TRAFFIC ANALYSIS SUMMARY MEMORANDUM

SR 167 – 8th Street E Vic. to S 277th Street Vic. Southbound HOT Lane

July 2008

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LIST OF EXHIBITS

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EXECUTIVE SUMMARY

What is the purpose of this report?

This memorandum summarizes the traffic analysis conducted for the SR 167 – 8th Street East Vicinity to South 277th Street Vicinity Southbound HOT lane project. The detailed analysis approach, assumptions, findings, effects, and mitigation measures are presented in the complete technical memorandum.

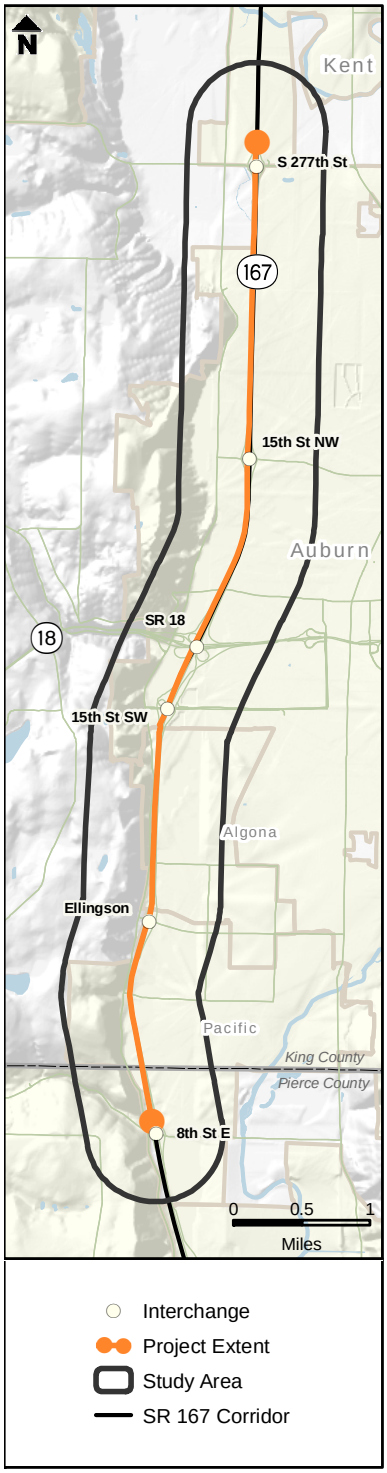
This report was prepared as part of a National Environmental Policy Act (NEPA) Documented Categorical Exclusion (DCE), which requires all actions sponsored or those with potential federal funding, permitted or approved by a federal agency to consider the environmental effects of the Proposal Action. The Washington State Environmental Policy Act (SEPA) requires a similar evaluation of environmental effects of proposed actions for state and local projects. This project is required to comply with both NEPA and SEPA, which includes a review of potential effects and possible mitigation measures. When there is an existing potential for traffic to be affected as a result of the proposed project, then a review of those potential effects and possible mitigation measures is required by both NEPA and SEPA.

What is the proposed project and why is it needed?

The Washington State Department of Transportation (WSDOT) plans to widen the State Route (SR) 167 roadway to construct a new southbound high-occupancy toll (HOT) lane from the vicinity of 8th Street E (MP 10.2) in Pierce County, Washington to the vicinity of S 277th Street in Kent (MP 18.24), King County, Washington (**Exhibit 1**). This new HOT lane will be a continuation of a southbound HOT lane that was constructed for the HOT Lane Pilot Project, which extends from the I-405 interchange in Renton to S 277th Street in Kent.

> High Occupancy Toll (HOT) lanes are managed lanes intended to increase mobility by allowing more vehicle use of the HOV lane. HOT lanes maintain free, priority status for transit and carpools, the same as a HOV lane, but also allow single occupancy vehicles to pay a toll to use the lane. Toll rates are variable, depending upon the level of congestion.

Exhibit 1
Vicinity Map

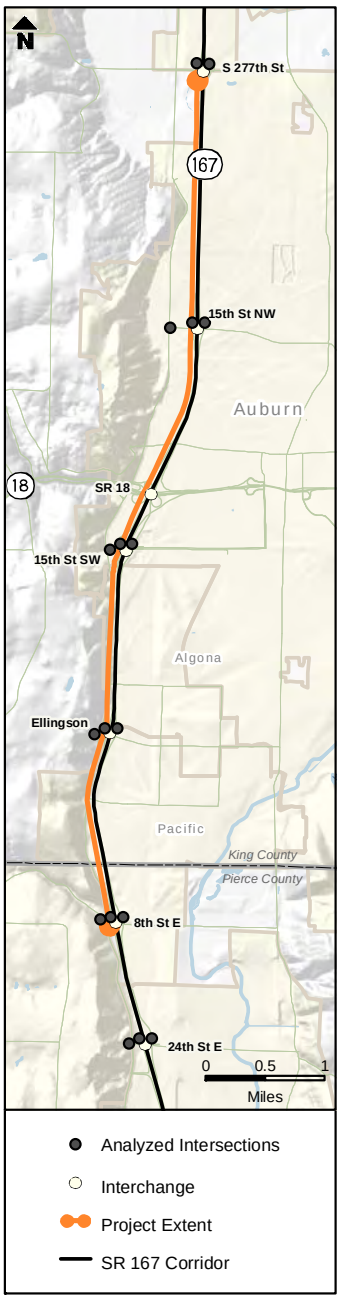


Source: Traffic Final Report, June 2008

The construction of the HOT lane will require widening the roadway to the outside of the existing pavement between 6th Avenue N in Algona and 5th Avenue S in Pacific. In addition, it will require widening the southbound bridge at the SR 18 interchange. Ramp meters will be installed at southbound on-ramps at the SR 167 interchanges with 15th Street SW, Ellingson Road, and 8th Street E. In addition, new signals will be installed at the SR 167 southbound ramp terminals with Ellingson Road and 8th Street E. All of the proposed widening work will occur within the WSDOT right-of-way, with the exception of the stormwater site. The stormwater site is located at the northwest quadrant of the SR 167 / SR 18 interchange area.

SR 167 is an important thoroughfare for cars, trucks, and transit in the Green River Valley. The additional capacity that this project will provide to SR 167 will relieve congestion and improve safety for commuters traveling southbound.

Exhibit 2
Study Area



Source: Perteet Traffic Analysis, 2006/2007 Study

What are the traffic analysis components?

The traffic analysis included two components:

- Analysis of the SR 167 mainline and ramp operations
- Analysis of the local intersection operations

The travel forecasts were derived from the SR 167 Corridor Plan Study. **Exhibit 2** illustrates the project area covered by the SR 167 Corridor Plan Study as well as the SR 167 study area analyzed for the southbound HOT lane.

What locations were analyzed?

Due to the initial range of project limits, the freeway operations were analyzed from S 277th Street in Kent to 24th Street E in Sumner. In addition, the following seventeen intersections were identified on both sides of SR 167 between S 277th Street and 24th Street E to be included in the local intersection operational analysis:

- S 277th Street & SR 167 southbound ramp
- S 277th Street & SR 167 northbound ramp
- 15th Street NW at West Valley Highway S
- 15th Street NW & SR 167 southbound ramp

- 15th Street NW & SR 167 northbound ramp
- 15th Street SW at West Valley Highway S
- 15th Street SW & SR 167 southbound ramp
- 15th Street SW & SR 167 northbound ramp
- Ellingson Road at West Valley Highway S
- Ellingson Road & SR 167 southbound ramp
- Ellingson Road & SR 167 northbound ramp
- 8th Street E at West Valley Highway S
- 8th Street E & SR 167 southbound ramp
- 8th Street E & SR 167 northbound ramp
- 24th Street E at W Valley Highway S
- 24th Street E Interchange ramps
- West Valley Highway S at SR 167 southbound ramp near 24th Street E

What does the traffic analysis provide?

The traffic analysis conducted for this study provides a comparison of how traffic operates in the base year of 2005 to what traffic is predicted to be like during the peak hour in 2010 (initially identified Year of Opening) and 2030 (Horizon Year) both with the proposed HOT lane (Build alternative), and without any additional lanes (No Build alternative) along southbound SR 167.

The Build alternative analyzed for this study is SR 167 from S 277th Street to 8th Street E which adds a southbound HOT lane between approximately 37th Street NW and just north of 8th Street E. The traffic analysis assumed the project to include the construction of ramp meters and an HOV bypass on all northbound and southbound arterial on-ramps between 15th Street SW and at 8th Street E. The project also includes extending the southbound exit lane to westbound SR 18.

What methodology was used for this traffic analysis?

The traffic forecasts for this study used the SR 167 Corridor Plan Study EMME/2 travel demand model. This model was developed, validated, and calibrated using the Regional Travel Demand Model built and maintained by the Puget Sound Regional Council (PSRC).

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 micro-simulation Model and the SYNCHRO Model, to evaluate the effectiveness of the transportation improvement project WSDOT is considering.

VISSIM Micro-Simulation Model

Micro-simulation 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 micro-simulation model will indicate how this affects the freeway upstream. The micro-simulation model includes roadway characteristics such as the number of lanes, ramp merge and diverge locations, intersection channelization and stop control, traffic volumes by mode, posted speed limits, and vertical grades.

Queue:

A queue is a line of waiting vehicles, for example, a queue of vehicles at a red light waiting for it to turn green.

Queue Length:

The length of the line of vehicles queued up at the intersection, waiting to proceed.

SYNCHRO Model

Local street intersection operations were modeled with the SYNCHRO software Build 614. SYNCHRO is a macroscopic analysis tool that forecasts traffic intersection operations in terms of delay, Level-of-Service (LOS), and queue lengths.

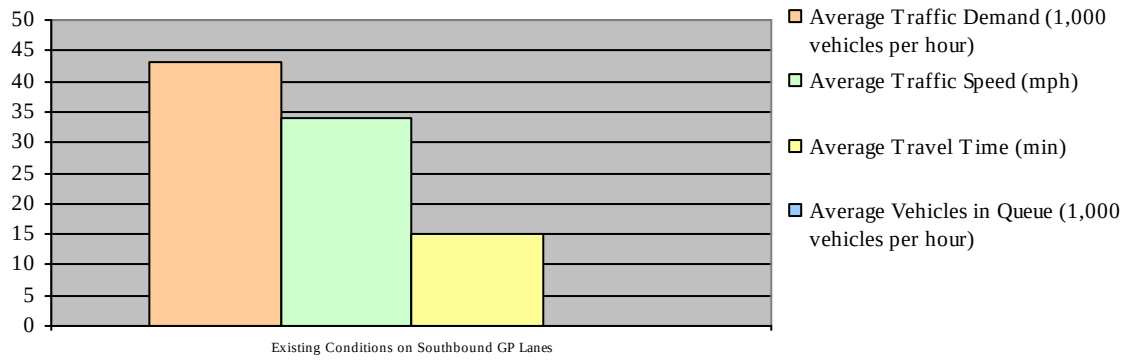
What are the operations effects on traffic?

Extending the southbound HOT lane from the end of the existing HOT lane will provide the opportunity for approximately 1,000 vehicles per hour during the afternoon peak to travel safer and faster for an additional 8 miles. By 2010 congestion during the four hour afternoon peak period (2 p.m. to 6 p.m.) will increase to the point that the speed in the general purpose lanes will drop to as low as 10 mph and the travel time will increase from the current 15 minutes to approximately 27 minutes from S 277th Street to 8th Street E. Vehicles in the HOT lane in 2010 would traverse this same section at an average speed of 46 mph. It is forecasted that more than 4,000 vehicles per day will benefit from this project with a savings of nearly 20 minutes per vehicle, or more than 1,300 hours per day saved by vehicles in the HOT lane.

Traffic Operations on SR 167 Mainline and Ramps

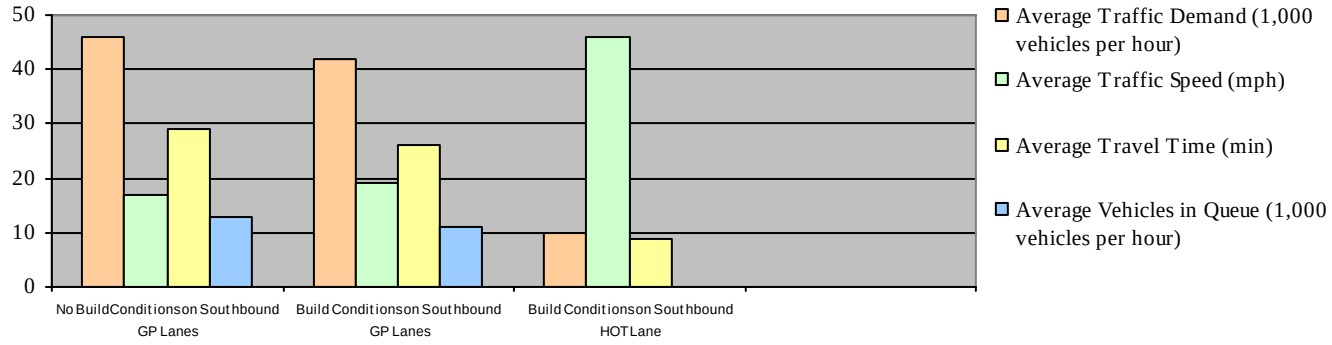
The following are key findings from the traffic analysis and relate to the afternoon peak hour operations of the southbound freeway and ramps, and are as follows:

Exhibit 3
2005 Traffic Conditions on Southbound SR 167



- In the Base Year 2005 as illustrated in Exhibit 3, the average speed on SR 167 southbound between S 277th Street and 8th Street E was 34 mph with a travel time of 15 minutes for the 8 mile section during the afternoon peak hour. About 4,300 vehicles per hour used this section of SR 167 during the afternoon peak hour and no queues were observed north of S 277th Street. In the northbound direction during the afternoon peak hour, operating speeds were near free-flow in 2005.

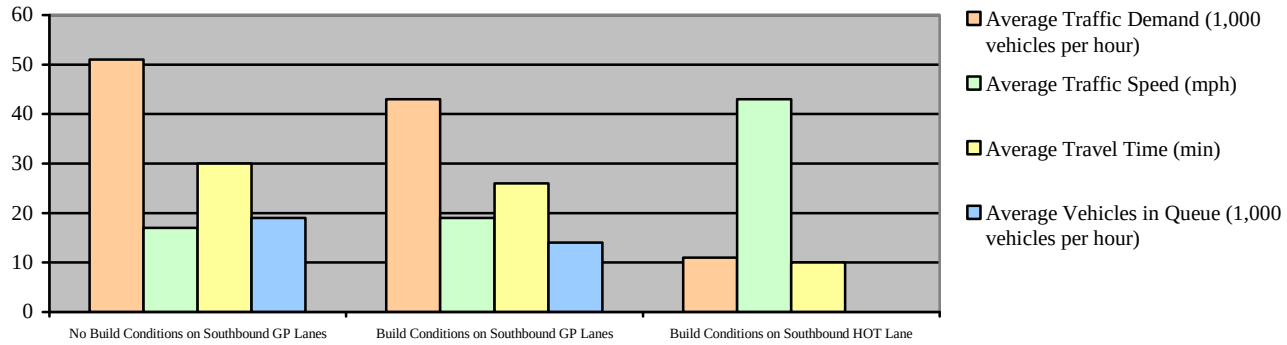
Exhibit 4
2010Traffic Conditions on Southbound SR 167



- Between 2005 and the 2010 No Build alternative (no improvements), traffic volumes on southbound SR 167 through the SR 18 interchange grows from 4,300 vehicles to 4,600 vehicles during the afternoon peak hour, an increase of about seven percent. As shown in Exhibit 4, this growth in traffic results in congested traffic conditions on southbound SR 167 general purpose lanes, with average speeds dropping by 50 percent from 34 mph to 17 mph, and average travel times doubling to nearly 29 minutes from 15 minutes. The congestion beginning through the SR 18 interchange extends north of S 277th Street and beyond the study limits. This results in a queue of almost 1,300 vehicles per hour north of S 277th Street.
- In the 2010 Build alternative with the completion of a HOT lane on southbound SR 167, the total traffic volumes during the afternoon peak hour across all lanes on southbound SR 167 increases from 4,600 vehicles per hour to 5,200 vehicles per hour, an increase of almost 21 percent over 2005 conditions (Exhibit 4). There is a slight improvement in traffic conditions on southbound SR 167 general purpose lanes during the afternoon peak hour. Traffic volumes on the southbound general purpose lanes drop to 2005 conditions of 4,200 vehicles per hour, with average speeds improving by 2 mph from 17 mph to 19 mph, and average travel times reducing by 3 minutes from 29 minutes to 26 minutes. The southbound HOT lane provides relief to traffic flows on southbound SR 167 during the afternoon

peak hour by carrying about 1,000 vehicles per hour, providing average speeds of 46 mph and average travel times of 9 minutes from S 277th Street to 8th Street E. However, congestion still exists through SR 18 interchange and extends north, resulting in a queue of 1,100 vehicles per hour north of S 277th Street.

Exhibit 5
2005 Traffic Conditions on Southbound SR 167



- In the year 2030 No Build alternative (no improvements) as depicted in Exhibit 5, travel volumes on SR 167 southbound mainline through the SR 18 interchange during the afternoon peak hour increases by almost 11 percent over the year 2010 conditions of 4,600 vehicles per hour to 5,100 vehicles per hour. This section is well over capacity by 2010 and the additional growth in traffic volume beyond this adds to the already poor traffic operations during the afternoon peak hour. The average speeds drop below 17 mph during the peak hour and the average travel time southbound between S 277th Street and 8th Street E is 30 minutes. Since the capacity of the system is full in the year 2010, additional traffic volume during the peak hour in the year 2030 is not served and is in a queue of 1,900 vehicles per hour extending north of S 277th Street.
- Total traffic volumes during the afternoon peak hour for the 2030 Build alternative with the completion of the HOT lane, is about 5,400 vehicles per hour, which is slightly higher than 2010 Build conditions of 5,200 vehicles per hour (Exhibit 5). Though traffic volumes increases in the year 2030 in the Build alternative, the SR 167 southbound mainline general purpose

lanes are at capacity by 2010. This results in conditions where the increase in traffic volumes during the afternoon peak hour not being served with a resulting queue of 1,400 vehicles per hour north of S 277th Street. As in 2010, the southbound HOT lane provides relief to traffic flows on southbound SR 167 during the afternoon peak hour by carrying about 1,100 vehicles per hour, providing average speeds of 43 mph and average travel times of 10 minutes from S 277th Street to 8th Street E.

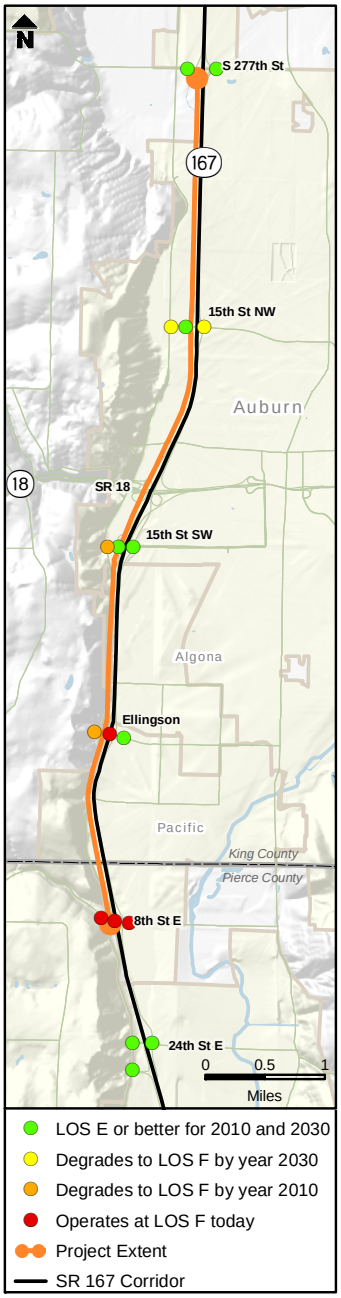
- The completion of a HOT lane between S 277th Street and 8th Street E in both 2010 and 2030 provides relief for about 1,000 to 1,100 vehicles per hour traveling at an average speed of 43 mph or better. The HOT lane is better utilized (1,600 vehicles per hour) north of 15th Street NW and south of 15th Street SW. Through the SR 18 interchange (between 15th Street NW and 15th Street SW), the volume in the HOT lane decreases to about 700 vehicle per hour. This is because vehicles entering or exiting to 15th Street NW, SR 18, and 15th Street SW do not have a quick or direct access to this lane. As there is no direct HOT lane access between 15th Street NW and 15th Street SW, the traffic entering or exiting the HOT lane in this 3 mile section, has to access the general purpose lanes, as well as merge across these lanes to enter or exit the HOT lanes. This analysis indicates providing a direct HOT lane access at SR 18 would improve the operating conditions and congestion on the general purpose lanes through the SR 18 interchange area.

Traffic Operations at Local Intersections

The traffic analysis included the study of seventeen local intersections on both sides of SR 167. Exhibits 6 and 7 depict and summarize the traffic operations during the afternoon peak hour and identify locations where the operations degrade to a level of service (LOS) F for the Build Alternative.

- The traffic operations analysis indicates four of the study intersections operated at LOS F in 2005 during the afternoon peak hour and will continue to do so in future years without further improvements. An additional four locations degrade to LOS F by the year 2010 or 2030 for both the No Build and Build alternatives.

Exhibit 6
Intersection LOS



Source: Perteet Traffic Analysis, 2006/2007 Study

- The Build alternative increases delay at only one LOS F intersection, which is the intersection of 15th Street NW and West Valley Highway S. The increase in delay is nominal, from 89 seconds per vehicle during the afternoon peak hour in the No Build alternative to 91 seconds per vehicle in the Build alternative.
- The majority of the intersections operating at LOS F are un-signalized and have delays on the stop sign controlled approach greater than two or three minutes during the afternoon peak hour for both the Build and No Build alternatives. WSDOT has plans to replace the existing stop sign controlled intersections at Ellingson Road and SR 167 southbound ramp and 8th Street E and SR 167 southbound ramp to traffic signals. The LOS at Ellingson Road and SR 167 southbound ramp would improve significantly from F (more than 150 seconds of delay) to D (37 seconds of deal), while the LOS at 8th Street E and southbound SR 167 ramp would continue to operate at F (more than 150 seconds of delay).

Level of Service (LOS)

Intersections are graded based on delay and assigned a level of service letter grade from "A" to "F". LOS A represents minimal delay (best) and LOS F represents maximum delay or congestion (worst).

Exhibit 7
Study Area Local Intersections Operations Summary (Afternoon peak hour)
Build Alternative

Intersection	Level of Service	Traffic Control
S 277th Street & SR 167 southbound ramps	LOS E or better for 2010 and 2030	Traffic Signal
S 277th Street & SR 167 northbound ramps	LOS E or better for 2010 and 2030	Traffic Signal
15th Street NW & West Valley Hwy S	**Degrades to LOS F by year 2030**	Traffic Signal
15th Street NW & SR 167 southbound ramps	LOS E or better for 2010 and 2030	Traffic Signal
15th Street NW & SR 167 northbound ramps	**Degrades to LOS F by year 2030**	Traffic Signal
15th Street SW & West Valley Hwy S	**Degrades to LOS F by year 2030**	Traffic Signal
15th Street SW & SR 167 southbound ramps	LOS E or better for 2010 and 2030	Traffic Signal
15th Street SW & SR 167 northbound ramps	LOS E or better for 2010 and 2030	Traffic Signal
Ellingson Rd. & West Valley Hwy S	**Degrades to LOS F by year 2010**	Stop Sign
Ellingson Rd. & SR 167 southbound ramps	**Operates at LOS F today**	Stop Sign (Proposed Traffic Signal)
Ellingson Rd. & SR 167 northbound ramps	LOS E or better for 2010 and 2030	Traffic Signal
8th Street E & West Valley Hwy S	**Operates at LOS F today**	Traffic Signal
8th Street E & SR 167 southbound ramps	**Operates at LOS F today**	Stop Sign (Proposed Traffic Signal)
8th Street E & SR 167 northbound ramps	**Operates at LOS F today**	Traffic Signal
24th Street E & West Valley Hwy S	LOS E or better for 2010 and 2030	Traffic Signal
24th Street E & SR 167 northbound ramps	LOS E or better for 2010 and 2030	Traffic Signal
West Valley Hwy S & SR 167 southbound ramps (near 24th Street E)	LOS E or better for 2010 and 2030	Traffic Signal

What are the effects of construction on traffic?

There will be minor temporary, direct effects on traffic circulation during construction. There will likely be temporary disruptions due to temporary lane closures and increased congestion during construction. Also, some complete nighttime closures will require shifting traffic between the Ellingson Road on- and off-ramps and the 15th Street SW on-ramp. This will likely increase travel times for general traffic, fire, emergency medical, and police vehicles through the project area during construction-related traffic slowdowns.

What measures will be taken to avoid, minimize, or mitigate the effects of construction on traffic?

WSDOT will coordinate with local agencies to prepare a Traffic Management Plan prior to lane closures or making any traffic flow changes. The Cities of Auburn, Algona, Pacific, and Sumner, the public, school districts, emergency service providers, and transit agencies will be informed of changes through a public information process. WSDOT and construction management mangers will make every effort to minimize traffic delays or disruptions during construction. Lane closures will occur in off-peak hours whenever possible, and will be coordinated with local agencies.

Transportation demand management (TDM) strategies will form an important part of the construction management program. TDM strategies from prior HOT lane construction projects and those identified in the SR 167 Corridor Plan will be implemented where possible to increase public awareness and participation in HOV travel and HOT lane benefits.