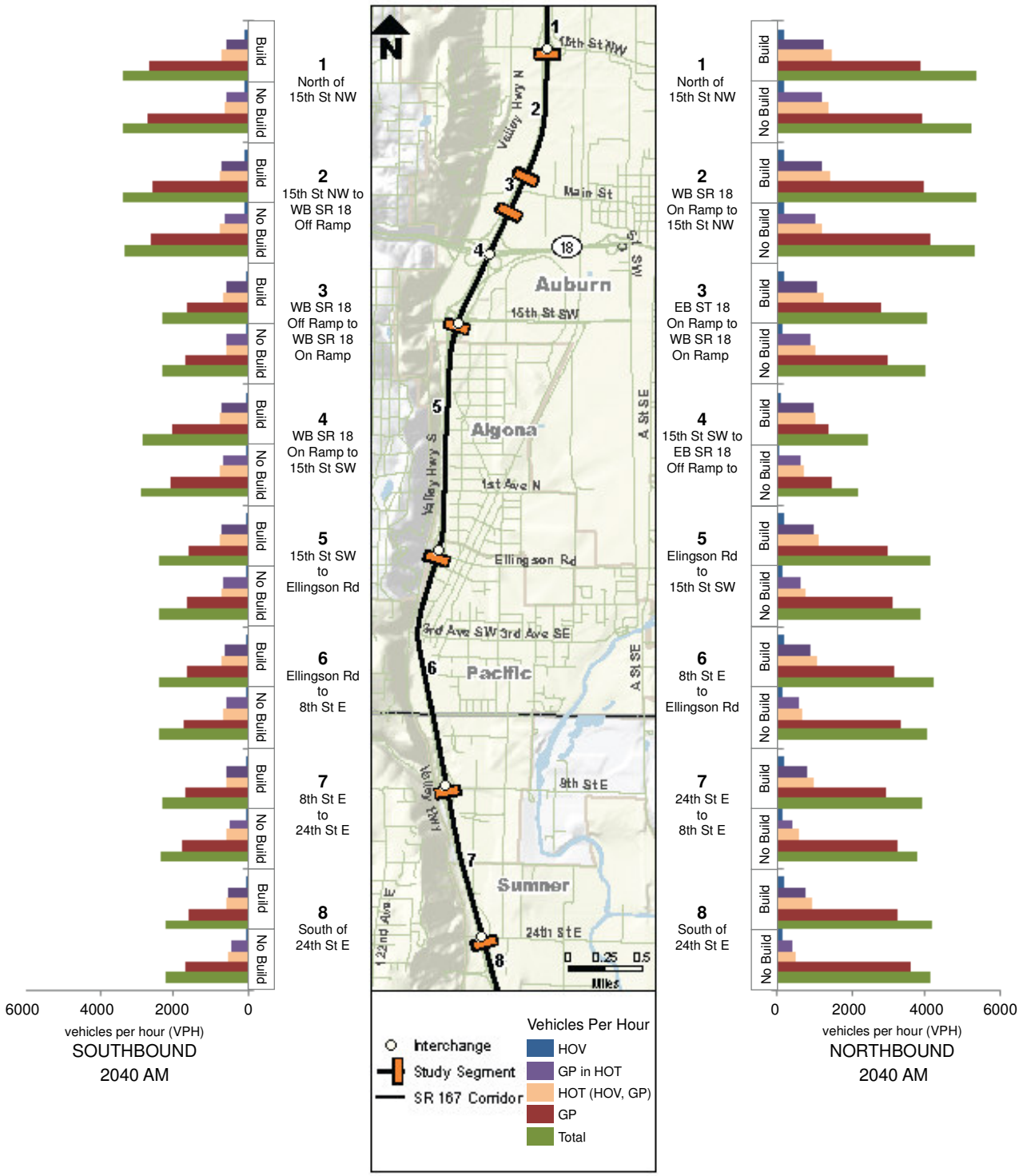
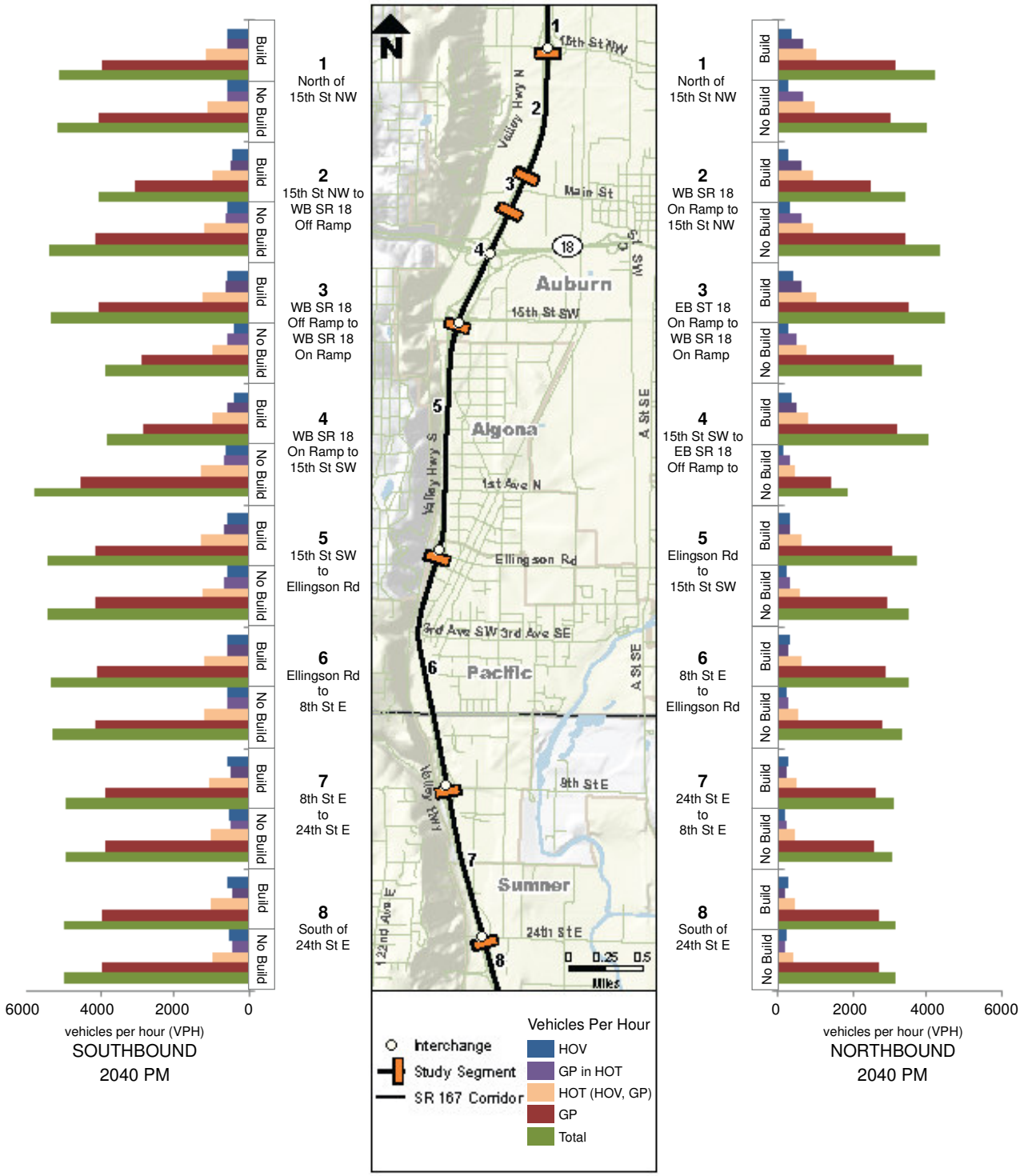


Exhibit 19
2040 No Build and Build PM Peak Hour SR 167 Traffic Volumes

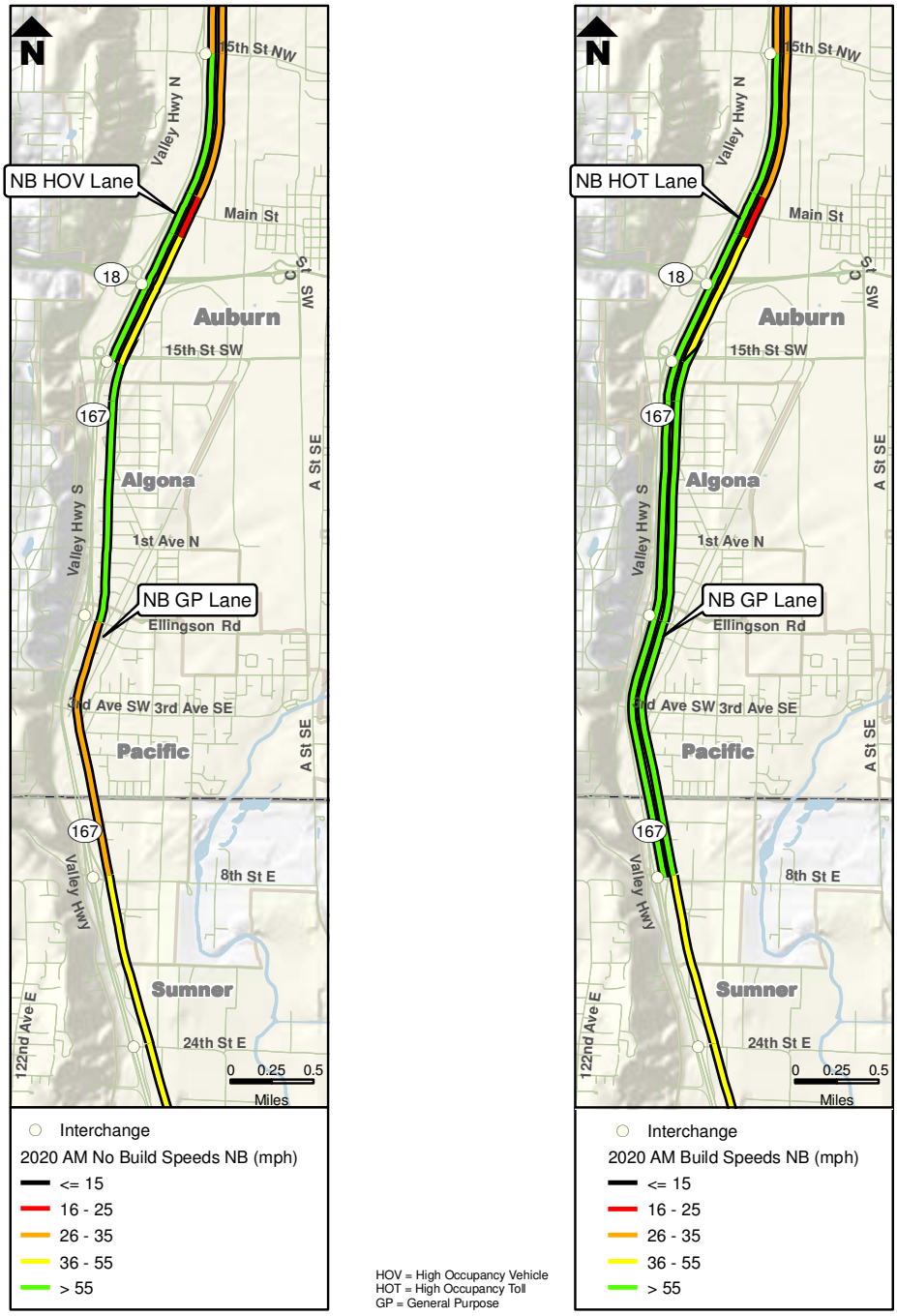


In the year 2040 under the No Build alternative, travel demand on SR 167 northbound mainline between 8th Street E and 15th Street SW would increase by more than 12 percent compared to existing conditions. The increase is not much more than the increase from existing to 2020. By 2040, congestion on the overall SR 167 corridor and I-405 is expected to increase significantly enough to divert some traffic to pursue alternative routes to their destinations. As an example, the on ramp traffic from EB SR 18 and 15th Street SW would increase by about 70% from existing conditions, but the traffic from WB SR 18 would increase by less than 5%, because motorists pursue alternative routes to go north and east of the area. The on ramp traffic from 8th Street E and Ellingson Road would increase by about 60% from existing conditions. Because of this, traffic volumes on some sections of SR 167 in the study area would be lower in 2040 than in 2020, and hence, traffic operations would be better. The increase in mainline SR 167 traffic volumes from existing to 2040 would be lower north of 15th Street SW than south of 15th Street SW because the traffic from WB SR 18 to northbound SR 167 is not expected to grow much as compared to existing conditions.

The growth in traffic demand is expected to worsen the travel conditions that are already currently congested. Even though the traffic demand between 8th Street E and 15th Street SW would each grow by 12%, throughput is expected to remain the same as today due to insufficient capacity in this segment, and also due to the effect of congestion downstream around the SR 18 interchange.

Exhibit 20 illustrates the AM peak period traffic speeds on SR 167 for the 2040 No Build and Build alternatives.

Exhibit 20
2040 No Build and Build AM Peak SR 167 Traffic Speeds



The travel time for GP traffic from 24th Street E to 15th Street NW is expected to increase from 11 minutes under existing conditions to about 14 minutes in 2040 during the morning commute. The travel time from 8th Street E to 15th Street SW is expected to increase from 4 minutes under existing conditions to 6 minutes in 2040 during the morning commute. The section of SR 167 near the SR 18 EB on ramp will experience significant congestion with operating speeds below 20 mph, but the merge from SR 18 WB traffic is not expected to get worse since the traffic volume from EB SR 18 to NB SR 167 would not increase considerably by 2040. Traffic demand on mainline SR 167 around the SR 18 interchange is expected to increase from 4,000 vehicles per hour to about 5,000 vehicles per hour during the morning commute. The travel time does not completely capture delays experienced by vehicles in queue outside the study area, since the VISSIM model only extends one interchange beyond the project. Approximately 1300 vehicles per hour are in queue on northbound SR 167 north of 15th Street SW.

Travel speeds at the 8th Street E interchange are expected to decrease, by about 15%, from 35 miles per hour today to 29 miles per hour in 2040. The speeds south of the 8th Street E interchange are expected to drop from 46 miles per hour to 40 miles per hour. Due to the significant growth in on ramp traffic from 8th Street E, the speeds between 8th Street E and Ellingson Road would drop from 55-60 miles per hour today to 25-35 miles per hour in 2040.

4.1.4. 2040 Build Alternative

The Build alternative would provide relief for about 900 vehicles per hour (vph) with an average speed of 60 mph in the HOT lane. Because of this, traffic operations in the GP lanes are also improved.

The travel time in 2040 for GP traffic from 24th Street E to 15th Street NW is expected to decrease from 14 minutes under the No Build alternative to 11 minutes under the Build alternative during the morning commute. The travel time from 8th Street E to 15th Street SW is expected to decrease from 6 minutes under

existing conditions to less than 4 minutes during the morning commute.

The travel speeds for GP traffic at the 8th Street E interchange are expected to increase twofold from 29 miles per hour under the No Build, to 55 miles per hour with the project. Speeds south of the 8th Street E interchange are expected to increase from 40 miles per hour under No Build, to 54 miles per hour with the project. Traffic congestion between the 8th Street E and Ellingson Road interchanges would be relieved with the project. The speeds are expected to improve from 30-40 miles per hour under No Build to above 55 miles per hour with the project. Traffic speed and density at the SR 18 and 15th Street SW interchanges are expected to improve marginally with the provision of a continuous HOT lane at that location. The travel speeds in the rest of the study area would not change significantly as compared to the No Build alternative.

The throughput on northbound SR 167 between 8th Street E and 15th Street SW is expected to increase from 88% of the demand in the No Build alternative to 92% of the demand in the Build alternative.

4.2. Local Intersection Operations

Intersection operations are summarized in terms of average delay per vehicle and LOS. Intersections are assigned a level of service letter grade from "A" to "F", where LOS A represents minimal vehicular delay and LOS F represents maximum delay or congestion. For intersections that are controlled by stop signs, the LOS is reported in terms of average delay per vehicle. But delay and LOS for the worst approach is also evaluated for mitigation consideration. For intersections that are controlled by traffic signals, the LOS reported is an average of all approaches. The level of service at the study intersections was evaluated using the Synchro traffic analysis software (Build 761).

For unsignalized locations where operations are at LOS F under the Build Alternative, the intersections were re-analyzed assuming a signal was installed, (if signal warrants were met) and channelization improvements were identified that would

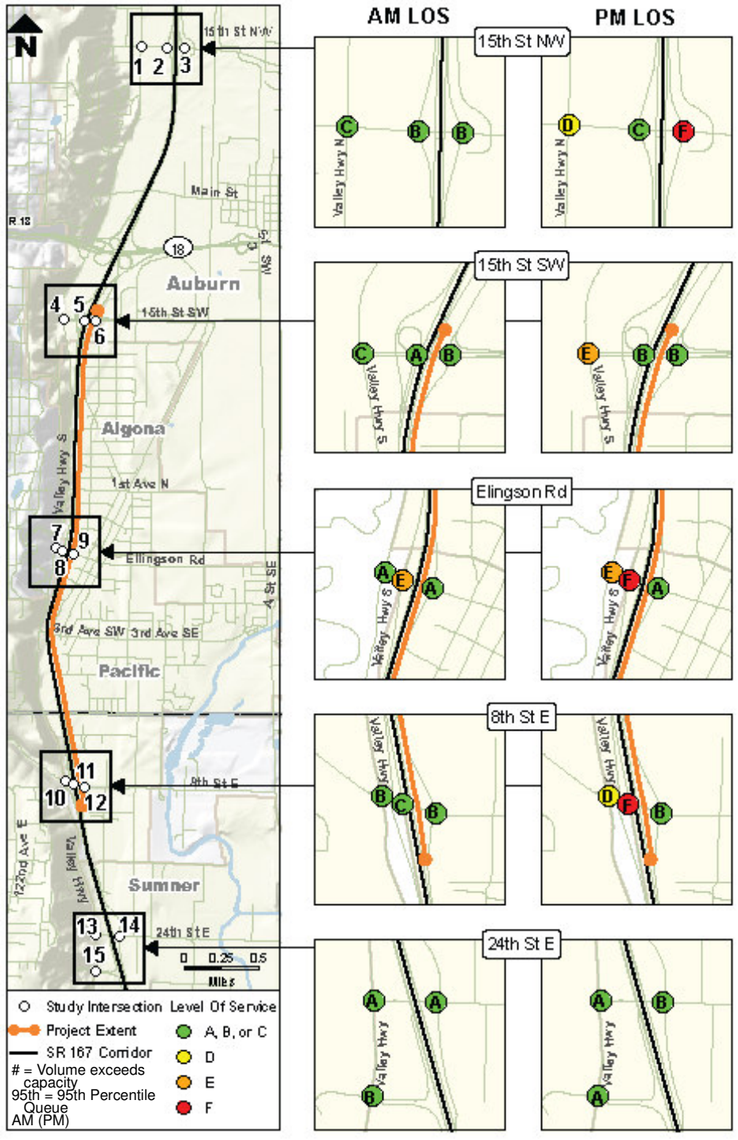
provide LOS E or better operations. At some locations a northbound turn lane was necessary in the AM and a southbound turn lane in the PM. The results shown for AM and PM do not combine improvements identified in the AM and PM analyses. This is done so that the causes of intersection LOS failure in the AM can be understood as opposed to PM, and hence, decide what improvements are most worth the investment.

For signalized locations, improvements are proposed for the Build alternative to improve the operations / delay to LOS E or better when compared to the No Build alternative.

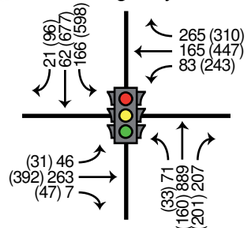
4.2.1. 2020 No Build and Build Alternatives

Exhibits 21 and **22** illustrate the peak hour intersection traffic volumes and LOS for 2020 No Build and Build alternatives, respectively. For the future year scenarios, traffic signals are optimized and coordinated along each arterial in the study area. The only improvement planned between today and year 2020 is the widening of eastbound 8th Street E from West Valley Highway past the SR 167 NB ramps.

Exhibit 21
2020 No Build Local Intersection Traffic Volumes and LOS

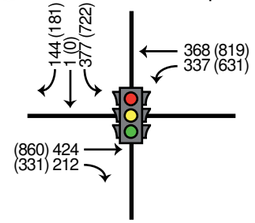


① 15th St NW at West Valley Highway



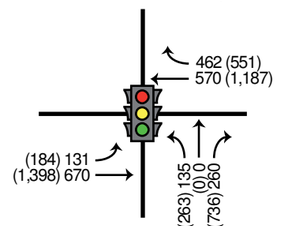
	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	C (D)	25 (44)	95th	NB (SB)	#459 (#666)

② 15th St NW at SR167 Southbound Ramps



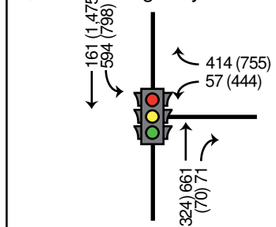
	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	B (C)	13 (24)	95th	SB (SB)	123 (390)

③ 15th St NW at SR167 Northbound Ramps



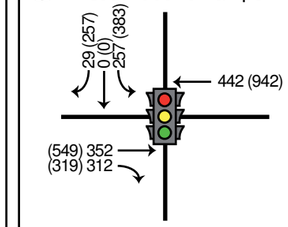
	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	B (F)	11 (92)	95th	WB (WB)	172 (#1,054)

④ 15th St SW at West Valley Highway



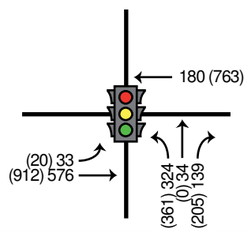
	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	C (E)	22 (80)	95th	NB (SB)	#474 (#1,677)

⑤ 15th St SW at SR167 Southbound Ramps



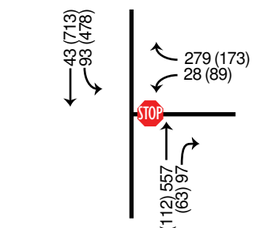
	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	A (B)	8 (16)	95th	SB (SB)	112 (322)

⑥ 15th St SW at SR167 Northbound Ramps



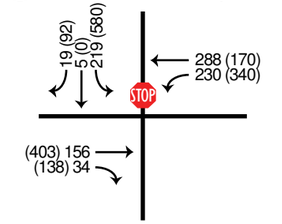
	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	B (B)	14 (12)	95th	NB (NB)	187 (185)

⑦ Ellingson Road at West Valley Highway



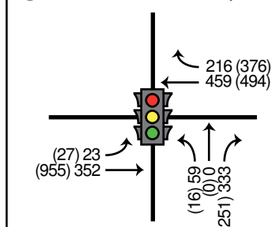
	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	A (E)	8 (49)	95th	WB (WB)	115 (257)

⑧ Ellingson Road at SR167 Southbound Ramps



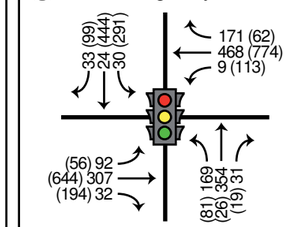
	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	E (F)	49 (3,902)	95th	SB (SB)	339 (Er)

⑨ Ellingson Road at SR167 Northbound Ramps



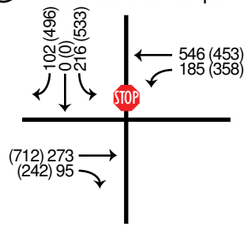
	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	A (A)	7 (9)	95th	WB (EB)	64 (170)

⑩ 8th St E at West Valley Highway



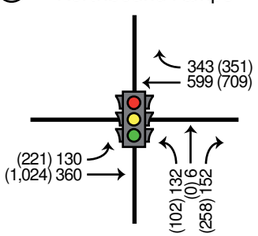
	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	B (D)	14 (40)	95th	NB (SB)	#285 (#544)

⑪ 8th St E at SR167 Southbound Ramps



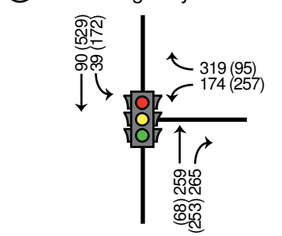
	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	C (F)	23 (1,912)	95th	SB (SB)	268 (Er)

⑫ 8th St E at SR167 Northbound Ramps



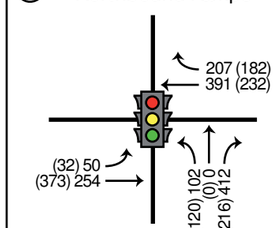
	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	B (B)	14 (19)	95th	WB (WB)	#210 (#302)

⑬ 24th St E at West Valley Highway



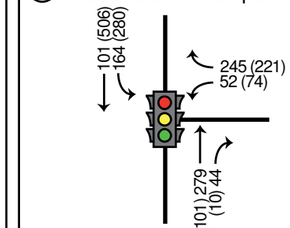
	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	A (A)	6 (10)	95th	WB (SB)	54 (197)

⑭ 24th St E at SR167 Northbound Ramps



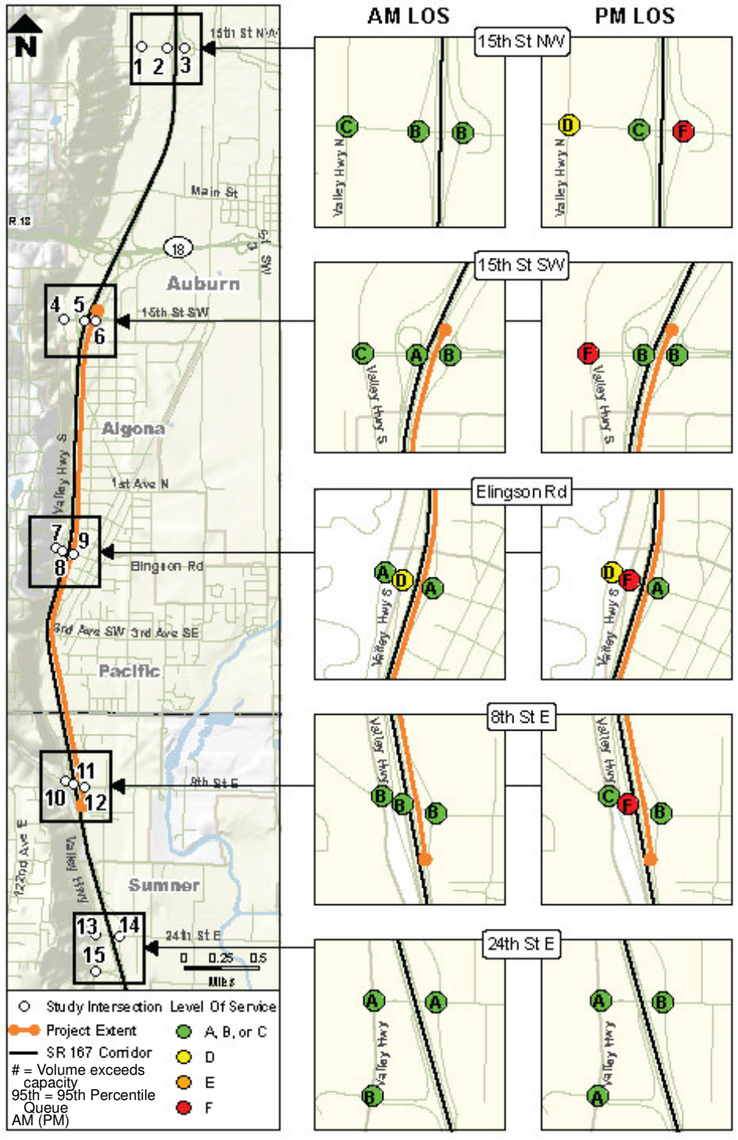
	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	A (B)	7 (11)	95th	WB (EB)	79 (74)

⑮ 24th St E at SR167 Southbound Ramps

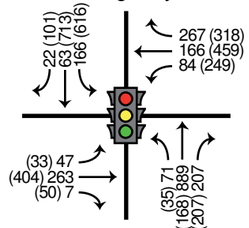


	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	B (A)	11 (9)	95th	SB (SB)	108 (150)

Exhibit 22
2020 Build Local Intersection Traffic Volumes and LOS

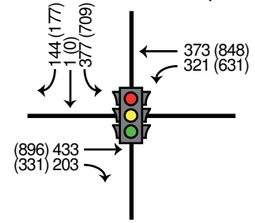


① 15th St NW at West Valley Highway



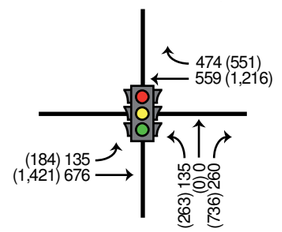
	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	C (D)	25 (49)	95th	NB (SB)	#472 (#731)

② 15th St NW at SR167 Southbound Ramps



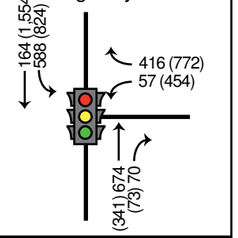
	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	B (C)	13 (26)	95th	SB (SB)	123 (410)

③ 15th St NW at SR167 Northbound Ramps



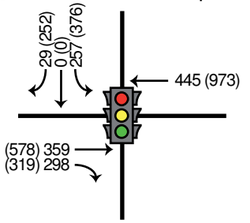
	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	B (F)	11 (93)	95th	WB (WB)	167 (#1,146)

④ 15th St SW at West Valley Highway



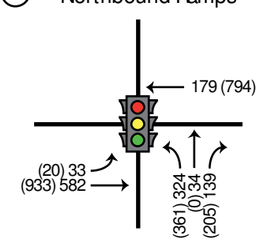
	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	C (F)	22 (91)	95th	NB (SB)	#489 (#1,779)

⑤ 15th St SW at SR167 Southbound Ramps



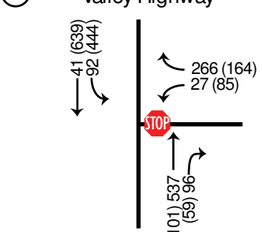
	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	A (B)	8 (16)	95th	SB (SB)	112 (318)

⑥ 15th St SW at SR167 Northbound Ramps



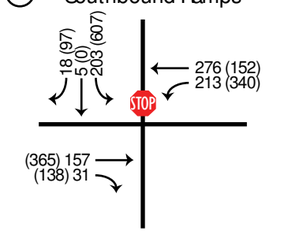
	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	B (B)	14 (12)	95th	NB (NB)	187 (185)

⑦ Ellingson Road at West Valley Highway



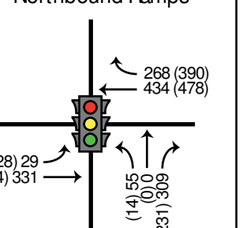
	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	A (D)	7 (32)	95th	WB (WB)	98 (212)

⑧ Ellingson Road at SR167 Southbound Ramps



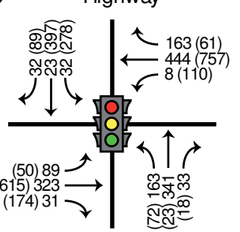
	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	D (F)	31 (4,154)	95th	SB (SB)	257 (Er)

⑨ Ellingson Road at SR167 Northbound Ramps



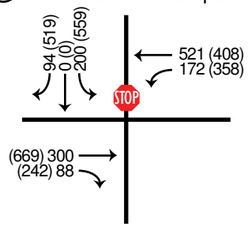
	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	A (A)	6 (8)	95th	WB (EB)	55 (161)

⑩ 8th St E at West Valley Highway



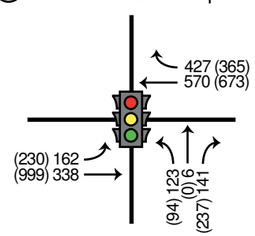
	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	B (C)	13 (31)	95th	NB (SB)	#234 (#482)

⑪ 8th St E at SR167 Southbound Ramps



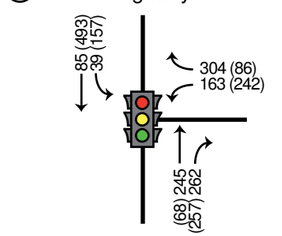
	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	C (F)	14 (2,034)	95th	SB (SB)	200 (Er)

⑫ 8th St E at SR167 Northbound Ramps



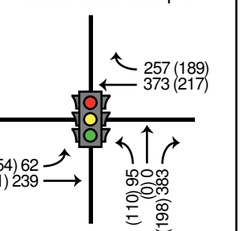
	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	B (B)	14 (17)	95th	WB (WB)	#195 (#296)

⑬ 24th St E at West Valley Highway



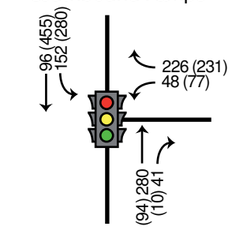
	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	A (A)	6 (7)	95th	WB (SB)	54 (131)

⑭ 24th St E at SR167 Northbound Ramps



	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	A (B)	7 (11)	95th	WB (EB)	74 (72)

⑮ 24th St E at SR167 Southbound Ramps



	Delay		Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	B (A)	10 (10)	95th	SB (SB)	102 (150)

During the AM peak hour (under 2020 No Build), traffic volumes on arterials in the study area would increase by 20 to 30 percent as compared with existing conditions. The NB SR 167 on ramp volume at Ellingson Road and 8th Street E would increase by about 17% from existing conditions to 2020 No Build.

The intersection LOS for 8th Street E at West Valley Highway, SR 167 SB ramps and SR 167 NB ramps would improve from under the 2020 No Build alternative with the addition of an eastbound through lane on 8th Street E. The ramp terminal intersections on 15th Street NW and 15th Street SW would improve slightly from existing conditions, due to coordinating and optimizing the signals along 15th Street NW and 15th Street SW. In the AM peak hour, none of the study intersections would operate at LOS F. The intersection of 8th Street E at SR 167 SB ramps, which currently operates at LOS F, would improve to LOS C with the additional eastbound lane on 8th Street E.

With the project, the AM peak traffic volumes and LOS at local arterial intersections would not change significantly.

In the PM peak hour (under 2020 No Build), traffic volumes on arterials in the study intersections would increase by 20 to 30 percent. The SB SR 167 off ramp volume at Ellingson Road and 8th Street E would increase by more than 100% from existing conditions to the 2020 No Build.

The following intersections would deteriorate to LOS F from existing conditions to the 2020 No Build alternative:

- 15th Street NW at SR 167 NB ramps

The addition of a WB right turn pocket at this intersection would improve the LOS from F to D.

With the project, traffic volumes on arterials would not change significantly. The slight increase in traffic volumes on arterials can be attributed to increased demand for SR 167. But the difference in volumes is not significant enough to change the LOS from the No Build alternative to the Build alternative. The intersection of 15th Street NW at SR 167 NB ramps would operate at LOS F under the Build alternative, as it would under

the No Build alternative. The addition of a WB right turn pocket would improve the LOS from F to D.

4.2.2. 2040 No Build and Build Alternatives

Exhibits 23 and **24** illustrate the peak hour intersection traffic volumes and LOS for 2040 No Build and Build alternatives, respectively.

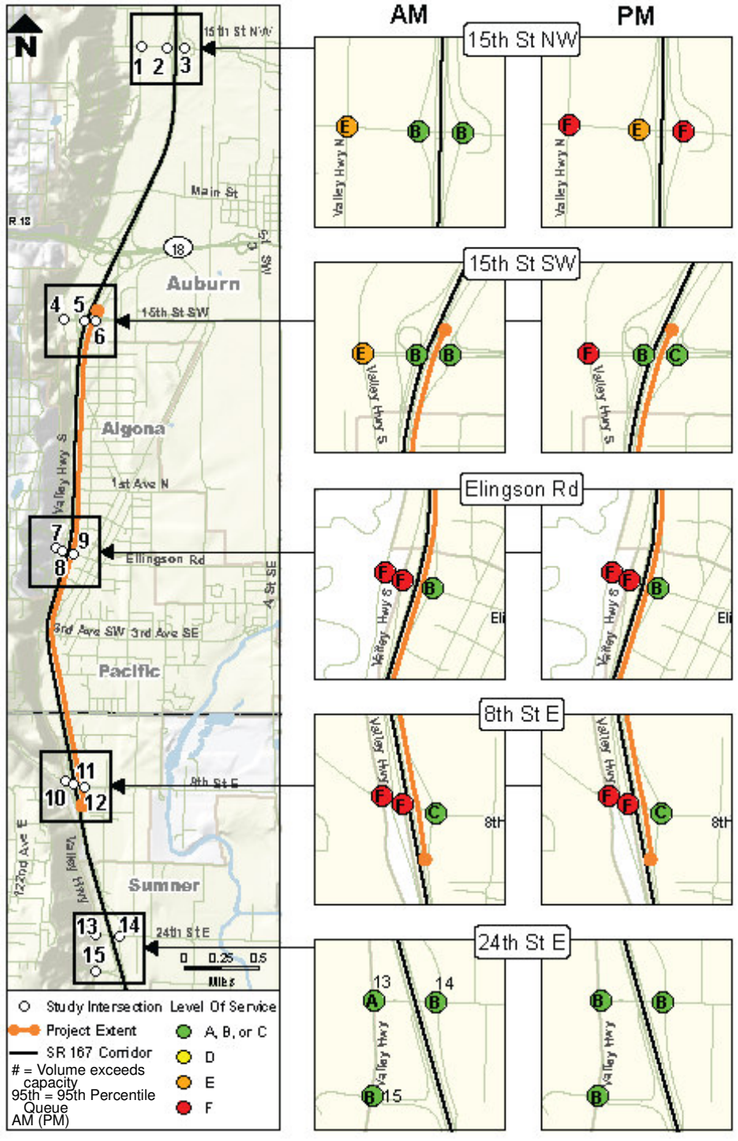
In the AM peak hour (under 2040 No Build), traffic volumes on arterials in the study area near the 15th Street SW interchange would increase by 30 to 35 percent. Traffic Volumes around the Ellingson Road and 8th Street E interchanges would increase by about 75%. The NB SR 167 on ramp volume at Ellingson Road and 8th Street E would increase by about 60% from existing conditions to 2040 (No Build). Volumes on West Valley Highway would increase by 50% in the north half of the study area, while they would increase twofold in the south half.

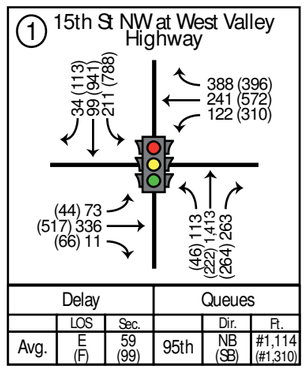
The intersection LOS for Ellingson Road at West Valley Highway and SR 167 SB ramps would deteriorate from LOS C in existing conditions to LOS F in 2040 No Build. The intersection of 8th Street E at SR 167 SB ramps would continue to operate at LOS F even with additional capacity on eastbound 8th Street E. The intersection LOS for 8th Street E at West Valley Highway would deteriorate from LOS C to LOS F. The following intersections would operate at LOS F in the 2040 No Build alternative in the AM peak hour:

- Ellingson Road at West Valley Highway
- Ellingson Road at SR 167 SB ramps
- 8th Street E at SR 167 SB ramps
- 8th Street E at West Valley Highway

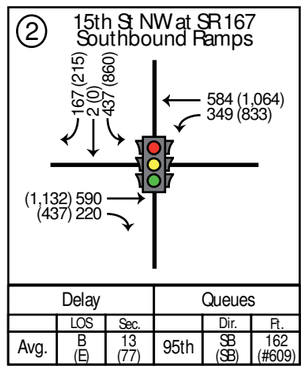
With the project, AM peak traffic volumes and LOS at local arterial intersections would not change significantly, and the above four intersections would continue to operate at LOS F.

Exhibit 23
2040 No Build Local Intersection Traffic Volumes and LOS

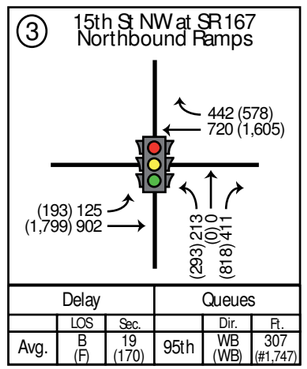




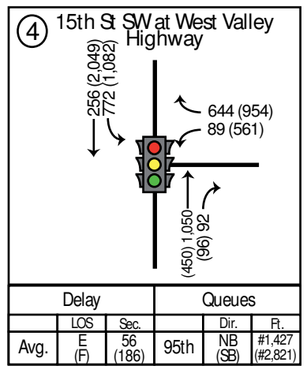
Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	E (F)	59 (99)	95th	NB (SB)	#1,114 (#1,310)



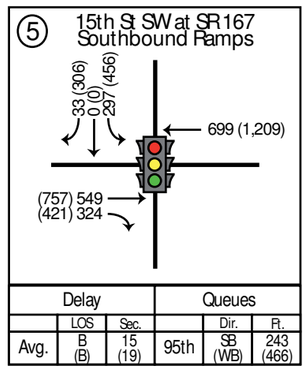
Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	B (E)	13 (77)	95th	SB (SB)	162 (#609)



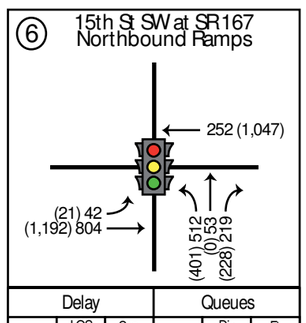
Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	B (F)	19 (170)	95th	WB (WB)	307 (#1,747)



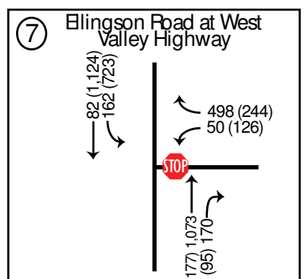
Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	E (F)	56 (186)	95th	NB (SB)	#1,427 (#2,821)



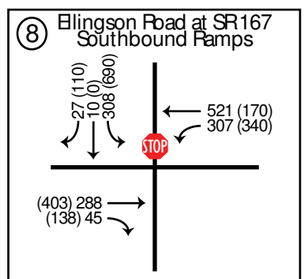
Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	B (B)	15 (19)	95th	SB (WB)	243 (466)



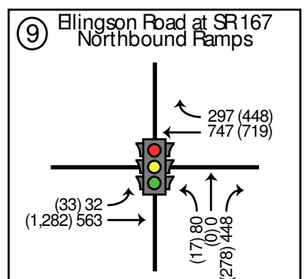
Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	B (C)	18 (24)	95th	NB (NB)	325 (389)



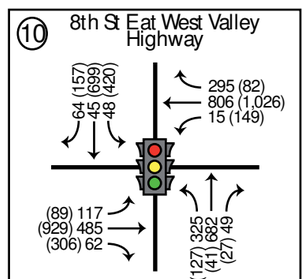
Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	F (F)	194 (517)	95th	WB (WB)	1,151 (Er)



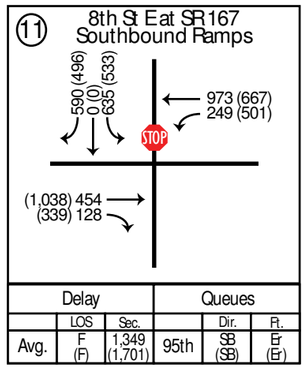
Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	F (F)	2,293 (3,401)	95th	SB (SB)	Er (Er)



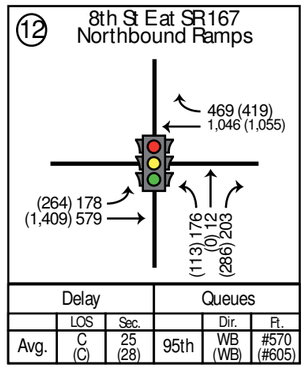
Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	B (B)	12 (12)	95th	NB (EB)	#264 (274)



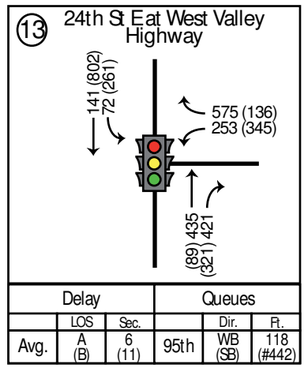
Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	F (F)	113 (158)	95th	NB (SB)	#709 (#1,162)



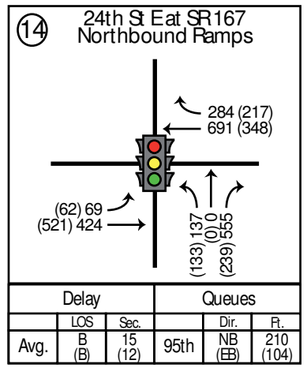
Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	F (F)	1,349 (1,701)	95th	SB (SB)	Er (Er)



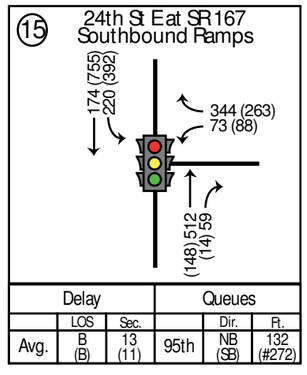
Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	C (C)	25 (28)	95th	WB (WB)	#570 (#605)



Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	A (B)	6 (11)	95th	WB (SB)	118 (#442)

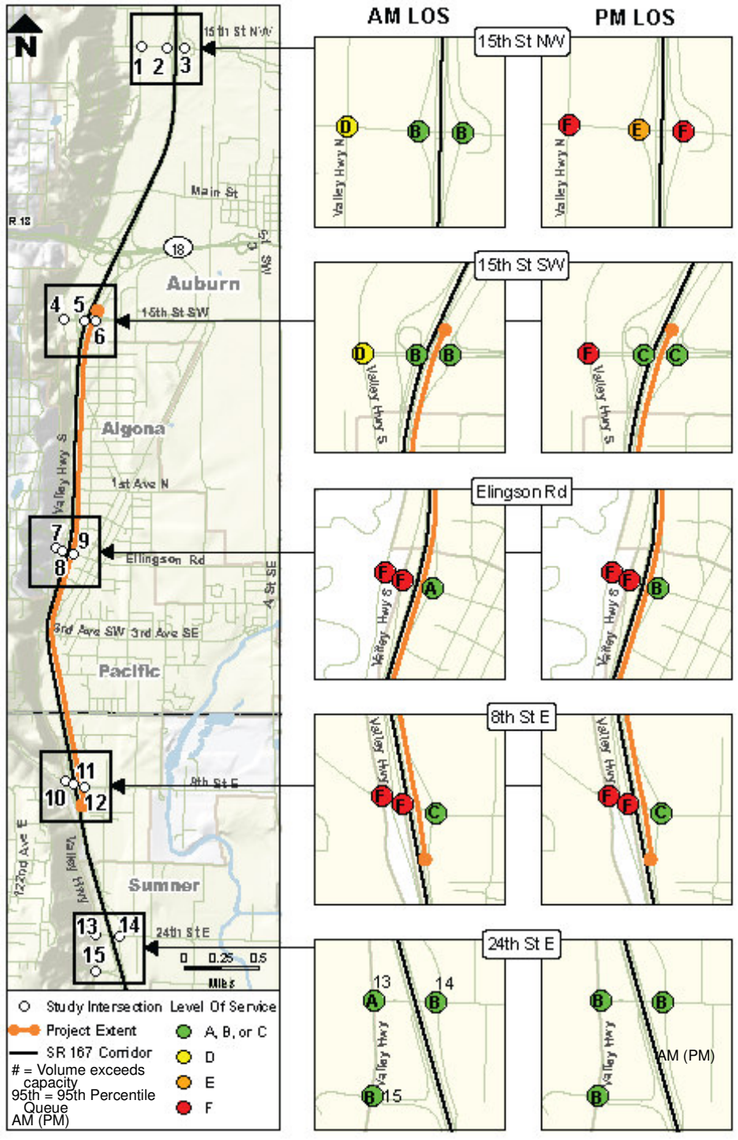


Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	B (B)	15 (12)	95th	NB (EB)	210 (104)

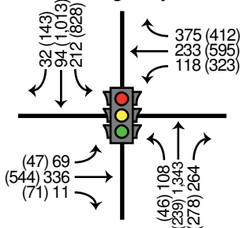


Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	B (B)	13 (11)	95th	NB (SB)	132 (#272)

Exhibit 24
2040 Build Local Intersection Traffic Volumes and LOS

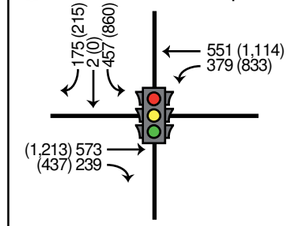


① 15th St NW at West Valley Highway



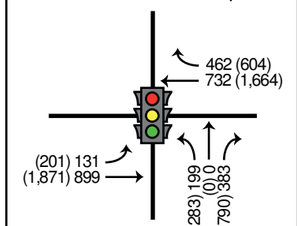
	Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	D (F)	53 (117)	95th	NB (SB)	#1,005 (#1,457)

② 15th St NW at SR167 Southbound Ramps



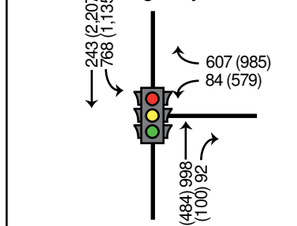
	Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	B (E)	13 (76)	95th	SB (SB)	165 (#648)

③ 15th St NW at SR167 Northbound Ramps



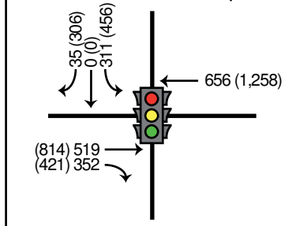
	Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	B (F)	18 (175)	95th	WB (WB)	292 (#1,819)

④ 15th St SW at West Valley Highway



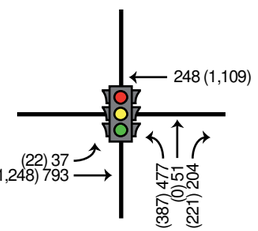
	Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	D (F)	50 (218)	95th	NB (SB)	#1,268 (#3,555)

⑤ 15th St SW at SR167 Southbound Ramps



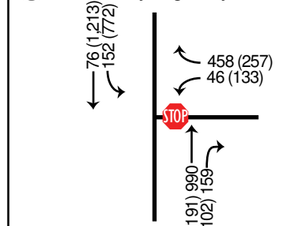
	Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	B (C)	15 (22)	95th	SB (WB)	233 (546)

⑥ 15th St SW at SR167 Northbound Ramps



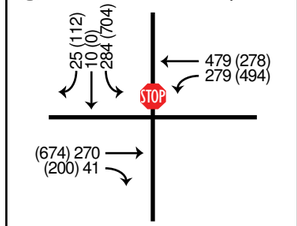
	Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	B (C)	16 (26)	95th	NB (WB)	#306 (516)

⑦ Ellingson Road at West Valley Highway



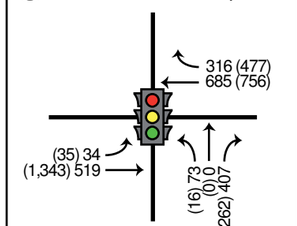
	Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	F (F)	136 (510)	95th	WB (WB)	939 (Er)

⑧ Ellingson Road at SR167 Southbound Ramps



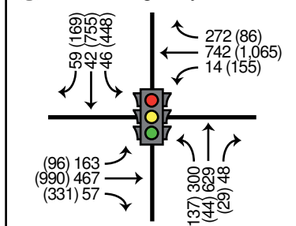
	Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	F (F)	185 (3,319)	95th	SB (SB)	772 (Er)

⑨ Ellingson Road at SR167 Northbound Ramps



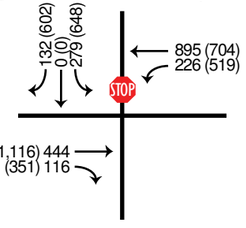
	Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	A (B)	10 (12)	95th	NB (EB)	#176 (#304)

⑩ 8th St E at West Valley Highway



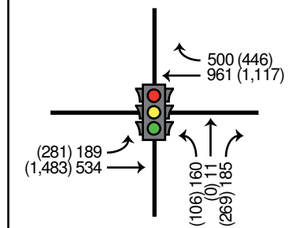
	Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	F (F)	90 (190)	95th	NB (SB)	#646 (#1,354)

⑪ 8th St E at SR167 Southbound Ramps



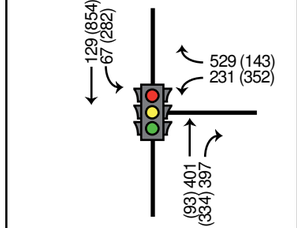
	Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	F (F)	132 (Er)	95th	SB (SB)	726 (Er)

⑫ 8th St E at SR167 Northbound Ramps



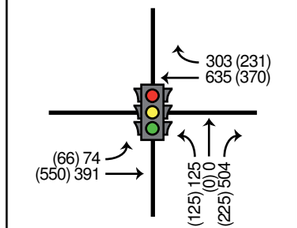
	Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	C (C)	25 (33)	95th	WB (WB)	531 (#604)

⑬ 24th St E at West Valley Highway



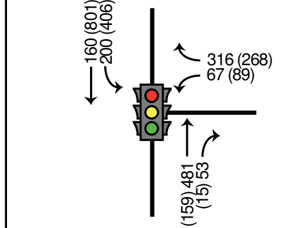
	Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	A (B)	7 (12)	95th	WB (SB)	116 (#489)

⑭ 24th St E at SR167 Northbound Ramps



	Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	B (B)	13 (13)	95th	WB (EB)	174 (111)

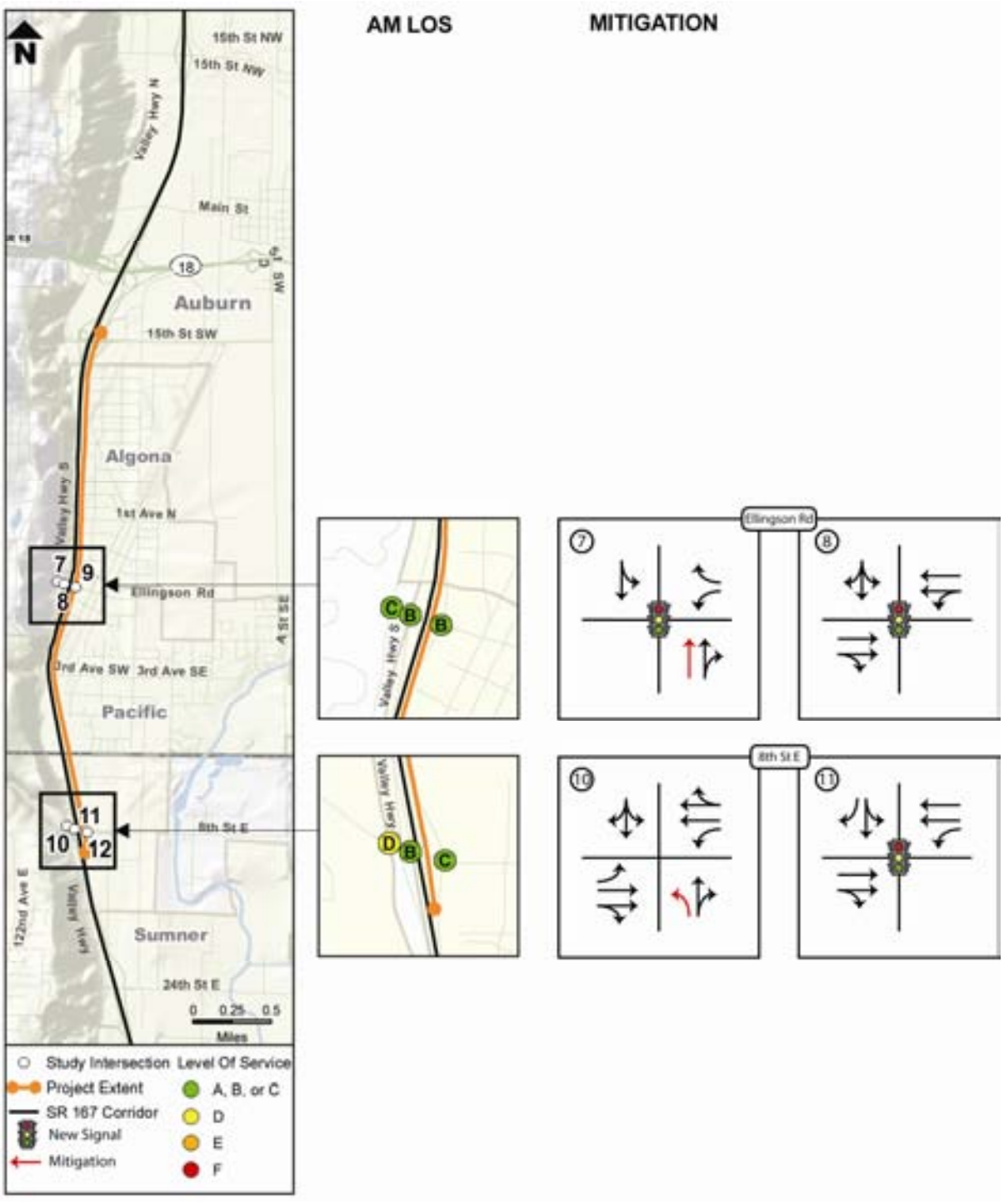
⑮ 24th St E at SR167 Southbound Ramps



	Delay			Queues		
	LOS	Sec.		Dir.	Ft.
Avg.	B (B)	13 (12)	95th	NB (SB)	126 (#285)

Exhibit 25 illustrates the improvements needed to make the intersections operate at LOS E or better in the 2040 AM peak hour. It is to be noted that these improvements would be needed to make the intersections operate at LOS E or better, irrespective of whether the project is built or not.

Exhibit 25
2040 AM Peak Hour Local Intersection Mitigation



In the PM peak hour (under 2040 No Build), traffic volumes on arterials in the study area by the 15th Street SW interchange would increase by 60 to 80 percent. Traffic volumes around Ellingson Road and 8th Street E interchanges would increase by about 95%. The SB SR 167 off ramp volume at Ellingson Road and 8th Street E would increase by 150% from existing conditions to 2040 (No Build).

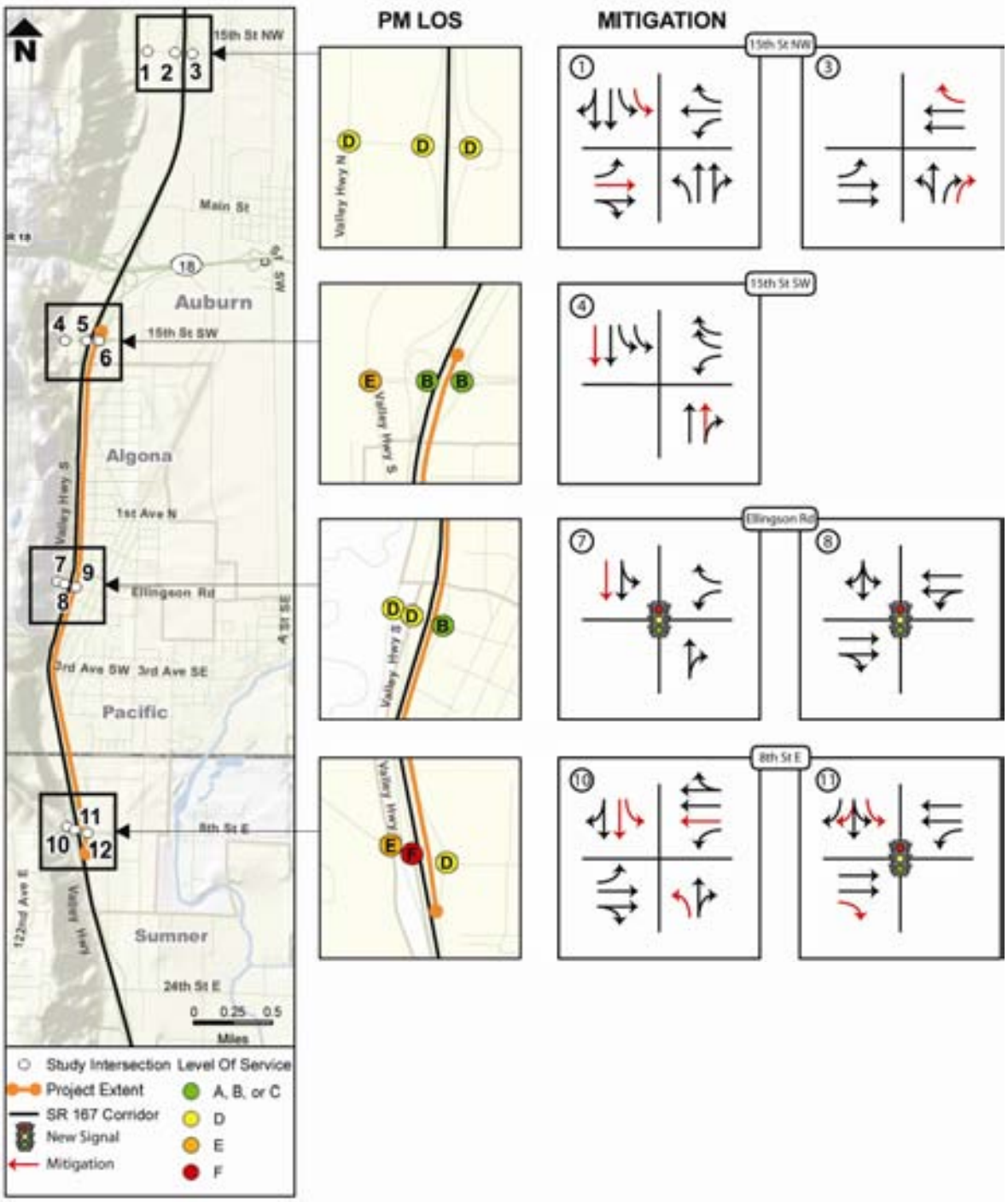
The following intersections would operate at LOS F under the 2040 No Build alternative during the PM peak hour:

- Ellingson Road at West Valley Highway
- Ellingson Road at SR 167 SB ramps
- 8th Street E at SR 167 SB ramps
- 8th Street E at West Valley Highway

With the project, traffic volumes on arterials would not change significantly. The slight increase in traffic volumes on arterials can be attributed to increased demand for SR 167. But the difference in volumes is not significant enough to change the LOS between the No Build alternative and the Build alternative. The intersection of 15th Street NW at SR 167 NB ramps would operate at LOS F under the Build alternative, as it would under the No Build alternative.

Exhibit 26 illustrates the improvements needed to make the intersections operate at LOS E or better during the 2040 PM peak hour.

Exhibit 26
2040 PM Peak Hour Local Intersection Mitigation



4.2.3. SIGNAL WARRANT ANALYSIS

Signal warrant analyses per the Manual of Uniform Traffic Control Device (MUTCD) were conducted for three stop-controlled intersections in the year 2020. They include:

- Ellingson Road at West Valley Highway S
- Ellingson Road and SR 167 SB ramps
- 8th Street E and SR 167 SB ramps

The signal warrant information is included in **Appendix C**.

The following descriptions summarize the criteria outlined in the MUTCD for the intersection signal warrant analysis.

Warrant #1: Eight-Hour Vehicular Volume

Condition A: Minimum Vehicular Volume

This warrant applies to conditions where the volume of intersecting traffic is the principal reason for consideration of signal installation. The warrant is conditioned on a traffic volume threshold for the minor and major approaches for each of any eight hours of an average day.

Condition B: Interruption of Continuous Traffic

This warrant applies to conditions where the traffic volume on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay or hazard in entering or crossing the major street. The warrant is conditioned on a traffic volume threshold for the minor and major approaches for each of any eight hours of an average day.

Combination: 80% of Conditions A and B

This warrant applies to conditions where both Conditions A and B volume thresholds are met by 80%.

Warrant #3: Peak Hour

This warrant applies to conditions where for a minimum of one hour of an average day, the minor-street suffers undue delay when entering or crossing the major street. This warrant is conditioned on delay experienced on a minor approach, and traffic volumes

experienced on a minor approach and total entering intersection.

Results of signal warrant analysis are summarized in **Exhibit 27**. The warrant analysis indicates the three intersections would meet the signal warrant criteria for both the Build and No Build alternatives in 2020. Two of the three intersections also meet the peak hour signal warrant for both AM and PM. Eight-hour vehicular volumes are not available for this study so the eighth hour is estimated as 6.25 percent of the daily peak hour volume. Even though the warrants are met for 2020, the LOS for the intersections would be E or better.

Since the warrants are met for the year 2020, they will be met in 2040, since intersection volumes would be higher in 2040 compared to 2020. Since the three intersections would operate at LOS F in both No Build and Build alternatives, signalization could be a mitigation measure.

Exhibit 27
Signal Warrant Analysis Results

Intersection Name	2020 No Build	2020 Build
Ellingson Road & West Valley Hwy S.		
Signal Warrant #1 Met?	Yes	Yes
Signal Warrant #3 Met for AM peak hour?	Yes	Yes
Signal Warrant #3 Met for PM peak hour?	Yes	Yes
Ellingson Road & SR 167 southbound ramps		
Signal Warrant #1 Met?	Yes	Yes
Signal Warrant #3 Met for AM peak hour?	No	No
Signal Warrant #3 Met for PM peak hour?	Yes	Yes
8th Street E. & SR 167 southbound ramps		
Signal Warrant #1 Met?	Yes	Yes
Signal Warrant #3 Met for AM peak hour?	Yes	Yes
Signal Warrant #3 Met for PM peak hour?	Yes	Yes

5.0 REFERENCES

WSDOT Environmental Procedures Manual, Chapter 460

http://www.wsdot.wa.gov/publications/manuals/fulltext/M31-11/460.pdf

TRB (Transportation Research Board). 2000. Highway capacity manual.

Traffic Analysis Toolbox Volume III: Guidelines for Applying Traffic Microsimulation Modeling Software

http://ops.fhwa.dot.gov/trafficanalysistools/tat_vol3/Vol3_Guidelines.pdf

Puget Sound Regional Council (PSRC)'s model version (LU_E06) for 2006, 2020 and 2040

Perteet Inc., 2007b. SR 167 Corridor Plan, January 2007.

Perteet Inc., 2007c. SR 167 - 8th Street E Vic. to S 277th Street Vic. Southbound HOT Lane Traffic Report. June 2007.

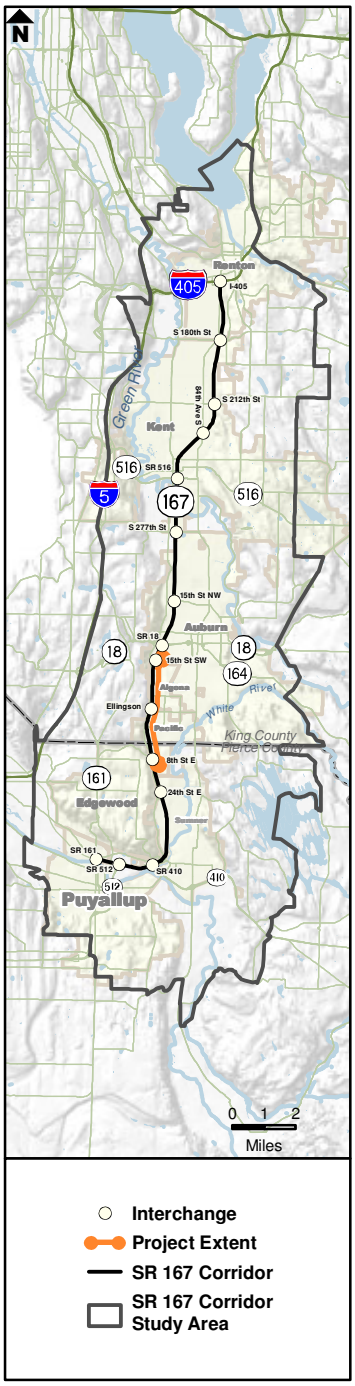
APPENDIX A

No Build Definition Memo

What is the SR 167 Corridor Study Area?

The SR 167 Corridor study area is the area where a majority of the trips accessing the SR 167 corridor begin or end. For the purpose of travel forecasting and traffic modeling, the SR 167 Corridor study area, as shown in **Exhibit 1** is defined as the area bounded by I-5 on the west side, I-405 on the north side, 140th/132nd Ave SE and Lake Tapps to the east, and SR 410 on the south side. This area includes the incorporated cities of Renton, Tukwila, Kent, Auburn, Pacific, Sumner, Milton, Edgewood, and a portion of Bonney Lake and Puyallup.

Exhibit 1
SR 167 Corridor Study Area



What local and regional roadway projects are assumed to be built by 2020 (Year of Opening) in the SR 167 Corridor Study Area?

A complete list of the 2020 No Build transportation system assumptions, such as new highways and roads as well as expansions of existing highways and roads are provided in **Exhibit 2**. This list of projects was developed from Puget Sound Regional Council's (PSRC) regionally approved 2020 Metropolitan Transportation Plan. The project list was reviewed for consistency with assumptions made for the most recently completed *SR 167 Stage 4 HOT Lanes Project and the SR 167 Corridor Plan*. It is recommended, that this list of roadway projects also be assumed to represent 2020 No Build (Year of Opening) conditions for the SR 167 Stage 5 HOT lane travel demand modeling analysis. It is also assumed that in 2020 all regional HOV lanes in the Puget Sound region will still be operating at 2+ person vehicle occupancy.

Exhibit 2

Roadway Projects Assumed to be Built by 2020 in SR 167 Corridor Study Area

PSRC MTP-ID#	Project Limits	Project Description
112	SR 704 (Cross Base Hwy), I-5 to SR 7 @ 176th St.	New 4 lane facility
113	Canyon Road, 106th St. E to 192nd St E	Widen lanes Both- Ways (BW) from 2 to 3 with TWLTL
115	176th St. E, SR-7 to SR 161	Widen lanes BW from 1 to 2 with TWLTL
127	8th St. E, W Valley Hwy to E Valley Hwy	Widen lanes BW from 1 to 2 with TWLTL
131	Spanaway Loop Rd Extension, SR 7 to 10th Ave S	New 3 lane facility
133, 187	Lake Tapps Parkway E, E Valley HWY to 182nd Ave E	New 4 lane facility
134	Canyon Rd. Extension, 192nd St. E to 260th St. E/SR 7	New 5 lane facility
135	Canyon Rd. North Extension, Pioneer Way to SR 167	New 4 lane facility
528	Canyon Rd. E, 72nd St. E to 106th St. E	Widen lanes BW from 1 to 2 with TWLTL
910	Carr Rd. SE, 108th Ave SE to SR 167	Widen lanes BW from 2 to 3
975	"M" St. NE, E Main St to Auburn Way S	Widen lanes from 1 to 2 with Grade Sep. RR crossing
976	52nd St NE (277th St), Auburn Way to Green river	Widen lanes BW from 1 to 2
978	"M" St. NE, E Main St. to 8th St NE	Widen lanes BW from 1 to 2
1600	SR 18, I-5 to SR 167 (WB Truck climbing lane)	Add 1 WB truck climbing lane
1644	I-5, SR 16 to Pierce County Line	Add HOV lanes
1692	SR 518, Port (North Airport Expressway) to I-5 (add EB GP lane)	Add 1 EB GP lane
2078	W Meeker St. Phase II, Green River Br. to SR 516	Widen lanes BW from 1 to 2 with TWLTL
2091	132nd Ave SE, SE 240th St to SE 256th St	Add TWLTL
2328	Oakesdale Ave, Monster Rd to SR 900	Widen lanes BW from 2 to 4 with TWLTL
2348	Strander Blvd Extension, Oakesdale Ave SW to West Valley Hwy and HOV only connection @ SR 167 to and from the south	New 4 lane arterial & HOV ramp
2567	I-5 Interchange @ SR 18/SR 161 "Triangle" – new SB I-5 & WB SR 18 to S 356th St ramp @ 16th Ave S	New ramp
3557	Tukwila Station Access, S 156th St to 16th Ave S	New 2 lane facility
4132	I-405 Corridor, I-5 to SR 169 Widening Stage 2 – add I GP lane each way from I-5 to SR 167 & I/2 Diamond interchange @ Talbot Rd.	Widen to 6 lanes and ½ interchange @ Talbot

Exhibit 2
Roadway Projects Assumed to be Built by 2020 in SR 167 Corridor Study Area (Cont.)

PSRC MTP-ID#	Project Limits	Project Description
4133	I-405 Corridor, SR 167 Direct Access Ramps	Direct Access HOV ramps
4136	I-405 Corridor, SR 167 to SR 169 Widening – add 2 lanes each way	Widen to 8 lanes
TIP05-2	SR 167 HOT lanes from I-405 to 15th ST SW	Convert HOV lanes to HOT lanes

TWLTL = Two-Way Left Turn Lane
Source: 2020 Metropolitan Transportation Plan, Puget Sound Regional Council (PSRC), 2008, Seattle.

What local and regional roadway projects are assumed to be built by 2040 in the SR 167 Corridor Study Area?

A complete list of the 2040 No Build transportation system assumptions, such as new highways and roads as well as expansions of existing highways and roads are provided in **Exhibit 3**. This list of projects was developed from Puget Sound Regional Council's (PSRC) regionally approved 2040 Metropolitan Transportation Plan. The project list was reviewed for consistency with assumptions made for the most recently completed *SR 167 Stage 4 HOT Lanes Project and the SR 167 Corridor Plan*. It is recommended, that this list of roadway projects also be assumed to represent 2040 No Build conditions for the SR 167 Stage 5 HOT lane travel demand modeling analysis. It is also assumed that by 2040 all regional HOV lanes in the Puget Sound region will operate at 3+ person vehicle occupancy.

Exhibit 3
Roadway Projects Assumed to be Built by 2040 in SR 167 Corridor Study Area

PSRC MTP- ID#	Project Limits	Project Description
2088	116th Ave SE Phase II, SE 157th St. (Edmonds) to Petrovitsky (major widening)	Widen lanes Both Way (BW) from 1 to 2
402	116th Ave SE, SE 208th St. to SE 240th St. (widen to 3-lanes)	Minor Widening (TWLTL)
2089	116th Ave SE, SE 256th St. to SR-516 (major widening)	Widen lanes BW from 1 to 2
898	132nd Ave SE, SE 256th St. to SE 272nd St.	Widen lanes BW from 1 to 2
2140	196th/200th St. Corridor, W Valley Hwy to E Valley Hwy	New 4-lane facility w/grade-separated RR
474	277th St. South Extension HOV, SE 272nd to Auburn Way	HOV lane extension
974	C" St. SW, 1st St. SW (Main) to SR-18	Minor widening (TWLTL)
815	Ellingson Rd., Skinner Rd to SR-167 (widen to 5-lanes)	Minor widening (TWLTL)

Exhibit 3
Roadway Projects Assumed to be Built by 2040 in SR 167 Corridor Study Area (Cont.)

PSRC MTP- ID#	Project Limits	Project Description
3510	I-405, I-5 Tukwila to SR-1 67 (add 2 GP lanes in each direction)	Widen lanes BW from 2 to 4
3511	I-405, SR-167 to SR-900/N Renton (add 2 GP lanes in each direction)	Widen add 2 GP lanes BW
3514	I-405, SR-169 to SR-167 (SB Auxiliary Lane)	Add SB auxiliary lane
3512	I-405, SR-900/N Renton to I-90 (add 2 GP lanes in each direction)	Widen add 2 GP lanes BW
1585	I-5 HOV - Pierce County Line to Tukwila Core HOV widening	HOV lane extension (3+ occupancy)
1645	I-5, Port of Tacoma Rd. to S 288th St. (King County Line)	HOV lane extension (3+ occupancy)
190	International Blvd. Ph. III, S 152nd St. to S 170th St. (widen to 6-ln, add 2 HOV)	Add HOV lanes
2128	Military Rd. S, S 288th St. to S 304th St. (widen to 4/5-lanes)	Widen lanes BW from 1 to 2
288	Military Rd. S, S 304th St. to S 320th St. (widen to 4/5-lanes)	Widen lanes BW from 1 to 2
289	Military Rd. S, S 320th St. to S 340th St. (widen to 3-lanes)	Minor widening (TWLTL)
896	Military Rd. S, SR-516 to S 228th St. (major widening)	Widen lanes BW from 1 to 2
2282	S 208th/212th St., SR-515 to SR-167 (widen to 6-lanes, 4GP + 2HOV)	Widen add GP and HOV lanes
2006	S 272nd St. Ph. II, 26th Ave S to SR-99 (minor widening)	Minor widening
2007	S 272nd St., Military Rd. to 26th Ave S (minor widening)	Minor widening
2004	S 272nd/277th St., Auburn Way to SR-516	New 4-lane facility
2005	S 277th St., SR-167 to 83rd Ave S (widen to 5-lanes)	Widen lanes BW from 1 to 2
913	S 312th St., 112th Ave SE to 124th Ave SE (major widening)	Widen lanes BW from 1 to 2
1560	S 312th St., 28th Ave S to Military Rd. S (new 4-lane road)	New 4-lane facility
914	S 320th St., 112th Ave SE to 124th Ave SE (widen to 3-lanes)	Minor Widening (TWLTL)
1559	S 321st St., Military Rd. to 51st Ave S (widen to 4-lanes)	Widen lanes BW from 1 to 2
464	SE 192nd St., Benson Rd. to 140th Ave SE (widen to 3-lanes)	Minor widening (TWLTL)

Exhibit 3
Roadway Projects Assumed to be Built by 2040 in SR 167 Corridor Study Area (Cont.)

PSRC MTP- ID#	Project Limits	Project Description
2280	SE 208th St., 116th Ave SE to 132nd Ave SE (widen to 5-lanes)	Minor widening (TWLTL)
2166	SE 256th St. Ph.I, 116th Ave SE to 136th Ave SE (132nd) (minor widening)	Minor widening
472	SE 277th St. extension, 114th Ave SE (112th) to SR-18 (new 4-lane arterial)	New 4-lane facility
291	SE 277th St., 83rd Ave S (SR-167) to West Valley Hwy (widen to 5-lanes)	Widen lanes BW from 1 to 2
1660	SR-167 @ 24th St. E	New interchange
1600	SR-18, I-5 to SR-164 (truck-climbing lane/widening)	Widen add truck lane
1297	SR-181, I-405 to Strander Blvd (widen to 7-lanes)	Widen add 1 lane B/W
498	SR-410, SR-167 to Bonney Lake (add 2GP lanes, 1 EB hill-climb lane)	Widen add GP lane B/W and EB truck climb lane
117	Sumner-Tapps Hwy Ext., Sumner-Tapps Hwy E to Lake Tapps Pkwy E	New 2-lane facility
1300	Tukwila International Blvd., Boeing Access Rd. to S 116th Way	Widening add 1 lane BW
2028	W Valley Hwy, Pacific NCL to King County Line (Jovita) (minor widening)	Minor widening
2026	W Valley Rd., Hawley Rd. (SR-516) to S 272nd St. (277th) (major widening)	Widen lanes BW from 1 to 2
2027	Washington Ave (SR-181), Harrison (Meeker) to Green River Br. (SR-516)	Add HOV lanes
519	128th St. E, SR-7 to SR-161 (widen to 4-lanes)	Widen lanes BW from 1 to 2
1479	198th Ave E, SR-410 (S Prairie Rd.) to 144th St. E	New 4-lane facility
1473	72nd St. E, Tacoma City Limits to Canyon Rd. E (widen to 5-lanes)	Widen lanes BW from 1 to 2
528	Canyon Rd. E, 72nd St E to 106th St. E (widen to 5-lanes)	Widen lanes BW from 1 to 2
910	Carr Rd. SE, 108th Ave SE to SR-167 (widen to 6-lanes)	Widen lanes BW from 2 to 3
2341	Park Dr. HOV, Garden Ave to I-405	Add HOV lanes
2346	R.HOV-48 SW 43rd St, SR-167 to 140th Ave SE	Add HOV lanes
869	R.PA-22 SW Grady Way, SR-167 to SR-515 (re-channelize for continuous EB lane)	Widen lanes BW from 2 to 3
462	S 320th/318th St., S Peasley Canyon Rd. (51st) to 15th St. NW	New 4-lane facility
468	SE 256th St. Phase II, 134th Ave (132nd) to 167th Ave SE (148th)	Widen lanes BW from 1 to 2

Exhibit 3
Roadway Projects Assumed to be Built by 2040 in SR 167 Corridor Study Area (Cont.)

PSRC MTP- ID#	Project Limits	Project Description
470	SE 256th St., SR-18 to Witte Rd.	New 2-lane facility
1722	SR-167 Extension, I-5 to SR-161 with Interchange @ I-5	New 6-lane FWY, 4 GP + 2 HOV lanes (3+ occupancy)
1684	SR-169, Black Diamond NCL (Kent-BD Rd.) to SR-516 (widen to 4/5-lanes)	Widen lanes BW from 1 to 2
1685	SR-169, SE Jones to SR-516 (widen to 4-lanes)	Widen lanes BW from 1-2 to 3
No ID	SR-181, SW Grady Way to 180th	Widen lanes BW from 2 to 3
1723	SR-512 HOV, I-5 to Canyon Rd.	Add HOV lanes (3+ occupancy)
1691	SR-516, SR-18 to SR-169 (widen to 4/5 lanes)	Widen lanes BW from 1 to 2
1692	SR-518, I-5 to SR-509 (widen GP or HOV)	Add HOV lanes (3+ occupancy)
2348	SW 27th St. HOV, SR-167 to Oakesdale Ave SW & HOV Direct Access Ramp	New Arterial HOV access
497	SR-162 (Orting Hwy), SR-410 to Orting City Limits	Widen BW from 2 to 5 lanes
3526	138th Ave SE, construct roadway SR-169 to 4th Ave NE (4-5 lanes)	New 5-lane facility
1816	SR-161, SR-167 to 36th St. E (widen to 4-lanes)	Widen lanes BW from 1-2 to 2
1744	SR-164, Dogwood St. to SE 380th St. (widen to 4-lanes)	Widen lanes BW from 1-2 to 2
1751	SR-169, City of Black Diamond (to Auburn-BD Rd.) (widen to 4-5 lanes)	Widen lanes BW from 1 to 2
1754	SR-181 HOV, 196th to I-405 (widen to 8-lanes by adding 1 HOV lane BW)	Add HOV lanes (3+ occupancy)
1821	SR-512, Canyon to SR-161 (widen to 6-lanes by adding 1 HOV lane BW)	Add HOV lanes (3+ occupancy)
1823	SR-512, Meridian St. to SR-167 (widen to 6-lanes by adding 1 HOV lane BW)	Add HOV lanes (3+ occupancy)
1822	SR-512, SR-161 to Meridian St. (widen to 6-lanes by adding 1 HOV lane BW)	Add HOV lanes (3+ occupancy)
TIP05-2	SR-167 NB HOT Lane, 15th St SW to I-405	Convert HOV lane to HOT lane
TIP05-2	SR-167 SB HOT Lane, I-405 to 37th St NW, 1 HOT Lane BW	Convert HOV lane to HOT lane
113	Canyon Road, 106th St. E to 192nd St E	Widen lanes BW from 2 to 3 with TWLTL
115	176th St. E, SR-7 to SR 161	Widen lanes BW from 1 to 2 with TWLTL
127	8th St. E, W Valley Hwy to E Valley Hwy	Widen lanes BW from 1 to 2 with TWLTL
131	Spanaway Loop Rd Extension, SR 7 to 10th Ave S	New 3 lane facility
133,187	Lake Tapps Parkway E, E Valley HWY to 182nd Ave E	New 4 lane facility

Exhibit 3
Roadway Projects Assumed to be Built by 2040 in SR 167 Corridor Study Area (Cont.)

PSRC MTP- ID#	Project Limits	Project Description
135	Canyon Rd. North Extension, Pioneer Way to SR 167	New 4 lane facility
456	Petrovitsky Rd. Phase III, 143rd Ave SE to 151st Ave SE	Widen lanes BW from 1 to 2
471	SE 256th St., 180th Ave SE to SR 18	New 4 lane facility with TWLTL
902	57th Ave S, S 180th St to S 190th St (200th)	Widen lanes BW from 1 to 2 with TWLTL
975	"M" St. NE, E Main St to Auburn Way S	Widen lanes from 1 to 2 with Grade Sep. RR crossing
976	52nd St NE (277th St), Auburn Way to Green River	Widen lanes BW from 1 to 2
978	"M" St. NE, E Main St. to 8th St NE	Widen lanes BW from 1 to 2
1606	SR 161, King Co. Line to SR 18	Widen lanes BW from 2 to 4 with TWLTL
1613	SR 509 Ext., Current terminus to I-5 @ S 214th St.	New 6 lane extension – 4 GP lanes + 2 HOV lanes
1640	I-5, Bridgeport to 96th St. vicinity (SR 512)	Add HOV lanes
1641	I-5, 96th St. vicinity (SR 512) to Tacoma South CL (84th St)	Add HOV lanes
1642	I-5, Tacoma South CL (84th St) to 72nd St vicinity	Add HOV lanes
1643	I-5, 72nd St vicinity to SR 16	Add HOV lanes
1644	I-5, SR 16 to Pierce County Line	Add HOV lanes
1659	SR 167, I-5 to SR 509 @ Port of Tacoma Rd	New 4 lane freeway
2328	Oakesdale Ave, Monster Rd to SR 900	Widen lanes BW from 2 to 4 with TWLTL
2329	SW 16th St., Oakesdale Ave SW to Lind Ave SW	Add TWLTL
3519	SR 167, I-405 to S 180th St	Widen GP lanes BW from 2 to 3

TWLTL = Two-Way Left Turn Lane
Source: 2040 Metropolitan Transportation Plan, Puget Sound Regional Council (PSRC), 2008, Seattle.

What transit service is assumed to be operating by 2020 and 2040 in the SR 167 Corridor Study Area?

A complete list of the 2020 and 2040 No Build transit system assumptions, such as new transit routes and changes to transit service frequencies are provided in **Exhibits 4 and 5**. **Exhibit 4** provides the transit service assumptions for the AM peak period, while **Exhibit 5** outlines the transit service assumptions for the Mid-Day period. This list of transit service assumptions was developed from Puget Sound Regional Council's (PSRC) 2040 Travel Demand Model Database. The project list was reviewed for consistency with assumptions

made for the most recently completed *SR 167 Stage 4 HOT Lanes Project and the SR 167 Corridor Plan*. It is recommended, that this list of transit service assumptions also be assumed to represent 2020 and 2040 No Build Transit conditions for the SR 167 Stage 5 HOT lane traffic modeling analysis.

Exhibit 4
Study Area 2020 and 2040 No Build AM Period Transit Service Assumptions

PSRC Model Route ID	Route Description	2007 headways (minutes)	2020 No Build Headways (minutes)	2040 No Build Headways (minutes)
MK915	AUBURN-ENUMC VAN 915	90	35	25
MK918	KENT DIAL-A-VAN 918	45	45	25
MK140	BURIEN-SEATC-RNT 140	16	16	16
MK149	BLK DIA-RNT VAN 149R	90	30	20
ST565	FED WAY - BELLEVUE 565	30	20	15
ST564	AUBURN-BELLEVUE 564	45	15	10
MK154	BOEING-AUBURN 154	120	20	15
MK155	FAIRWOOD-STHCNTR 155	60	35	26
MK110	RENTON CIRCULATR 110	30	24	16
MK181	FED WAY-AUBURN 181	30	15	12
MK143	BLK DIA-RENT-SEA 143	90	45	30
MK168	TIMBERLANE-KENT 168	60	15	12
MK167	AUB-KENT-BTC-UW 167X	45	45	18
MK240	BELLEVUE-RENTON 240	30	18	12
MK247	OVERLAKE-RENTON-KENT 247	90	85	70
MK151	AUBURN-S AUBURN 151	36	36	33
MK183	FED WAY-KENT VAN 183	36	36	36
MK185	N AUB-AUBURN VAN 185	120	78	30
MK186	S AUB-AUBURN VAN 186	45	26	17
MK917	AUB-ALGN-PAC VAN 917	60	45	41
MK149	BLK DIA-RENT VAN 149	90	90	20
MK164	GREEN RV CC-KENT 164	45	25	16
MK169	KENT TC-RENTON TC 169	30	18	13
MK153	KENT-RENTON 153	36	30	25
MK101	RENTON-SEATTLE 101	26	26	20

Exhibit 4
Study Area 2020 and 2040 No Build AM Period Transit Service Assumptions (Cont.)

PSRC Model Route ID	Route Description	2007 Headways (minutes)	2020 No Build Headways (minutes)	2040 No Build Headways (minutes)
MK150	KENT TC-SEA CBD 150	30	30	30
MK106	RENTON-SEA CBD 106	26	26	24
MK107	RENTON-RANIER BCH 107	30	30	19
MK101	S. RENTON-SEATTLE 101	26	26	20
MK101	FAIRWD-RENTON-SEATTLE101	60	22	16
MK148	FAIRWD-RENTON 148	30	18	12
MK150	AUB-KENT TC-SEA 150	30	30	14
MK152	ABURN-SEA CBD 152E	120	42	80
MK152	ENUMCLW-SEA CBD 152E	45	45	45
MK158	LK MERIDIAN-SEA 158	60	20	19
MK159	TIMBERLANE-SEA 159	65	20	20
MK160	CLENCARIN-SEA 160	60	20	15
MK166	HGHLN CC-KENT TC 166	30	30	30
MK162	KENT-SEATTLE CBD 162	45	20	23
MK163	EAST HILL-CBD 163	45	16	12
COMMTR	EVERETT TO SEATTLE CBD – Sounder Rail	30	30	20
COMMTR	TACOMA TO SEATTLE CBD – Sounder Rail	40	40	20

Source: 2020 and 2040 Regional Travel Demand Models, Puget Sound Regional Council (PSRC), 2008, Seattle.

Exhibit 5
Study Area 2040 No Build Mid-Day Transit Service Assumptions

PSRC Model Route ID	Route Description	2007 Headways (minutes)	2020 No Build Headways (minutes)	2040 No Build Headways (minutes)
MK915	AUBURN-ENUMC VAN 915	90	60	40
MK918	KENT DIAL-A-VAN 918	60	60	18
MK140	BURIEN-SEATC-RNT 140	30	20	15
ST565	FED WAY - BELLEVUE 565	30	12	9
MK155	FAIRWOOD-STHCNTR 155	60	60	50
MK181	FED WAY-AUBURN 181	30	15	12
MK168	TIMBERLANE-KENT 168	60	46	36
MK240	BELLEVUE-RENTON 240	30	18	14
MK151	AUBURN-S AUBURN 151	30	30	30
MK183	FED WAY-KENT VAN 183	60	60	46
MK185	N AUB-AUBURN VAN 185	72	72	72
MK186	S AUB-AUBURN VAN 186	72	72	60
MK917	AUB-ALGN-PAC VAN 917	60	60	44
MK149	BLK DIA-RENT VAN 149	120	50	36
MK164	GREEN RV CC-KENT 164	60	45	35
MK169	KENT TC-RENTON TC 169	30	23	18
MK101	RENTON-SEATTLE 101	30	30	30
MK106	RENTON-SEA CBD 106	30	30	30
MK107	RENTON-RANIER BCH 107	33	22	14
MK148	FAIRWD-RENTON 148	33	20	15
MK150	AUB-KENT TC-SEA 150	30	30	24
MK166	HGHLN CC-KENT TC 166	30	30	30
MK585	LAKEWOOD - AUBURN	30	30	Discontinued

Source: 2020 and 2040 Regional Travel Demand Models, Puget Sound Regional Council (PSRC), 2008, Seattle.

APPENDIX B

Freeway Forecasts

Project: SR 167 - 8th Street E Vicinity to 15th Street SW Vicinity Northbound HOT Lane
Subject: EXISTING AM PEAK HOUR VEHICULAR VOLUMES

Northbound

		15th ST NW				SR 18								15th ST SW				Ellingson Rd					8th ST E					24th St E			
	Mainline	On	Mainline	Off	Mainline	On from WB SR 18	Mainline	On from EB SR 18/15th SW	Mainline	EB Off	Mainline	**SR 18 EB ON**	Mainline			Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline
Vehicles Per Hour																															
Total	4506	516	3990	416	4406	1280	3126	1080	2046	780			2826			520	3346	205	3141	350	3491	410	3081	260	3341	220	3121	459	3580
GP Total	3695	423	3272	341	3613	1050	2563	886	1678	640			2317	0	0	426	2744	168	2576	287	2863	336	2526	213	2740	180	2559	376	2936
HOV	811	93	718	75	793	230	563	194	368	140			509			94	602	37	565	63	628	74	555	47	601	40	562	83	644
GP	3695	423	3272	341	3613	1050	2563	886	1678	640			2317			426	2744	168	2576	287	2863	336	2526	213	2740	180	2559	376	2936

Southbound

		15th ST NW				SR 18								15th ST SW				Ellingson Rd					8th ST E					24th St E			
	Mainline	Off	Mainline	On	Mainline	Off (to WB)	Mainline	On (from WB)	Mainline	Off (to EB)	Mainline		Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline
Vehicles Per Hour																															
Total	3170	550	2620	500	3120	970	2150	620	2770	590			2180	300	1880	340	2220	230	1990	240	2230	300	1930	250	2180	280	1900	185	2085
GP Total	2853	495	2358	450	2808	873	1935	558	2493	531			1962	270	1692	306	1998	207	1791	216	2007	270	1737	225	1962	252	1710	167	1877
HOV	317	55	262	50	312	97	215	62	277	59			218	30	188	34	222	23	199	24	223	30	193	25	218	28	190	19	209
GP	2853	495	2358	450	2808	873	1935	558	2493	531			1962	270	1692	306	1998	207	1791	216	2007	270	1737	225	1962	252	1710	167	1877

Project: SR 167 - 8th Street E Vicinity to 15th Street SW Vicinity Northbound HOT Lane

Subject: EXISTING PM PEAK HOUR VEHICULAR VOLUMES

Northbound

		S 277th ST			15th ST NW				SR 18								15th ST SW				Ellingson Rd				8th ST E				24th St E			
	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On from WB SR 18	Mainline	On from EB SR 18/15th SW	Mainline	EB Off	Mainline	SR 18 EB ON	Mainline			Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline
Vehicles Per Hour																																
Total	4040	610	3430	580	4010	700	3310	740	4050	690	3360	1670	1690	740			2430			420	2850	310	2540	220	2760	440	2320	300	2620	180	2440	280	2720
GP Total	3418	519	2899	490	3390	595	2795	625	3420	587	2833	1420	1414	619			2032	0	0	351	2384	264	2120	184	2304	374	1930	250	2179	153	2026	233	2259
HOV	622	92	531	90	620	105	515	115	630	104	527	251	276	121			398			69	466	47	420	36	456	66	390	50	441	27	414	47	461
Transit	1																				1											
HOT (GP)																																
GP	3418	519	2899	490	3390	595	2795	625	3420	587	2833	1420	1414	619			2032			351	2384	264	2120	184	2304	374	1930	250	2179	153	2026	233	2259
%HOV	15%	15%	15%	15%	15%	15%	16%	16%	16%	15%	16%	15%	16%	16%			16%			16%	16%	15%	17%	17%	17%	15%	17%	17%	17%	15%	17%	17%	17%
Count HOV	540		500		530		330																									
Count HOV %	13%		15%		13%		10%																									
Deviation from R&R	1.15		1.06		1.17		1.56																									

Southbound

		S 277th ST			15th ST NW				SR 18								15th ST SW				Ellingson Rd				8th ST E				24th St E			
	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off (to WB)	Mainline	On (from WB)	Mainline	Off (to EB)	Mainline		Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline
Vehicles Per Hour																																
Total	5070	710	4360	470	4830	860	3970	770	4740	1140	3600	1070	4670	680			3990	610	3380	400	3780	320	3460	480	3940	490	3450	600	4050	140	3910	290	4200
GP Total	4019	563	3456	390	3846	685	3161	639	3800	914	2886	888	3775	550			3225	493	2732	332	3064	259	2805	398	3203	398	2805	498	3303	114	3188	241	3429
HOV	1051	147	904	80	984	175	809	131	940	226	714	182	895	130			765	117	648	68	716	61	655	82	737	92	645	102	747	26	722	49	771
Transit	10																				3											
HOT (GP)																																
GP	4019	563	3456	390	3846	685	3161	639	3800	914	2886	888	3775	550			3225	493	2732	332	3064	259	2805	398	3203	398	2805	498	3303	114	3188	241	3429
%HOV	21%	21%	21%	17%	20%	20%	20%	17%	20%	20%	20%	17%	19%	19%			19%	19%	19%	17%	19%	19%	19%	17%	19%	19%	19%	17%	18%	18%	18%	17%	18%
Count HOV	1040		950		950																											
Count HOV %	21%		22%		20%																											
Deviation from R&R	1.01		0.95		1.04																											

Project: SR 167 - 8th Street E Vicinity to 15th Street SW Vicinity Northbound HOT Lane
Subject: 2020 NO BUILD AM PEAK HOUR VEHICULAR VOLUMES

Northbound

|HOT lane begins here

		15th ST NW				SR 18								15th ST SW				Ellingson Rd				8th ST E				24th St E			
	Mainline	On	Mainline	Off	Mainline	WB On	Mainline	EB On/15th SW	Mainline	EB Off	Mainline	SR 18 EB ON	Mainline			Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline
Vehicles Per Hour																													
Total	5,514	593	4,921	395	5,316	1,600	3,716	1,327	2,389	763			3,152			494	3,646	240	3,406	392	3,798	480	3,319	291	3,610	257	3,352	514	3,866
HOV	811	87	723	58	782	235	546	195	351	112	0	0	463	0	0	73	536	35	501	58	558	71	488	43	531	38	493	76	568
GP in HOT	690	49	641	0	641	132	509	109	400	0			400				400	20	380		380	40	340		340	21	319	0	319
HOT (HOV, GP)	1,501	136	1,365	58	1,423	367	1,055	305	751	112	0	0	863	0	0	73	936	55	881	58	938	110	828	43	871	59	812	76	887
GP in GP lanes	4,013	457	3,556	337	3,893	1,233	2,661	1,022	1,638	651	0	0	2,289	0	0	421	2,710	185	2,526	334	2,860	370	2,490	248	2,739	198	2,540	438	2,979

Southbound

|HOT lane terminates here

		15th ST NW				SR 18								15th ST SW				Ellingson Rd				8th ST E				24th St E			
	Mainline	Off	Mainline	On	Mainline	Off to SR 18 WB	Mainline	On from SR18 WB	Mainline	Off to SR 18 EB	Mainline		Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline
Vehicles Per Hour																													
Total	3107	523	2584	550	3134	855	2279	448	2726	711			2016	285	1731	374	2105	244	1861	269	2130	318	1812	280	2092	297	1795	207.2	2002
HOV	86	14	72	15	86	23	63	12	75	19	0	0	56	8	48	10	59	7	52	7	59	9	51	8	58	8	50	6	56
GP in HOT	565	50	515	140	655	100	555	120	675	40			635	40	595	70	665	60	605	0	605	100	505	0	505	40	465	0	465
HOT (HOV, GP)	651	64	587	155	741	123	618	132	750	59	0	0	691	48	643	80	724	67	657	7	664	109	556	8	563	48	515	6	521
GP in GP lanes	2456	458	1998	395	2393	732	1660	316	1976	651	0	0	1325	237	1087	294	1381	177	1204	262	1466	209	1256	272	1529	249	1280	202	1481

Project: SR 167 - 8th Street E Vicinity to 15th Street SW Vicinity Northbound HOT Lane
Subject: 2020 BUILD AM PEAK HOUR VEHICULAR VOLUMES

Northbound

|HOT lane begins here

		15th ST NW				SR 18								15th ST SW				Ellingson Rd				8th ST E				24th St E			
	Mainline	On	Mainline	Off	Mainline	WB On	Mainline	EB On/15th SW	Mainline	EB Off	Mainline	SR 18 EB ON	Mainline			Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline
Vehicles Per Hour																													
Total	5,502	609	4,894	395	5,289	1,408	3,881	1,206	2,674	869			3,543			494	4,037	297	3,740	364	4,104	595	3,509	270	3,780	319	3,461	477	3,938
HOV	822	91	731	59	790	210	580	180	399	130	0	0	529	0	0	74	603	44	559	54	613	89	524	40	565	48	517	71	588
GP in HOT	670	49	621	0	621	113	509	97	412	0			412				412	24	388		388	48	341		341	26	315	0	315
HOT (HOV, GP)	1,492	140	1,352	59	1,411	323	1,088	277	811	130	0	0	941	0	0	74	1,015	68	947	54	1,001	136	865	40	905	73	832	71	903
GP in GP lanes	4,011	469	3,541	336	3,878	1,085	2,793	930	1,863	739	0	0	2,602	0	0	420	3,022	229	2,793	310	3,103	458	2,644	230	2,874	246	2,629	406	3,035

Southbound

|HOT lane terminates here

		15th ST NW				SR 18								15th ST SW				Ellingson Rd				8th ST E				24th St E			
	Mainline	Off	Mainline	On	Mainline	Off to SR 18 WB	Mainline	On from SR18 WB	Mainline	Off to SR 18 EB	Mainline		Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline
Vehicles Per Hour																													
Total	3107	523	2584	525	3109	869	2240	452	2692	657			2035	285	1750	357	2107	225	1881	250	2131	294	1837	260	2097	274	1823	192.4	2015
HOV	85	14	71	14	85	24	62	12	74	18	0	0	56	8	48	10	58	6	52	7	59	8	51	7	58	7	50	5	56
GP in HOT	565	50	515	140	655	100	555	120	675	40			635	40	595	70	665	60	605	0	605	100	505	0	505	40	465	0	465
HOT (HOV, GP)	650	64	586	154	740	124	617	132	749	58	0	0	691	48	643	80	723	66	657	7	664	108	556	7	563	47	515	5	521
GP in GP lanes	2456	458	1998	371	2369	745	1624	320	1943	600	0	0	1344	237	1106	277	1384	159	1224	243	1467	186	1281	253	1534	227	1307	187	1494

Project: SR 167 - 8th Street E Vicinity to 15th Street SW Vicinity Northbound HOT Lane
Subject: 2020 NO BUILD PM PEAK HOUR VEHICULAR VOLUMES

Northbound

|HOT lane begins here

		15th ST NW				SR 18								15th ST SW				Ellingson Rd				8th ST E				24th St E			
	Mainline	On	Mainline	Off	Mainline	WB On	Mainline	EB On/15th SW	Mainline	EB Off	Mainline	**SR 18 EB ON**	Mainline			Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline
Vehicles Per Hour																													
Total	4,030	735	3,295	999	4,294	640	3,654	1,843	1,811	781			2,592			567	3,159	403	2,756	264	3,020	572	2,448	360	2,808	234	2,574	336	2,910
HOV	350	64	287	87	373	56	318	160	157	68	0	0	225	0	0	49	275	35	240	23	263	50	213	31	244	20	224	29	253
GP in HOT	690	60	630	0	630	150	480	150	330	0			330				330	40	290		290	50	240		240	40	200	0	200
HOT (HOV, GP)	1,040	124	917	87	1,003	206	798	310	487	68	0	0	555	0	0	49	605	75	530	23	553	100	453	31	484	60	424	29	453
GP in GP lanes	2,990	611	2,379	912	3,291	434	2,857	1,533	1,324	713	0	0	2,037	0	0	518	2,555	328	2,227	241	2,468	472	1,996	329	2,324	174	2,151	307	2,457

Southbound

|HOT lane terminates here

		15th ST NW				SR 18								15th ST SW				Ellingson Rd				8th ST E				24th St E			
	Mainline	Off	Mainline	On	Mainline	Off to SR 18 WB	Mainline	On from SR18 WB	Mainline	Off to SR 18 EB	Mainline		Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline
Vehicles Per Hour																													
Total	5989	903	5086	963	6049	1514	4535	1603	6138	440			5698	641	5057	500	5557	672	4885	480	5365	1029	4336	600	4936	294	4642	290	4932
HOV	979	144	835	154	988	242	747	256	1003	70	0	0	932	102	830	80	910	107	803	77	879	164	715	96	811	47	764	46	810
GP in HOT	565	50	515	140	655	100	555	120	675	40			635	40	595	70	665	60	605	0	605	100	505	0	505	40	465	0	465
HOT (HOV, GP)	1544	194	1350	294	1643	342	1302	376	1678	110	0	0	1567	142	1425	150	1575	167	1408	77	1484	264	1220	96	1316	87	1229	46	1275
GP in GP lanes	4445	709	3737	669	4405	1172	3233	1227	4460	330	0	0	4130	498	3632	350	3982	505	3478	403	3881	765	3116	504	3620	207	3413	244	3657

Project: SR 167 - 8th Street E Vicinity to 15th Street SW Vicinity Northbound HOT Lane
Subject: 2020 BUILD PM PEAK HOUR VEHICULAR VOLUMES

Northbound

|HOT lane begins here

		15th ST NW				SR 18								15th ST SW				Ellingson Rd				8th ST E				24th St E			
	Mainline	On	Mainline	Off	Mainline	WB On	Mainline	EB On/15th SW	Mainline	EB Off	Mainline	**SR 18 EB ON**	Mainline			Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline
Vehicles Per Hour																													
Total	4,073	735	3,338	999	4,337	597	3,740	1,809	1,931	842			2,773			567	3,340	419	2,922	242	3,164	594	2,570	330	2,900	243	2,657	308	2,965
HOV	384	69	315	94	409	56	353	171	182	79	0	0	262	0	0	53	315	39	276	23	298	56	242	31	274	23	251	29	280
GP in HOT	690	60	630	0	630	150	480	150	330	0			330				330	40	290		290	50	240		240	40	200	0	200
HOT (HOV, GP)	1,074	129	945	94	1,039	206	833	321	512	79	0	0	592	0	0	53	645	79	566	23	588	106	482	31	514	63	451	29	480
GP in GP lanes	2,999	606	2,393	905	3,298	391	2,907	1,488	1,419	763	0	0	2,182	0	0	514	2,695	339	2,356	219	2,575	488	2,087	299	2,386	180	2,206	279	2,485

Southbound

|HOT lane terminates here

		15th ST NW				SR 18								15th ST SW				Ellingson Rd				8th ST E				24th St E			
	Mainline	Off	Mainline	On	Mainline	Off to SR 18 WB	Mainline	On from SR18 WB	Mainline	Off to SR 18 EB	Mainline		Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline
Vehicles Per Hour																													
Total	5941	886	5055	963	6018	1493	4525	1616	6141	415			5726	628	5097	500	5597	704	4893	480	5373	1078	4295	600	4895	308	4587	290	4877
HOV	983	143	840	155	995	241	754	261	1015	67	0	0	948	101	846	81	927	114	814	77	891	174	717	97	814	50	764	47	811
GP in HOT	565	50	515	140	655	100	555	120	675	40			635	40	595	70	665	60	605	0	605	100	505	0	505	40	465	0	465
HOT (HOV, GP)	1548	193	1355	295	1650	341	1309	381	1690	107	0	0	1583	141	1441	151	1592	174	1419	77	1496	274	1222	97	1319	90	1229	47	1276
GP in GP lanes	4393	693	3700	667	4368	1152	3215	1235	4451	308	0	0	4143	487	3656	349	4005	530	3475	403	3877	804	3073	503	3576	218	3358	243	3601

Project: SR 167 - 8th Street E Vicinity to 15th Street SW Vicinity Northbound HOT Lane
Subject: 2040 NO BUILD AM PEAK HOUR VEHICULAR VOLUMES

Northbound

|HOT lane begins here

		15th ST NW				SR 18								15th ST SW				Ellingson Rd				8th ST E				24th St E			
	Mainline	On	Mainline	Off	Mainline	WB On	Mainline	EB On/15th SW	Mainline	EB Off	Mainline	SR 18 EB ON	Mainline			Off	Mainline	On	Mainline	Off	Mainline	On	192	Off	Mainline	On	Mainline	Off	Mainline
Vehicles Per Hour																													
Total	5,253	568	4,686	624	5,310	1,295	4,014	1,830	2,184	884			3,068			780	3,848	329	3,518	527	4,046	659	3,387	392	3,779	354	3,425	692	4,117
HOV	161	17	144	19	163	40	123	56	67	27	0	0	94	0	0	24	118	10	108	16	124	20	104	12	116	11	105	21	126
GP in HOT	1,197	150	1,047	0	1,047	150	897	250	647	0			647				647	90	557		557	120	437		437	60	377	0	377
HOT (HOV, GP)	1,358	167	1,191	19	1,210	190	1,020	306	714	27	0	0	741	0	0	24	765	100	665	16	681	140	541	12	553	71	482	21	503
GP in GP lanes	3,895	400	3,495	605	4,099	1,106	2,994	1,524	1,470	856	0	0	2,327	0	0	756	3,083	229	2,853	511	3,365	519	2,846	380	3,226	283	2,943	670	3,614

Southbound

|HOT lane terminates here

		15th ST NW				SR 18								15th ST SW				Ellingson Rd				8th ST E				24th St E			
	Mainline	Off	Mainline	On	Mainline	Off to SR 18 WB	Mainline	On from SR18 WB	Mainline	Off to SR 18 EB	Mainline		Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline
Vehicles Per Hour																													
Total	3392	605	2787	570	3357	1020	2337	524	2861	521			2339	330	2009	388	2397	342	2055	362	2417	446	1970	376.7268	2347	416	1931	278.7778	2209
HOV	86	15	71	14	85	26	60	13	73	13	0	0	60	8	51	10	61	9	52	9	62	11	50	10	60	11	49	7	56
GP in HOT	565	50	515	140	655	100	555	120	675	40			635	40	595	70	665	60	605	0	605	100	505	0	505	40	465	0	465
HOT (HOV, GP)	651	65	586	154	740	126	615	133	748	53	0	0	695	48	646	80	726	69	657	9	667	111	555	10	565	51	514	7	521
GP in GP lanes	2741	540	2201	416	2617	894	1722	390	2113	468	0	0	1645	282	1363	308	1671	273	1398	352	1750	335	1415	367	1782	366	1416	272	1688

Project: SR 167 - 8th Street E Vicinity to 15th Street SW Vicinity Northbound HOT Lane
Subject: 2040 BUILD AM PEAK HOUR VEHICULAR VOLUMES

Northbound

|HOT lane begins here

		15th ST NW				SR 18								15th ST SW				Ellingson Rd				8th ST E				24th St E			
	Mainline	On	Mainline	Off	Mainline	WB On	Mainline	EB On/15th SW	Mainline	EB Off	Mainline	SR 18 EB ON	Mainline			Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline
Vehicles Per Hour																													
Total	5,354	593	4,761	582	5,343	1,284	4,059	1,625	2,434	954			3,388			728	4,116	350	3,765	480	4,245	701	3,544	356	3,900	376	3,524	629	4,153
HOV	218	24	194	24	218	52	165	66	99	39	0	0	138	0	0	30	168	14	153	20	173	29	144	15	159	15	144	26	169
GP in HOT	1,280	84	1,196	0	1,196	100	1,096	137	959	0			959				959	49	910		910	99	811		811	53	758	0	758
HOT (HOV, GP)	1,498	108	1,390	24	1,414	152	1,262	203	1,058	39	0	0	1,097	0	0	30	1,127	64	1,063	20	1,083	127	955	15	970	68	902	26	927
GP in GP lanes	3,856	486	3,370	558	3,928	1,132	2,797	1,421	1,376	915	0	0	2,291	0	0	698	2,989	287	2,702	460	3,162	573	2,588	342	2,930	308	2,622	603	3,226

Southbound

|HOT lane terminates here

		15th ST NW				SR 18								15th ST SW				Ellingson Rd				8th ST E				24th St E			
	Mainline	Off	Mainline	On	Mainline	Off to SR 18 WB	Mainline	On from SR18 WB	Mainline	Off to SR 18 EB	Mainline		Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline
Vehicles Per Hour																													
Total	3392	633	2759	620	3379	1045	2334	519	2854	537			2317	345	1972	422	2393	315	2078	329	2407	411	1996	342.5	2339	384	1955	253.45	2208
HOV	86	16	70	16	86	26	59	13	72	14	0	0	59	9	50	11	61	8	53	8	61	10	51	9	59	10	50	6	56
GP in HOT	620	50	570	140	710	100	610	120	730	40			690	40	650	70	720	60	660	0	660	100	560	0	560	40	520	0	520
HOT (HOV, GP)	706	66	640	156	796	126	669	133	802	54	0	0	749	49	700	81	781	68	713	8	721	110	611	9	619	50	570	6	576
GP in GP lanes	2686	566	2120	464	2584	919	1665	386	2051	483	0	0	1568	296	1272	341	1613	247	1366	320	1686	301	1385	334	1719	334	1385	247	1632

Project: SR 167 - 8th Street E Vicinity to 15th Street SW Vicinity Northbound HOT Lane
Subject: 2040 NO BUILD PM PEAK HOUR VEHICULAR VOLUMES

Northbound

|HOT lane begins here

		S 277th ST				15th ST NW				SR 18								15th ST SW				Ellingson Rd				8th ST E				24th St E			
	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	WB On	Mainline	EB On/15th SW	Mainline	EB Off	Mainline	SR 18 EB ON	Mainline			Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline
Vehicles Per Hour																																	
Total	4,297	915	3,382	638	4,020	770	3,250	1,110	4,360	482	3,878	2,018	1,860	1,043			2,903			630	3,533	481	3,052	293	3,345	682	2,663	399	3,062	279	2,783	372	3,155
HOV	312	67	246	46	292	56	236	81	317	35	282	147	135	76	0	0	211	0	0	46	257	35	222	21	243	50	194	29	223	20	202	27	229
GP in HOT	730	40	690	0	690	60	630	0	630	150	480	150	330	0			330				330	40	290		290	50	240		240	40	200	0	200
HOT (HOV, GP)	1,042	107	936	46	982	116	866	81	947	185	762	297	465	76	0	0	541	0	0	46	587	75	512	21	533	100	434	29	463	60	402	27	429
GP in GP lanes	3,254	808	2,446	592	3,037	654	2,383	1,029	3,413	297	3,116	1,721	1,394	967	0	0	2,362	0	0	584	2,946	406	2,540	271	2,812	582	2,229	370	2,599	219	2,380	345	2,726

Southbound

|HOT lane terminates here

		S 277th ST				15th ST NW				SR 18								15th ST SW				Ellingson Rd				8th ST E				24th St E			
	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off to SR 18 WB	Mainline	On from SR18 WB	Mainline	Off to SR 18 EB	Mainline		Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline
Vehicles Per Hour																																	
Total	5425	888	4537	776	5168	1075	4093	1271	5364	1513	3851	1957	5808	287			5521	763	4758	660	5418	800	4618	672	5290	1225	4065	840	4905	350	4555	406	4961
HOV	572	94	478	82	560	113	447	134	581	159	421	206	627	30	0	0	597	80	517	70	586	84	502	71	573	129	444	89	532	37	495	43	538
GP in HOT	515	40	475	90	565	50	515	140	655	100	555	120	675	40			635	40	595	70	665	60	605	0	605	100	505	0	505	40	465	0	465
HOT (HOV, GP)	1087	134	953	172	1125	163	962	274	1236	259	976	326	1302	70	0	0	1232	120	1112	140	1251	144	1107	71	1178	229	949	89	1037	77	960	43	1003
GP in GP lanes	4338	754	3584	604	4043	912	3131	997	4128	1254	2874	1631	4505	217	0	0	4288	642	3646	520	4167	656	3511	601	4112	996	3116	751	3868	273	3595	363	3958

Project: SR 167 - 8th Street E Vicinity to 15th Street SW Vicinity Northbound HOT Lane
Subject: 2040 BUILD PM PEAK HOUR VEHICULAR VOLUMES

Northbound

|HOT lane begins here

		S 277th ST			15th ST NW				SR 18								15th ST SW			Ellingson Rd				8th ST E				24th St E			
	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	WB On	Mainline	EB On/15th SW	Mainline	EB Off	Mainline	SR 18 EB ON	Mainline			Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline
Vehicles Per Hour																																
Total	4,449	885	3,565	667	4,232	805	3,427	1,073	4,500	453	4,047	2,034	2,013	1,095			3,108			609	3,717	512	3,205	275	3,480	726	2,754	375	3,129	297	2,832	350	3,182
HOV	384	76	307	57	365	69	295	92	388	39	349	175	174	94	0	0	268	0	0	52	320	44	276	24	300	63	237	32	270	26	244	30	274
GP in HOT	730	40	690	0	690	60	630	0	630	150	480	150	330	0			330				330	40	290		290	50	240		240	40	200	0	200
HOT (HOV, GP)	1,114	116	997	57	1,055	129	925	92	1,018	189	829	325	504	94	0	0	598	0	0	52	650	84	566	24	590	113	477	32	510	66	444	30	474
GP in GP lanes	3,336	768	2,568	610	3,177	676	2,501	981	3,482	264	3,218	1,709	1,509	1,001	0	0	2,510	0	0	557	3,066	427	2,639	251	2,890	613	2,277	343	2,620	231	2,388	320	2,708

Southbound

|HOT lane terminates here

		S 277th ST			15th ST NW				SR 18								15th ST SW			Ellingson Rd				8th ST E				24th St E			
	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off to SR 18 WB	Mainline	On from SR18 WB	Mainline	Off to SR 18 EB	Mainline		Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline	Off	Mainline	On	Mainline
Vehicles Per Hour																																
Total	5374	888	4487	776	5120	1075	4045	1271	5315	1490	3825	1974	5799	268			5531	763	4769	660	5429	816	4613	696	5309	1250	4059	870	4929	357	4572	420.5	4993
HOV	598	99	500	86	586	120	466	141	608	166	442	220	662	30	0	0	632	85	547	73	620	91	529	77	607	139	468	97	565	40	525	47	572
GP in HOT	515	40	475	90	565	50	515	140	655	100	555	120	675	40			635	40	595	70	665	60	605	0	605	100	505	0	505	40	465	0	465
HOT (HOV, GP)	1113	139	975	176	1151	170	981	281	1263	266	997	340	1337	70	0	0	1267	125	1142	143	1285	151	1134	77	1212	239	973	97	1070	80	990	47	1037
GP in GP lanes	4261	749	3512	599	3969	905	3064	989	4053	1224	2829	1634	4463	198	0	0	4265	638	3627	517	4143	665	3478	619	4097	1010	3086	773	3860	277	3582	374	3956

APPENDIX C

Signal Warrants

Warrant 1, Eight-Hour Vehicular Volume

West Valley Highway at Ellingson

2020 No Build

For Future Condition Volumes 8th Highest Hour will be assumed to be 62.5% of Peak Hour

Standard 1: Only one condition must exist

A. The vehicles per hour given in both of the 100 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; or
B. The vehicles per hour given in both of the 100 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.

Standard 2: Both conditions must exist

A. The vehicles per hour given in both of the 80 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; and
B. The vehicles per hour given in both of the 80 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.

Criteria: (From Table 4C-1)	Condition A		Condition B	
	100%	80%	100%	80%
Sum Major Street	500	400	750	600
Max Minor Street	200	160	100	80

AM Peak Hour

Major Street					
	790	×	0.625	=	494
Minor Street					
	307	×	0.625	=	192
				Standard 1	Not Met
				Standard 2	Not Met

PM Peak Hour

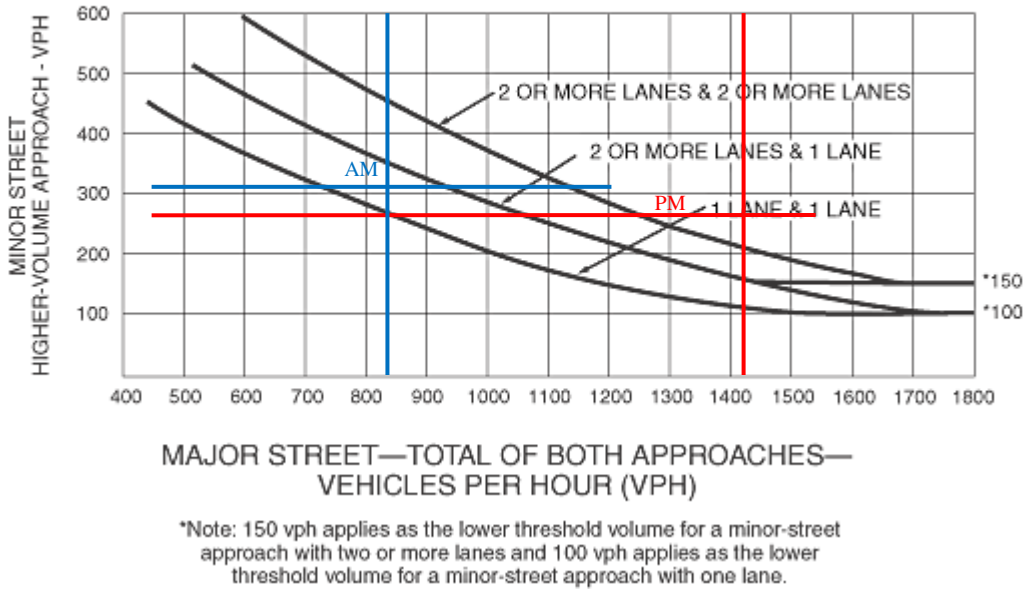
Major Street					
	1366	×	0.625	=	854
Minor Street					
	262	×	0.625	=	164
				Standard 1	Met
				Standard 2	Met

Warrant 3, Peak Hour Volume

West Valley Highway at Ellingson

2020 No Build

Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Warrant 1, Eight-Hour Vehicular Volume

Ellingson at SR 167 SB ramps

2020 No Build

For Future Condition Volumes 8th Highest Hour will be assumed to be 62.5% of Peak Hour

Standard 1: Only one condition must exist

A. The vehicles per hour given in both of the 100 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; or
B. The vehicles per hour given in both of the 100 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.

Standard 2: Both conditions must exist

A. The vehicles per hour given in both of the 80 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; and
B. The vehicles per hour given in both of the 80 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.

Criteria: (From Table 4C-1)	Condition A		Condition B	
	100%	80%	100%	80%
Sum Major Street	600	480	900	720
Max Minor Street	150	120	75	60

AM Peak Hour

Major Street					
	708	×	0.625	=	443
Minor Street					
	244	×	0.625	=	153
				Standard 1	Not Met
				Standard 2	Not Met

PM Peak Hour

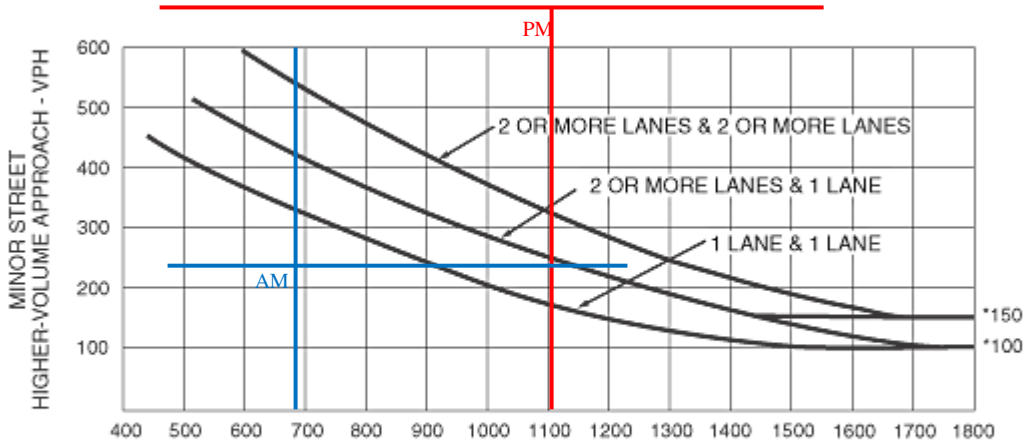
Major Street					
	1051	×	0.625	=	657
Minor Street					
	672	×	0.625	=	420
				Standard 1	Met
				Standard 2	Not Met

Warrant 3, Peak Hour Volume

Ellingson at SR 167 SB ramps

2020 No Build

Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Warrant 1, Eight-Hour Vehicular Volume

8th Street at SB Ramps

2020 No Build

For Future Condition Volumes 8th Highest Hour will be assumed to be 62.5% of Peak Hour

Standard 1: Only one condition must exist

A. The vehicles per hour given in both of the 100 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; or
B. The vehicles per hour given in both of the 100 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.

Standard 2: Both conditions must exist

A. The vehicles per hour given in both of the 80 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; and
B. The vehicles per hour given in both of the 80 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.

Criteria: (From Table 4C-1)	Condition A		Condition B	
	100%	80%	100%	80%
Sum Major Street	600	480	900	720
Max Minor Street	150	120	75	60

AM Peak Hour

Major Street					
	1099	×	0.625	=	687
Minor Street					
	318	×	0.625	=	199
				Standard 1	Met
				Standard 2	Not Met

PM Peak Hour

Major Street					
	1407	×	0.625	=	879
Minor Street					
	1029	×	0.625	=	643
				Standard 1	Met
				Standard 2	Met

Warrant 3, Peak Hour Volume

8th Street at SB Ramps

2020 No Build

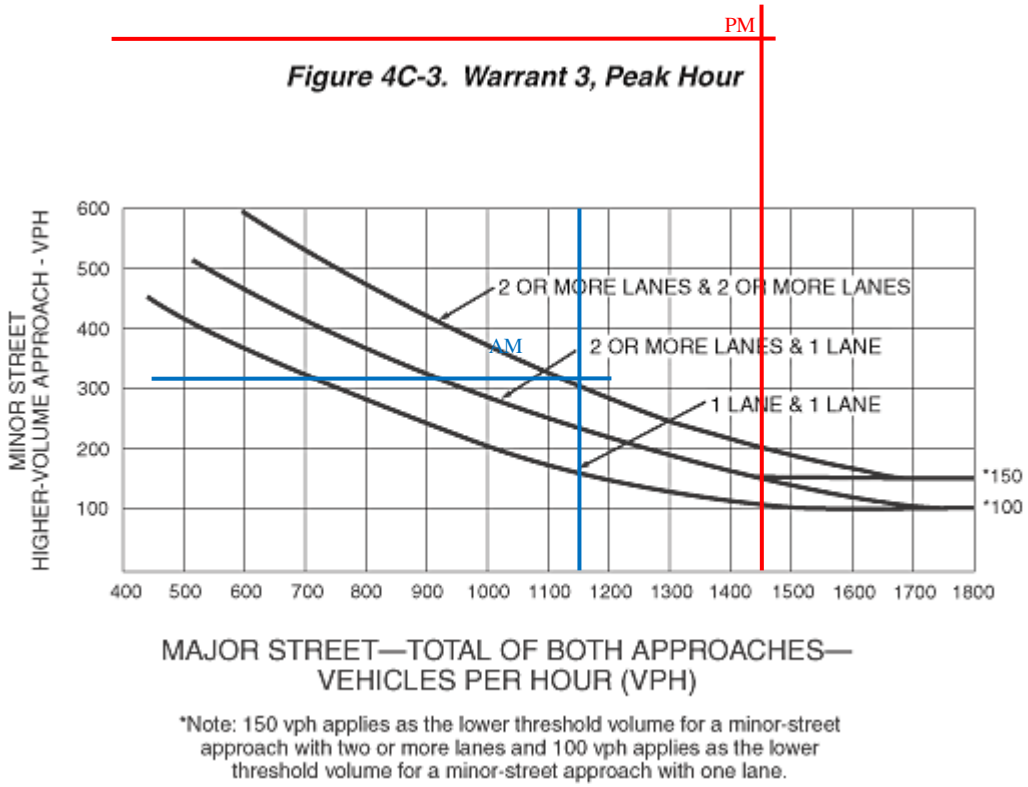


Figure 4C-3. Warrant 3, Peak Hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Warrant 1, Eight-Hour Vehicular Volume

West Valley Highway at Ellingson

2020 Build

For Future Condition Volumes 8th Highest Hour will be assumed to be 62.5% of Peak Hour

Standard 1: Only one condition must exist

A. The vehicles per hour given in both of the 100 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; or
B. The vehicles per hour given in both of the 100 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.

Standard 2: Both conditions must exist

A. The vehicles per hour given in both of the 80 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; and
B. The vehicles per hour given in both of the 80 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.

Criteria: (From Table 4C-1)	Condition A		Condition B	
	100%	80%	100%	80%
Sum Major Street	500	400	750	600
Max Minor Street	200	160	100	80

AM Peak Hour

Major Street					
	766	×	0.625	=	479
Minor Street					
	293	×	0.625	=	183
				Standard 1	Not Met
				Standard 2	Not Met

PM Peak Hour

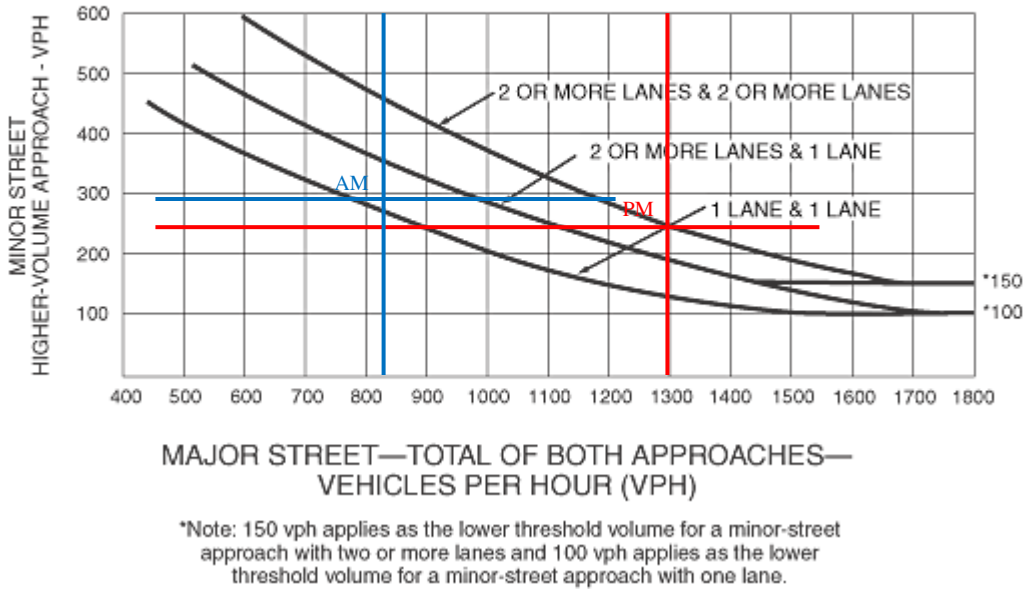
Major Street					
	1242	×	0.625	=	776
Minor Street					
	249	×	0.625	=	156
				Standard 1	Met
				Standard 2	Met

Warrant 3, Peak Hour Volume

West Valley Highway at Ellingson

2020 Build

Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Warrant 1, Eight-Hour Vehicular Volume

Ellingson at SR 167 SB ramps

2020 Build

For Future Condition Volumes 8th Highest Hour will be assumed to be 62.5% of Peak Hour

Standard 1: Only one condition must exist

C. The vehicles per hour given in both of the 100 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; or
D. The vehicles per hour given in both of the 100 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.

Standard 2: Both conditions must exist

C. The vehicles per hour given in both of the 80 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; and
D. The vehicles per hour given in both of the 80 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.

Criteria: (From Table 4C-1)	Condition A		Condition B	
	100%	80%	100%	80%
Sum Major Street	600	480	900	720
Max Minor Street	150	120	75	60

AM Peak Hour

Major Street					
	678	×	0.625	=	424
Minor Street					
	226	×	0.625	=	141
				Standard 1	Not Met
				Standard 2	Not Met

PM Peak Hour

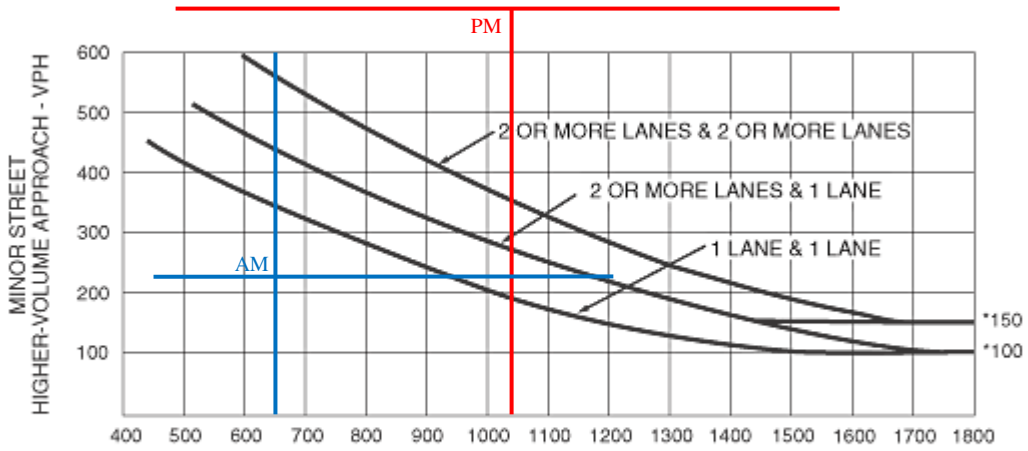
Major Street					
	995	×	0.625	=	622
Minor Street					
	704	×	0.625	=	440
				Standard 1	Met
				Standard 2	Not Met

Warrant 3, Peak Hour Volume

Ellingson at SR 167 SB ramps

2020 Build

Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Warrant 1, Eight-Hour Vehicular Volume

8th Street at SB Ramps

2020 Build

For Future Condition Volumes 8th Highest Hour will be assumed to be 62.5% of Peak Hour

Standard 1: Only one condition must exist

A. The vehicles per hour given in both of the 100 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; or
B. The vehicles per hour given in both of the 100 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.

Standard 2: Both conditions must exist

A. The vehicles per hour given in both of the 80 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; and
B. The vehicles per hour given in both of the 80 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.

Criteria: (From Table 4C-1)	Condition A		Condition B	
	100%	80%	100%	80%
Sum Major Street	600	480	900	720
Max Minor Street	150	120	75	60

AM Peak Hour

Major Street					
	1081	×	0.625	=	676
Minor Street					
	294	×	0.625	=	184
				Standard 1	Met
				Standard 2	Not Met

PM Peak Hour

Major Street					
	1677	×	0.625	=	1048
Minor Street					
	1078	×	0.625	=	674
				Standard 1	Met
				Standard 2	Met

Warrant 3, Peak Hour Volume

8th Street at SB Ramps

2020 Build