Washington State Truck Freight Performance Measure Program

Paula Hammond, P.E.
Secretary of Transportation

Dave Dye, P.E.
Deputy Secretary

Steve Reinmuth
Chief of Staff

Barbara Ivanov
Freight Systems Division Co-Director
Washington State Department of Transportation

Edward McCormack
Research Assistant Professor
TransNow Regional Transportation Center, University of Washington

Larry Pursley
Executive Vice President
Washington Trucking Association

Washington State Transportation Commission
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Washington State Department of Transportation

The Washington State Truck Performance Measure Program

- With the support of the Washington Trucking Associations, the Washington State Legislature initiated the first state truck performance measure program in the U.S. in 2007.

- In the 2007 Transportation Budget, the state Legislature appropriated $320,000, assumed $128,000 in matching federal funds through the Washington State Department of Transportation (WSDOT), and an additional $192,000 via the University of Washington TransNow Regional Center, to develop the Truck Freight Performance Measure program to guide state freight investments and track project effectiveness.

- The Bill funded a program to track truck trips through geographic information system (GIS) technology, and assigned management of the research to WSDOT (Freight Systems Division). WSDOT began a pilot program in the central Puget Sound region in 2008.

- After reviewing the proof of concept, in 2010 the Legislature appropriated an additional $122,000 to expand the program to major truck corridors, statewide.

How Does Measuring Truck Freight Performance Benefit Washington State?

By accurately tracking truck trip travel times and network reliability, the Truck Freight Performance Measure project deliverables help Washington State support:

- Future federal freight funding requests. The next re-authorization of the Transportation Bill will require performance-based freight project evaluation and performance measures.
- Increased public accountability to citizens. Tracking truck freight performance before and after projects are constructed explains the value of their investments.
- Making the most productive investments of state dollars. Quantifying delay at truck freight bottlenecks allows the state to identify key problems and prioritize project funding.

How Can we Use GPS Truck Data to Analyze Freight Systems?

WSDOT developed new methodology to objectively identify and rank truck highway bottlenecks. The method:

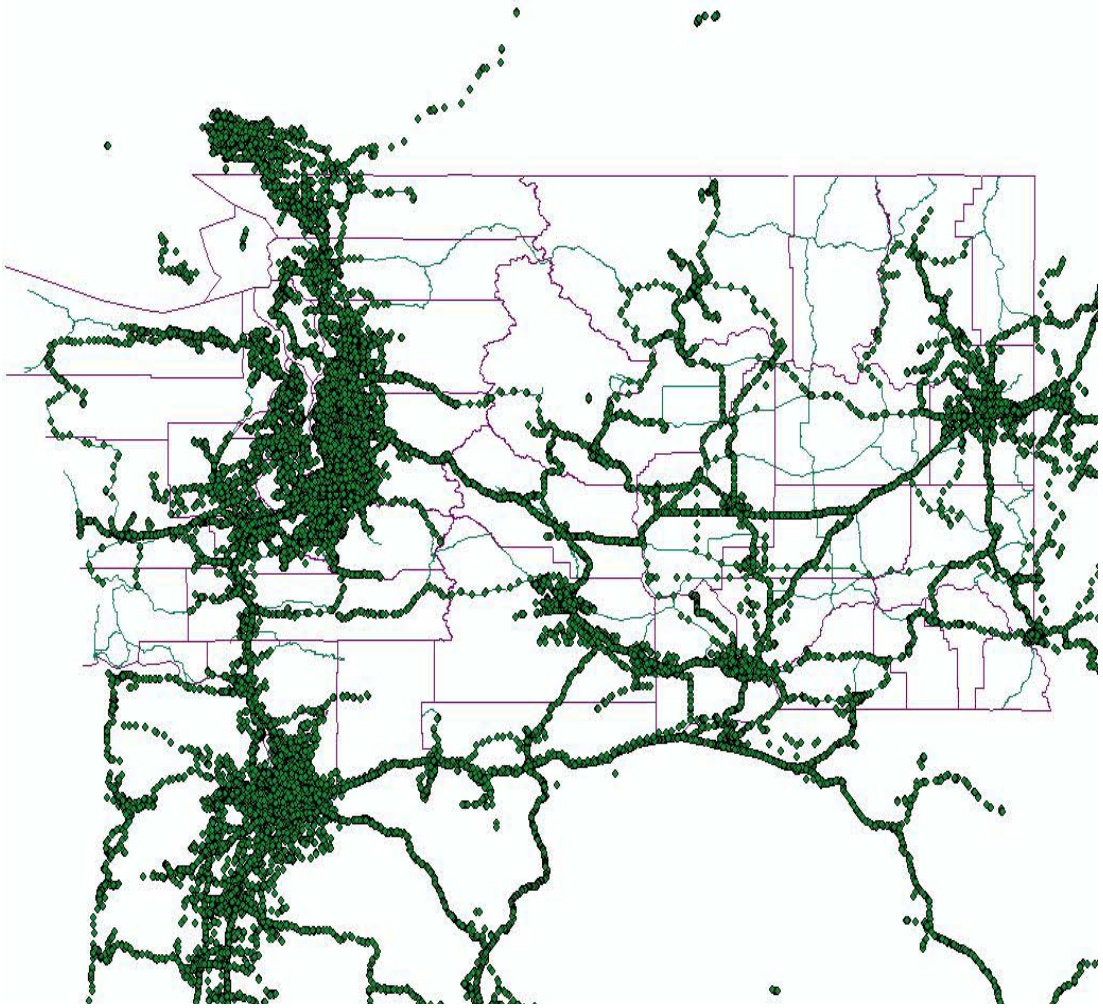
- Supports a transparent and defensible process to identify and rank truck bottlenecks on the state's major freight corridors.
- Is automated, in order to analyze millions of data points drawn from the current sample of approximately 6,000 trucks traveling on the state's major truck corridors each week.
- Accounts for the importance of high-volume truck corridors, while being flexible enough to identify both urban and rural truck highway bottlenecks.

Identifying Truck Bottlenecks

Step 1 - Code truck Global Positioning System (GPS) data to Washington State's freight corridors.

WSDOT buys GPS location, spot speed and directional truck data directly from national GPS vendor(s).

The vendors provide fleet management services for trucking companies.



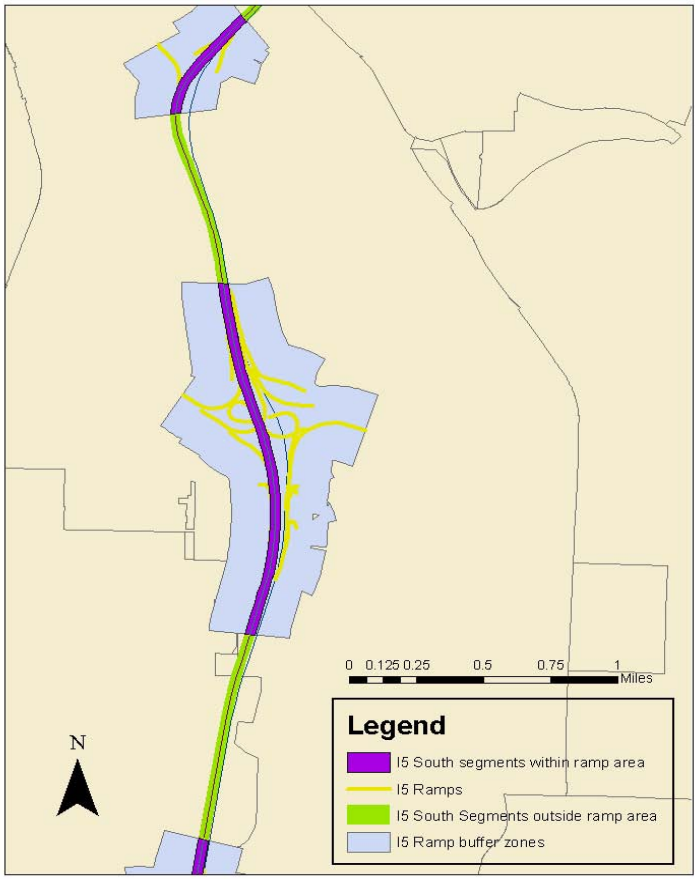
Identifying Truck Bottlenecks

Step 2 – Pre-determine segments to analyze on the state's major truck corridors.

WSDOT divided the state highway system into segments according to:

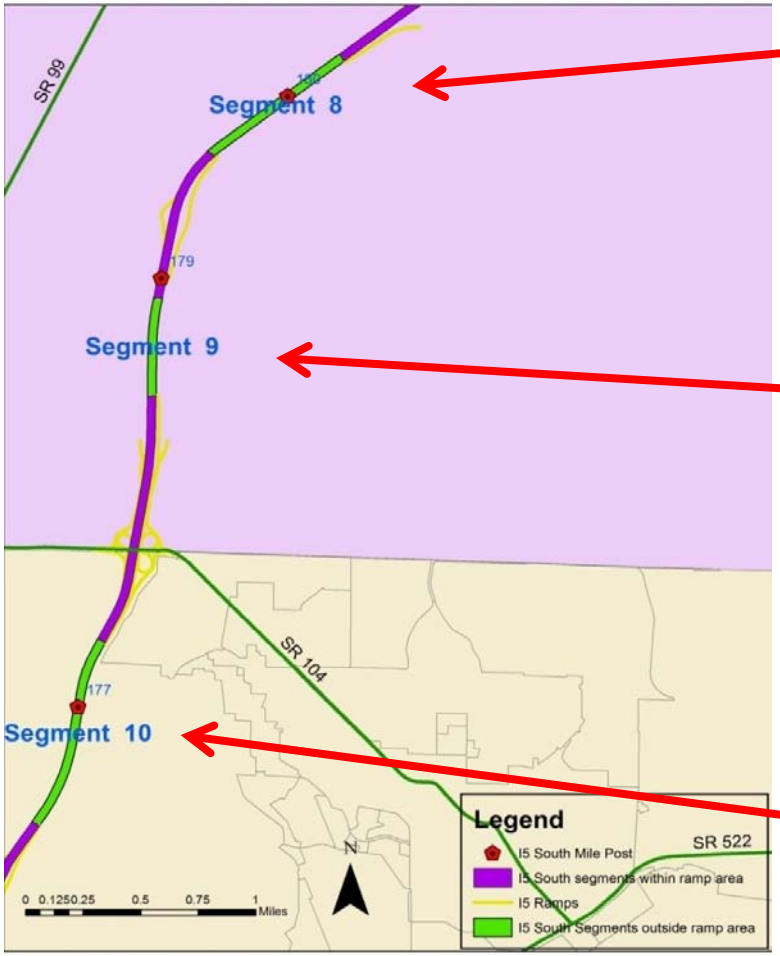
- The location of ramps in urban areas, and
- Assigned shorter lengths in rural areas to facilitate root cause analysis of truck highway bottlenecks.

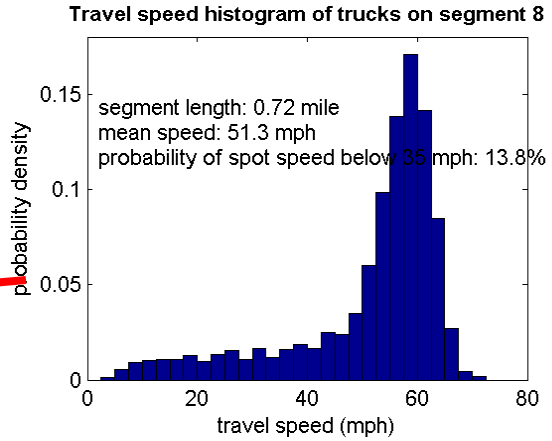
WSDOT's analysis is limited to highways and roads with enough data points for a robust sample. National research has shown that a one-to-two percent sample of all trucks provides statistically-valid speed data.

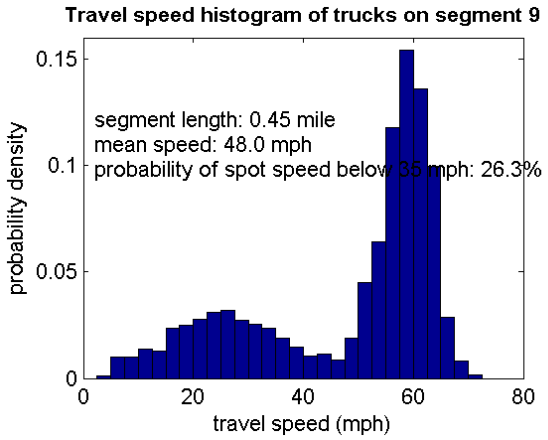


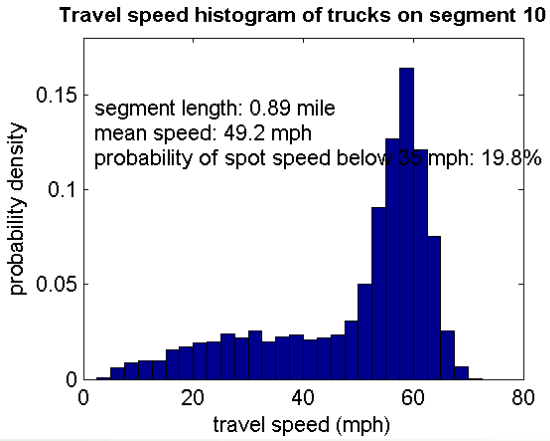
Identifying Truck Bottlenecks

Step 3 – Automatically pull GPS data from trucks traveling on the predetermined corridor segments.







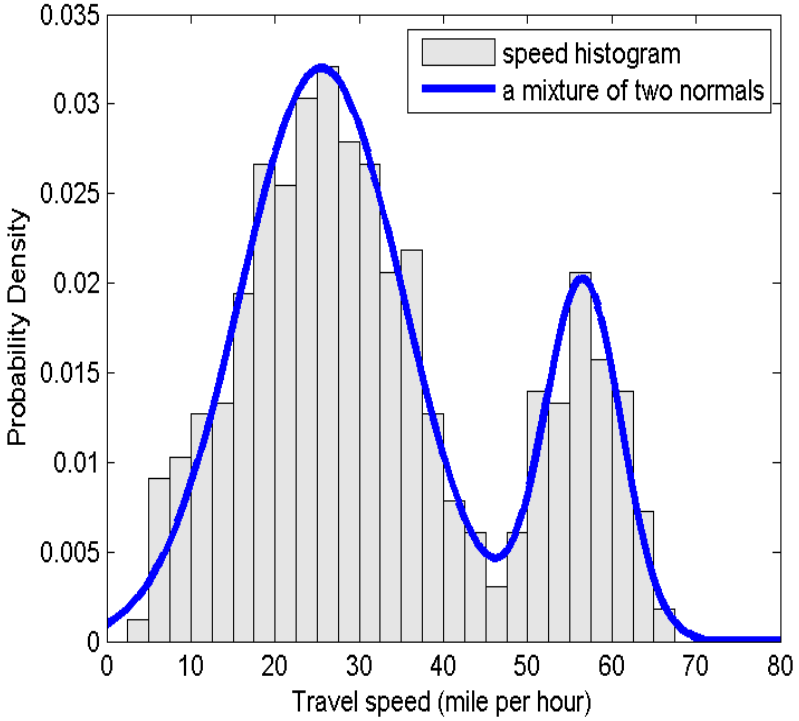


Identifying Truck Bottlenecks

Step 4 – Determine each segment's reliability by analyzing truck speed data by time-of-day.

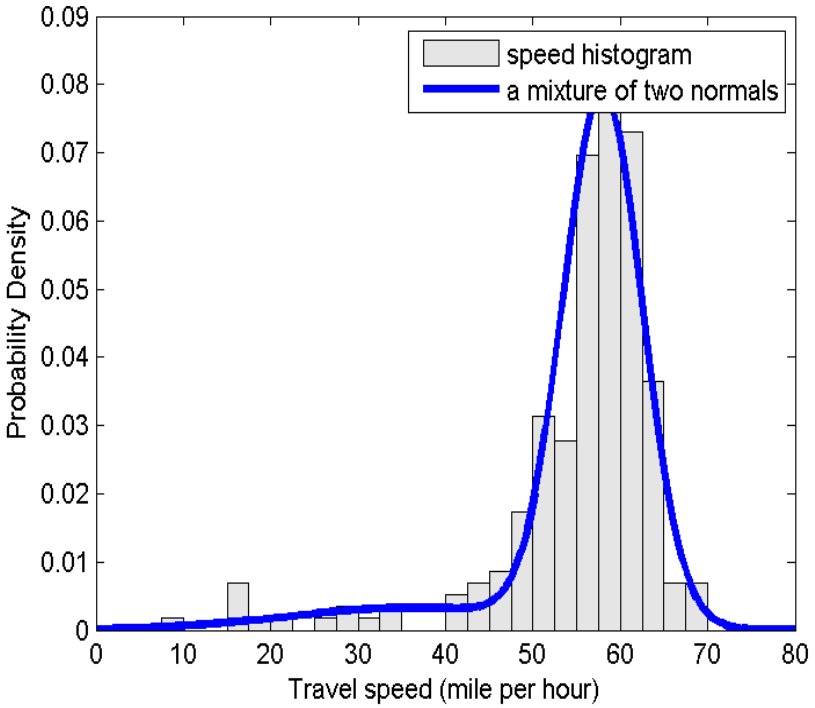
AM Peak

Speed distribution for SB I-5 (Snohomish County between 220th SW and 236th SW)



PM Peak

Speed distribution for SB I-5 (Snohomish County between 220th SW and 236th SW



The diagram on the left shows a highway segment that is unreliable in the AM peak. The diagram on the right shows that trucks reliably travel at 50 to 65 miles per hour in the PM peak on the same segment.

Identifying Truck Bottlenecks.

Step 5 – Define and apply criteria to rank the highway bottlenecks.

WSDOT developed four criteria to identify and rank truck bottlenecks:

1. Truck speed below severe congestion threshold, which WSDOT has defined as 60 percent of posted speed (35 miles per hour on urban freeways),
2. Average speed,
3. Speed distribution (reliability), and
4. Truck volume.

Percentage of truck speeds falling below severe congestion threshold on southbound I-5

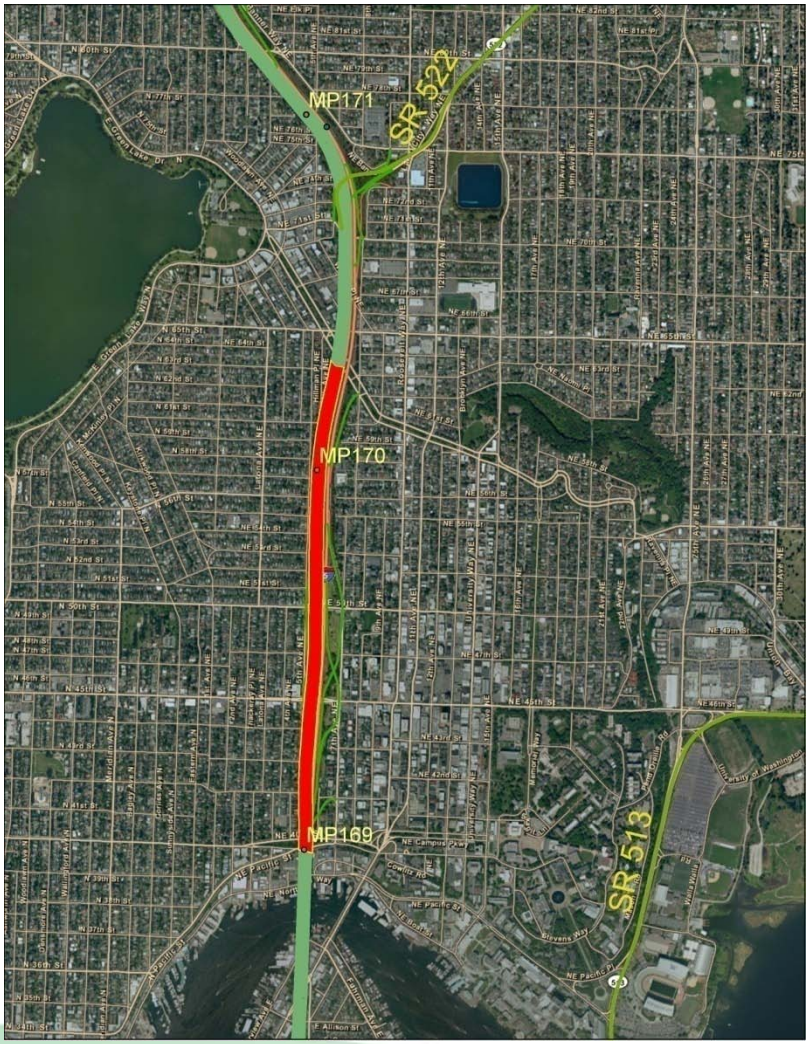
Segment Location	6AM-9AM	9AM-3PM	3PM-7PM	7PM-6AM	Average
NE 63rd St and NE Pacific Ave E	53.9%	51.7%	80.1%	6.9%	48.2%
NE Pacific St and Eastlake Ave E	39.9%	41.8%	78.3%	7.7%	41.9%
NE 75th St and NE 63rd St	43.2%	43.9%	69.4%	8.1%	41.2%
NE 80th St and NE 75th St	37.4%	41.1%	66.6%	7.1%	38.0%
NE 90th St and NE 79th St	29.1%	39.2%	56.3%	2.0%	31.7%
Eastlake Ave E and SR 520	13.7%	26.0%	82.8%	4.1%	31.6%
SR 520 and I-90	20.2%	22.4%	66.4%	5.0%	28.5%
NE 95th St and NE 90th St	19.1%	35.1%	57.0%	1.7%	28.2%
NE Pacific St and Eastlake Ave E	7.6%	38.4%	57.9%	3.5%	26.8%
NE 123rd St and NE 117th St	14.9%	19.7%	34.3%	2.8%	17.9%

Results of the Washington State Truck Performance Measure Program

- In 2010, the FHWA Office of Freight Management and Operations chose Washington state to be their only state partner in the national Freight Performance Measure program. WSDOT is currently providing and testing advanced technologies with FHWA and the American Transportation Research Institute.
- The program has objectively identified the most severe truck bottlenecks in the Central Puget Sound region and across the state, as shown in the following examples.

Severe Truck Bottleneck in Central Puget Sound

I-5 southbound



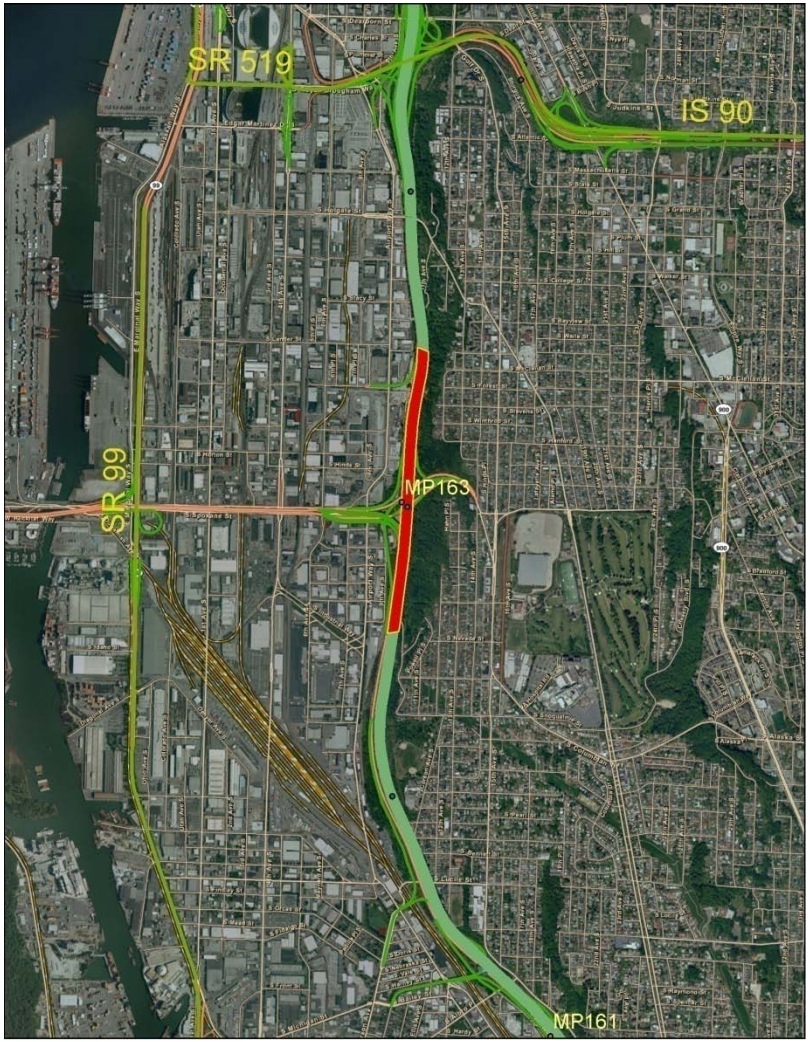
- Location: I-5 southbound between NE 63rd St and NE Pacific Ave. E
- Length: 1.3 mile
- Daily Truck Volume: 11,000

- Average truck travel speed: 38 mph
- Percentage of travel speed below 35mph: 48%
- Travel Reliability:

Time Period	Reliability
AM	Unreliable
Midday	Unreliable
PM	Unreliable
Night	Reliably Fast

Severe Truck Bottleneck in Central Puget Sound

I-5 northbound



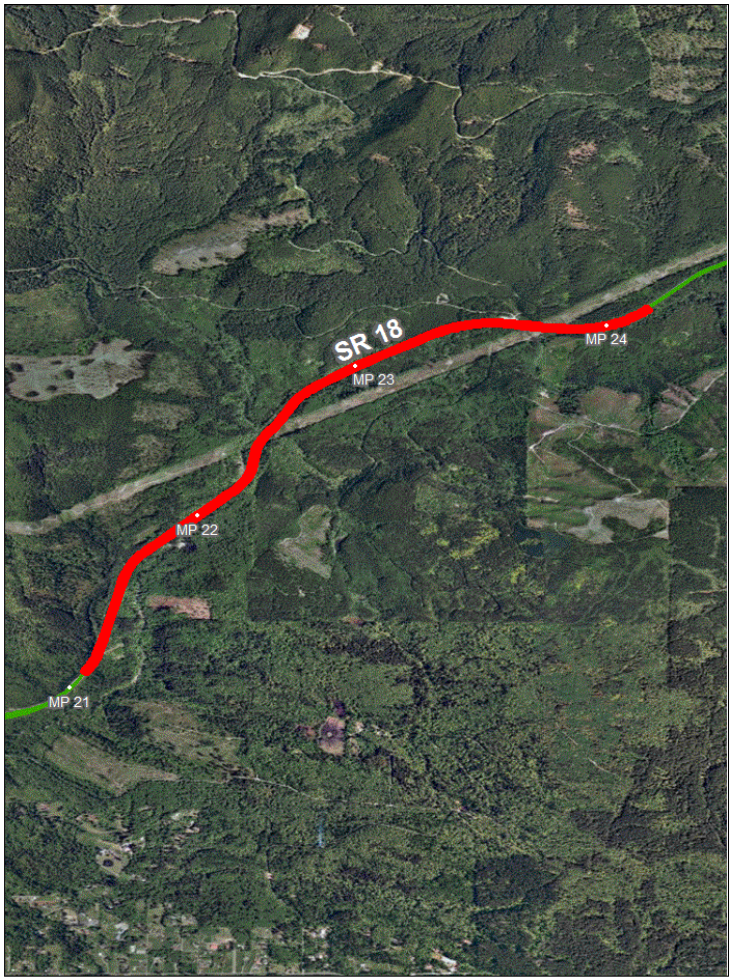
- Location: I-5 northbound between S. Lander St. and S. Nevada St
- Length: 1.0 mile
- Daily Truck Volume: 18,000

- Average truck travel speed: 35 mph
- Percentage of travel speed below 35mph: 56%
- Travel Reliability:

Time Period	Reliability
AM	Unreliable
Midday	Unreliable
PM	Unreliable
Night	Reliably Fast

Severe Truck Bottleneck in Central Puget Sound

SR 18 eastbound



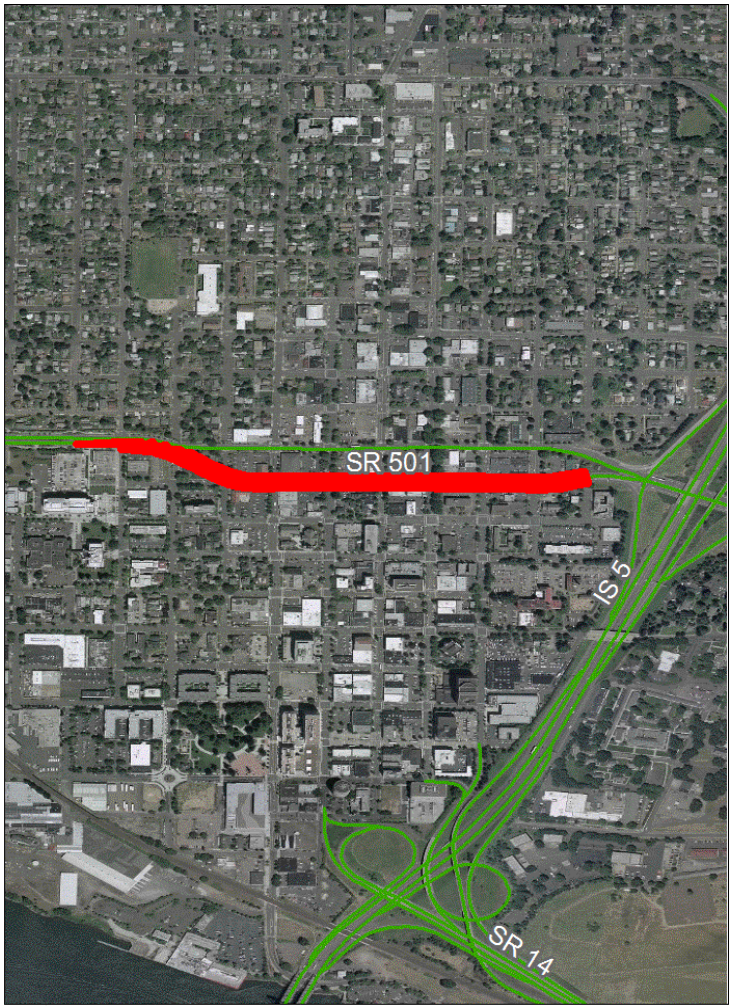
- Location: SR-18 eastbound, milepost 22 – 24, SE of Tiger Mtn.
- Length: 3 miles
- Daily Truck Volume: 3,600

- Average truck travel speed: 39 mph
- Percentage of travel speed below 60% of posted speed limit: 47%
- Travel Reliability:

Time Period	Reliability
AM	Unreliable
Midday	Unreliable
PM	Unreliable
Night	Unreliable

Severe Statewide Truck Bottleneck

SR 501 eastbound



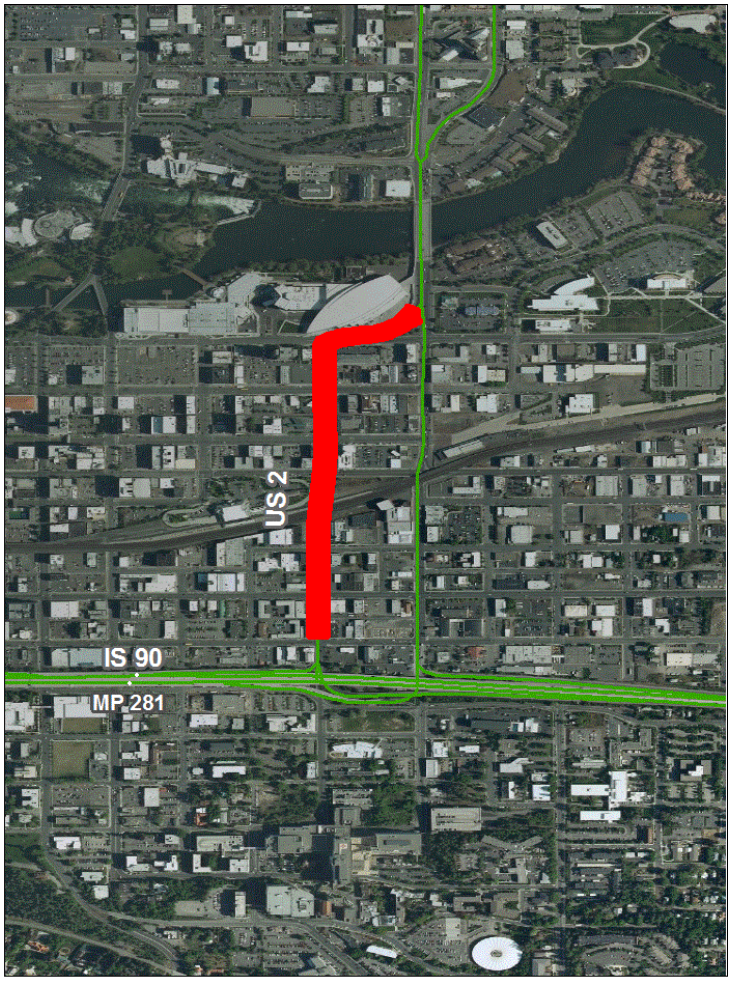
- Location: SR 501 eastbound, west of I-5, Vancouver, WA
- Length: 0.5 mile
- Daily Truck Volume: 2,000

- Average truck travel speed: 18 mph
- Percentage of travel speed below 60% of posted speed limit: 100%
- Travel Reliability: Unreliable

- This segment contains six signalized intersections.

Severe Statewide Truck Bottleneck

US 2 / SR 395



- Location: US 2/SR 395, southbound, north of I-90, Spokane, WA
- Length: 0.6 miles
- Daily Truck Volume: 1,300

- Average truck travel speed: 17 mph
- Percentage of travel speed below 60% of posted speed limit: 79%
- Travel Reliability: Unreliable

- This segment contains five signalized intersections.

Lessons Learned in Washington State's Truck Performance Measure Program

- The long-term success of this program depends on retaining access to data owned by trucking companies. They support the Washington State program because we protect their proprietary data and use the information to improve the state's truck freight system.

- To independently verify the spot speeds, we compared the trucks' GPS spot speeds to speeds from traffic loops. They matched.

- To use GPS data for before-and-after studies of freight projects, the program manager must track diversion rates on the network, and have more frequent reads for shorter corridor segments.

Questions?

Contact:

Barbara Ivanov
Washington State Department of Transportation
Freight Systems Division
Co-Director
ivanovb@wsdot.wa.gov

Edward McCormack
University of Washington
Truck Performance Measures Project Principal Investigator
edm@uw.edu

Larry Pursley
Washington Trucking Association
Executive Vice President
larry@wtassns.com