

# Puget Sound Gateway Program

SR 509

Steering Committee

June 9, 2016

CRAIG J. STONE, PE GATEWAY PROGRAM ADMINISTRATOR

OMAR JEPPEPERSON, PE SR 509 PROJECT MANAGER

# Agenda

- Welcome & Introductions
- Program Overview
- Scenario Review
- Review Essential Performance Metrics and Ratings
- Review Contextual Performance Metrics and Ratings
- Review Cost Estimates
- Refine Scenarios
- Conclusion and Next Steps

# Puget Sound Gateway Program Update

- Gateway Program Management Office
- SR 167 Activities
- Coordination with WSDOT Secretary

# SR 509 Steering Committee 2016 Work Plan



# Legislative Direction

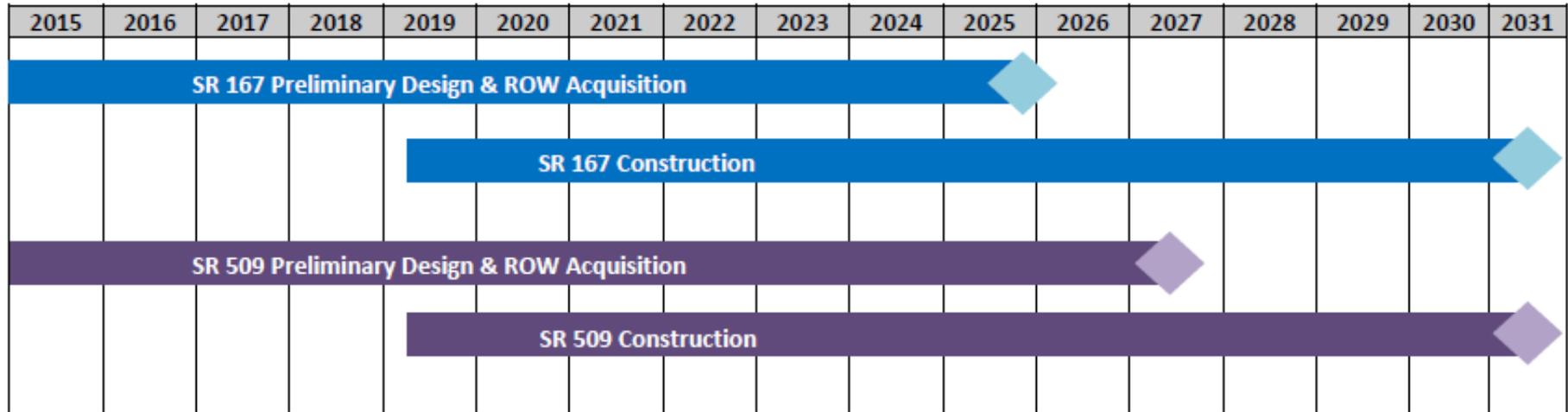
*In making budget allocations to the Puget Sound Gateway project, **the department shall implement the project's construction as a single corridor investment. The department shall develop a coordinated corridor construction and implementation plan for SR 167 and SR 509 in collaboration with affected stakeholders.***

*Specific funding allocations must be based on where and when specific project segments are ready for construction to move forward and investments can be best optimized for timely project completion. Emphasis must be placed on avoiding gaps in fund expenditures for either project.*

# Puget Sound Gateway Program

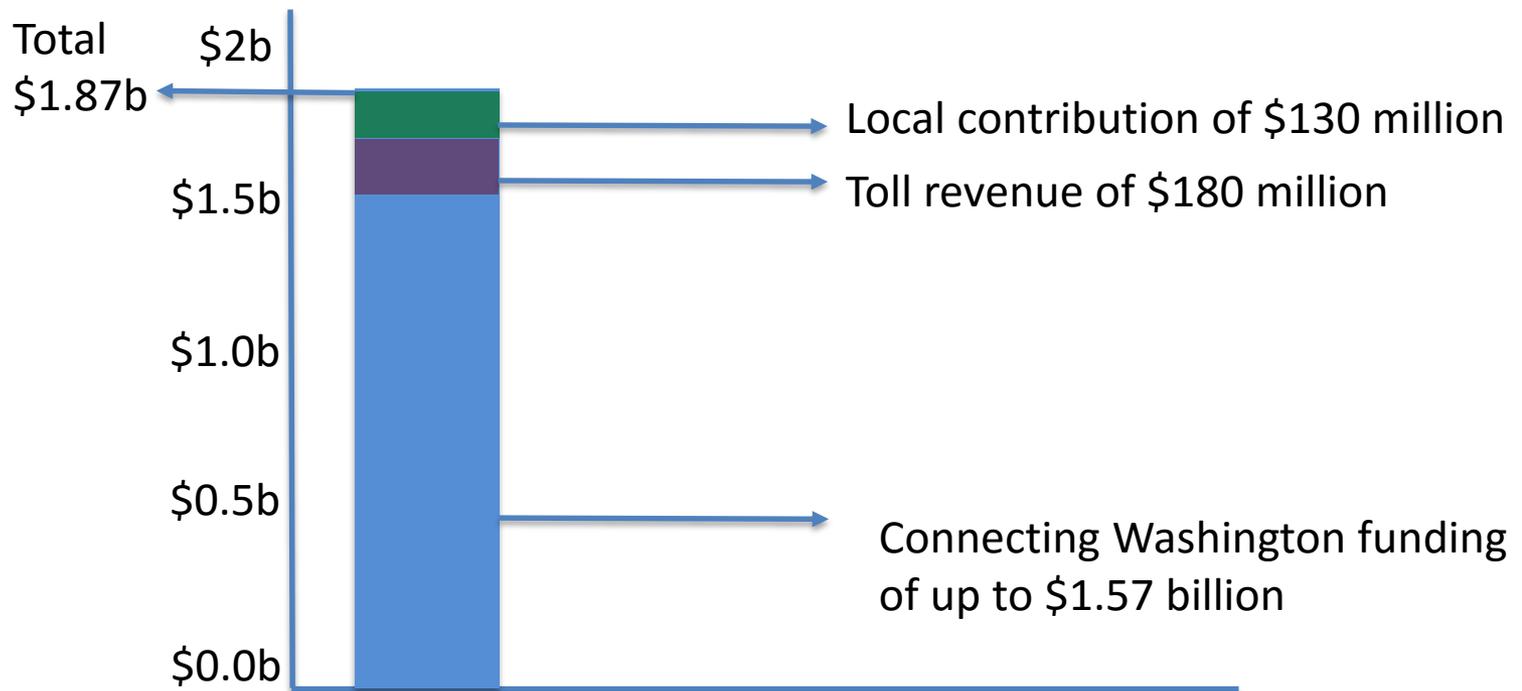
Puget Sound Gateway projects (SR 167 and SR 509) are funded on the same 16-year timeline

- Total funding is \$1.87 billion; this amount assumes \$310 million local match and tolling revenue



# Puget Sound Gateway Program

Total funding is \$1.87 billion; this amount assumes \$310 million local match and tolling revenue.

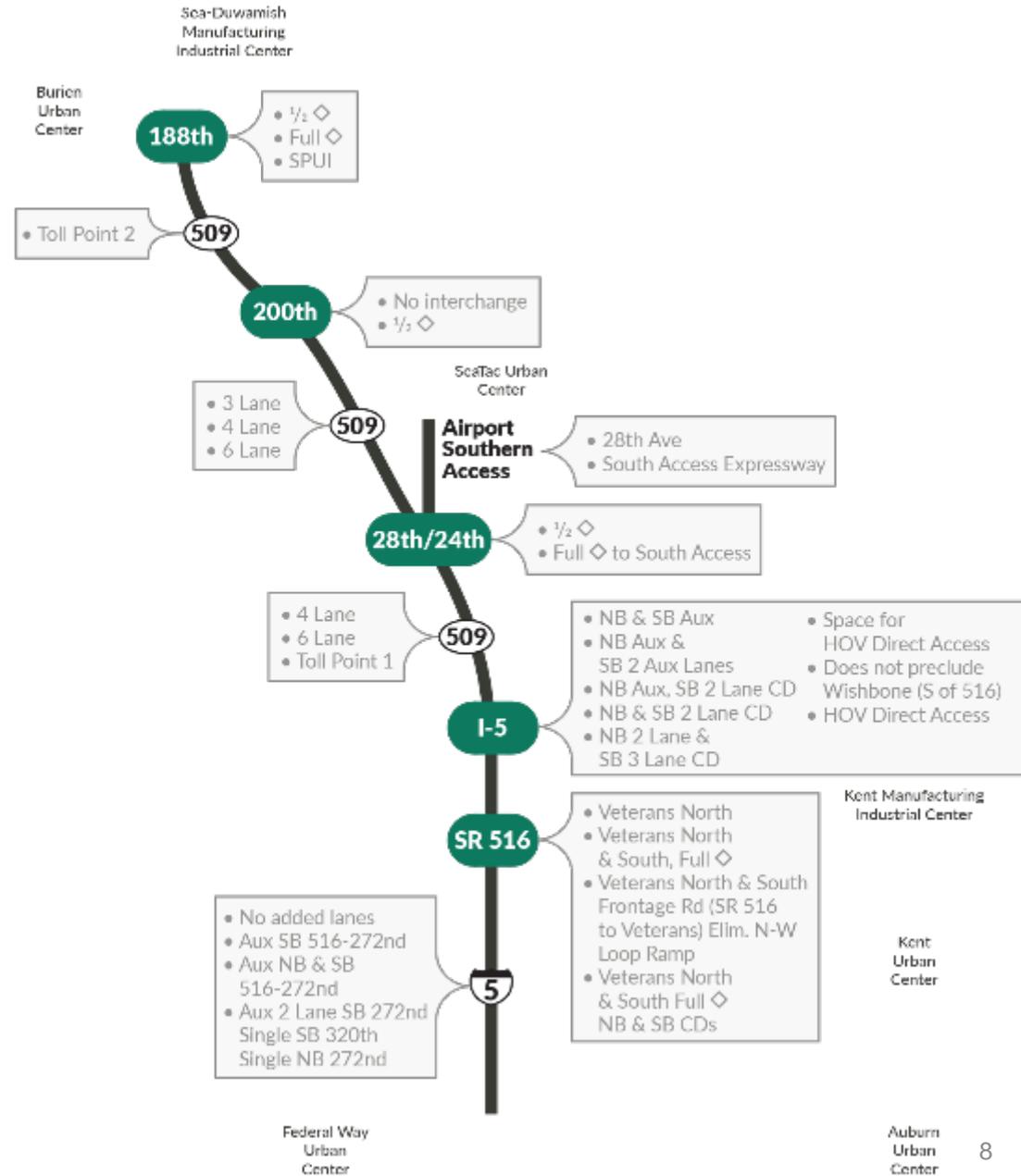


# Key Questions for Consideration

- Number of lanes on SR 509
- Tolls
- Managed lanes
- Forward compatibility
- Effects to I-5
- Connectivity
- South access

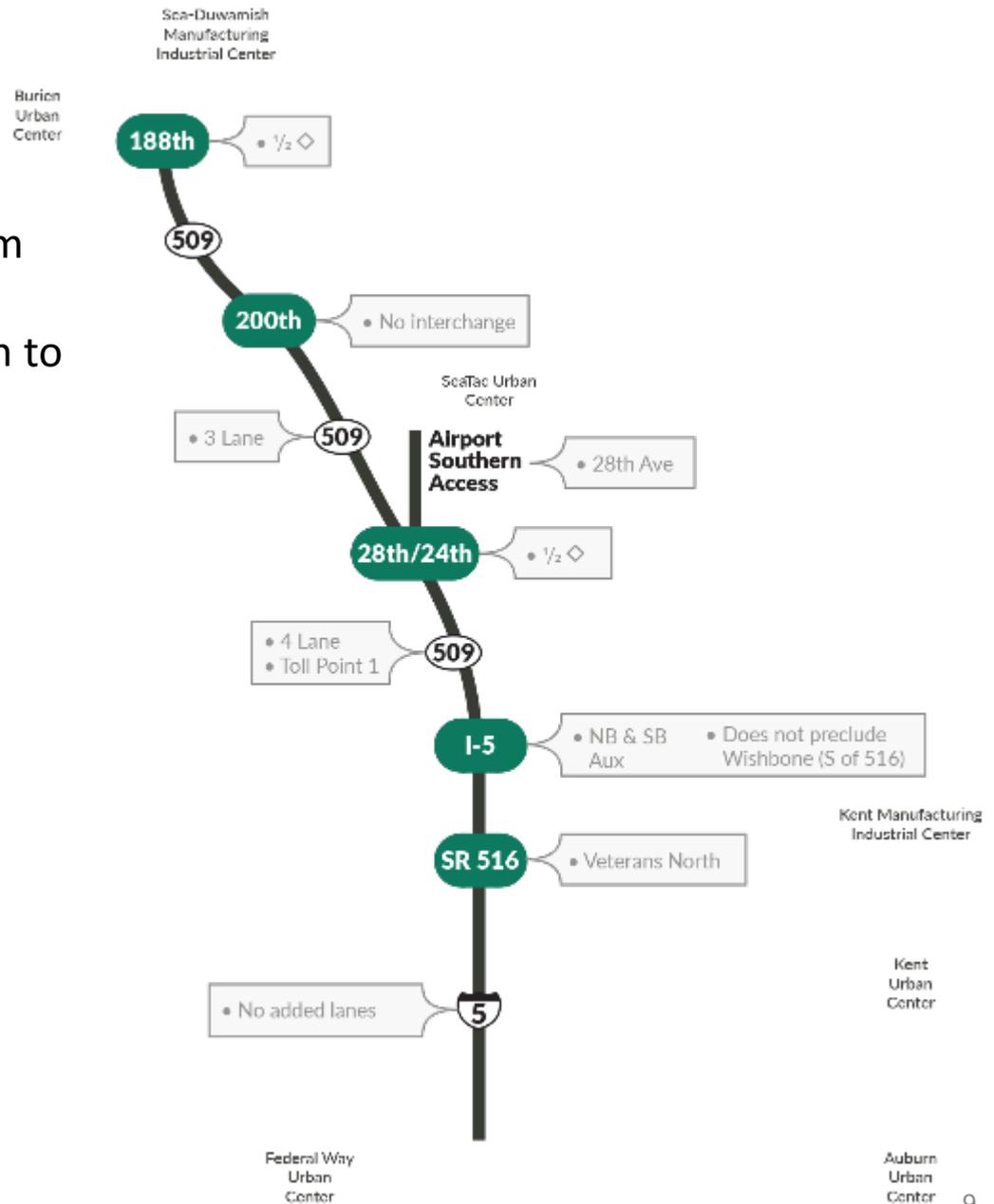
# Scenarios

- Range from “closing the gap” to “full-build”



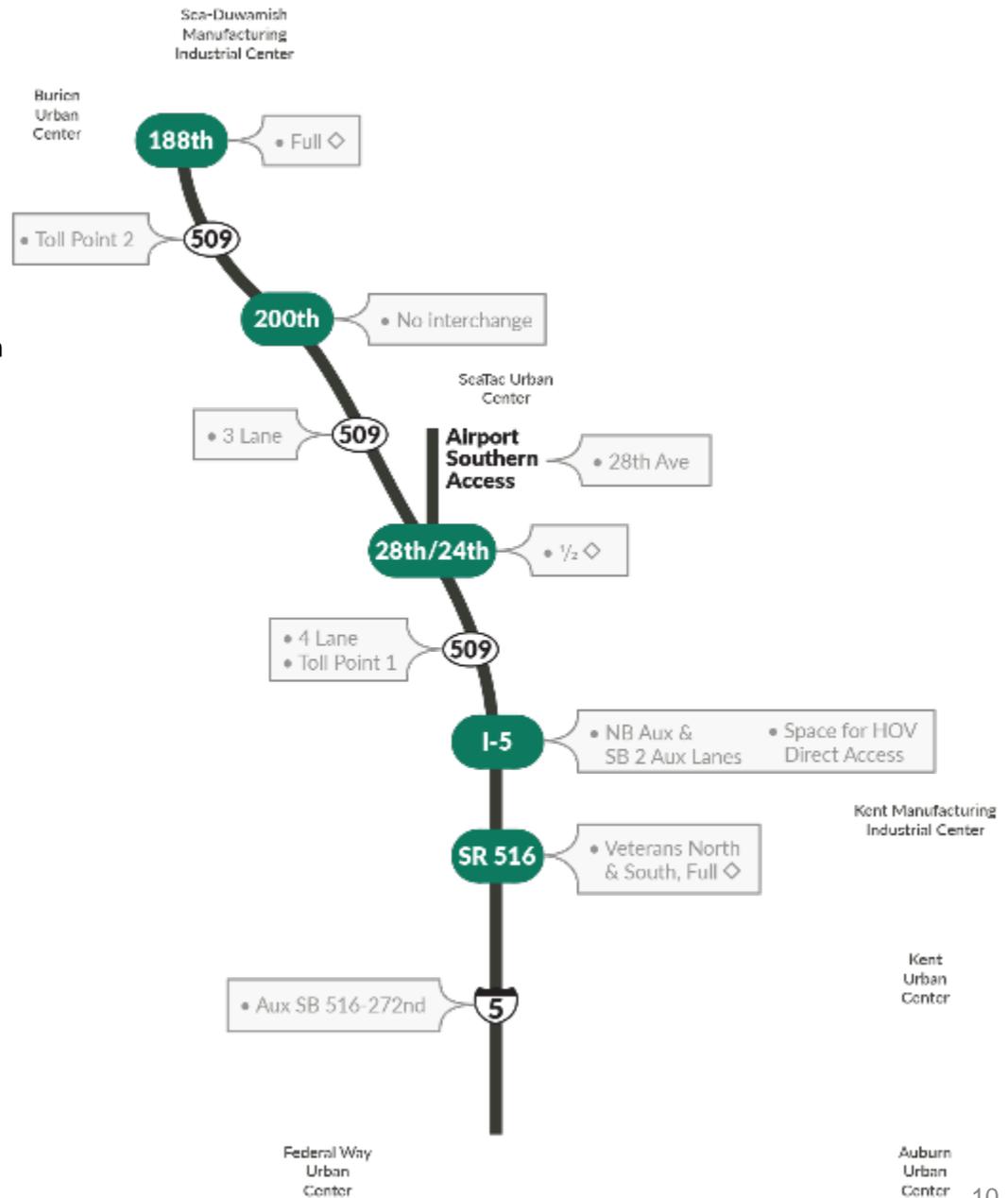
# Scenario 1: Closing the Gap

- Focuses on creating a connection from 188<sup>th</sup> to I-5
- 2 lanes with truck climbing lane 188<sup>th</sup> to 28<sup>th</sup>/24<sup>th</sup>. Becomes 4 lanes south of 28<sup>th</sup>/24<sup>th</sup>
- No interchange at 200<sup>th</sup>



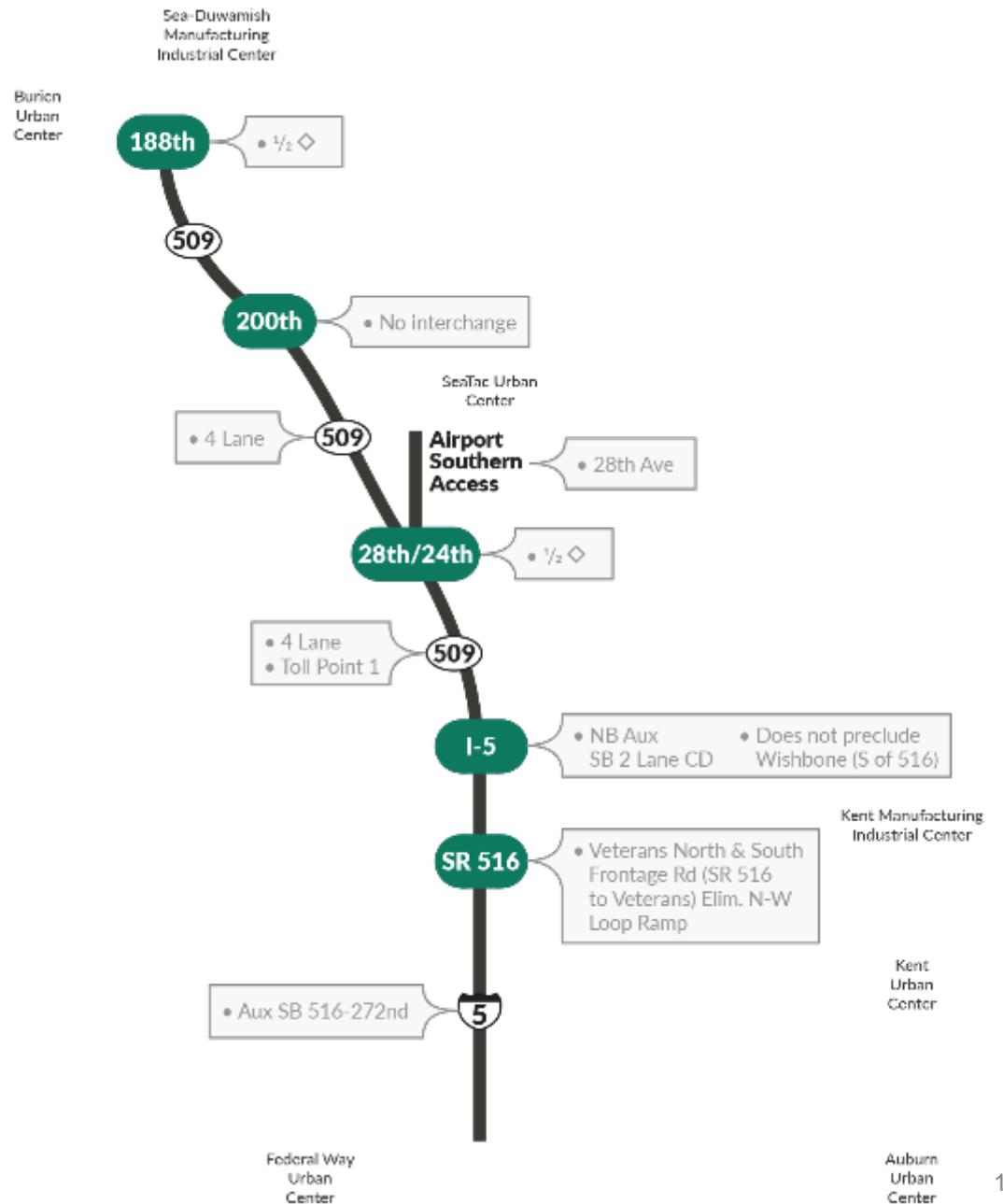
# Scenario 2: Limited Connectivity

- Presents a configuration similar to the 2013 Gateway concept
- 2 lanes with truck climbing lane 188<sup>th</sup> to 28<sup>th</sup>/24<sup>th</sup>. Becomes 4 lanes south of 28<sup>th</sup>/24<sup>th</sup>
- No interchange at 200<sup>th</sup>



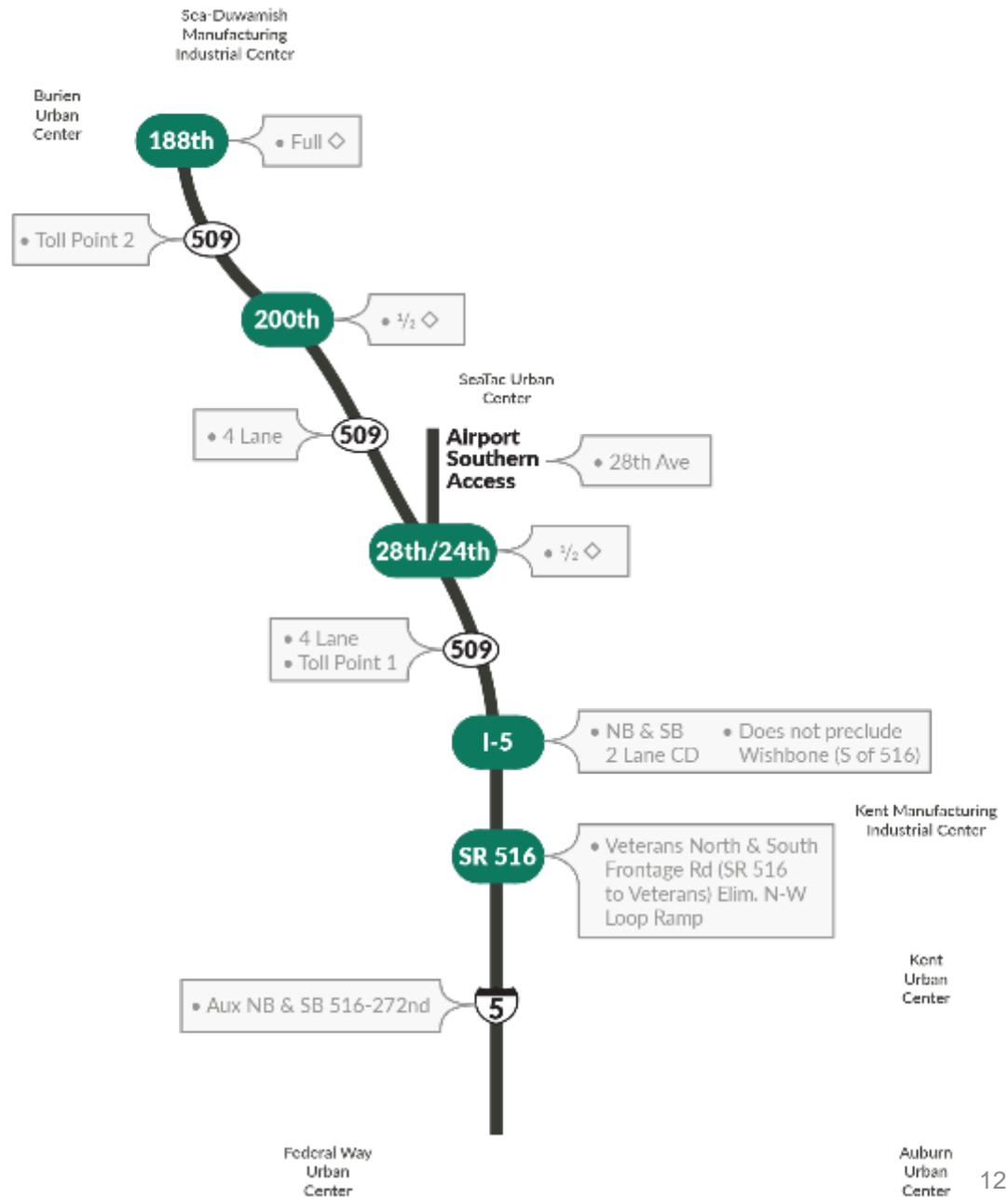
# Scenario 3: Moderate Connectivity

- Creates enhanced connectivity compared to scenarios 1 and 2
- 4 lanes throughout alignment
- No interchange at 200<sup>th</sup>



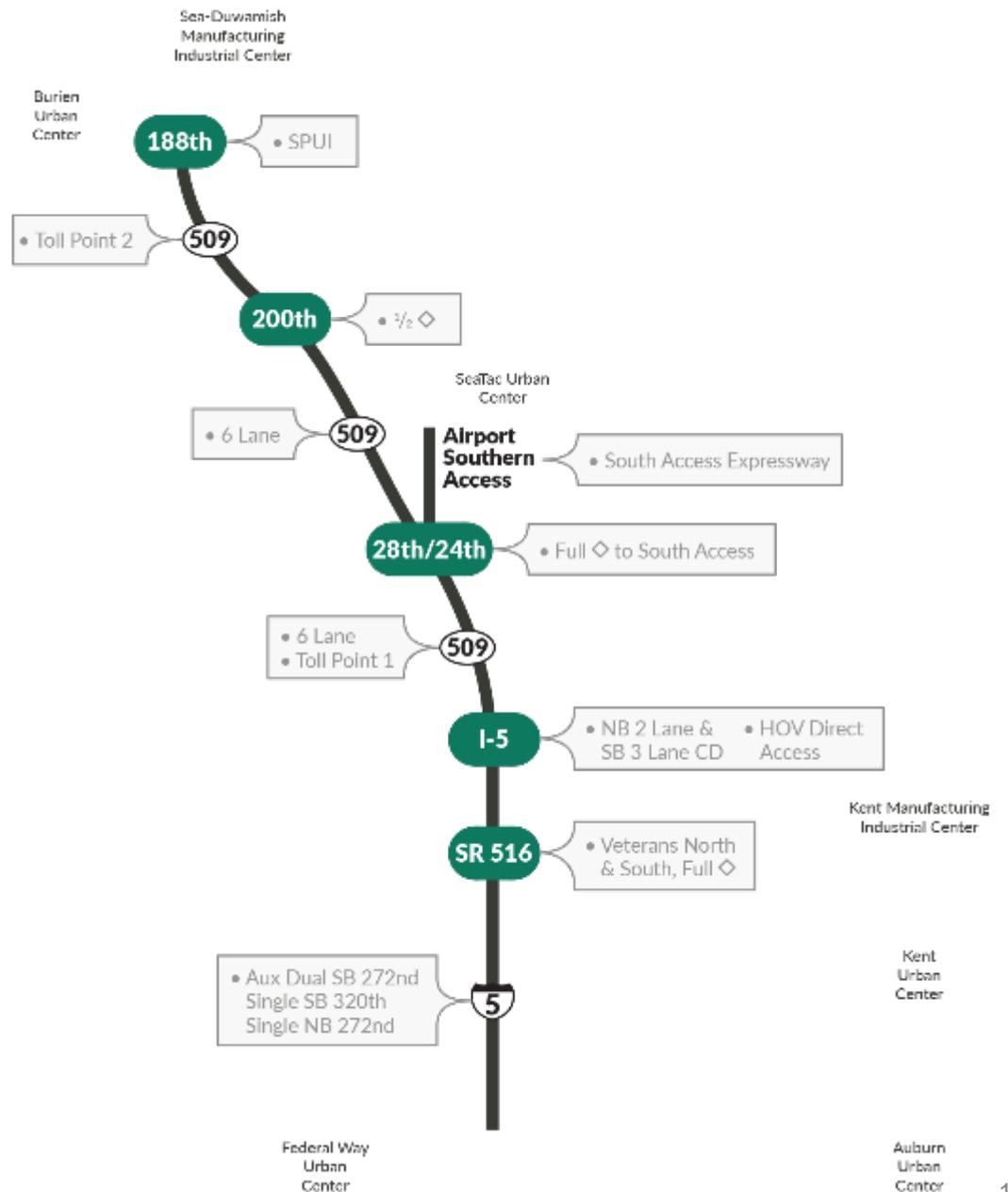
# Scenario 4: Full Connectivity

- Creates a full connectivity scenario
- 4 lanes throughout alignment
- ½ diamond interchange at 200th



# Scenario 5: Full Build

- Similar to the EIS concept
- 6 lanes throughout alignment
- ½ diamond interchange at 200th



# Performance Evaluation Results

Scenario Comparison Table - SR 509 Completion Project

Date: 6/2/16

Performance Category	Essential Performance Metrics										Contextual Performance Metrics							Cost											
	Mobility										Economic Vitality	Safety	Safety	Mobility					Env1	Other									
	Auto / Freight	Auto / HOV / Bus	Freight / Auto / Transit	Freight / Auto / Transit	Freight / Auto / Transit	Freight / Auto / Transit	Freight / Auto / Transit	Freight / Auto / Transit	Freight / Auto / Transit	Freight / Auto / Transit	Freight / Auto / Transit				Ped	Ped & Bike													
Mode	SCENARIO										SCENARIO																		
Performance METRIC	SCENARIO										SCENARIO																		
	SR 509 Performance			I-5 Performance	Delay	Airport - Travel Time	Airport - Travel Time Reliability	Centers - Travel Time	Centers - Travel Time Reliability	Centers - Travel Time Reliability	Economic Benefit	Local and Regional Comprehensive Plan	Safety	Safety	# of Serious Injury and Fatal Crashes (5-5 & SR 509)	Safety	# of Serious Injury and Fatal Crashes on local arterials	Support multimodal choices to SeaTac Airport and KDM Link Light Rail Station	Improve Intermodal relationships between the SeaPort, Airport, and Manufacturing/Industrial Centers	Number and location of Crossings	Continuity and Consistency of Pedestrian and Bicycle facilities	Improve Continuity and Consistency of Pedestrian and Bicycle facilities	Sensitive Area Impact	Forward Compatibility with future highway widening	Right of Way Impact	Sound Transit PWLE Project Compatibility	Compatibility with ST FWLE		
	Improve throughput and lower levels of congestion on new SR 509 facility			Maintain or improve I-5 Operations between S. Spokane St and SR18	Reduce hours of delay in project subarea network	Reduce travel time between SeaTac Airport and the area south of S. 200th St.	Improve travel time reliability between SeaTac Airport and the area south of S. 200th St.	Reduce travel time between Urban Centers/Manufacturing/Industrial Centers in South King County	Improve travel time reliability between Urban Centers, Manufacturing/Industrial Centers in South King County	Improve economic vitality	Support local and regional comprehensive land use planning and development.	# of Serious Injury and Fatal Crashes (5-5 & SR 509)																	
	No Build																												
	Scenario 1 - Closing the Gap																												
	Scenario 2 - Limited Connectivity																												
	Scenario 3 - Moderate Connectivity																												
	Scenario 4 - Full Connectivity																												
	Scenario 5 - Full-Build																												

# Performance Metrics Evaluation Results

- Scenarios were evaluated using our previously reviewed performance metrics
- Performance metrics are based on our essential and contextual needs
- Each scenario is rated in each category via the following:

 **Very Good**

 **Good**

 **Moderate**

 **Fair**

 **Poor**

Evaluation results are relative between the scenarios.

# Essential Performance Targets

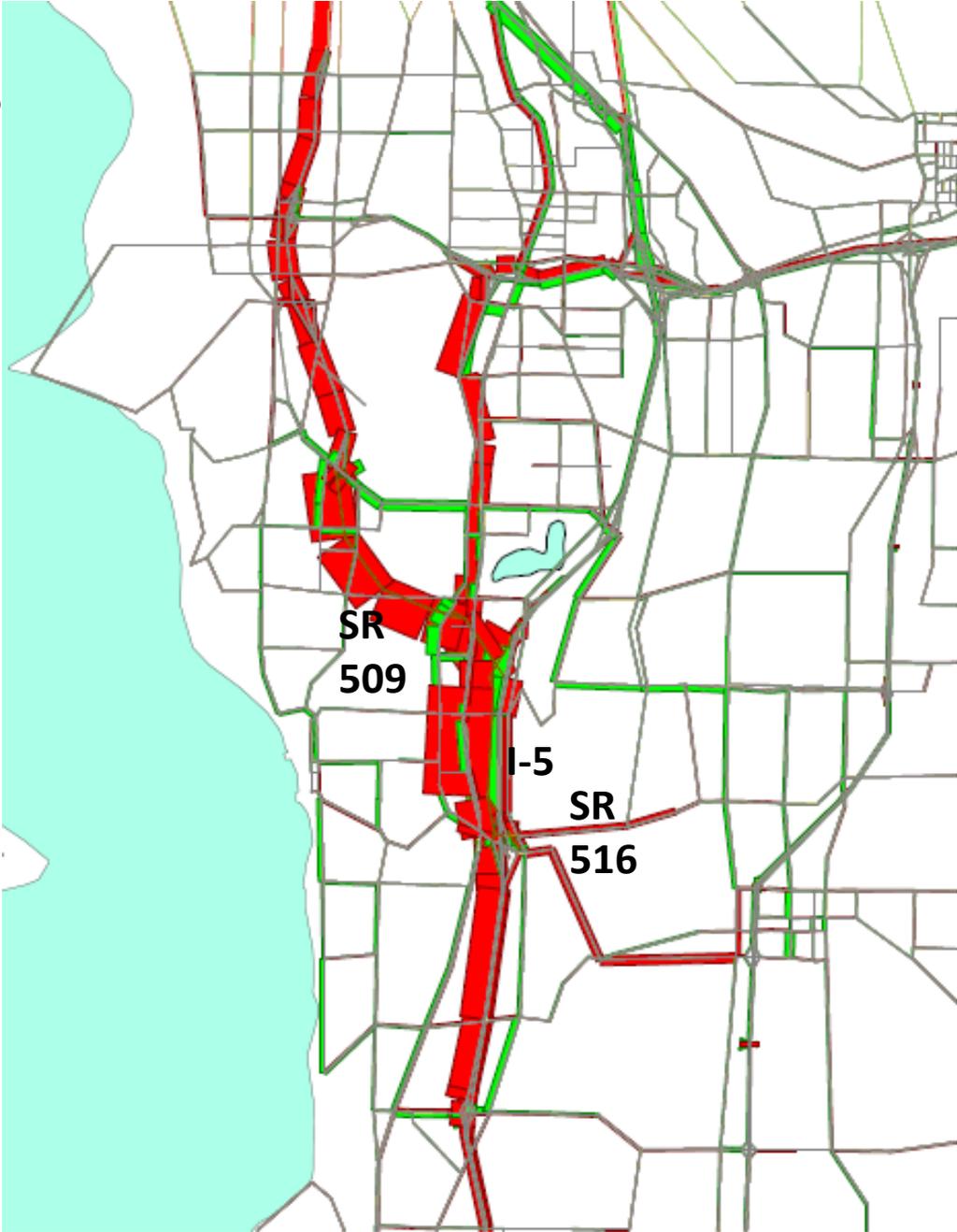
- Improve throughput and lower levels of congestion on new SR 509 facility
- Maintain or improve I-5 operations between S. Spokane St and SR 18
- Reduce hours of delay in the project subarea network
- Reduce travel time between Sea-Tac Airport and the area south of S. 200<sup>th</sup> St.
- Improve travel time reliability between Sea-Tac Airport and the area south of S. 200<sup>th</sup>
- Reduce travel time between Urban Centers and Manufacturing Industrial Centers in South King County
- Improve travel time reliability between Urban Centers and Manufacturing Industrial Centers in South King County
- Improve economic vitality
- Support local and regional comprehensive land use planning and development
- Reduce number of serious injury and fatal crashes (I-5 and SR 509)

# Performance Metrics Results

## General Observations

- Adding the missing SR 509 connection shifts trips towards the SR 509 corridor.
- The single lane section on scenarios 1 and 2 limit the volume shifted to SR 509.
- Tolling allows for better operations and improved performance.

# Travel Pattern Changes



# Mobility- SR 509 Performance

Throughput potential and congestion were evaluated for 2025 southbound PM conditions.

	Projected Mainline Volume	Projected LOS	LOS D Volume Capacity	LOS E Volume Capacity	Capacity Limitation
S1	1440	E	600	1600	Single Lane Section
S2	1480	E	600	1600	Single Lane Section
S3	1810	C	3000	3500	Grade approaching I-5
S4	2390	C	3000	3500	Grade approaching I-5
S5	2840	D	3000	3500	Grade approaching I-5
S5 Free	3280*	E	3000	3500	Grade approaching I-5

\*General purpose lane only.

LOS for reference only. LOS based on Highway Capacity Manual calculations. Two Lane Highway used for S1, S2. Basic Freeway Section used for S3, S4, S5, S5 Free.

## Auto/Freight

Scenario 1: Fair 

Scenario 2: Fair 

Scenario 3: Good 

Scenario 4: Good 

Scenario 5: Moderate 

## HOV/Bus

Scenario 1: Fair 

Scenario 2: Fair 

Scenario 3: Good 

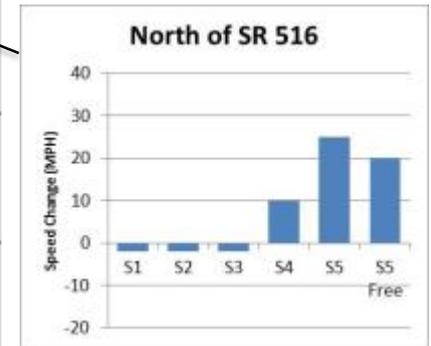
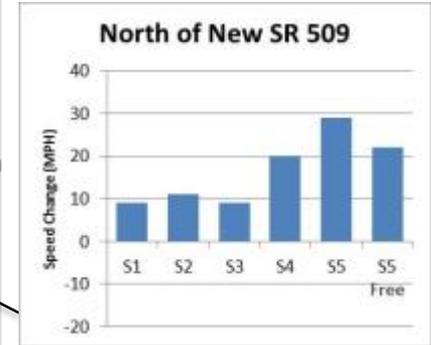
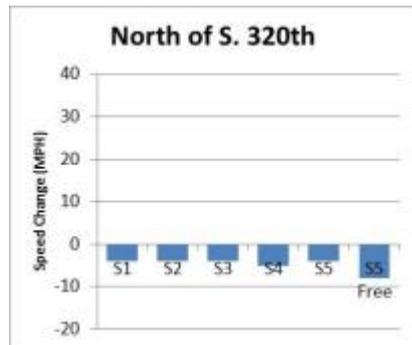
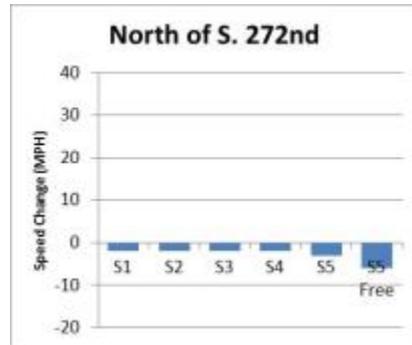
Scenario 4: Good 

Scenario 5: Very Good 

# Mobility- I-5 Performance

## I-5 Performance Northbound AM, 2025

I-5 model projected speeds were evaluated at several screenline locations

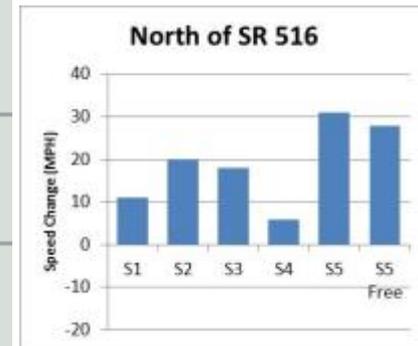
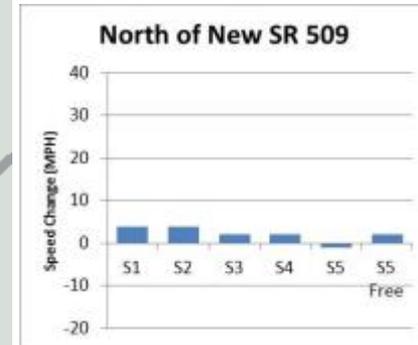
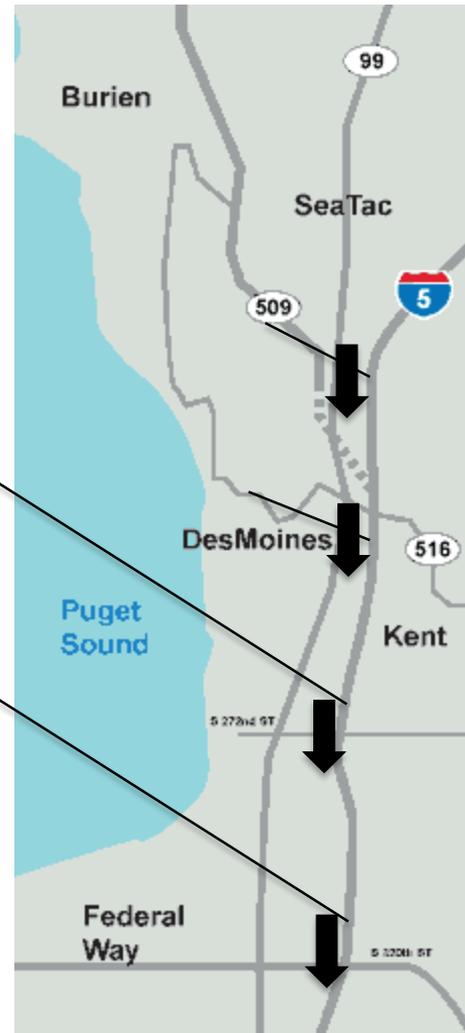
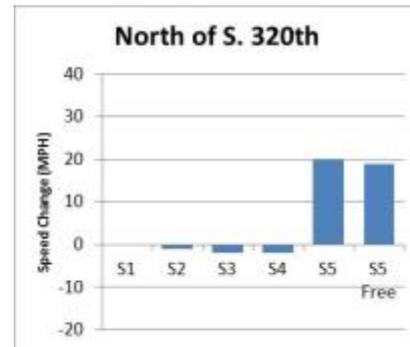
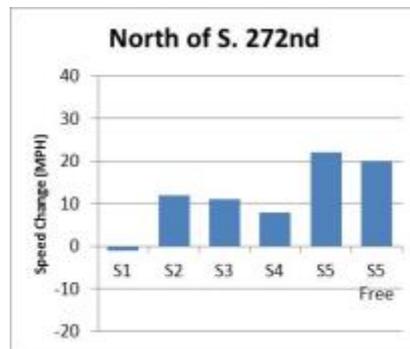


# Mobility- I-5 Performance

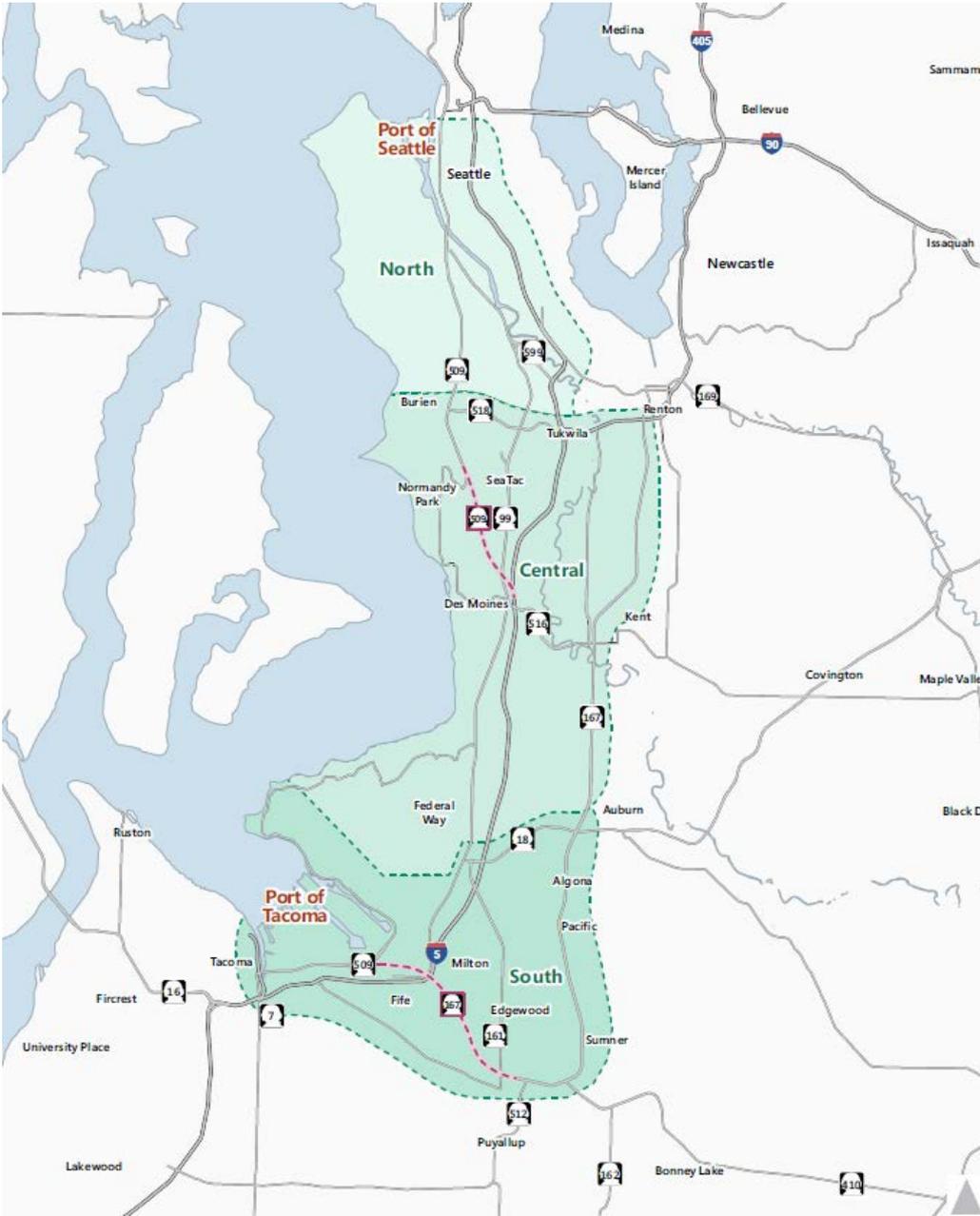
## I-5 Performance Southbound PM, 2025

I-5 model projected speeds were evaluated at several screenline locations

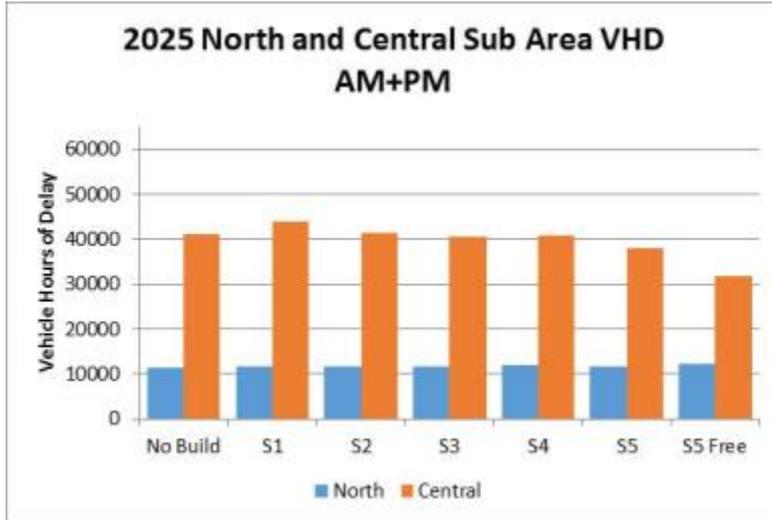
- Scenario 1: Moderate 
- Scenario 2: Moderate 
- Scenario 3: Moderate 
- Scenario 4: Good 
- Scenario 5: Good 



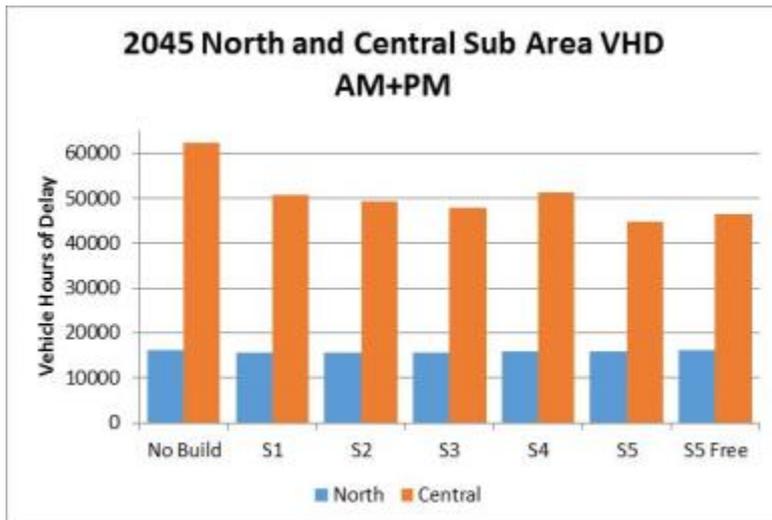
# Updated Project Subarea



# Mobility- Subarea Delay



Total vehicle hours of delay (VHD) were evaluated for the North and Central sub areas



**Scenario 1: Moderate**

**Scenario 2: Moderate**

**Scenario 3: Good**

**Scenario 4: Moderate**

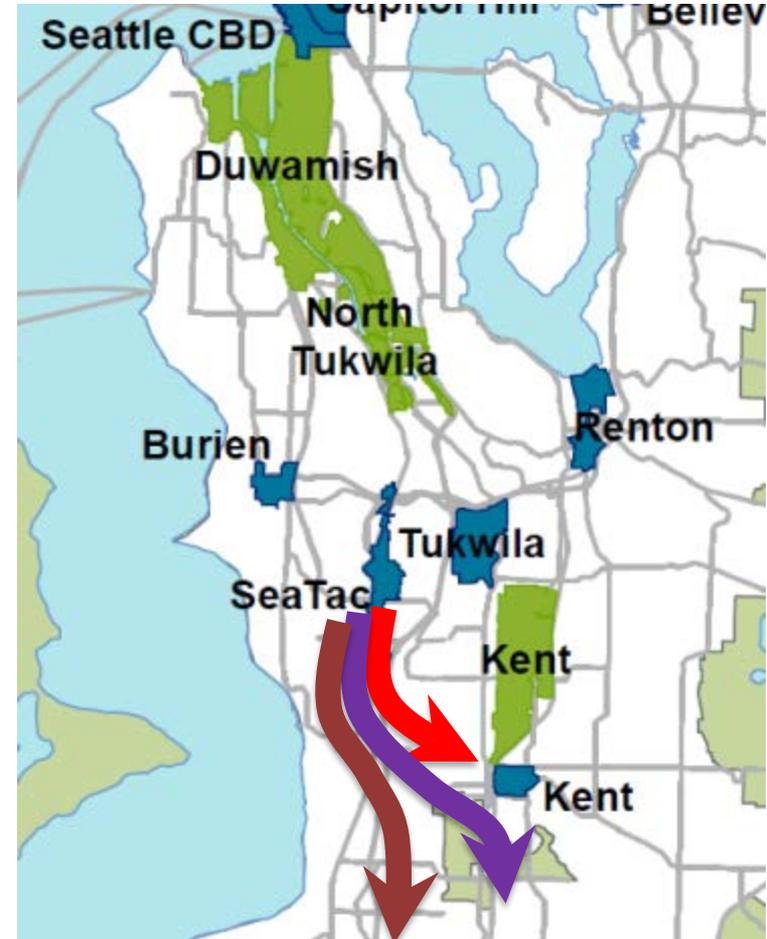
**Scenario 5: Good**

# Mobility- Travel Time from the Airport

- Travel time savings from the airport to Federal Way, Auburn and Kent were evaluated for 2025 PM conditions.

2025 PM Travel Time Savings (minutes)			
	Federal Way	Auburn	Kent
S1	6.5	10.5	18.5
S2	8.0	12.0	18.5
S3	8.0	12.0	19.0
S4	11.0	12.5	19.0
S5	11.5	14.0	19.0
S5 Free	11.5	14.0	19.0

2045 PM Travel Time Savings (minutes)			
	Federal Way	Auburn	Kent
S1	0.0	0.0	0.5
S2	0.0	3.5	1.5
S3	0.0	3.5	2.0
S4	0.0	2.0	0.5
S5	5.5	8.5	2.0
S5 Free	4.0	7.5	2.0



Scenario 1: Moderate

Scenario 2: Good

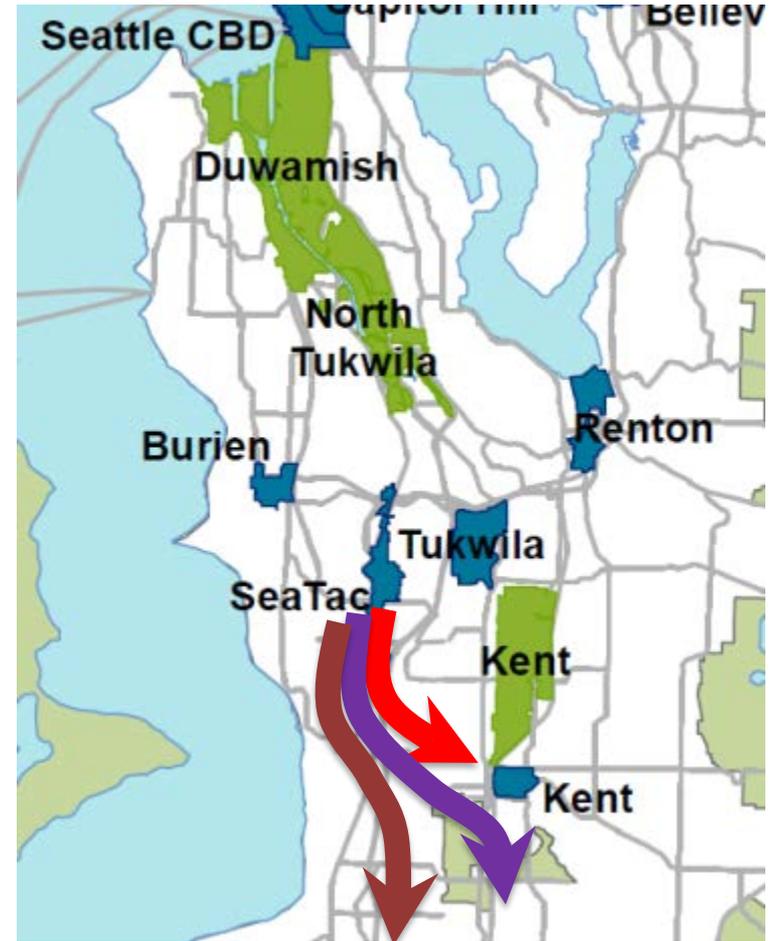
Scenario 3: Good

Scenario 4: Very Good

Scenario 5: Very Good

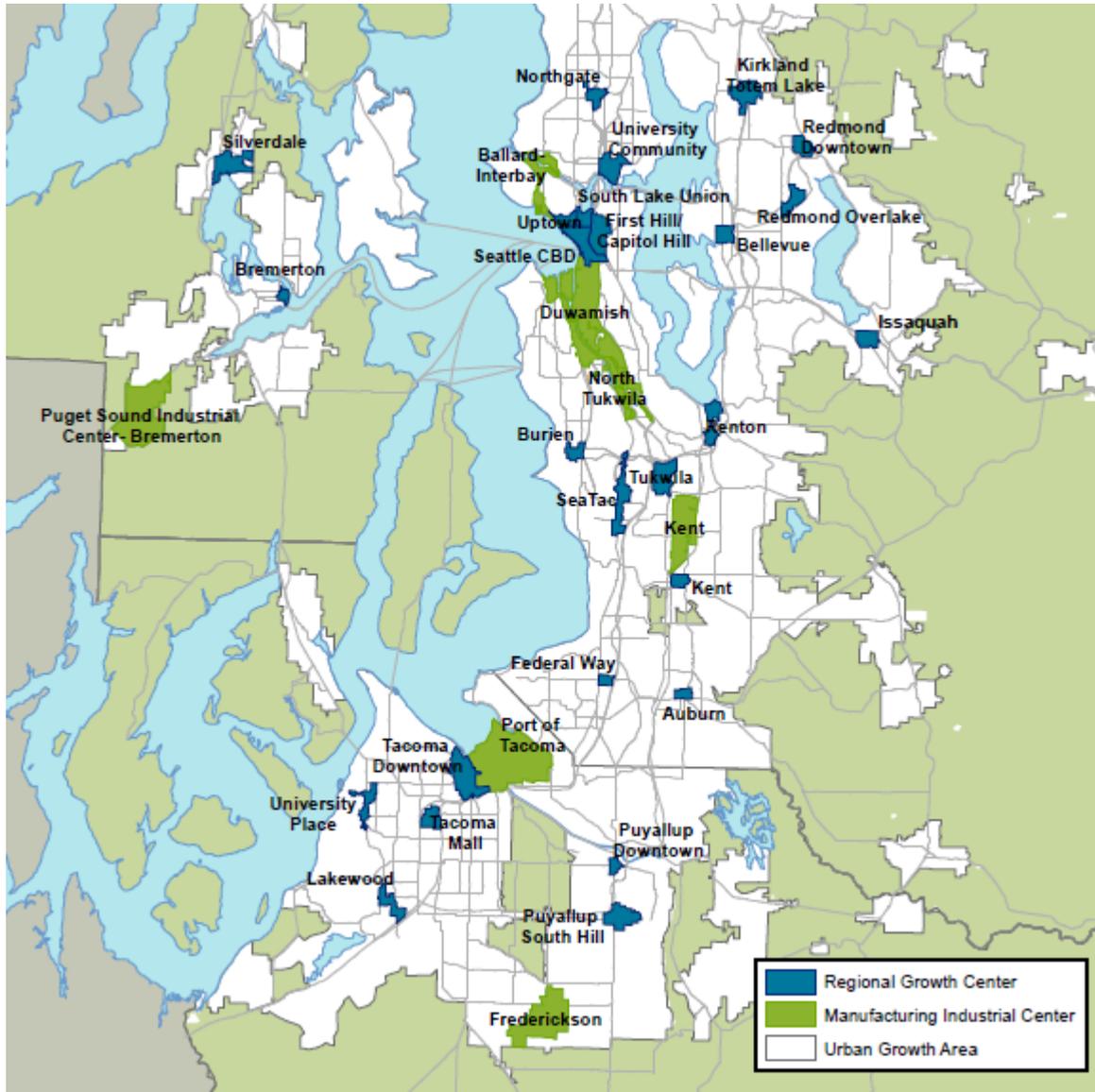
# Mobility- Reliability from the Airport

Travel Time 50% longer than free flow and twice as long as free flow were evaluated



- Scenario 1: Moderate
- Scenario 2: Moderate
- Scenario 3: Moderate
- Scenario 4: Moderate
- Scenario 5: Moderate

# Travel Time Between Centers



- Duwamish
- Burien
- North Tukwila
- Tukwila
- SeaTac
- Renton
- Kent Industrial
- Kent
- Federal Way
- Auburn

# Mobility- Travel Time Between Centers

Each trip between the 10 centers were evaluated for each scenario, for AM & PM and for 2025 and 2045 to determine where changes occurred compared to no build. Two example charts of time savings in minutes are shown:

**2025 PM Scenario 1**

	Duwamish	North Tukwila	Burien	Seatac	Tukwila	Renton	Kent Industrial	Kent	Federal Way	Auburn
Duwamish		0	0	0	0.5	0	0.5	1	2	2.5
North Tukwila	0		0	0.5	0	0.5	0.5	1	1	1
Burien	0	0		0.5	0	0	0.5	1	2.5	2.5
Seatac	0	0	0		0	0	+1	+0.5	0	0
Tukwila	0	0	0	0.5		0	0.5	0.5	0	1
Renton	0	0	0	0.5	0		0	0.5	0.5	0.5
Kent Industrial	0.5	0	0	0.5	0	0		0	1	0.5
Kent	0.5	0.5	1.5	0	0	0.5	0		0.5	0.5
Federal Way	1	0.5	2.5	0	0.5	1	0	0		0
Auburn	1	0.5	1.5	0	0.5	0.5	0	0	0	

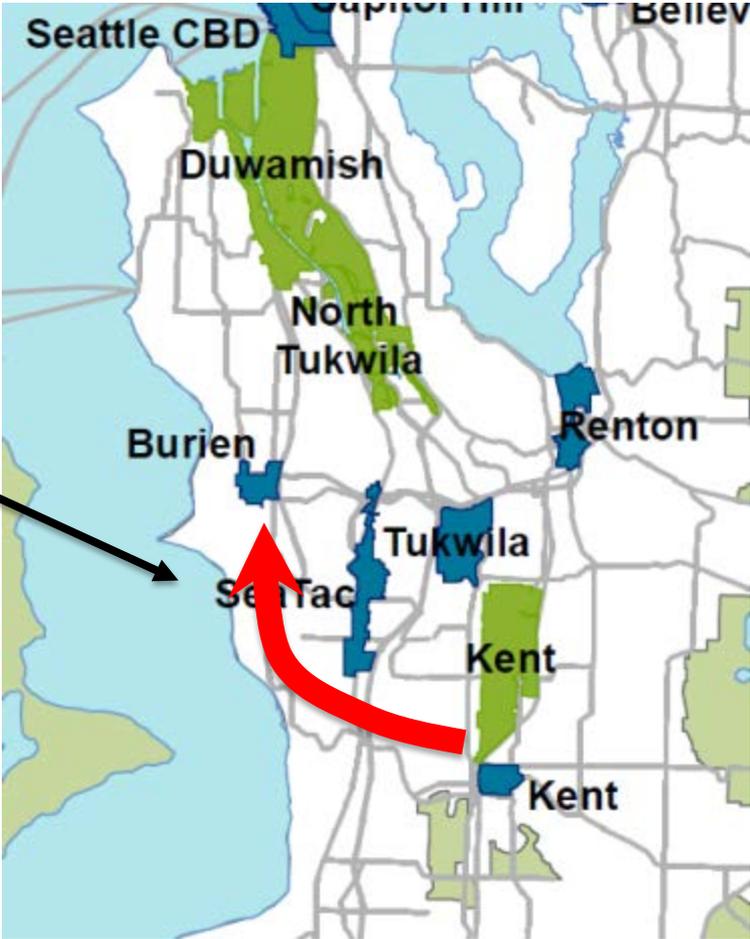
**2025 PM Scenario 5**

	Duwamish	North Tukwila	Burien	Seatac	Tukwila	Renton	Kent Industrial	Kent	Federal Way	Auburn
Duwamish		0	+0.5	0	0	0	1	1.5	6	5.5
North Tukwila	0		0	0	0	0.5	1	1.5	2.5	3
Burien	0	0		1	0.5	0.5	1	2.5	4.5	5.5
Seatac	0	0.5	0		0	0	0.5	0	2	1.5
Tukwila	0	0	0	0.5		0	0.5	1	1.5	3.5
Renton	0	0	0	0.5	0		0.5	1	1	2
Kent Industrial	0	0	0	0.5	0	0		0	4	3
Kent	0.5	0.5	1.5	0	0	0.5	0		3	2.5
Federal Way	1	1	2.5	0.5	1	1	0	0		+0.5
Auburn	1	1	1.5	0.5	0.5	0.5	0	0	0.5	

# Mobility- Travel Time Between Centers

Key AM travel changes

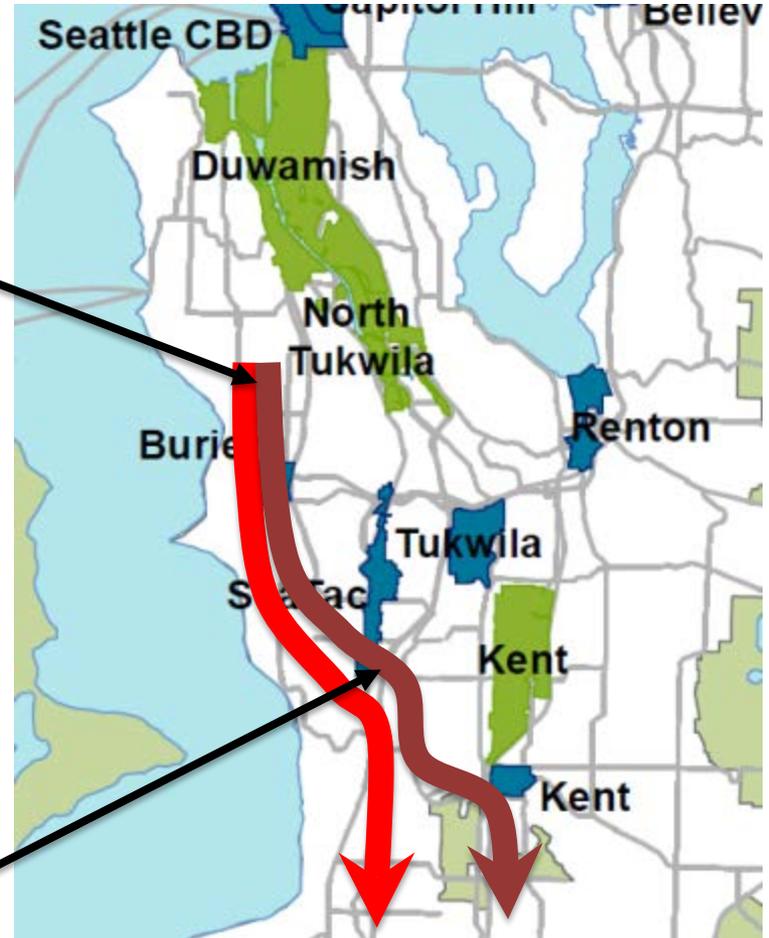
Kent to Burien Travel Time Savings		
	2025 AM	2045 AM
S1	+0.5	0.5
S2	0.0	0.5
S3	0.5	1.5
S4	1.0	2.5
S5	1.0	1.5
S5 Free	2.0	2.5



# Mobility- Travel Time Between Centers

Key PM travel changes

Duwamish to Federal Way Travel Time Savings (minutes)		
	2025 PM	2045 PM
S1	2.0	1.0
S2	3.5	1.5
S3	4.0	1.0
S4	3.0	1.0
S5	6.0	1.5
S5 Free	4.5	2.0



Scenario 1: Moderate

Scenario 2: Moderate

Scenario 3: Good

Scenario 4: Good

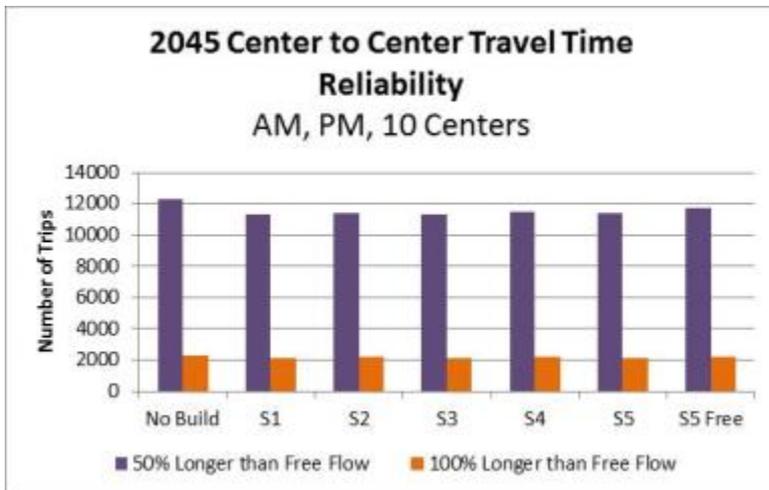
Scenario 5: Good

Duwamish to Auburn Travel Time Savings (minutes)		
	2025 PM	2045 PM
S1	2.5	1.5
S2	3.5	1.5
S3	4.0	1.0
S4	3.0	1.0
S5	5.5	2.0
S5 Free	4.5	1.5

# Mobility- Reliability Between Centers



- Travel time 50% longer than free flow and twice as long as free flow were evaluated
- Results of all trip pairs



- Scenario 1: Moderate
- Scenario 2: Moderate
- Scenario 3: Moderate
- Scenario 4: Moderate
- Scenario 5: Moderate

# Economic Vitality – Economic Benefit

Estimates of the 20-year benefits in the North and Central sub areas and relationship to project costs were evaluated. Comparative rating of scenarios using travel time savings benefits only.

	B/C Ratio
<b>Scenario 1: Moderate</b> 	0.7
<b>Scenario 2: Very Good</b> 	2.1
<b>Scenario 3: Very Good</b> 	2.2
<b>Scenario 4: Good</b> 	1.4
<b>Scenario 5: Good</b> 	1.5

Net present value calculations assuming 4% discount rate, \$16/hr for individuals, \$76/hr for trucks.

# Economic Vitality: Comprehensive Land Use Planning and Development

How did we measure how scenarios support local and regional comprehensive land use planning and development?

Evaluated each alternative based on connections between the Urban and Manufacturing Industrial Centers.

- Scenario 1: Fair** 
- Scenario 2: Moderate** 
- Scenario 3: Moderate** 
- Scenario 4: Very Good** 
- Scenario 5: Very Good** 

Scenario 1 received a “fair” because it didn’t provide as many connections and opportunities to link the centers

Scenarios 4 and 5 received ratings of very good because they provided the maximum level connections, intersections and linkages

# Safety – Number of Serious and Fatal Crashes

Assessment of the changes in crashes on the highway sections.

**Scenario 1: Fair** 

**Scenario 2: Fair** 

**Scenario 3: Moderate** 

**Scenario 4: Moderate** 

**Scenario 5: Moderate** 

The single lane section of SR 509 and I-5 weaving sections in scenario 1 and 2 may have a higher crash experience than the other scenarios.

# Essential Performance Metrics

Scenario Comparison Table - SR 509 Completion Project

Performance Category 	Essential Performance Metrics										
	Mobility								Economic Vitality	Safety	
Mode 	Auto / Freight	HOV / BUS	Freight / Auto / Transit	Freight / Auto / Transit	Freight / Auto / Transit	Freight / Auto / Transit	Freight / Auto / Transit	Freight / Auto / Transit			
Performance METRIC 	SR 509 Performance Improve throughput and lower levels of congestion on new SR 509 facility		I-5 Performance Maintain or Improve I-5 Operations between S. Spokane St and SR18	Delay Reduce hours of delay in project subarea network	Airport - Travel Time Reduce travel time between SeaTac Airport and the area south of S. 200th St.	Airport - Travel Time Reliability Improve travel time reliability between SeaTac Airport and the area south of S. 200th St.	Centers - Travel Time Reduce travel time between Urban Centers, Manufacturing Industrial Centers in South King County	Centers - Travel Time Reliability Improve travel time reliability between Urban Centers, Manufacturing Industrial Centers in South King County	Economic Benefit Improve economic vitality	Local and Regional Comprehensive Plan Support local and regional comprehensive land use planning and development	Safety # of Serious Injury and Fatal Crashes (I-5 & SR 509)
SCENARIO											
No Build											
Scenario 1 - Closing the Gap											
Scenario 2 - Limited Connectivity											
Scenario 3 - Moderate Connectivity											
Scenario 4 - Full Connectivity											
Scenario 5 - Full-Build											

# Contextual Performance Metrics

- Reduce the number of serious injury and fatal crashes on local arterials
- Support multimodal choices to Sea-Tac Airport and Kent-Des Moines Link Light Rail Station
- Improve intermodal relationships between the seaport, airport and manufacturing/industrial centers
- Reduce pedestrian vehicle exposure
- Improve continuity and consistency of pedestrian and bicycle facilities
- Reduce area of impact to sensitive areas
- Maintains forward compatibility with future highway widening
- Reduce right of way impact
- Compatibility with Sound Transit Federal Way Link Extension

# Safety – Serious and Fatal Crashes on Local Arterials

How did we measure “Number of serious injury and fatal crashes on local arterials”?

The relative shift of trips off the local street system was viewed favorably as the crash exposure per mile traveled is estimated to be lower on a highway section than on a local arterial .

**Scenario 1:** Moderate 

**Scenario 2:** Moderate 

**Scenario 3:** Good 

**Scenario 4:** Good 

**Scenario 5:** Good 

# Mobility – Choices to Airport and KDM Station

How did we measure how scenarios “Support multimodal choices to and from SeaTac Airport and Kent-Des Moines Link Light Rail Station”?

We looked at how each scenario improves connections to the airport and Kent-Des Moines Link Light Rail station.

**Scenario 1:** Moderate 

**Scenario 2:** Good 

**Scenario 3:** Good 

**Scenario 4:** Very Good 

**Scenario 5:** Very Good 

# Mobility – Intermodal Relationships

How did we measure how scenarios “Improve intermodal relationships between the seaport, airport, and manufacturing/industrial centers”?

We evaluated the scenarios based on the facilities provided that improve the connections between the seaport, the airport and the manufacturing/industrial centers.

**Scenario 1: Fair** 

**Scenario 2: Moderate** 

**Scenario 3: Good** 

**Scenario 4: Good** 

**Scenario 5: Very Good** 

# Mobility – Reduce Pedestrian/Vehicle Exposure

How did we measure how scenarios “Reduce pedestrian vehicle exposure”?

We evaluated improvements made to pedestrian crossings at interchanges along the corridor. Reconstruction to provide signalized crossings reduces pedestrian vehicle exposure.

**Scenario 1:** Fair 

**Scenario 2:** Good 

**Scenario 3:** Good 

**Scenario 4:** Good 

**Scenario 5:** Good 

# Mobility – Improve Pedestrian & Bicycle Facilities

How did we measure how scenarios “Improve continuity and consistency of pedestrian and bicycle facilities”?

We looked at the number of ramp crossings that pedestrians need to make to navigate across an interchange and if bike lanes are added through interchanges.

**Scenario 1:** Good 

**Scenario 2:** Moderate 

**Scenario 3:** Good 

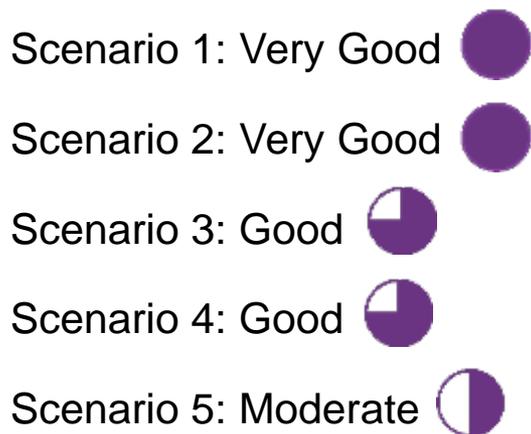
**Scenario 4:** Moderate 

**Scenario 5:** Good 

# Environment – Reduce Impact to Sensitive Areas

How did we measure “Reduce area of impact to sensitive areas”?

Less shadow impacts at Wetlands A and B which are high class wetlands reduced impacts to sensitive areas



Scenarios 1 and 2 have one lane in each direction with climbing lanes resulting in a narrow footprint and better score. The Full build has the widest footprint and had the lowest score.

# Other – Forward Compatibility

How did we measure “Forward Compatibility”?

For Forward Compatibility, we looked at right of way, structure width, and compatibility with future highway widening.

- Scenario 1: Fair** 
- Scenario 2: Moderate** 
- Scenario 3: Good** 
- Scenario 4: Good** 
- Scenario 5: Very Good** 

# Other – Right of Way Impacts

How did we measure how scenarios “Reduce right of way impacts”?

Reducing right of way impacts reduces impacts on the community and reserves more property for economic development and housing in an important urban area. Generally narrower footprint scored better.

**Scenario 1:** Very Good 

**Scenario 2:** Fair 

**Scenario 3:** Good 

**Scenario 4:** Fair 

**Scenario 5:** Fair 

# Other – Compatibility with Sound Transit FWLE

How did we measure “Compatibility with Sound Transit FWLE”?

We reviewed how the scenarios interact with the proposed Sound Transit Federal Way Link Extension. Scenarios that reduce required span lengths and provided additional space for flexibility at key locations scored higher.

**Scenario 1: Good** 

**Scenario 2: Fair** 

**Scenario 3: Moderate** 

**Scenario 4: Moderate** 

**Scenario 5: Fair** 

# Contextual Performance Metrics

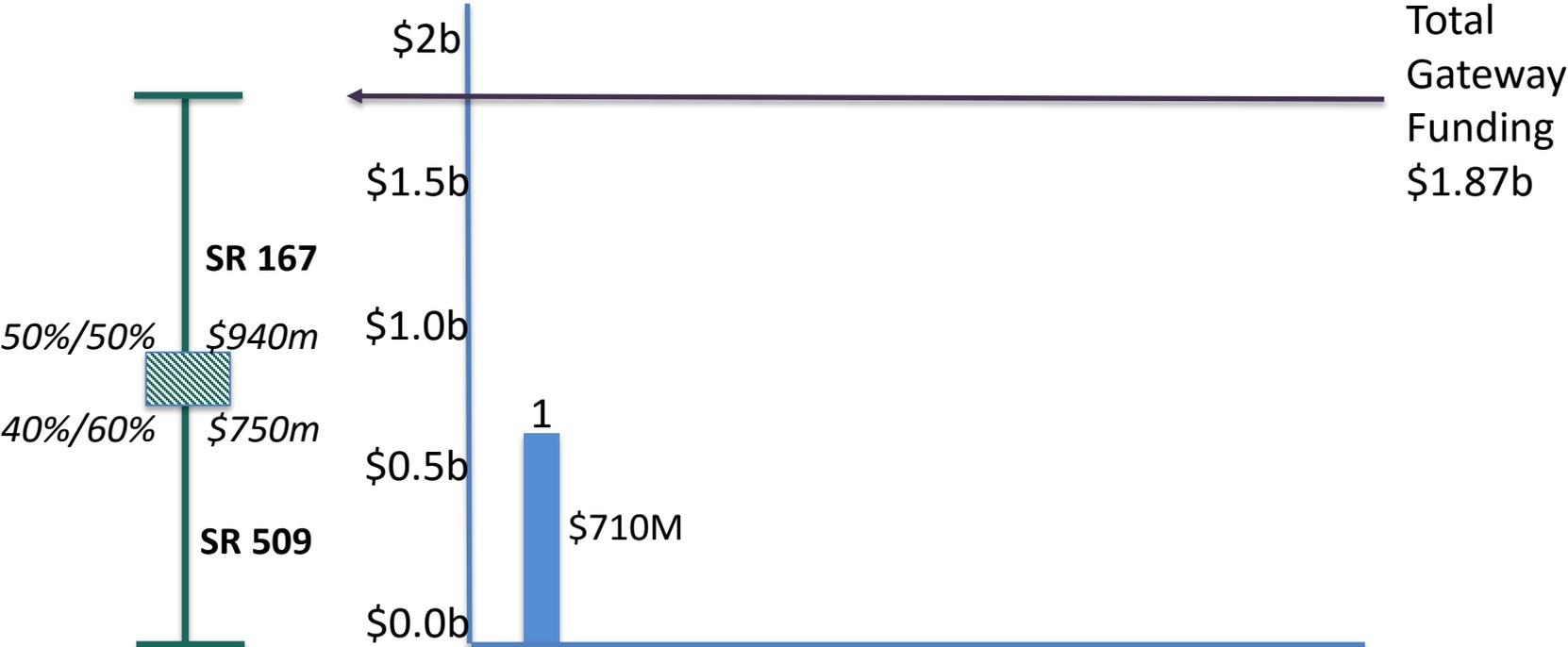
Date: 6/8/16

Contextual Performance Metrics									
Safety	Mobility				Env't	Other			
			Ped	Ped & Bike					
Safety # of Serious Injury and fatal crashes on local arterials	Support multimodal choices to SeaTac Airport and KDM Link Light Rail Station	Improve intermodal relationships between the SeaPort, Airport, and Manufacturing/Industrial Centers	Number and location of Crossings Reduce Pedestrian vehicle exposure	Continuity and Consistency of Pedestrian and Bicycle facilities Improve Continuity and Consistency of Pedestrian and Bicycle facilities	Sensitive Area Impact Reduce area of impact to sensitive areas	Forward Compatibility with future highway widening	Right of Way Impact Reduce Right of Way Impact	Sound Transit FWLE Project Compatibility with ST FWLE	

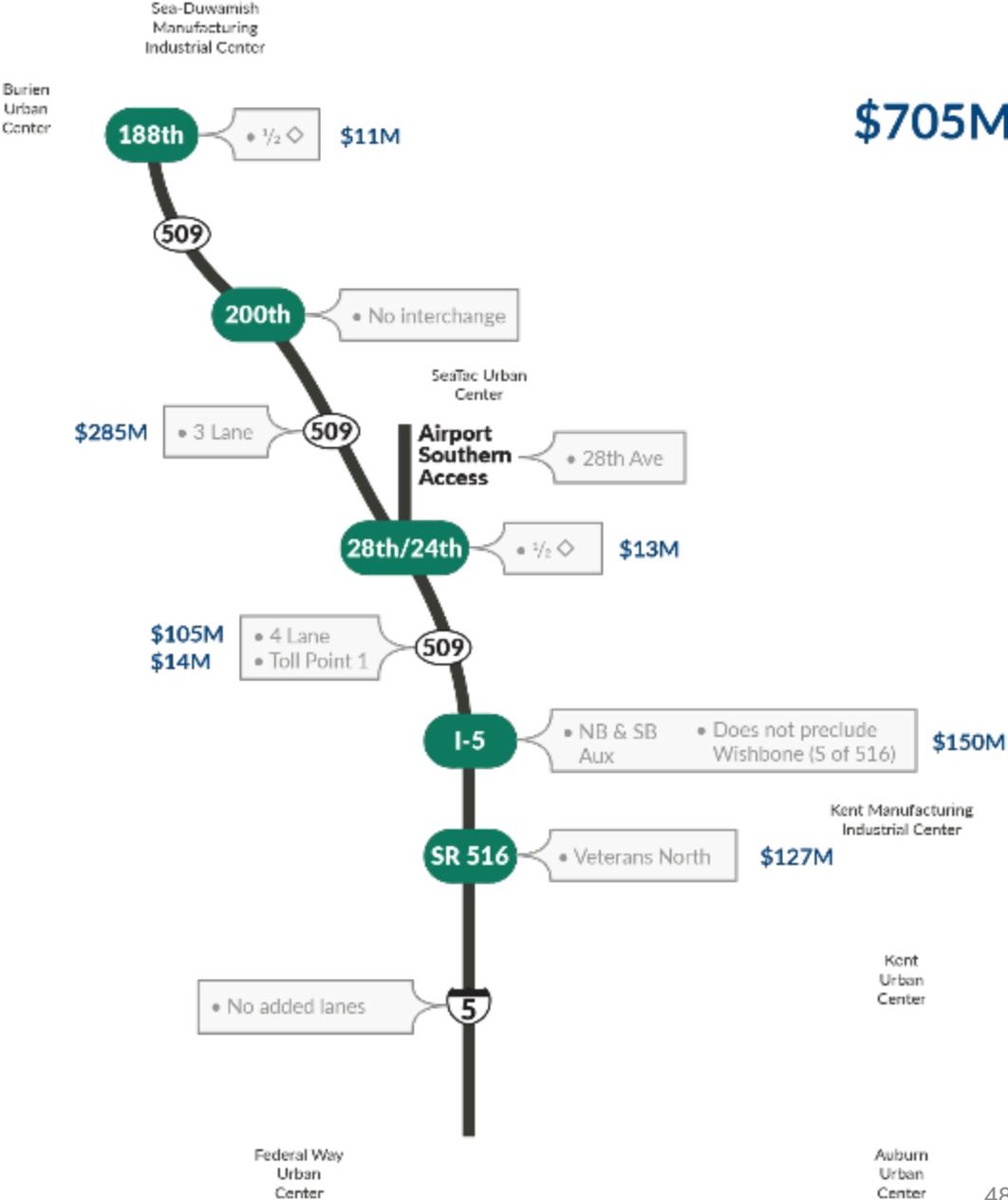
# Preliminary Cost Review

- Costs are developed based on major items (bridges, earthwork, pavement) that can be estimated directly.
- Programmatic and project development costs are consistent across all scenarios.
- Assumptions included using a base year of 2016
  - PE estimates inflated to year 2019
  - Right of Way estimates inflated to year 2021
  - Construction estimates inflated to year 2025
- 4% risk applied to address events and project unknowns.

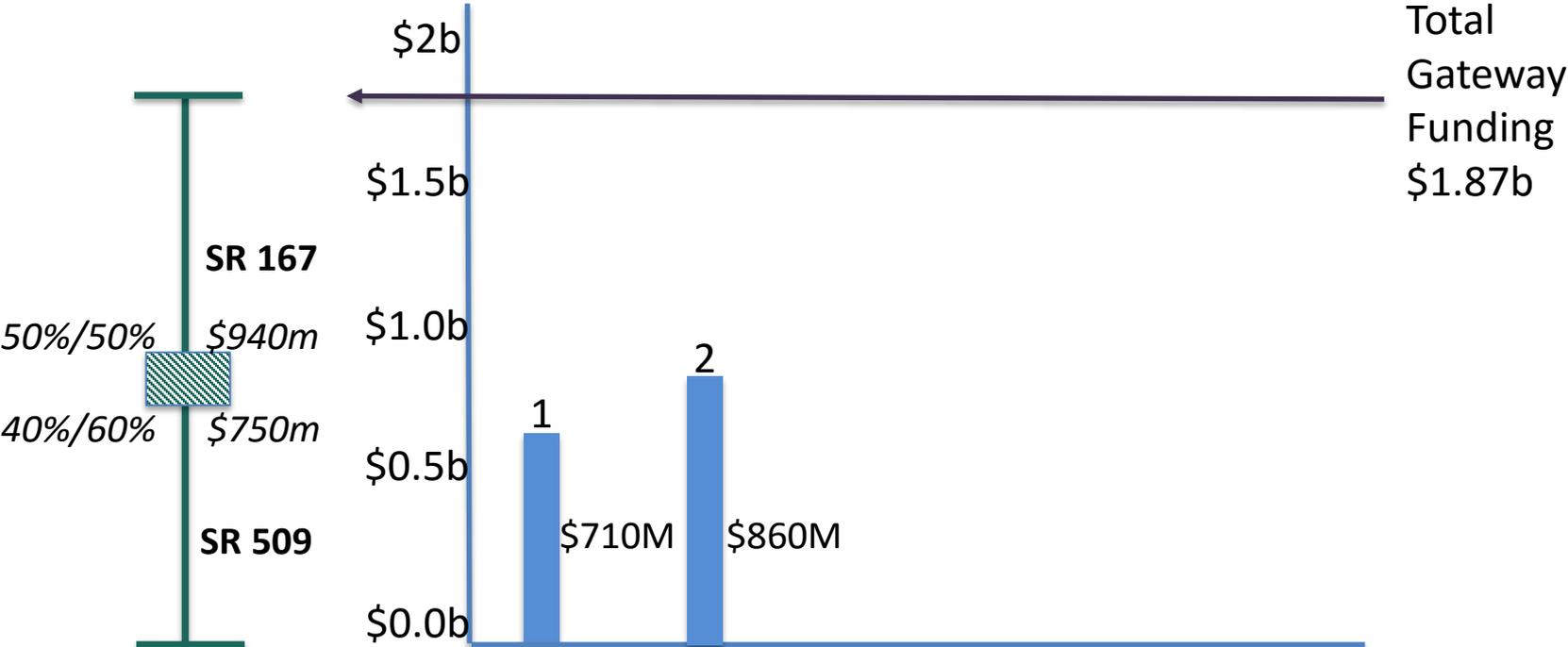
# Scenario 1: Closing the Gap



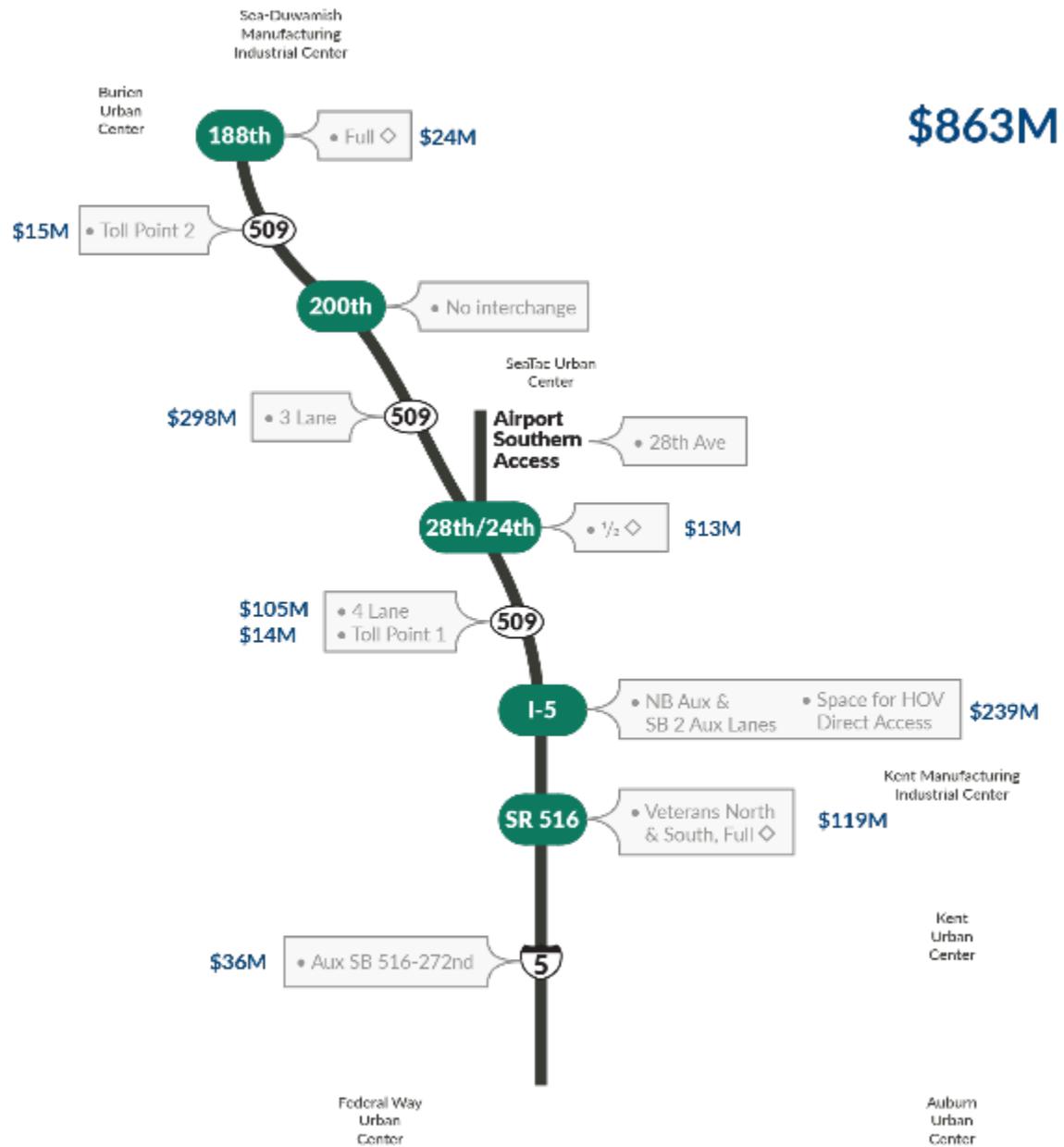
# Scenario 1: Closing the Gap



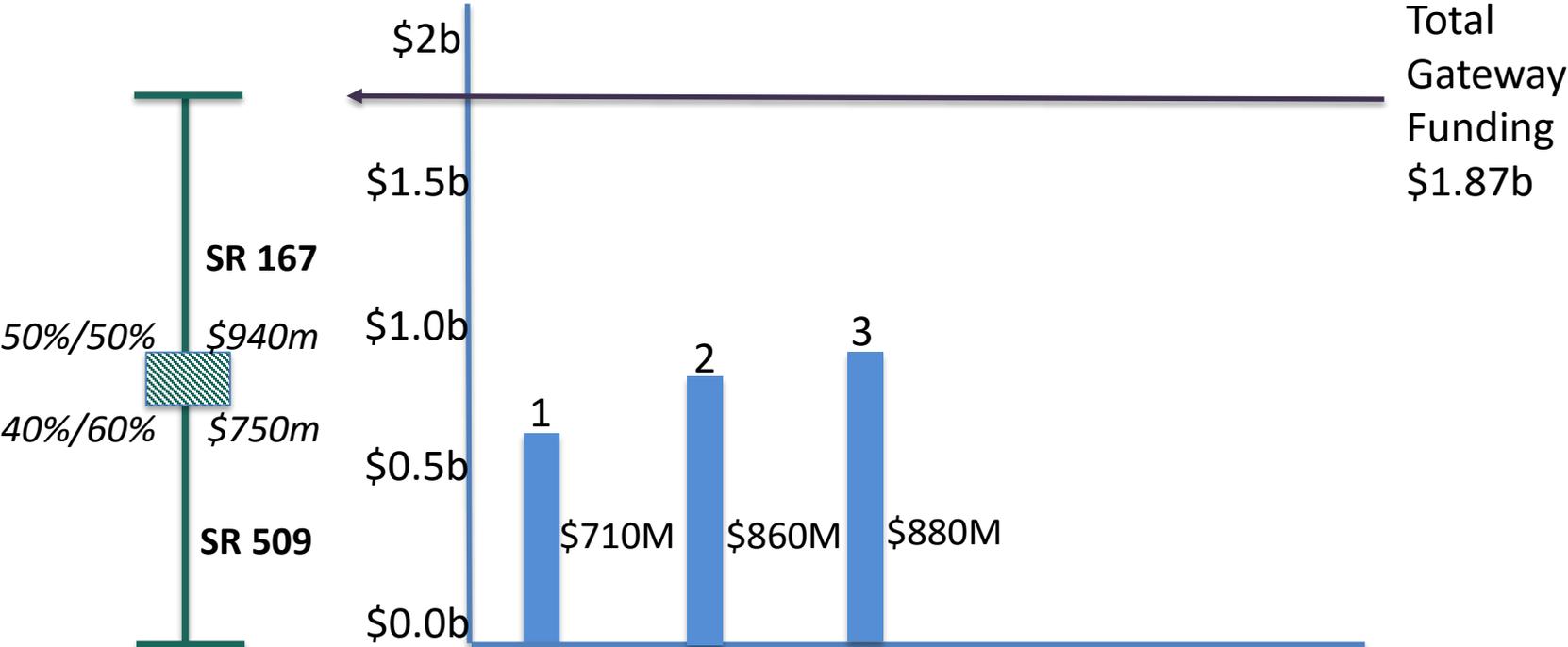
# Scenario 2: Limited Connectivity



# Scenario 2: Limited Connectivity

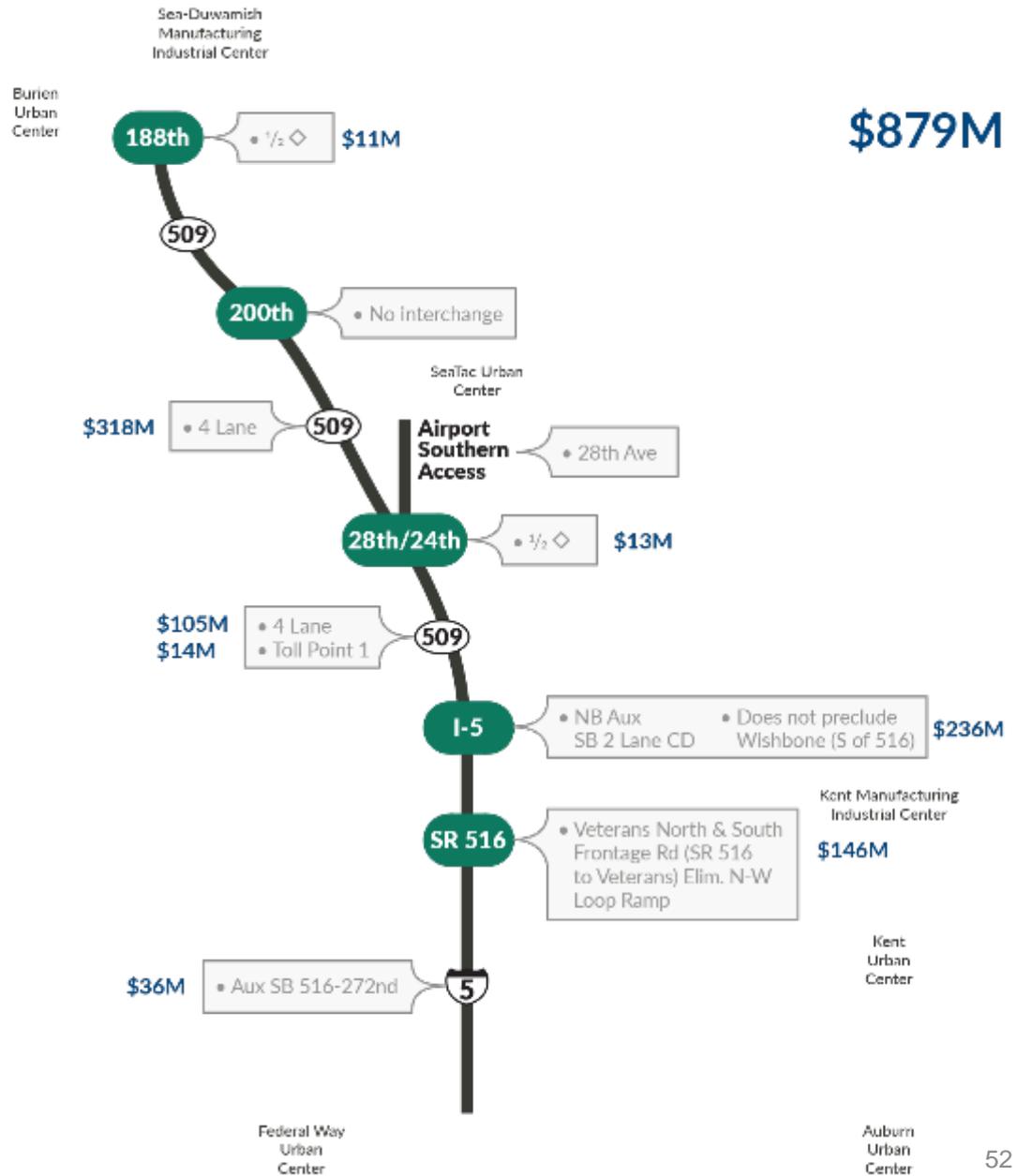


# Scenario 3: Moderate Connectivity

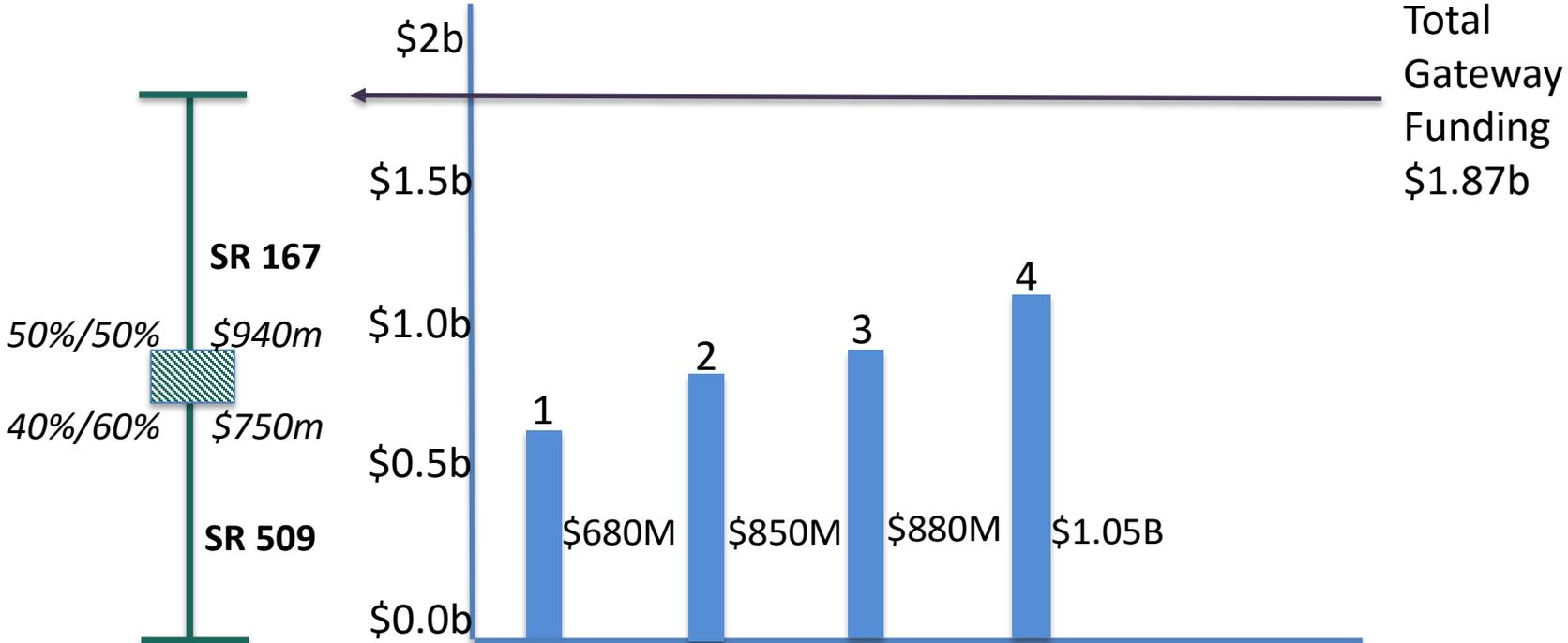


# Scenario 3: Moderate Connectivity

**\$879M**

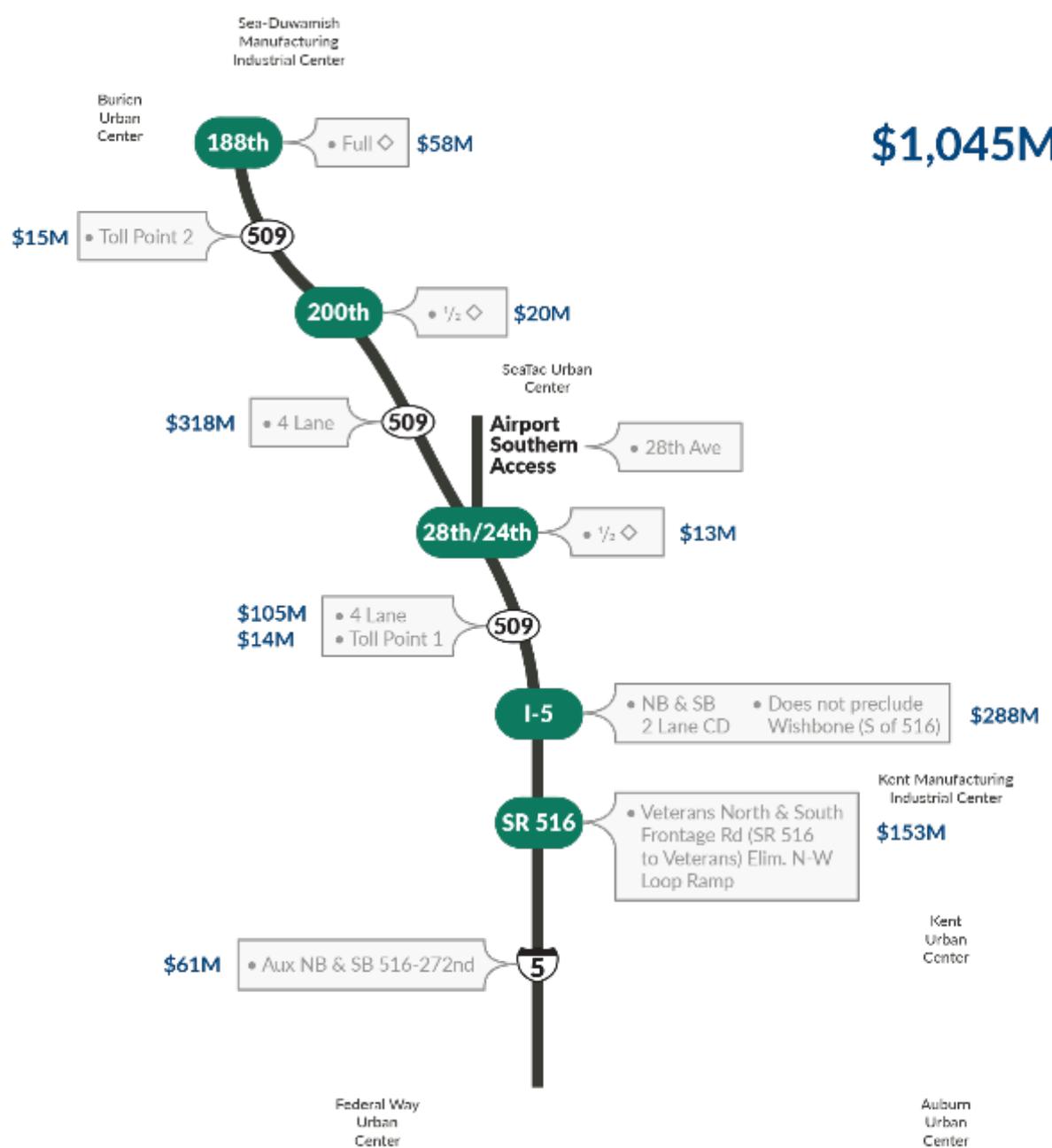


# Scenario 4: Full Connectivity

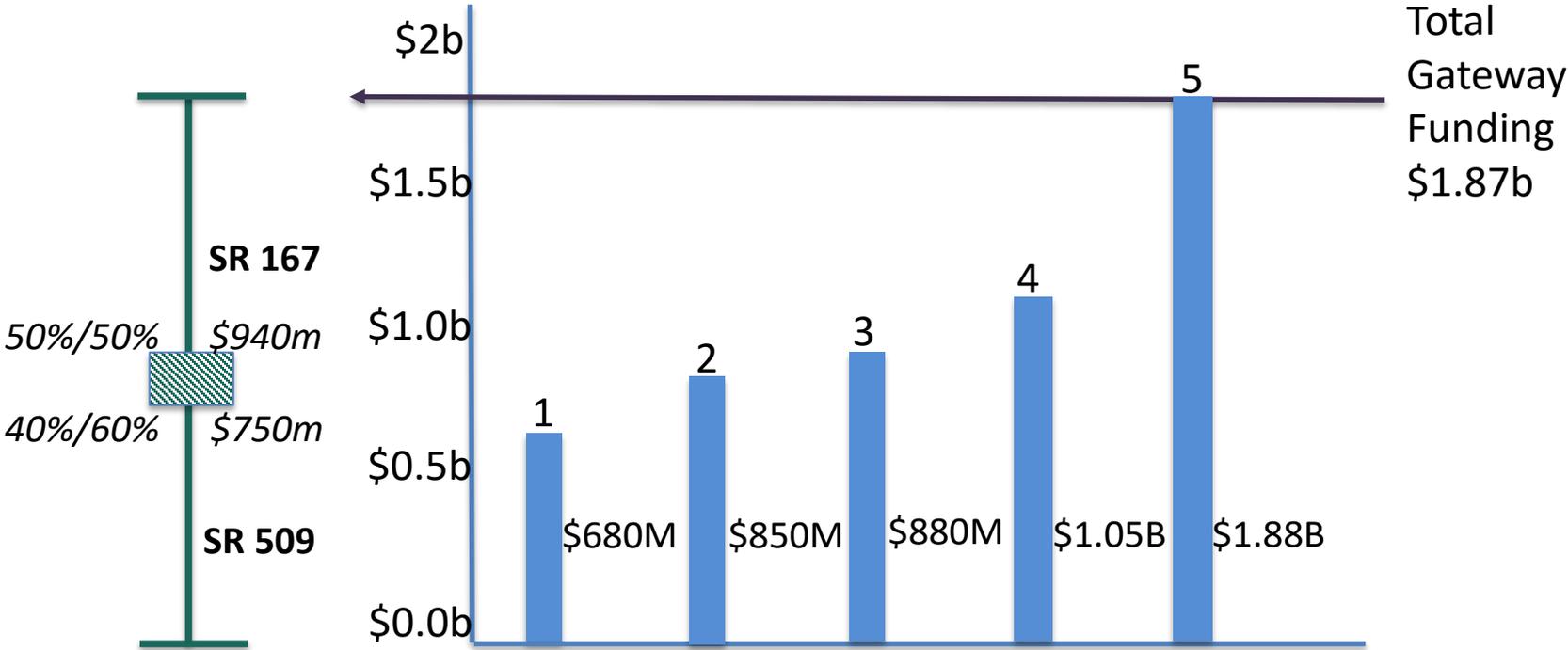


# Scenario 4: Full Connectivity

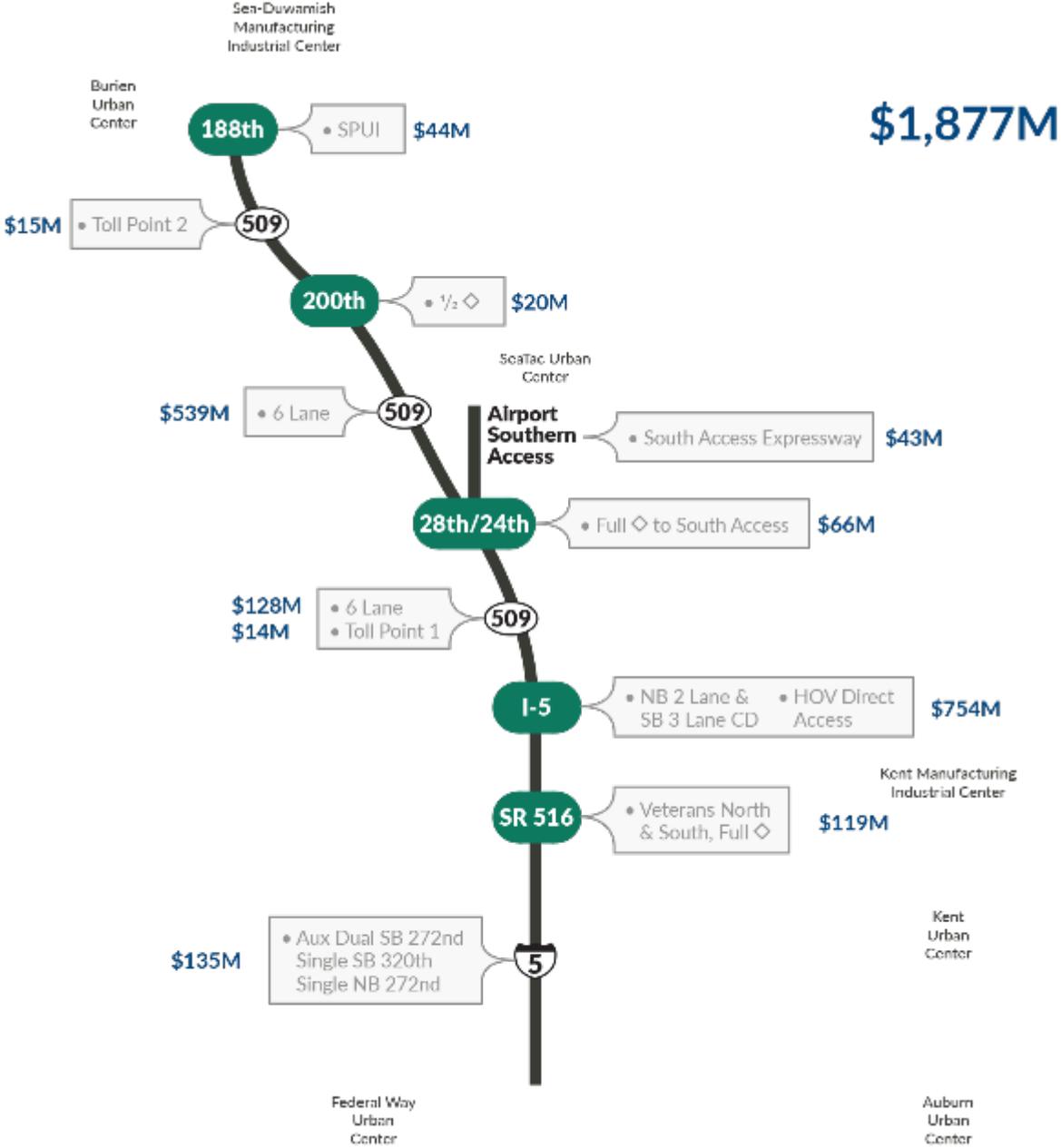
**\$1,045M**



# Scenario 5: Full Build



# Scenario 5: Full Build



# Performance Evaluation Results – Key Takeaways

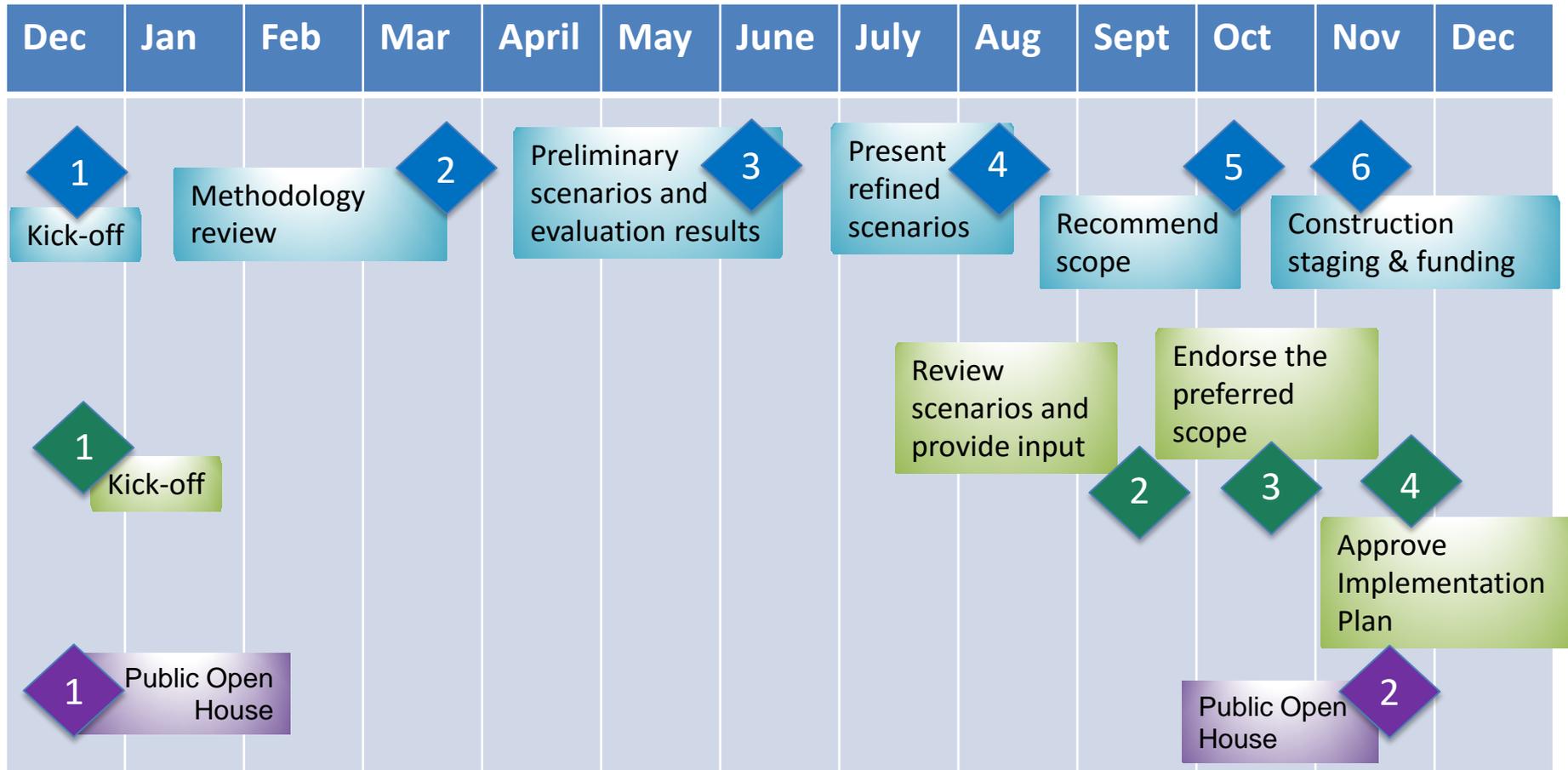
Key areas where scenarios differed in performance:

- Scenario 1 and 2 does not perform as well as 3, 4, 5
- Traffic performance of 3, 4, and 5 are similar
- Cost of scenario 5 is twice scenario 3 and about the same as the entire Gateway Budget

# Key Questions for Refinement

- Number of lanes on SR 509
- Tolls
- Managed lanes
- Forward compatibility
- Effects to I-5
- Connectivity
- South access

# Project Schedule (SR 509)



Steering Committee Meeting



Executive Committee Meeting



Open House

## More information:

**Craig J. Stone, PE**

Puget Sound Gateway Program Administrator

(206) 464-1222

[stonec@wsdot.wa.gov](mailto:stonec@wsdot.wa.gov)