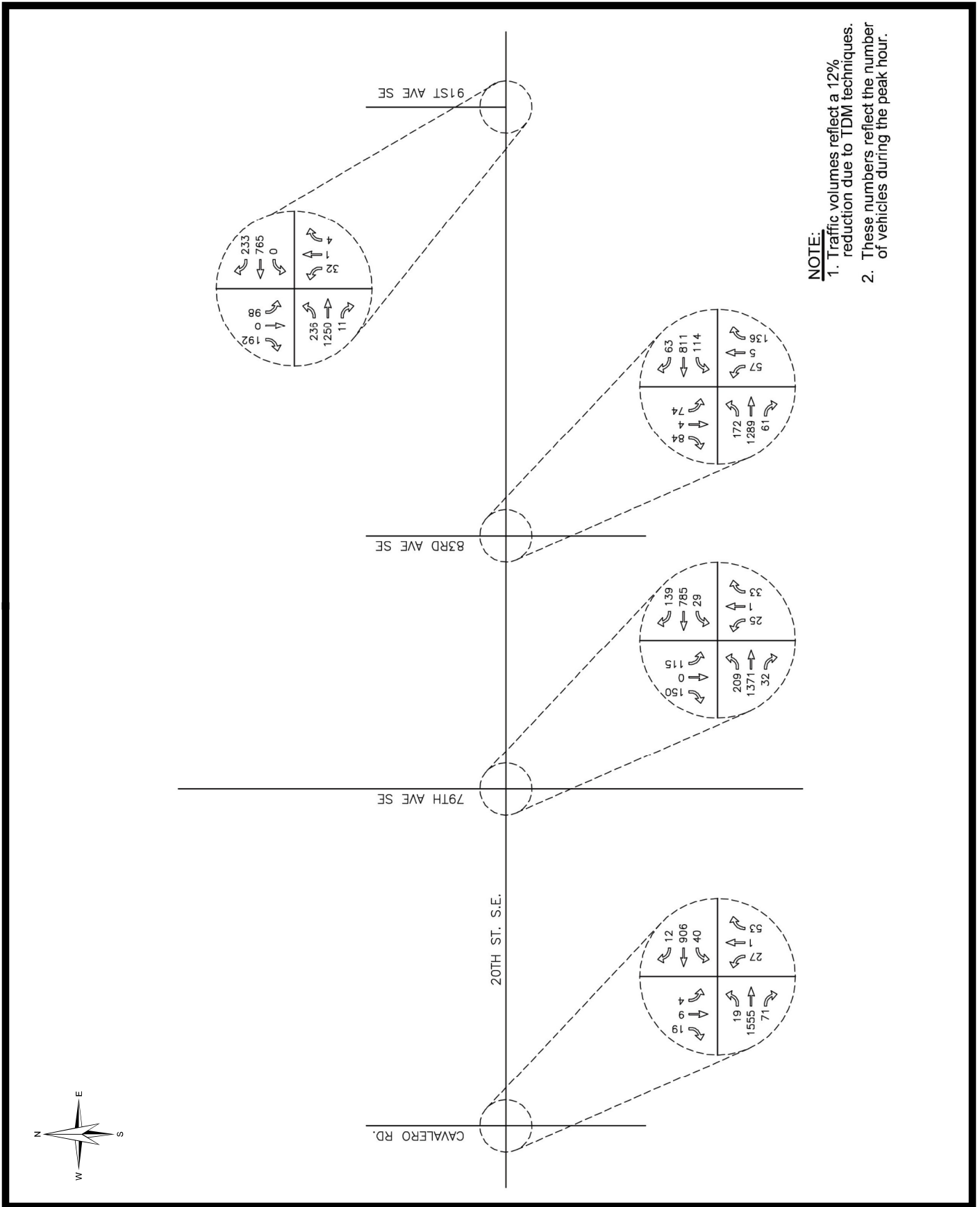


Snohomish County disclaims any warranty of merchantability or warranty of fitness of this map for any particular purpose, either express or implied. Any user of this map assumes all responsibility for use thereof, and further agrees to hold Snohomish County harmless from and against any damage, loss, or liability arising from any use of this map.

**Figure 11a: 2031 Preferred Alternative  
AM Peak-Hour Traffic Volumes**



Snohomish County disclaims any warranty of merchantability or warranty of fitness of this map for any particular purpose, either express or implied. Any user of this map assumes all responsibility for use thereof, and further agrees to hold Snohomish County harmless from and against any damage, loss, or liability arising from any use of this map.

**Figure 11b: 2031 Preferred Alternative  
PM Peak-Hour Traffic Volumes**

Three road improvement packages included Design Horizon Year 2031 traffic forecasts (to be constructed and in-place by that year) are as follows:

Snohomish County project - currently funded 20<sup>th</sup> Street SE Improvements (widening to five lanes between 91<sup>st</sup> Avenue SE and South Lake Stevens Road projected to be completed before Opening Year 2010).

WSDOT project - currently funded SR 9 Improvements (widening to five lanes between a point approximately 2,500 north of 20<sup>th</sup> Street SE and SR9's intersection with South Lake Stevens Road, south of 20<sup>th</sup> Street SE. These improvements are projected to be completed before Opening Year 2010).

WSDOT project - currently funded HOV and Auxiliary Lane Improvements on I-5 (additional lanes from SR 526 to East Marine View Drive projected to be completed by 2008).

## **Impacts - Transportation**

### **During Construction**

#### **Preferred Alternative**

Construction would cause short-term traffic blockages. Peak-hour traffic would be markedly slower along any portion of the corridor under construction. In most cases, one lane would typically be closed during construction. In some cases, construction of the roadway and drainage improvements may require short-term closures of the entire roadway, particularly for the utility crossings. In addition, the vertical alignment improvements at 20th Street SE and Cavalero Road may require a short-term closure of the north and south intersection legs. As a result of these short-term blockages, it may be necessary to implement traffic detours around construction zones.

Driveways of properties along the corridor will also be reconstructed and may require temporary connections to maintain access.

#### **No Action Alternative**

No improvements would take place under the No Action Alternative. Therefore, no construction related impacts would occur.

### **During Operation**

The operational analysis focuses on the post-construction vehicle speed and level of service effects associated with the Preferred Alternative and the No Action Alternative.

#### **Preferred Alternative**

To determine impacts associated with the Preferred Alternative, Opening Year 2010 and Design Horizon Year 2031 arterial speeds (Table 3a) and levels of service (Table 3b) were determined using Synchro and VISSIM software.

Under the Preferred Alternative conditions for Opening Year 2010, vehicle travel speeds are maintained above 13 mph if a westbound AM peak-hour HOV lane is designated and some

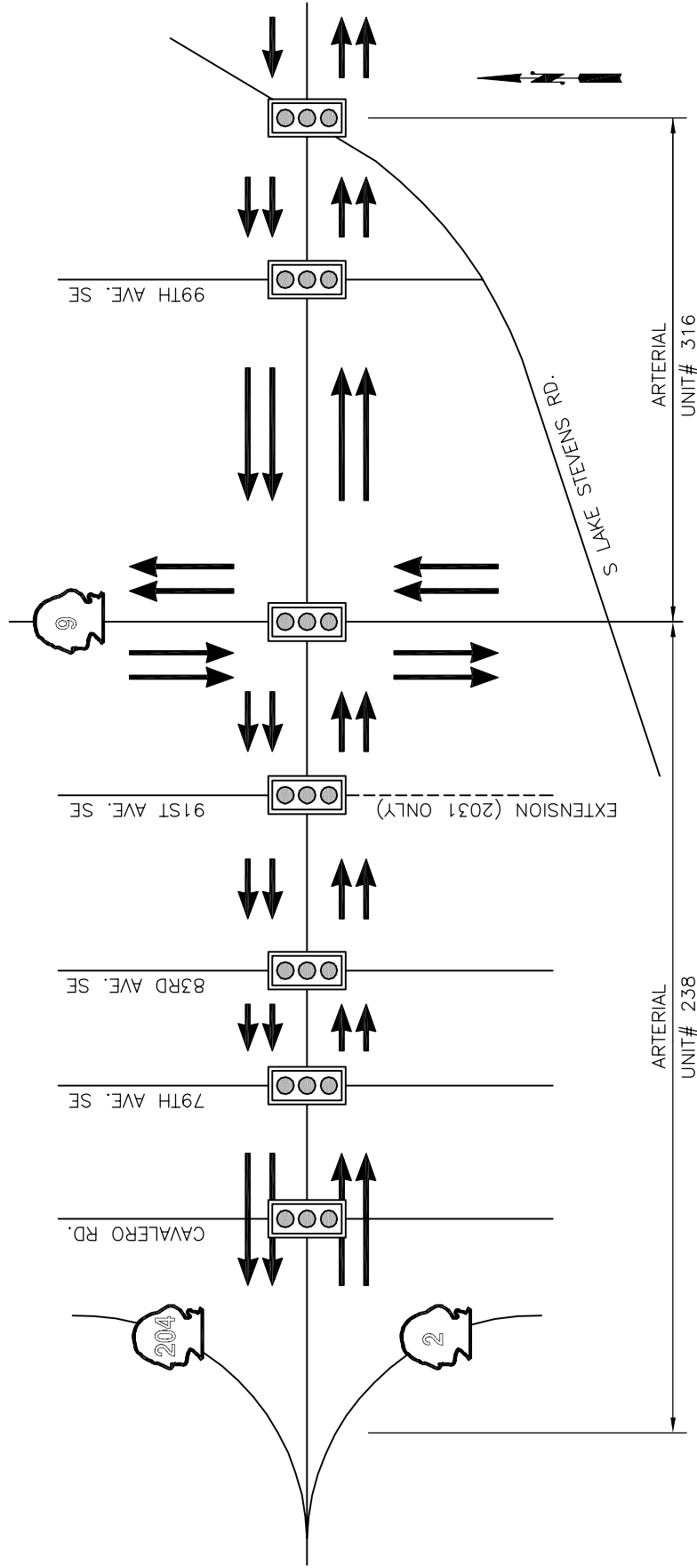
**Table 3a: Preferred Alternative Vehicle Arterial Speed Analysis**

ARTERIAL UNIT	YEAR	AM PEAK HOUR		PM PEAK HOUR	
		WESTBOUND	EASTBOUND	WESTBOUND	EASTBOUND
US 2 TO SR 9 (ARTERIAL UNIT #238)	2010	13.3 MPH	23.5 MPH	32.9 MPH	18.7 MPH
	2031*	19.6 MPH	17.4 MPH	33.0 MPH	18.1 MPH
SR 9 TO S. LAKE STEVENS ROAD (ARTERIAL UNIT #316)	2010	22.2 MPH	32.2 MPH	25.6 MPH	27.1 MPH
	2031*	26.0 MPH	26.6 MPH	22.2 MPH	27.0 MPH

NOTE:

\*2031 VOLUMES ASSUME 50% MODAL SHIFT AND 45% LESS PEAK HOUR TRAFFIC

**5 Lanes from US 2 to 91st Avenue SE**



**Table 3b: Preferred Alternative Level of Service (LOS)**

20th St Intersection	Year	AM Peak Hour					PM Peak Hour				
		NB	SB	EB	WB	Overall	NB	SB	EB	WB	Overall
Cavalero (signalized)	2010	D (36.4)	B (16.9)	A (2.0)	A (1.0)	A (2.5)	C (27.5)	C (21.1)	A (2.8)	B (3.1)	A (3.6)
	2031	D (54.1)	C (27.2)	A (2.7)	A (2.4)	A (4.9)	D (44.4)	C (32.5)	A (3.8)	A (1.4)	A (4.5)
79th (signalized)	2010	B (15.7)	C (27.8)	A (3.2)	A (5.3)	A (9.4)	B (17.2)	B (17.8)	A (2.4)	A (5.5)	B (14.6)
	2031	C (27.8)	D (51.1)	A (6.4)	A (7.1)	B (15.0)	B (18.2)	B (16.2)	A (4.4)	B (10.9)	A (7.9)
83rd (signalized)	2010	B (18.2)	C (32.0)	A (6.8)	B (13.2)	B (14.6)	B (17.7)	C (26.5)	A (4.6)	A (5.5)	A (6.9)
	2031	C (28.3)	D (44.3)	C (22.0)	B (15.2)	C (21.6)	C (25.8)	E (63.6)	A (9.7)	A (6.6)	B (12.8)
91st (signalized)	2010	----	C (22.7)	A (7.8)	A (9.4)	B (10.3)	----	C (20.8)	A (7.5)	A (5.1)	A (7.7)
	2031	D (50.4)	D (50.1)	A (6.5)	A (5.8)	B (13.0)	D (50.3)	C (34.1)	B (12.0)	A (5.2)	B (12.4)

Analysis software: Synchro Version 6 (Build 614)

Note: Number in parenthesis is delay in seconds per vehicle.

Level of service is generated only for the existing or planned approaches. Where there are dashes in an approach column for an intersection approach, that approach does not exist and/or is not planned (and therefore a level of service value is not applicable).

moderate TDM techniques are used to encourage more carpools and transit ridership. For LOS, all County controlled intersection legs operate at LOS D or better in the Opening Year 2010 with the proposed improvements between US 2 and 91st Avenue SE.

Under the Preferred Alternative conditions for Design Horizon Year 2031, to achieve the vehicle travel times of 22 mph and above shown in Table 3a, significant TDM techniques must be employed that that would encourage a major shift of single occupancy vehicles to transit, carpools, or vanpools to reduce traffic volumes.

Alternatively, if additional road improvements were to be programmed for US 2, or a surface route constructed across Ebey Island (parallel to US 2), the arterial speed in the westbound direction during the AM peak-hour for all sections of 20th Street would be expected to improve. There will be less operational impacts under this alternative as vehicles will travel more quickly through and between intersections.

For LOS, all County controlled intersection legs can operate at LOS E or better for 2031 with the proposed improvements between US 2 and 91st Avenue SE. This is conditional on the designation of a westbound AM peak-hour HOV lane and moderate TDM techniques are employed that would encourage a modest shift from single occupancy vehicles to transit, carpools and vanpools to reduce future traffic volumes.

### **No Action Alternative**

The No Action Alternative would maintain the existing lane configurations between US 2 and 91st Avenue SE, and traffic control operations at all three intersections within the project area.

Under the No Action Alternative, arterial speeds in Opening Year 2010 fall below 13 mph for the westbound direction in the AM peak-hour (Table 4a).

For LOS, conditions at the 20th Street SE and Cavalero Road intersection will have one County controlled leg operating at LOS F for both AM and PM peak-hours for the anticipated Opening Year 2010 (Table 4b). Level of service deteriorates even further by Design Horizon Year 2031, to LOS F for at least one County controlled leg for the intersections of Cavalero Road, 79th Avenue SE, and 83rd Avenue SE. This alternative fails to meet the project objectives of alleviating congestion and improving safety along the 20th Street SE corridor.

## **Mitigation - Transportation**

### **During Construction**

#### **Preferred Alternative**

Prior to and during construction, local residents and business owners will be kept informed of any expected lane closures and timing (schedule and duration) of work in their area so that adjustments to their travel routes and schedules can be made accordingly.

Throughout construction, warning lights, barricades, lanterns, signage, steel plates and temporary fencing would be installed at all openings or other hazards to ensure safety. The construction contractor will work with property owners to maintain property access and to

minimize impacts to property. Traffic revisions and detours will be signed according to the approved traffic control

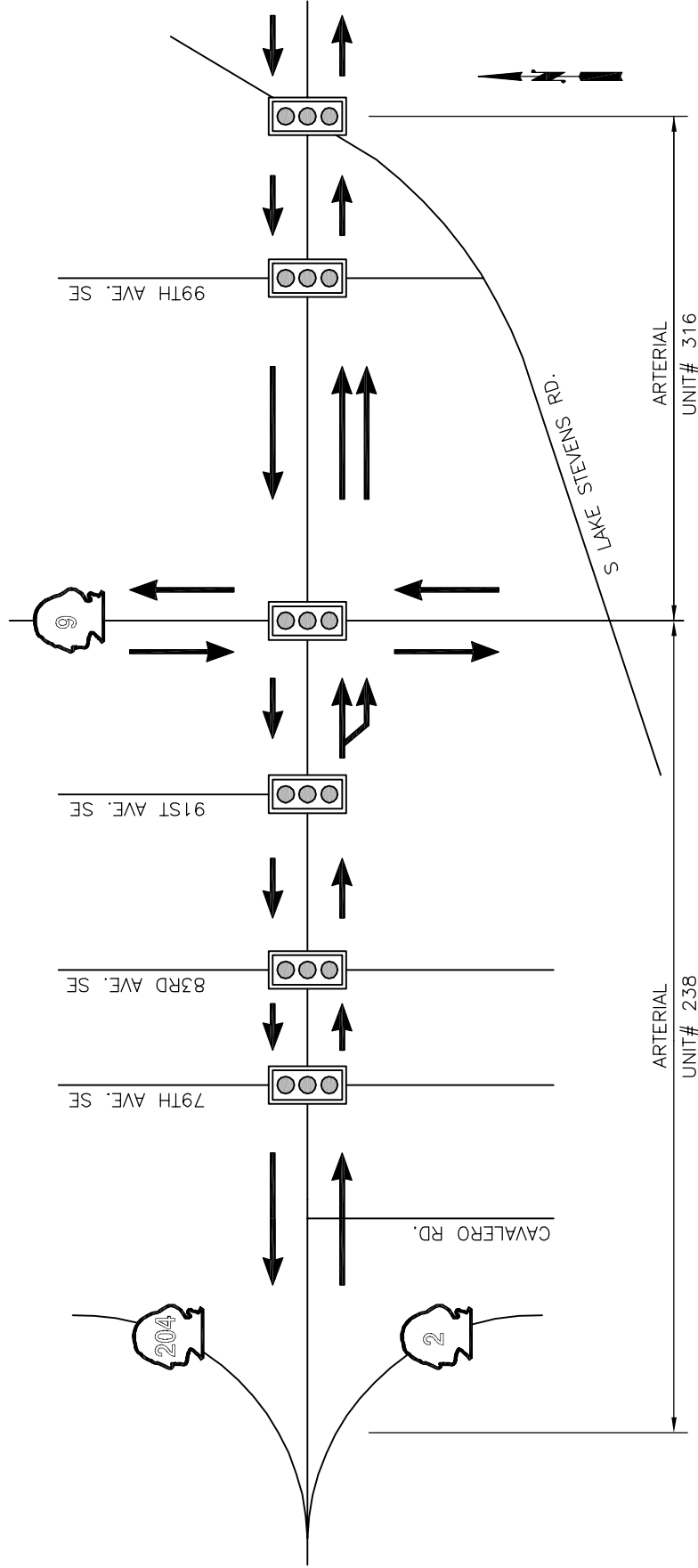
**Table 4a: No-Action Alternative Vehicle Arterial Speed Analysis**

ARTERIAL UNIT	YEAR	AM PEAK HOUR		PM PEAK HOUR	
		WESTBOUND	EASTBOUND	WESTBOUND	EASTBOUND
SR 2 TO SR 9 (ARTERIAL UNIT #238)	2010	8.7 MPH	22.3 MPH	32.9 MPH	18.7 MPH
	2031	*	*	*	*
SR 9 TO S. LAKE STEVENS ROAD (ARTERIAL UNIT #316)	2010	15.4 MPH	31.4 MPH	25.6 MPH	23.0 MPH
	2031	*	*	*	*

\* NOT DETERMINED

NOTE: SHADED RESULT INDICATES FAILURE TO MEET MINIMUM REQUIRED ARTERIAL (VEHICULAR) SPEED OF 13 MPH

**No-Action Alternative**



**Table 4b: No-Action Level of Service (LOS)**

20th St Intersection	Year	AM Peak Hour					PM Peak Hour				
		NB	SB	EB	WB	Overall	NB	SB	EB	WB	Overall
Cavalero (unsignalized)	2010	F (*)	----	A (0.0)	A (0.6)	----	F (451.2)	----	A (0.0)	A (1.5)	----
	2031	F (*)	----	A (0.0)	A (0.1)	----	F (*)	----	A (0.0)	B (10.9)	----
79th (signalized)	2010	B (15.4)	D (36.3)	A (6.1)	C (22.2)	C (21.3)	B (16.8)	B (18.2)	B (13.4)	B (13.3)	B (13.9)
	2031	D (38.9)	F (118.1)	A (6.7)	F (206.1)	F (144.7)	C (33.9)	D (41.1)	F (88.1)	C (31.9)	E (64.2)
83rd (signalized)	2010	B (19.1)	D (37.2)	B (12.7)	C (26.6)	C (23.5)	B (17.2)	C (27.4)	B (16.0)	B (11.3)	B (15.0)
	2031	E (59.8)	F (150.7)	D (46.5)	D (132.3)	F (104.5)	D (40.1)	F (90.1)	F (144.0)	D (40.1)	F (98.0)
91st (signalized)	2010	----	C (22.5)	A (7.2)	B (11.2)	B (11.2)	----	C (20.8)	A (7.7)	A (8.7)	A (9.2)
	2031	----	D (45.2)	B (12.6)	A (3.8)	B (12.3)	----	C (33.1)	B (14.5)	A (5.7)	B (13.3)

Analysis software: Synchro Version 6 (Build 614)

\*Out of reporting range in Synchro.

Note: Number in parenthesis is delay in seconds per vehicle. Shaded result indicates failure to meet level of service E or better. Overall level of service is not generated by unsignalized intersections. Level of service is generated only for the existing or planned approaches. Where there are dashes in an approach column for an intersection approach, that approach does not exist and/or is not planned (and therefore a level of service value is not applicable).

plans. Flaggers will be used to facilitate traffic flow and direct motorists around the construction zones. Traffic control requirements will conform to Washington State Department of Transportation, American Public Works Association, United States Department of Transportation Manual of Uniform Traffic Control Devices, and Snohomish County specifications for road construction.

Construction sequencing will be provided to minimize impacts related to lane closures and to maintain traffic flow and emergency services. As proposed, the widening and reconstruction sequence of 20th Street SE will be accomplished in two phases. The south half of the roadway, including walls, and a portion of the drainage collection system and stormwater detention and treatment facilities will be constructed in the first phase by shifting the traffic to the north and utilizing the existing shoulder. The traffic will then be shifted to the south on the new pavement section (excluding final pavement lift) and the road, wall, and a portion of the drainage collection system and stormwater detention and treatment facilities will be constructed on the north side.

If total lane closures become necessary (i.e. due to utility crossings), through traffic could be temporarily routed to SR 204 and SR 2. The vertical alignment improvements at 20th Street SE and Cavelero Road may also require a short-term closure of the north and south legs (Cavelero Road). Access to residences on this street could be achieved by way of a detour on nearby side streets. Throughout construction, access to residences on either side of the road, and for emergency vehicles, will be maintained.

### **No Action Alternative**

No construction related impacts would occur under the No Action Alternative. Therefore, no mitigation is required.

### **During Operation**

Two levels of criteria were established to evaluate the need to mitigate for operational impacts: LOS E must be achieved on all County controlled legs of the improved intersections on 20<sup>th</sup> Street SE, and a minimum arterial speed of 13 mph be maintained during the AM and PM peak-hours. These criteria were examined for the Opening Year 2010 and the Design Horizon Year 2031.

### **Preferred Alternative**

To maintain intersections at the minimum LOS E on Arterial Unit #238 for 2010 or 2031, a designated HOV lane and moderate TDM techniques must be implemented. TDM should encourage 15% of single occupancy vehicles to shift to transit, carpools, or vanpools that would reduce future traffic volumes by 12%. Only the southbound PM peak-hour leg of 83<sup>rd</sup> Avenue SE is an LOS E, and only in 2031. The majority of legs of the four intersections within the arterial unit (Cavelero Road, and 79<sup>th</sup>, 83<sup>rd</sup> and 91<sup>st</sup> Avenues SE) are LOS C and above, even in 2031.

To maintain the westbound arterial speed on Arterial Unit #238 above 13 mph in the AM peak-hour for 2010, a designated HOV lane and moderate TDM techniques must be implemented. The measures must encourage a modal shift of about 15% to reduce “opening day” peak hour traffic volumes by about 12%. To maintain the same speed level in 2031, a designated HOV lane and significant TDM techniques must be implemented. The measures must encourage a modal shift

of approximately 50% to reduce design year peak-hour traffic volumes by about 45%. This means that most of the single occupancy vehicle drivers must shift into buses, carpools, or vanpools, or travel at other times by changing work shifts. The TDM program would need to be funded.

Also, extension of the westbound AM peak-hour HOV lane east of 91st Avenue SE, widening of US 2 by WSDOT, or construction of a surface route to Ebey Island parallel to US 2, would improve arterial speeds with less modal shift required from TDM measures.

### **No Action Alternative**

No mitigation measures are proposed since no project action will take place under this alternative.

### **Significant Unavoidable Adverse Impacts**

The County's minimum arterial speed of 13 mph can be achieved in 2010 and 2031 assuming the project implements a designated HOV lane between Cavalero Road and 91<sup>st</sup> Avenue SE, and implements TDM techniques that result in moderate and significant modal shifts, respectively. To maintain intersections at a minimum LOS E on Arterial Unit #238 for both 2010 and 2031, a designated HOV lane and moderate TDM techniques will also be required. However, the avoidance of significant impacts on arterial speed and level of service would depend upon funding of the TDM program.