

## Section 11: Evaluation and Screening of Alternatives

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### How Were the Final Four Options Evaluated and Screened?

The same performance measures used in the initial screening described in Section 8 were utilized to screen the final four options. Those measures were:

- To what extent does the option move more people than the baseline scenario?
- To what extent does the option improve travel time over the baseline scenario?
- To what extent does the option reduce congestion as measured against the baseline scenario?
- To what extent does the option reduce traffic volumes on the surrounding arterial network?
- To what extent does the option improve safety over the baseline scenario?
- To what extent does each option improve freight mobility over the baseline scenario?
- To what extent is the natural and built environment affected by each scenario?
- How cost effective is each of the four remaining options?

The SR 167 Corridor Plan analyzed all the data gathered as outlined in Sections 2 through 10 of this Corridor Plan.

#### **No Build Scenario:**

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The **No Build** (No Improvement) Scenario assumes that no SR 167 projects will be constructed beyond those currently funded:

- Add a southbound auxiliary lane from I-405 to 43<sup>rd</sup> Street.  
*Construction: 2008*
- Extend the southbound HOT lane from S 277<sup>th</sup> Street to 8<sup>th</sup> Street E.  
*Construction: 2012-2014*

#### **Baseline Scenario:**

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The **Baseline** Scenario assumes the projects listed in the "No Build" scenario are constructed plus other projects that can be reasonably assumed to be funded and built by 2030, as recommended by "Destination 2030":

- Extend the northbound HOT lane from 8<sup>th</sup> Street E to 15<sup>th</sup> Street SW.  
*Construction 2020*
- Add northbound and southbound auxiliary lanes from SR 516 to S 277<sup>th</sup> Street.  
*Construction 2020*
- Add northbound and southbound general purpose lanes from S 180<sup>th</sup> Street to SR 516.  
*Construction 2020*
- Extend the northbound and southbound HOT lanes from 8<sup>th</sup> Street E to SR 410.  
*Construction 2030*

"Destination 2030" is the region's long range transportation plan prepared by PSRC. It is a strategy to meet regional transportation demands in King, Kitsap, Pierce, and Snohomish counties until the year 2030.

### ***How Will the Long-Term Options Move More People, Save Time, and Reduce Congestion?***

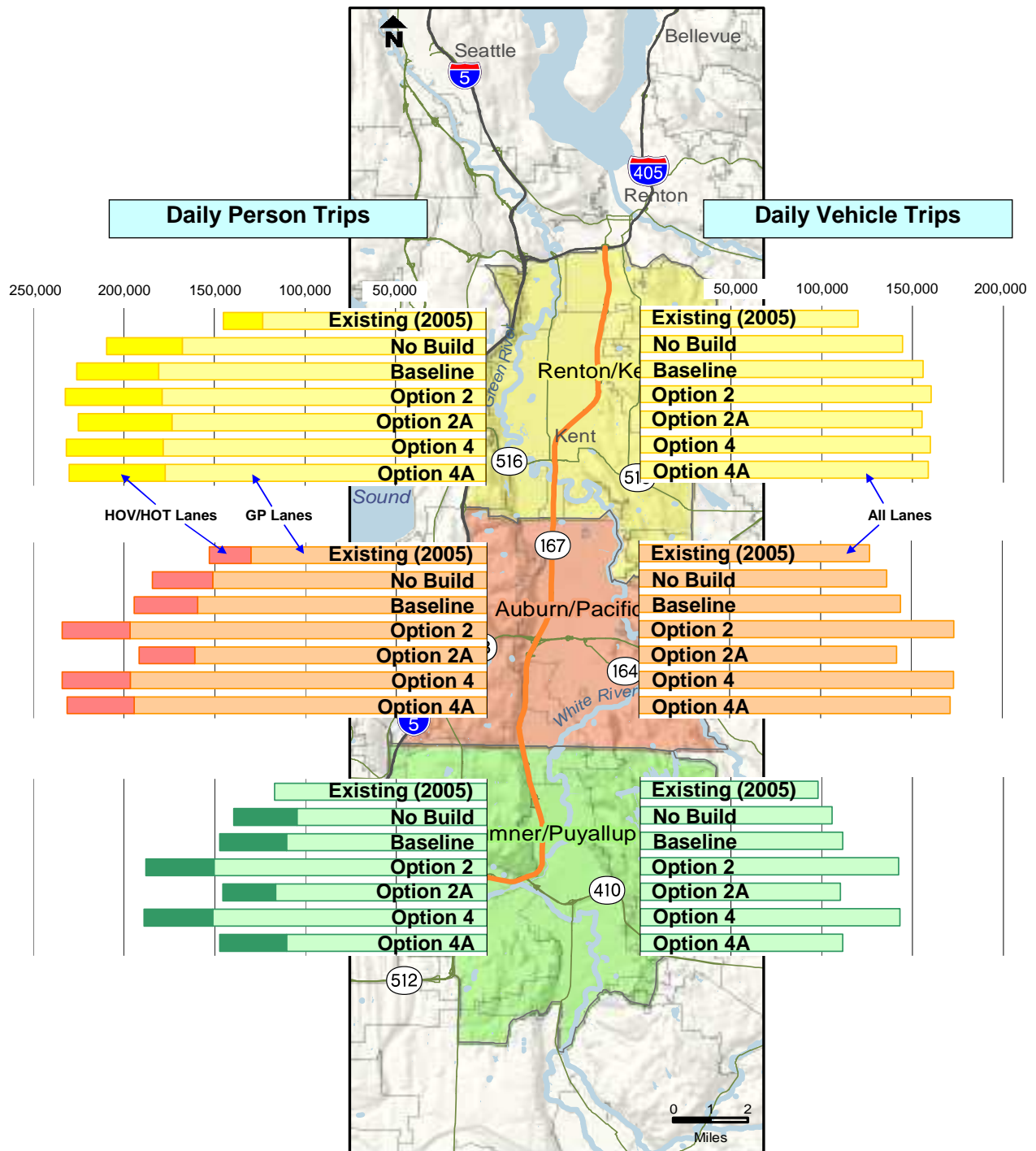
Each of the options analyzed in this study proposes to add capacity to SR 167 to move more people and freight. The bookends are Option 2A, which adds one additional managed lane in each direction throughout the corridor, and Option 4 which results in a ten lane cross section with two managed lanes in each direction throughout the corridor.

The transportation modeling work done to evaluate how effective each option is at reducing congestion indicates even Option 4 will provide insufficient capacity to meet future travel demand.

Exhibit 11-1 illustrates a comparison of the daily person and vehicle trips that are accommodated on SR 167 under the baseline scenario and the four remaining long-term build options.

Exhibit 11-2 illustrates the difference in peak hour speed between the Baseline and the long-term build alternatives in the general purpose lanes. The HOV/HOT lanes would be managed through a variable toll structure to maintain vehicle speeds at 45 mph or greater at all times throughout the day.

Forecasted 2030 Travel Demand – Person Trips and Vehicle Trips



Source: Perteet

**Exhibit 11-2  
Forecasted 2030 Afternoon Peak Hour Average Travel Speed for the General Purpose Lanes**

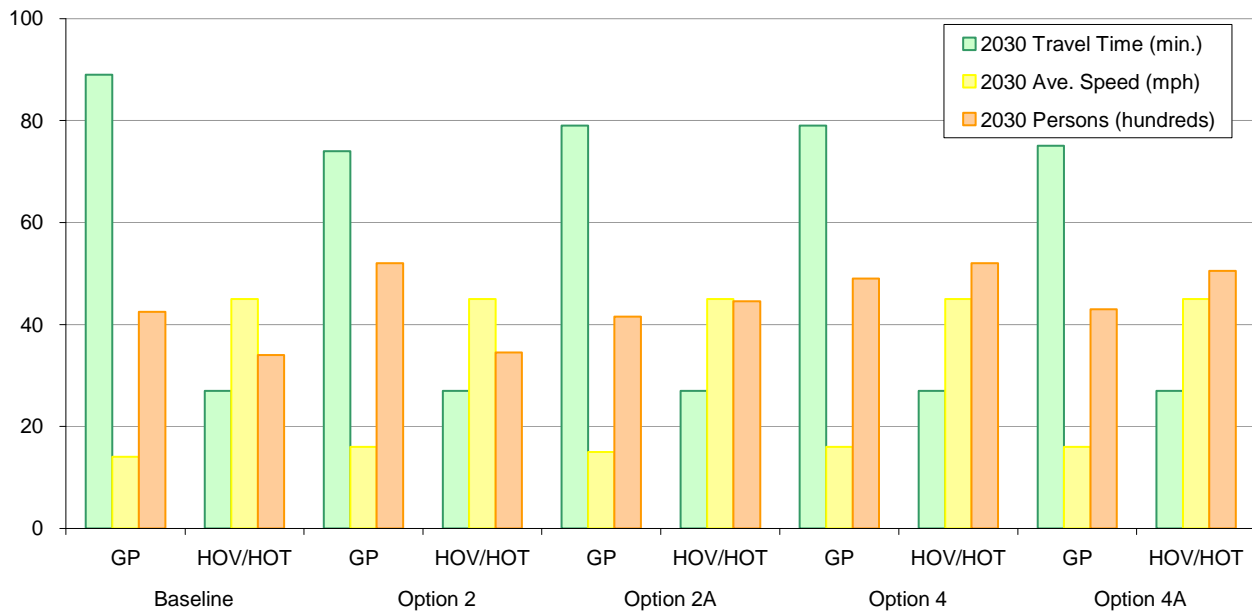
		Baseline	Option 2	Option 2A	Option 4	Option 4A
North Segment	Northbound	56 mph	56 mph	56 mph	56 mph	56 mph
	Southbound	26 mph	26 mph	28 mph	26 mph	28 mph
Central Segment	Northbound	47 mph	55 mph	47 mph	55 mph	55 mph
	Southbound	8 mph	10 mph	9 mph	9 mph	13 mph
South Segment	Northbound	46 mph	46 mph	46 mph	51 mph	46 mph
	Southbound	15 mph	20 mph	17 mph	19 mph	14 mph

Source: Perteet

Traffic volumes will increase between now and 2030 with or without improvements. If no changes are made (No Build Option) to the existing highway the increased travel demand will cause peak periods to grow longer and congestion to increase. Exhibit 11-3 illustrates a summary of the travel times, speeds, and person-trips for each option.

Option 2A has lower person-trips than the Baseline because of a bottleneck created at SR 18. While the Baseline extends the lane through the interchange, Option 2A drops a lane southbound.




**Exhibit 11-3  
Traffic Screening for Long-Term Options for the Afternoon Peak Hour**










Source: Perteet





Exhibit 11-4 illustrates a comparison, by lane, of the travel times, speeds, and person-trips for each option. The current 39-minute peak hour travel time between Renton and Puyallup in the general purpose lanes will increase to nearly 90 minutes in the year 2030 Baseline condition. This lengthy commute time and low speed during the afternoon peak hour results in only 4,250 persons moved in the general purpose lanes.






**Exhibit 11-4  
Forecasted 2030 Afternoon Peak Hour Average Travel Time & Speed for the Corridor**






Existing Conditions					
			North of SR 18 Only		
1,800	1,800	2,150	=	5,750 Persons	
39 min.	39 min.	27 min.		Time	
31 mph	31 mph	45 mph		Speed	

2030 Baseline					
					
2,125	2,125	3,400	=	7,650 Persons	
89 min.	89 min.	27 min.		Time	
14 mph	14 mph	45 mph		Speed	

2030 Option 2					
					
1,733	1,733	1,733	3,450	=	8,650 Persons
74 min.	74 min.	74 min.	27 min.		Time
16 mph	16 mph	16 mph	45 mph		Speed

2030 Option 2A					
				North of SR 18 Only	
2,075	2,075	2,225	2,225	=	8,600 Persons
79 min.	79 min.	27 min.	27 min.		Time
15 mph	15 mph	45 mph	45 mph		Speed

2030 Option 4					
					
1,633	1,633	1,633	2,600	2,600	= 10,100 Persons
77 min.	77 min.	77 min.	27 min.	27 min.	Time
16 mph	16 mph	16 mph	45 mph	45 mph	Speed

2030 Option 4A					
					North of SR 18 Only
1,433	1,433	1,433	2,525	2,525	= 9,350 Persons
75 min.	75 min.	75 min.	27 min.	27 min.	Time
16 mph	16 mph	16 mph	45 mph	45 mph	Speed

**Time** = time to travel from one end of the corridor to the other.  
**Speed** = average speed while traveling from one end of the corridor to the other.

Source: Perteet

The total number of persons moved in the afternoon peak hour is almost identical in Options 2 and 2A. However, during the peak hour 1,000 more persons per hour can travel at 45 mph or greater, in the HOV/HOT lane(s) from Renton to Puyallup in Option 2A. Option 2 has 950 more persons per hour traveling at only 16 mph.

Option 2 carries the most people in the general purpose lanes at 5,200 per hour during the afternoon peak. Option 4 carries the most persons for all lanes during the peak hour at 10,100.

### ***What are Transportation Demand Management (TDM) and Transit-Oriented Development (TOD), and how might they help congestion?***

While roadway improvements are essential to promote freight mobility and economic development, no single solution will address the growing problem of congestion within the SR 167 Corridor.

TDM provides various strategies that attempt to change how, when and where people travel in order to improve traffic conditions. TDM strategies often include the following types of programs:

- HOV lanes and direct access ramps
- Increasing transit service and better integration with Sounder commuter rail service
- Non-motorized improvements, such as sidewalks and bike lanes
- Rideshare programs
- Car sharing
- Guaranteed ride home
- Commute Trip Reduction (CTR)
- Flextime and telecommuting
- Taxi improvements
- Road tolls
- Commuter financial incentives
- Parking pricing

For further information on TDM strategies in the corridor, see **SR 167 Corridor Technical Memorandum No. 7: Evaluation and Final Screening of SR 167 Corridor Options- Appendix D-Summary of Transit, TDM, and TOD Jurisdiction Policies**

These programs are administered by various agencies, with participation or coordination with WSDOT.

Land use planning that incorporates concepts such as smart growth and Transit-Oriented Development (TOD) are also important tools for better management of transportation demand. Smart growth generally encourages jurisdictions to integrate transportation and land use decisions by encouraging more compact, mixed-use development within existing urban areas, and discouraging urban sprawl, which typically necessitates automobile use.

The regional growth centers along the Corridor have, or are developing, TOD neighborhoods. These neighborhoods are typically focused around transit stations (rail/bus), and have relatively high-density developments that are likely to include multi-story mixed commercial and residential buildings and pedestrian friendly design. Some land use policies also encourage TDM, such as car free areas, parking management, and traffic calming. The TDM strategies can also support increased residential and employment growth in the corridor's urban centers.

The local agencies' policies regarding multimodal connections and transit oriented development, coupled with increased transit service will be important elements in future management of traffic along the corridor.

## *How Can Public Transit Assist in Reducing Congestion?*

Transit service can be an effective option to reducing the overall demand for additional lane capacity on the SR 167 Corridor. Transit service includes commuter rail service, regional express bus service, and local bus service. Regional express bus routes would use the HOT lanes and the potential direct access ramps in the SR 167 Corridor.

If the HOV/HOT direct-connection ramps are constructed at the I-405/SR 167 interchange, they would connect a 50-plus mile HOV/HOT managed lane system that could be the backbone of a Bus Rapid Transit (BRT) system between Auburn, Bellevue, Lynnwood, and Everett.

Forecasted transit ridership in the SR 167 Corridor shows that transit plays a much larger role in the north segment of SR 167 than the south segment. The modeling information also shows that the existing transit service will not meet future demands and will need to be expanded and improved.

The overall modeling results show that bus ridership could increase from 10,900 daily riders in 2000 to a range of 22,600 to 23,000 in the year 2030. Rail ridership, which did not exist in 2000, has been estimated to range from 7,700 to 16,000 in 2030. Public transit can help reduce congestion by shifting some commute trips to bus and rail.

The level of bus transit ridership was modeled to be higher for Option 4 or 4A because there would be two HOV/HOT lanes in each direction throughout the entire corridor. Each of the two HOV/HOT lanes are forecasted to provide almost an hour time savings when traveling the corridor as compared to the general purpose lanes and they carry 60 to 75 percent more people per lane during the afternoon peak hour. The use of the lanes becomes much more appealing under these conditions.

## How Will the Long-Term Options Affect the Arterials?

Existing and forecasted volumes on the parallel arterial routes with the long-term improvement options (Options 2, 2A, 4, 4A) and without any additional improvements (Baseline) were conducted. The locations analyzed are illustrated in Exhibit 11-5., and the detailed results are included in Appendix D.

The northern parallel arterials are best improved by Options 2 or 2A, as compared to the Baseline condition in 2030. Option 2 provides the least growth (most favorable) in arterial peak hour traffic volume in the central and southern sections.

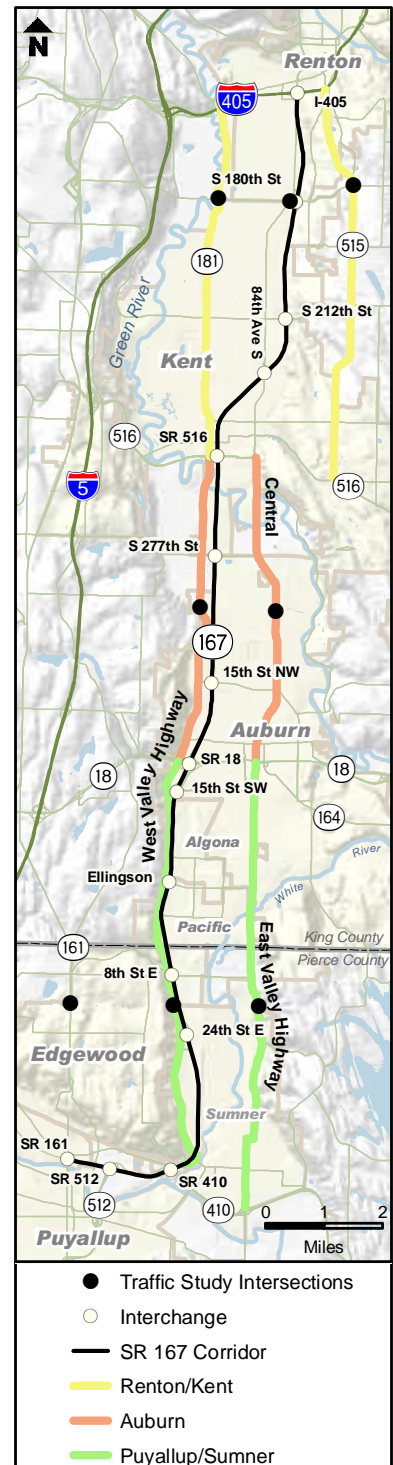
## How Will Safety be Improved?

Safety is generally related to travel speed consistency. If travel speeds are maintained there is a greater likelihood that there will be fewer collisions. Traffic that has inconsistent travel speeds (i.e. speed up, slow down, speed up) is more likely to have a higher accident rate.

For all of the options, the average HOV/HOT lane travel time and speed remains constant because the variable toll rate would be designed to maintain an average speed of 45 mph. HOV lanes allow entering and exiting the HOV lane at any point. HOT lanes have specific ingress/egress locations where vehicles can only enter/exit the HOT lane. The inability to enter/exit the HOT lane between ingress/egress areas greatly reduces vehicles weaving between lanes. Safety is generally improved for motorists who use the HOT lanes.

The addition of auxiliary lanes will improve safety. Auxiliary lanes are traffic lanes immediately to the right of the general purpose through-lanes and are used to assist in lane changing between interchanges. These lanes provide more room for weaving and merging, as well as provide the space for changing travel speeds (i.e. speeding up to merge onto the freeway or slowing down to exit the freeway).

Exhibit 11-5  
**Afternoon Peak Hour Traffic Volumes – Local Arterial Growth Patterns Along SR 167**



### ***How Will the Long-Term Options Affect Freight Mobility?***

Trucks are permitted in the two right-most general purpose lanes. They are not permitted in the HOV/HOT lane if they weigh more than 10,000 tons. It would require legislative action to allow trucks in the HOV/HOT lanes when there are two or more HOV/HOT lanes in each direction.

The HOV/HOT lanes operate more efficiently under all of the options. Single occupant vehicles that elect to pay the toll and enter the HOV/HOT lanes result in general purpose traffic that moves out of the general purpose lanes. This makes more room in the general purpose lanes to accommodate more vehicles, including trucks. Unfortunately, compared to today's conditions, all long-term options show a reduction in travel speeds and have longer peak hours in the general purpose lanes, which directly affect freight mobility.

All improvement options can include the improvement of on-ramp merge areas to better accommodate freight trucks and therefore improve safety. Also, intersection turning radii should be considered with any improvement option to suit large truck turning movements.

### ***What Natural and Built Environment Might be Affected by SR 167 Expansion?***

The environmental criteria does not cover the full spectrum of environmental issues but rather covers aspects of the environment that could have potential effects on the selection of the options and help differentiate between options.

Because of the close proximity of many of the natural resources to the freeway all options have effects on the environment. The environmental screening was not as useful as hoped. Most of the effects occur with the addition of one lane, which includes all options considered.

WSDOT quantitatively evaluated the effects on environmental resources based on cost, type of permitting required, actual

effects on resources, and mitigation costs. The environmental screening was performed on each of the options by taking the existing conditions in GIS format and overlaying the project's area of analysis to calculate an area of effect.

Key environmentally sensitive areas in the Corridor are:

- Wetlands
- Floodplains
- Wildlife and Fish Habitat
- Aquifer Recharge Areas
- Urban Natural Open Space
- Parks

### **Wetlands**

The expansion of one additional lane in each direction could impact up to 28 acres of wetlands and 40 acres of wetland buffer areas. The expansion to two additional lanes in each direction could impact up to 33 acres of wetlands and 48 acres of wetland buffer areas.

To address these potential impacts, proper design techniques, including retaining walls and near vertical road shoulders (protected with guardrail), can be used to avoid and/or greatly minimize the maximum potential effects identified in this study.

WSDOT's policy on impacts to sensitive areas, in priority is:

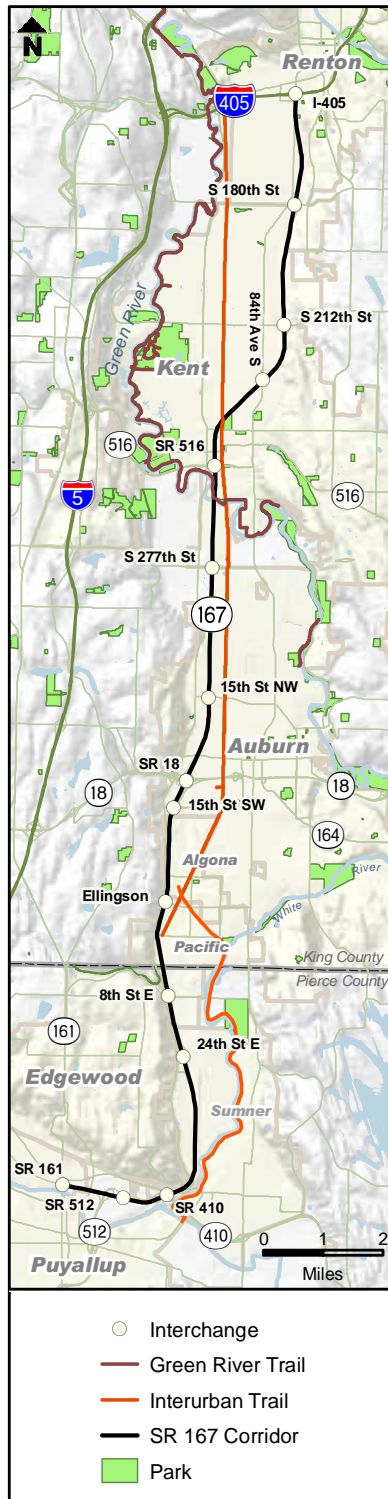
- Avoid impacts (use retaining walls, steep slopes, etc.)
- Minimize impacts
- Mitigate for the impacts

### **Floodplains**

The expansion of one additional lane in each direction could impact up to 47 acres of the 100-year floodplain (based on 2006 FEMA floodplain maps), 14 acres of the 500-year floodplain, and 17 acres of the floodway area. The expansion

Exhibit 11-6

**Section 4(f) Properties in the SR 167 Corridor**



Source: Perteet GIS

to two additional lanes in each direction could impact up to 50 acres of the 100-year floodplain, 16 acres of the 500-year floodplain, and 19 acres of the floodway area.

**Wildlife and Fish Habitat**

The expansion of one additional lane in each direction could impact up to 22 acres of wildlife habitat and up to three fish species. The expansion to two additional lanes in each direction could impact up to 33 acres of wildlife habitat and up to 10 fish species.

**Aquifer Recharge Areas**

WSDOT is required by state regulation to provide water quality treatment for all stormwater runoff. With all options, groundwater resources will not likely have a negative impact. This is because the majority of the existing roadway has little stormwater treatment before discharging to the ground and local streams. With all options the stormwater for new as well as existing pavement will be treated for water quality.

**Urban Open Space**

The expansion to one lane in each direction could impact up to 22 acres in the urban open space areas. There could also be impacts on 139 acres in waterfowl areas.

The expansion to two lanes in each direction could impact 33 acres of the urban open space areas. There could also be 156 acres impacted in waterfowl areas.

**Parks and Section 4(f)**

The expansion to one lane in each direction could have some limited impacts on Section 4(f) properties. Known Section 4(f) properties along the corridor are illustrated in Exhibit 11-6.

The expansion to two lanes in each direction could have a higher level of impact, specifically up to 12 acres of potential impact. Site specific analysis will be needed to determine if these facilities are directly impacted.

The potential effects of these long-term options in these parks and trails include:

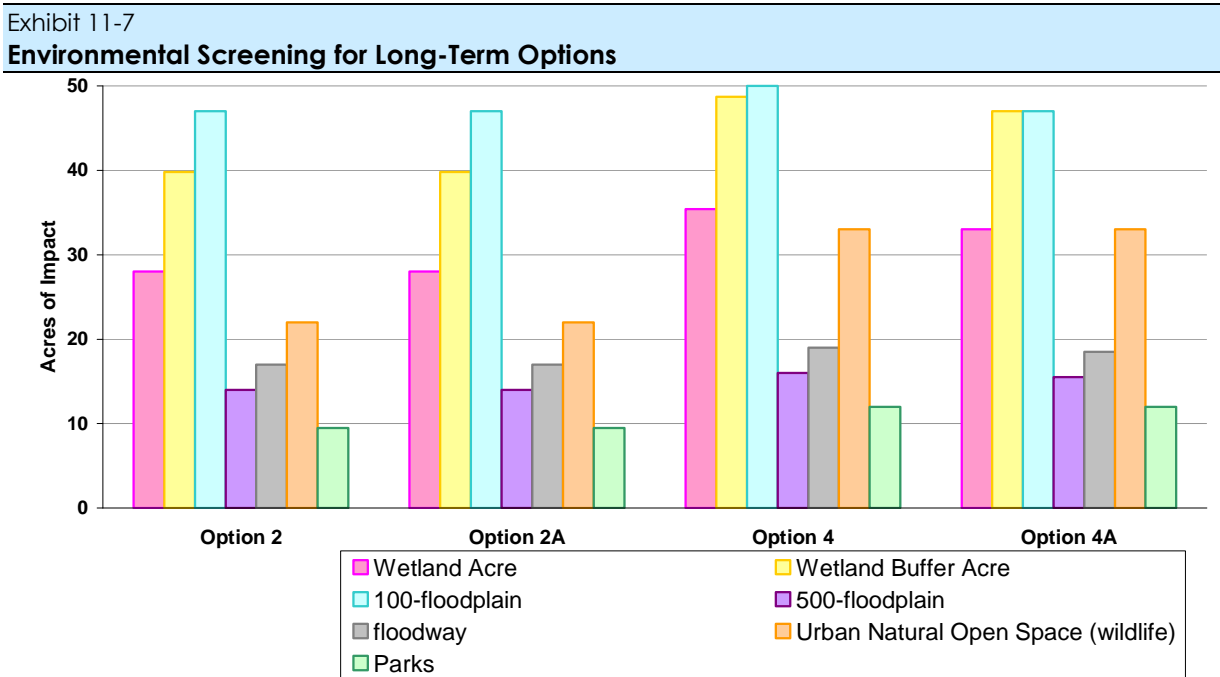
Park Name	8-Lane Option Affected Area (Acres)	10-Lane Option Affected Area (Acres)
Auburn Environmental	5.5	6.2
Cleveland Park	0.2	0.2
Commons Playfield	0.5	0.7
Interurban Trail Site	0.7	0.8
Naden Park	0.4	0.4
Panther Creek	1.7	3.1
Renton Wetlands	0.0	0.1
Riverview Park	0.4	0.6
Total Effect	9.5	12.0

Due to the Interurban Trail (pedestrian/bicycle trail) running adjacent to the SR 167 Corridor, the potential for impacts along the length of the trail illustrates a potential impact of 1,100 to 1,200 lineal feet using GIS analysis.

Option 2A has a slightly smaller impact area than Option 2 since there is one less lane south of SR 18. The same is true for Option 4A having a slightly smaller impact area than Option 4 with one less lane south of SR 18.

Options 2 and 2A have similar environmental impacts even though Option 2A has one less lane south of SR 18. This is due to the fact that south of SR 18 the widening will occur towards the median which has almost no major environmental sensitivities. There is widening to the outside of the existing lanes for a small stretch of roadway near the Ellingson Road interchange. The median can accommodate up to two additional lanes in each direction. Option 4 (10 lanes) would require widening towards the median and outside, therefore it has the greatest impacts.

Exhibit 11-7 illustrates a summary of the Environmental Screening results.



Source: WSDOT & Petteet GIS

Option 4 has the highest level of potential impacts on the Section 4(f) resources and urban open spaces. This impact would most likely be temporary with limited impacts to the trail. The Section 4(f) resource can most likely be avoided, but further design information is necessary to determine the level of impact or mitigation. City and county projects in the past have successfully provided detours for the trail users and reconstructed the trail at the conclusion of the construction project.

Options 2 and 2A have the least environmental impacts.

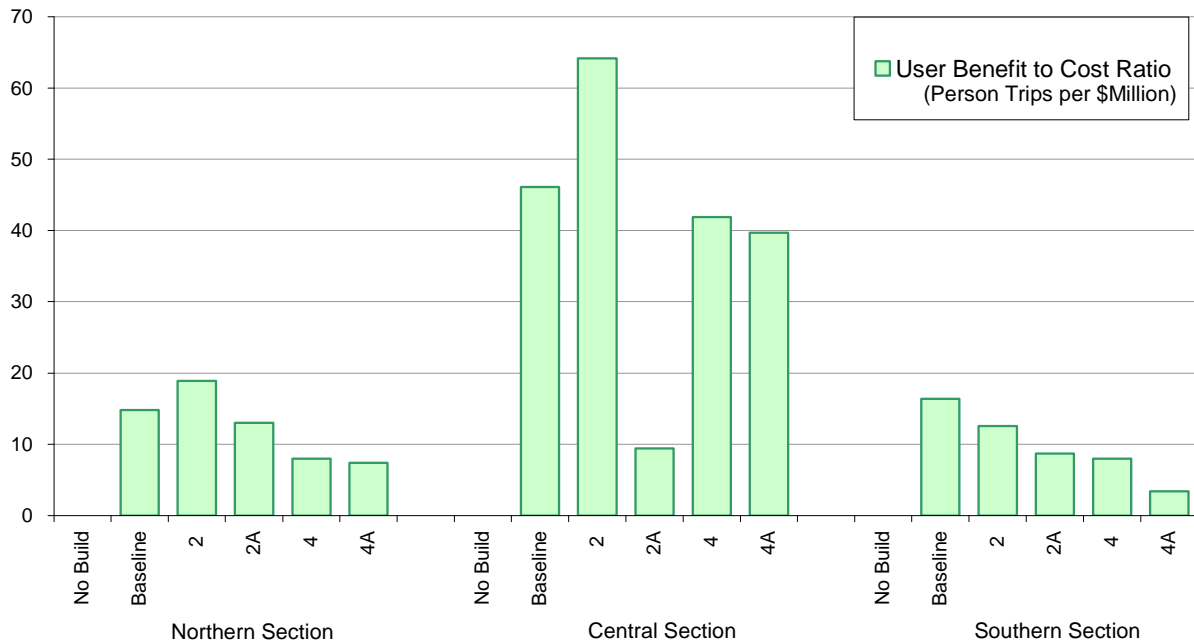
## How Does Cost Compare to Benefits?

As illustrated in *Section 10: Cost Estimates*, Option 2A costs the least to design, purchase right of way, and construct, at a range of \$2.2 to \$2.7 billion. Option 4 costs the most at more than 3.5 times as much as Option 2A.

Option 2 provides the best person-trips-per-cost benefit in the northern and central sections.

The Baseline Option is best in the southern section because it carries similar daily person trips as Option 4A but with fewer lanes (less cost) and slightly better daily person trips as Option 2A (same number of lanes). Options 2 and 4 carry more daily person trips as the Baseline Option but at a much higher cost because they require more lanes which results in a lower benefit to cost ratio. Exhibit 11-8 illustrates a summary of the person-trips to cost ratios..

Exhibit 11-8  
2030 User Benefits to Cost Ratio



Source: Perteet

## **Key Findings of This Section**

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### **Move People**

- Options 2 and 4 provide the most person-trips and vehicle-trips above the Baseline in the northern and central sections.
- Option 4 carries the most people and vehicles in the southern section, just slightly more than Option 2.

### **Travel Time**

- Option 2 provides the best travel time from Renton to Puyallup, at 74 minutes, in the general purpose lanes during the peak commute hours.
- All options provide approximately the same travel time in the HOV/HOT lane since that lane would use toll rates to maintain a minimum average speed of 45 mph to provide a corridor travel time of 27 minutes.

### **Congestion**

- Option 4, with 10 lanes, provides for the most vehicles with nearly identical travel times and speeds as the long-term options. Option 4 would provide the least congestion.

### **Local Arterials**

- The northern parallel arterials are best improved by Options 2 or 2A, as compared to the Baseline condition.
- Option 2 provides the least growth (most favorable) in arterial peak hour traffic volume in the central and southern sections.
- The local agencies' policies regarding multimodalism and transit oriented development, coupled with transit improvements will need to be key elements in future management of traffic along the corridor.

## **Safety**

- Safety is generally improved for motorists who use the HOT lanes.
- All of the long-term options will improve the safety of SR 167.

## **Freight Mobility**

- All of the long-term options will improve freight mobility on SR 167.

## **Natural and Built Environment**

- Options 2 and 2A have the least environmental impacts.

### Wetlands

- Options 2 (8 lanes) and 2A (8/6 lanes) could impact up to 28 acres of wetland and 40 acres of wetlands buffer.
- Option 4 (10 lanes) could impact up to 33 acres of wetlands and 48 acres of wetland buffer areas.

### Floodplains

- Options 2 and 2A could impact up to 47 acres of the 100-year floodplain, 14 acres of the 500-year, and 17 acres of the floodway area.
- Option 4 could impact up to 50 acres of the 100-year flood plain, 16 acres of the 500-year, and 19 acres of floodway. Option 4A would have slightly less impacts.

### Wildlife and Fish Habitat

- Options 2 and 2A could impact up to 22 acres of wildlife habitat and up to three fish species.
- Option 4 could impact up to 33 acres of wildlife habitat and up to 10 fish species. Option 4A would have similar impacts.

Urban Open Space (Habitat for small animals)

- Options 2 and 2A could impact up to 22 acres of urban open space areas.
- Option 4 could impact up to 33 acres of urban open space. Option 4A would have slightly less impacts.

Parks and Section 4(f)

- Options 2 and 2A could indirectly impact up to 9.5 acres of parks and 4(f) properties.
- Option 4 could directly and indirectly impact up to 12 acres of parks and 4(f) properties. Option 4A would have slightly less impacts.

**Cost Effectiveness**

- Option 2 provides the greatest person-trips-per-cost benefit in the northern and central sections.
- The Baseline provides the greatest benefit south of SR 18.