



Washington State  
Department of Transportation

# The 2016 Corridor Capacity Report Appendix

For the 15th edition of the annual *Congestion Report*

Published November 2016

Roger Millar, Secretary of Transportation



**WSDOT's comprehensive annual analysis of  
multimodal state highway system performance**

Developed in  
partnership with



**SOUNDTRANSIT**

**communitytransit**  
smile & ride



Southwest Washington  
Regional Transportation Council



**INTERcity  
TRANSIT**

**SRTC**  
Spokane Regional Transportation Council



**King County  
METRO**

Puget Sound Regional Council  
**PSRC**



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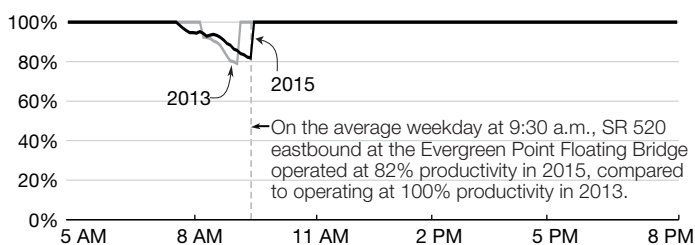
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## How to read throughput and stamp graphs

### Throughput productivity

Vehicle throughput measures how many vehicles move through a highway segment/spot location in an hour. Throughput productivity is measured as the difference between the highest observed average 5-minute flow rate during the year and the flow rate that occurs when vehicles travel slower than the maximum throughput speed (42 to 51 mph) observed at a particular location of the highway for that calendar year. Lost throughput productivity is the percentage of a highway's vehicle throughput lost due to congestion (see [pp. 5-6, 30, 37 and 43](#)).

**Example: Throughput productivity on eastbound SR 520 at the Evergreen Point Floating Bridge 2013 and 2015; Based on the highest observed 5-minute flow rate; Eastbound = 1,630 vehicles per hour per lane = 100%**



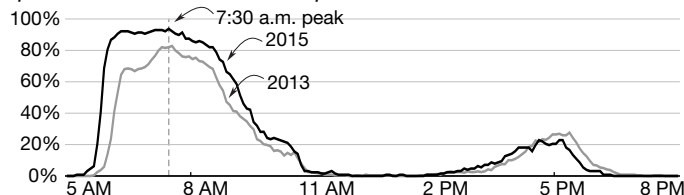
Data sources and analysis: WSDOT Multimodal Planning Division, Washington State Transportation Center, and WSDOT Office of Strategic Assessment and Performance Analysis.

### Duration and frequency of congestion

The best visual evidence to show whether the peak period is spreading or contracting can be seen in "stamp graphs". These graphs, comparing 2013 and 2015 data, show the percentage of days annually with average speeds that were slower than a defined congestion threshold (45 mph for "congestion" and 36 mph for "severe congestion") on key highway segments statewide (see [pp. 9-11, 31-32, 37, 41 and 43](#)).

High occupancy vehicle (HOV) lane stamp graphs compare the frequency and duration of congestion for HOV lane users with the congestion experienced by single occupant vehicle (SOV) lane users on the same route during 2015 (see [pp. 24-26](#)).

**Example: Severe congestion on the Federal Way to Seattle commute 2013 and 2015; Northbound; Percent of days the average speed was slower than 36 mph**



How frequently (and when) was the average trip speed slower than 36 mph? At 7:30 a.m. in 2013, you had an 82% chance that traffic would be moving slower than 36 mph. In 2015, the situation worsened (black line above gray line), and your chance of being stuck in severely congested conditions (slower than 36 mph) was 94%.

Data sources and analysis: WSDOT Northwest Region Traffic Office, Washington State Transportation Center, and WSDOT Office of Strategic Assessment and Performance Analysis.

See the second edition of [WSDOT's Handbook for Corridor Capacity Evaluation](#) for additional details regarding methods for measuring and reporting highway system performance, along with a glossary of terms used for systems analysis.

WSDOT's 2016 *Corridor Capacity Report* is available at <http://wsdot.wa.gov/publications/fulltext/graynotebook/CCR16.pdf>. Additional congestion and capacity related analyses are available at [www.wsdot.wa.gov/Accountability/Congestion/](http://www.wsdot.wa.gov/Accountability/Congestion/)

On the cover: Traffic backs up heading into downtown Spokane (Photo courtesy of Eastern Region Transportation Engineer Mike Bjordahl)



# Vehicle hours of delay

## Average weekday delay on major freeways

2006 through 2015; Vehicle hours of delay per day

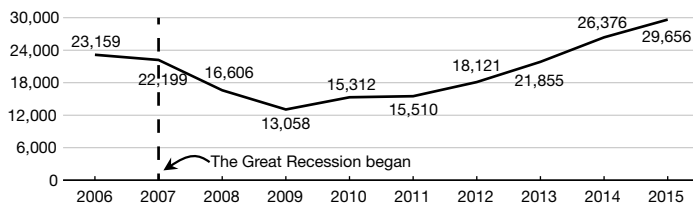
Central Puget Sound	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2013 vs. 2015
I-5	10,520	10,568	7,324	6,684	7,033	7,354	9,894	11,638	14,389	16,810	44.4%
I-405	8,334	7,654	6,864	4,478	5,605	5,719	6,439	7,978	9,427	9,768	22.4%
SR 520	2,224	2,180	1,518	1,334	1,496	1,335	363	564	633	818	45.0%
I-90	824	659	282	212	455	565	756	963	1,064	1,149	19.3%
SR 167	1,257	1,138	618	350	723	537	669	712	863	1,111	56.0%
<b>Subtotal</b>	<b>23,159</b>	<b>22,199</b>	<b>16,606</b>	<b>13,058</b>	<b>15,312</b>	<b>15,510</b>	<b>18,121</b>	<b>21,855</b>	<b>26,376</b>	<b>29,656</b>	<b>35.7%</b>
South Puget Sound (I-5)	N/A	N/A	N/A	N/A	N/A	2,118	1,814	3,080	3,601	5,799	88.3%

Data source: WSDOT Multimodal Planning Division.

Notes: To make accurate comparisons, the 2013 data was recalculated for this report. To learn why delay and miles traveled do not increase hand in hand, see [p. 10](#) of the 2nd edition of the *Handbook for Corridor Capacity Evaluation*. See the lane mile inventory on [p. 4](#) for delay context.

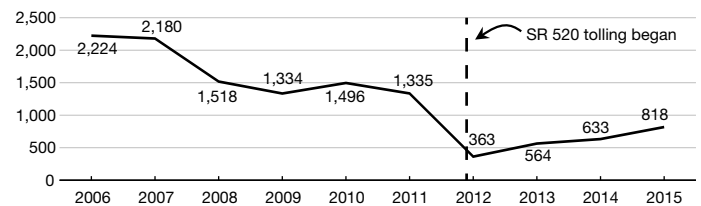
### Central Puget Sound daily vehicle hours of delay

2006 through 2015; Combined delay for I-5, I-405, SR 520, I-90 and SR 167



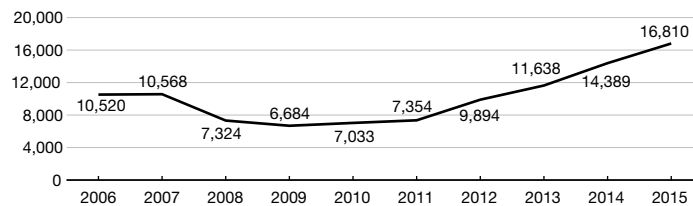
### SR 520 daily vehicle hours of delay

2006 through 2015



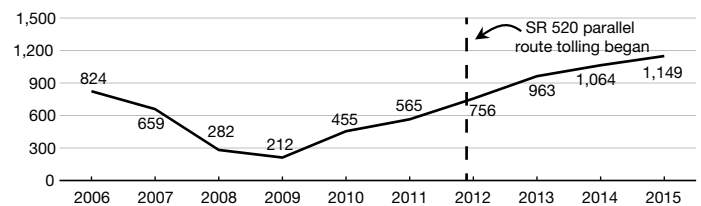
### I-5 daily vehicle hours of delay

2006 through 2015



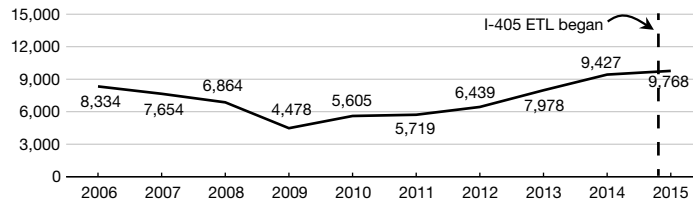
### I-90 daily vehicle hours of delay

2006 through 2015



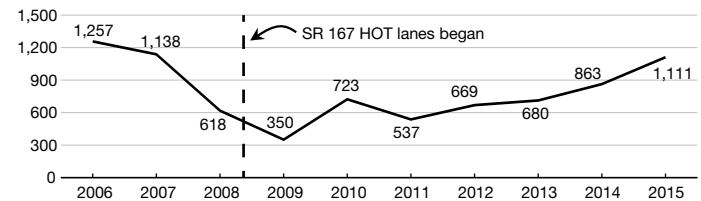
### I-405 daily vehicle hours of delay

2006 through 2015



### SR 167 daily vehicle hours of delay

2006 through 2015



Data source: WSDOT Multimodal Planning Division.

Note: See y-axis values for context of daily vehicle hours of delay across corridors.

## Statewide Congestion Indicators

# Vehicle miles traveled and lane mile and ITS inventories

### Average weekday vehicle miles traveled on major freeways

2006 through 2015; Vehicle miles traveled in thousands per day

Central Puget Sound	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2013 vs. 2015
I-5	7,687	7,744	7,583	7,676	7,835	8,020	7,919	8,000	8,027	8,119	1.5%
I-405	3,593	3,507	3,500	3,616	3,656	3,744	3,717	3,722	3,697	3,687	-0.9%
SR 520	1,053	1,019	932	901	933	941	732	775	739	807	4.1%
I-90	1,464	1,580	1,414	1,511	1,649	1,531	1,611	1,624	1,626	1,621	-0.2%
SR 167	977	947	921	947	1,060	1,003	992	977	987	992	1.5%
<b>Subtotal</b>	<b>14,774</b>	<b>14,797</b>	<b>14,350</b>	<b>14,651</b>	<b>15,133</b>	<b>15,239</b>	<b>14,971</b>	<b>15,098</b>	<b>15,075</b>	<b>15,226</b>	<b>0.8%</b>
South Puget Sound (I-5)	N/A	N/A	N/A	N/A	N/A	4,971	5,063	5,075	5,206	5,139	1.3%

Data source: WSDOT Multimodal Planning Division.

Notes: The reported VMT numbers are only a partial representation for reasons such as only single occupant vehicle (SOV) lanes being analyzed, data station malfunction, work zone traffic diversion, etc. To make accurate comparisons, the 2013 data was recalculated for this report. See the lane mile inventory below for vehicle miles traveled context.

### Lane mile inventory on major freeways

As of December 31, 2015

Corridor	Mileposts	Lane miles	Special use lane miles	Total lane miles
I-5	143.64 - 189.32	348.25	87.91	436.16
I-405	0.44 - 29.51	152.74	76.38	229.12
SR 520	0.28 - 11.22	45.64	16.34	61.98
I-90	3.02 - 16.96	98.32	19.97	118.29
SR 167	15.86 - 25.62	44.63	17.92	62.55
<b>Subtotal</b>		689.58	218.52	908.1
South Puget Sound (I-5)	105.38 - 143.64	271.12	15.22	286.34

Data source: WSDOT Multimodal Planning Division.

Note: This inventory does not include ramp mileage.

### WSDOT Intelligent Transportation Systems Inventory

2011 through 2015; Number of devices or sites

Device Type	2011	2012	2013	2014	2015	Approximate cost per device
Closed circuit television cameras	746	850	933	1,087	1,146	\$15,000–\$30,000
Variable message signs	258	232	279	306	319	\$100,000–\$250,000
Highway advisory radio transmitters	88	83	86	86	86	\$50,000
Road/weather information systems	106	106	109	111	113	\$25,000–\$50,000
Metered ramps	155	149	150	189	190	\$10,000–\$20,000
Traffic data stations	660	742	767	840	899	\$10,000–\$20,000
Smarter highway gantries	56	56	56	56	59	\$650,000–\$900,000

Data source: WSDOT Traffic Operations Office.

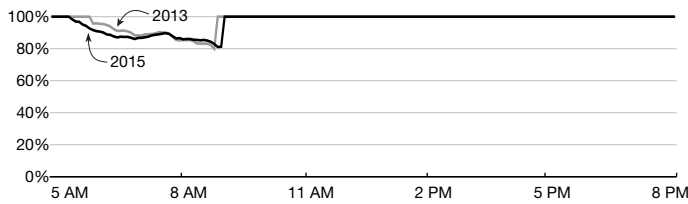


# Throughput productivity

**Throughput productivity at select central Puget Sound region freeway locations by commute direction (part 1)**  
2013 and 2015; Based on the highest observed 5-min. flow rate (min.) flow rates; Vehicles per hour per lane (vphpl) at specific mileposts (MP)

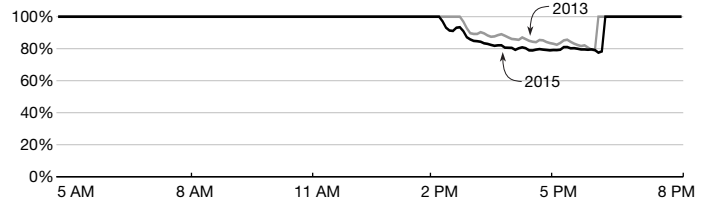
## Northbound I-5 at S 188th Street (MP 153.0)

Based on the highest observed 5 min. flow rate of 1,970 vphpl = 100%



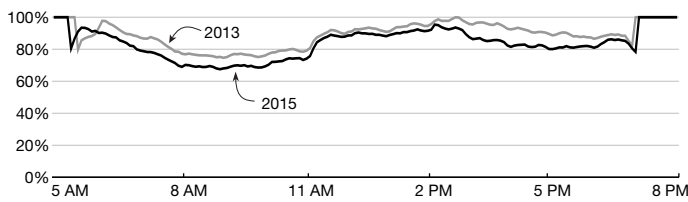
## Southbound I-5 at S 188th Street (MP 153.0)

Based on the highest observed 5 min. flow rate of 1,510 vphpl = 100%



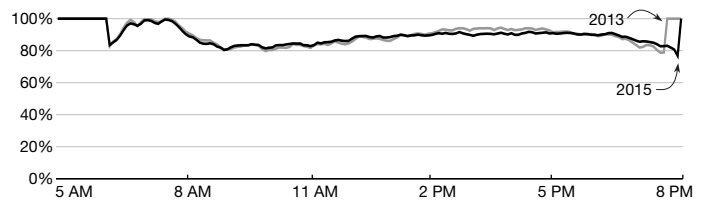
## Northbound I-5 at I-90 (MP 164.0)

Based on the highest observed 5 min. flow rate of 1,540 vphpl = 100%



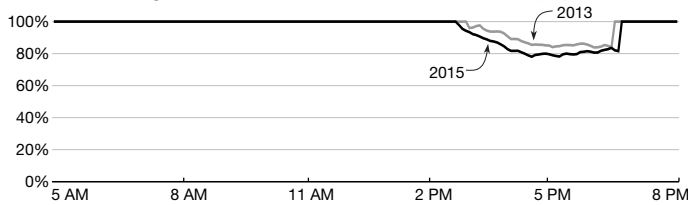
## Southbound I-5 at I-90 (MP 164.0)

Based on the highest observed 5 min. flow rate of 1,730 vphpl = 100%



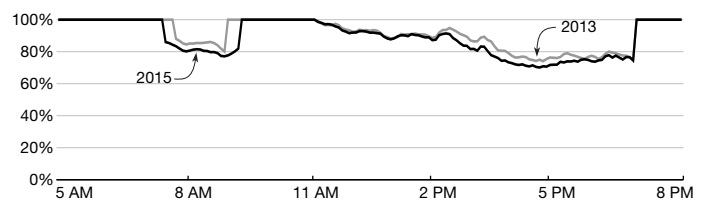
## Northbound I-5 at NE 103rd Street (MP 172.0)

Based on the highest observed 5 min. flow rate of 1,500 vphpl = 100%



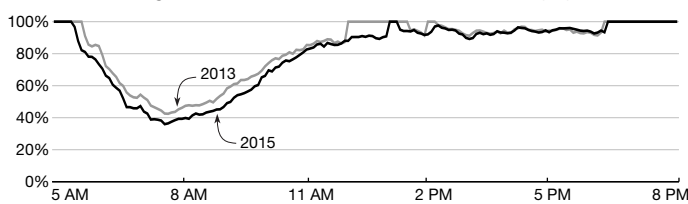
## Southbound I-5 at NE 103rd Street (MP 172.0)

Based on the highest observed 5 min. flow rate of 1,630 vphpl = 100%



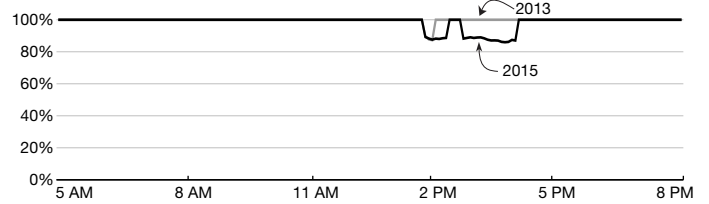
## Northbound I-405 at SR 169 (MP 4.0)

Based on the highest observed 5 min. flow rate of 1,670 vphpl = 100%



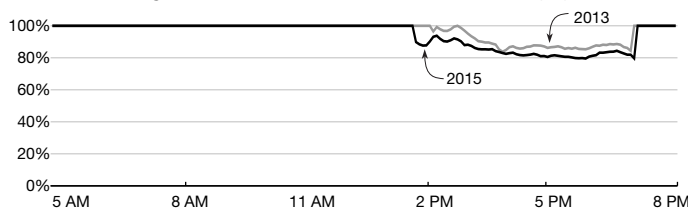
## Southbound I-405 at SR 169 (MP 4.0)

Based on the highest observed 5 min. flow rate of 1,780 vphpl = 100%



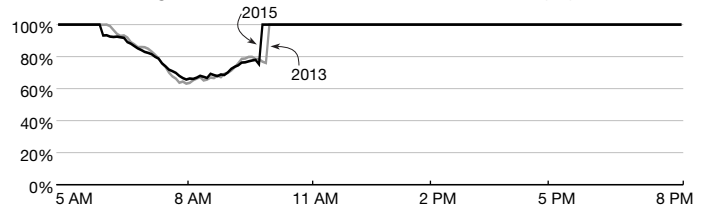
## Northbound I-405 at NE 160th Street (MP 22.5)

Based on the highest observed 5 min. flow rate of 1,640 vphpl = 100%



## Southbound I-405 at NE 160th Street (MP 22.5)

Based on the highest observed 5 min. flow rate of 1,620 vphpl = 100%



Data sources and analysis: WSDOT Multimodal Planning Division, Washington State Transportation Center, and WSDOT Office of Strategic Assessment and Performance Analysis.

Note: See [p. 2](#) for throughput definitions and how to read these graphs.

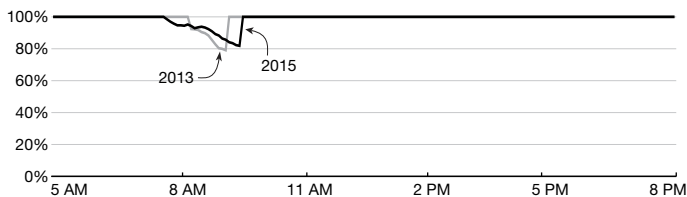
# Central Puget Sound Region

## Throughput productivity

**Throughput productivity at select central Puget Sound region freeway locations by commute direction (part 2)**  
2013 and 2015; Based on the highest observed 5-minute (min.) flow rates; Vehicles per hour per lane (vphpl) at specific mileposts (MP)

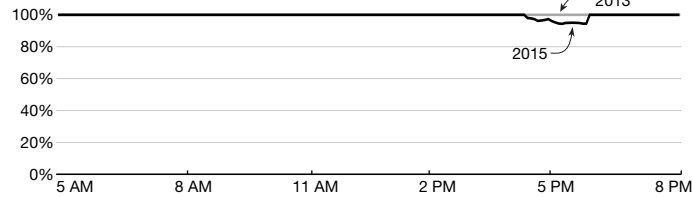
### Eastbound SR 520 at Evergreen Point Floating Bridge (MP 1.5)

Based on the highest observed 5 min. flow rate of 1,630 vphpl = 100%



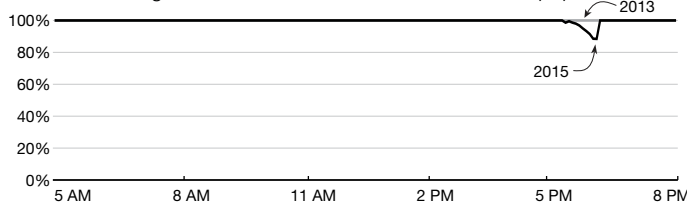
### Westbound SR 520 at Evergreen Point Floating Bridge (MP 1.5)

Based on the highest observed 5 min. flow rate of 1,630 vphpl = 100%



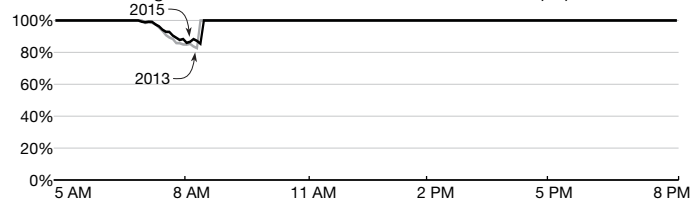
### Eastbound I-90 at SR 900 (MP 16.5)

Based on the highest observed 5 min. flow rate of 1,720 vphpl = 100%



### Westbound I-90 at SR 900 (MP 16.5)

Based on the highest observed 5 min. flow rate of 1,570 vphpl = 100%



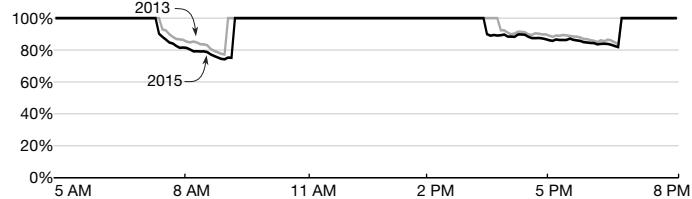
### Eastbound I-90 at the floating bridge (MP 5.5)

Based on the highest observed 5 min. flow rate of 1,780 vphpl = 100%



### Westbound I-90 at the floating bridge (MP 5.5)

Based on the highest observed 5 min. flow rate of 1,830 vphpl = 100%



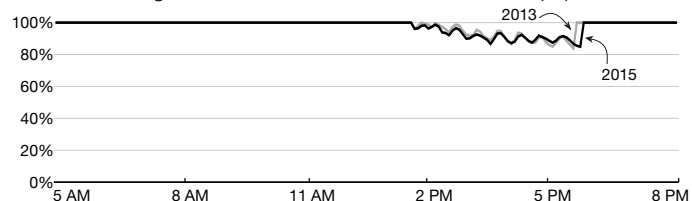
### Northbound SR 167 at 84th Avenue SE (MP 21.5)

Based on the highest observed 5 min. flow rate of 1,530 vphpl = 100%



### Southbound SR 167 at 84th Avenue SE (MP 21.5)

Based on the highest observed 5 min. flow rate of 1,540 vphpl = 100%



Data sources and analysis: WSDOT Multimodal Planning Division, Washington State Transportation Center, and WSDOT Office of Strategic Assessment and Performance Analysis.

Note: See [p. 2](#) for throughput definitions and how to read these graphs.

# Routinely congested segments in 2013

## Central Puget Sound region routinely congested freeway segments

2013 weekdays; Length of congestion in miles; Duration of congestion in hours:minutes

Route and direction	Morning peak period				Evening peak period			
	Start and end times	Begin and end milepost	Length of congestion	Duration of congestion	Start and end times	Begin and end milepost	Length of congestion	Duration of congestion
I-5 northbound	5:35-8:10 a.m.	144.5-153.5	9.0	2:35	2:00-6:25 p.m.	161-165.5	4.5	4:25
	6:10-9:55 a.m.	159-165.5	6.5	3:45	3:30-6:20 p.m.	166-172.5	6.5	2:50
					3:10-6:40 p.m.	172.5-179	6.5	3:30
					2:45-5:55 p.m.	184.5-185	0.5	3:10
					2:40-5:40 p.m.	191-192.5	1.5	3:00
I-5 southbound	6:15-6:30 a.m. <sup>1</sup>	184.5-184	0.5	0:15	2:00-7:00 p.m.	172.5-165	7.5	5:00
	6:10-9:00 a.m.	182.5-173.5	9.0	2:50	2:00-6:30 p.m.	164.5-163	1.5	4:30
	7:15-9:20 a.m.	171.5-168	3.5	2:05	2:45-5:45 p.m.	156-151	5.0	3:00
	7:25-7:50 a.m. <sup>1</sup>	167-166.5	0.5	0:25				
	7:05-8:05 a.m.	164.5-163	1.5	1:00				
I-405 northbound	5:45-9:55 a.m.	3-8.5	5.5	4:10	2:25-6:00 p.m.	0.5-5.5	5.0	3:35
	8:50-8:55 a.m. <sup>1</sup>	11-11.5	0.5	0:05	2:25-6:45 p.m.	15-23.5	8.5	4:20
					3:10-6:15 p.m.	25-28	3.0	3:05
I-405 southbound	6:10-9:55 a.m.	29-16.5	12.5	3:45	4:45-5:20 p.m. <sup>1</sup>	24.5-24	0.5	0:35
	7:15-8:10 a.m.	8-6	2.0	0:55	2:00-7:15 p.m.	14.5-6.5	8.0	5:15
					2:00-2:45 p.m. <sup>1</sup>	3-2.5	0.5	0:45
					2:45-4:50 p.m.	0.5-0	0.5	2:05
I-90 eastbound	7:30-9:05 a.m.	3.5-4	0.5	1:35	5:20-5:25 p.m. <sup>1</sup>	3.5-4	0.5	0:05
					5:15-5:45 p.m. <sup>1</sup>	6.5-7.5	1.0	0:30
I-90 westbound	7:10-8:00 a.m.	16.5-15	1.5	0:50	4:45-5:35 p.m.	11-10	1.0	0:50
	7:15-9:05 a.m.	14.5-12.5	2.0	1:50	3:35-6:55 p.m.	8.5-5.5	3.0	3:20
	7:45-8:50 a.m.	11-10.5	0.5	1:05				
	7:20-8:00 a.m. <sup>1</sup>	9-8	1.0	0:40				
	7:25-9:10 a.m.	6.5-2.5	4.0	1:45				
SR 520 eastbound	8:25-8:50 a.m. <sup>1</sup>	1.5-2.5	1.0	0:25	5:10-6:05 p.m.	11-13	2.0	0:55
SR 520 westbound	7:25-9:15 a.m.	4-1.5	2.5	1:50	3:40-6:45 p.m.	7.5-1.5	6.0	3:05
SR 167 northbound	5:35-8:20 a.m.	14.5-19.5	5.0	2:45				
	6:15-8:45 a.m.	25-26	1.0	2:30				
SR 167 southbound					2:45-2:50 p.m. <sup>1</sup>	24.5-24	0.5	0:05
					2:15-6:25 p.m.	19.5-13	6.5	4:10
<b>Totals</b>			<b>70.0</b>	<b>37:05</b>			<b>80.0</b>	<b>62:05</b>

Data sources and analysis: Washington State Transportation Center and WSDOT Office of Strategic Assessment and Performance Analysis.

Notes: Totals can include congestion at the same location at different times throughout the day. 1 Not reported on routinely congested segments map or narrative in main report due to duration of less than 50 minutes.



# Central Puget Sound Region

## Routinely congested segments in 2015

### Central Puget Sound region routinely congested freeway segments

2015 weekdays; Length of congestion in miles; Duration of congestion in hours:minutes

Route and direction	Morning peak period				Evening peak period			
	Start and end times	Begin and end milepost	Length of congestion	Duration of congestion	Start and end times	Begin and end milepost	Length of congestion	Duration of congestion
I-5 northbound	5:25-8:10 a.m.	144.5-153.5	9.0	2:45	2:00-6:30 p.m.	161.5-165.5	4.0	4:30
	6:05-10:00 a.m.	158.5-165.5	7.0	3:55	2:50-6:45 p.m.	166-179	13.0	3:55
					5:30-5:35 p.m. <sup>1</sup>	179.5-180	0.5	0:05
					3:40-5:35 p.m.	182.5-183	0.5	1:55
					2:30-6:15 p.m.	184.5-185	0.5	3:45
					2:45-4:45 p.m.	190-190.5	0.5	2:00
I-5 southbound	5:50-6:20 a.m. <sup>1</sup>	185.5-185	0.5	0:30	2:00-7:05 p.m.	172.5-165	7.5	5:05
	6:10-6:35 a.m. <sup>1</sup>	184-183.5	0.5	0:25	2:00-6:55 p.m.	164.5-163	1.5	4:55
	5:40-9:45 a.m.	182.5-173.5	9.0	4:05	2:35-6:00 p.m.	157-151	6.0	3:25
	7:10-9:45 a.m.	172.5-167.5	5.0	2:35				
	8:10-9:00 a.m.	166.5-166	0.5	0:50				
	7:05-8:05 a.m.	164.5-163.5	1.0	1:00				
I-405 northbound	5:30-10:00 a.m.	2.5-8.5	6.0	4:30	2:15-6:00 p.m.	0.5-5.5	5.0	3:45
	8:30-9:45 a.m.	10.5-12	1.5	1:15	2:40-6:50 p.m.	14.5-23.5	9.0	4:10
					2:30-6:45 p.m.	24-28	4.0	4:15
I-405 southbound	5:45-10:00 a.m.	29-16	13.0	4:15	2:00-7:25 p.m.	15-6.5	8.5	5:25
	7:25-7:45 a.m. <sup>1</sup>	10-9	1.0	0:20	2:15-4:25 p.m.	3-2.5	0.5	2:10
	7:10-8:20 a.m.	8-6	2.0	1:10	2:35-5:30 p.m.	1.5-0	1.5	2:55
I-90 eastbound	7:15-9:00 a.m.	3.5-4.5	1.0	1:45	4:15-6:00 p.m.	9-10	1.0	1:45
I-90 westbound	7:05-8:05 a.m.	16.5-15	1.5	1:00	4:45-5:35 p.m.	11-10	1.0	0:50
	7:15-9:15 a.m.	14.5-12.5	2.0	2:00	3:25-7:05 p.m.	8.5-5.5	3.0	3:40
	7:40-9:05 a.m.	11-10.5	0.5	1:25				
	7:15-7:50 a.m. <sup>1</sup>	9-8	1.0	0:35				
	7:30-9:05 a.m.	7-3	4.0	1:35				
SR 520 eastbound	7:40-9:15 a.m.	0.5-2.5	2.0	1:35	5:25-6:05 p.m. <sup>1</sup>	11-11.5	0.5	0:40
SR 520 westbound	7:15-9:50 a.m.	4.5-1.5	3.0	2:35	3:15-6:55 p.m.	7-1.5	5.5	3:40
SR 167 northbound	5:25-8:20 a.m.	16-19	3.0	2:55				
	6:05-9:10 a.m.	23.5-26	2.5	3:05				
SR 167 southbound					2:00-6:00 p.m.	20-15.5	4.5	4:00
<b>Totals</b>			<b>76.5</b>	<b>46:05</b>			<b>78.0</b>	<b>66:50</b>

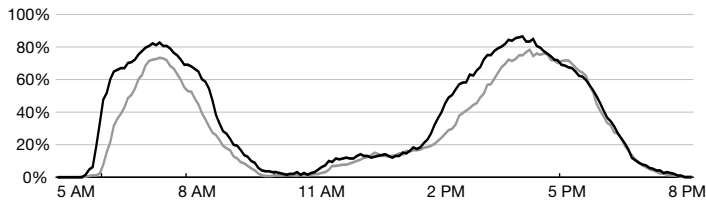
Data sources and analysis: Washington State Transportation Center and WSDOT Office of Strategic Assessment and Performance Analysis.

Notes: Totals can include congestion at the same location at different times throughout the day. 1 Not reported on routinely congested segments map or narrative in main report due to duration of less than 50 minutes.

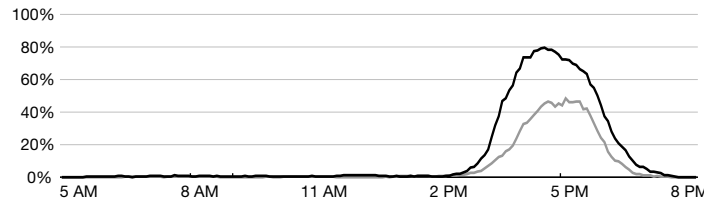
# Stamp graphs: Frequency, duration of SEVERE congestion

Stamp graphs of SEVERE congestion by time of day on central Puget Sound region freeways (part 1)  
2013 and 2015 weekdays; Percent of days average speed was slower than 36 mph

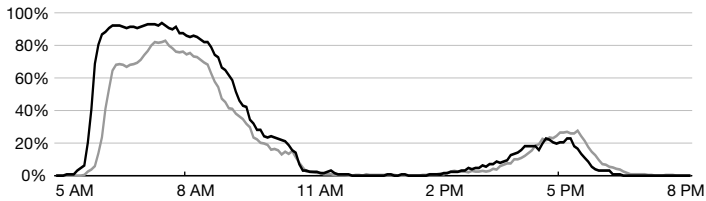
**Everett to Seattle via I-5**



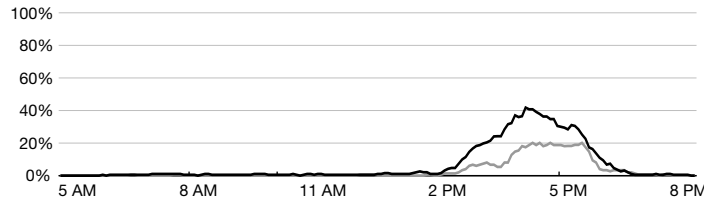
**Seattle to Everett via I-5**



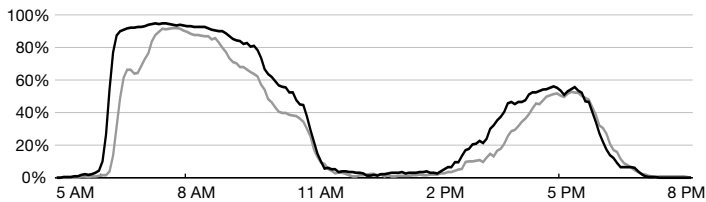
**Federal Way to Seattle via I-5**



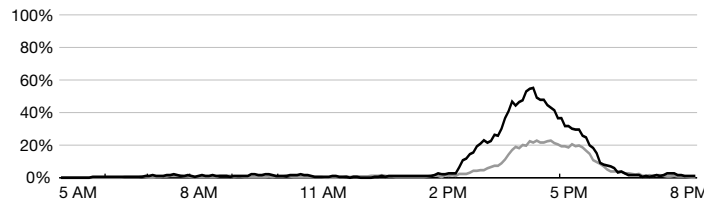
**Seattle to Federal Way via I-5**



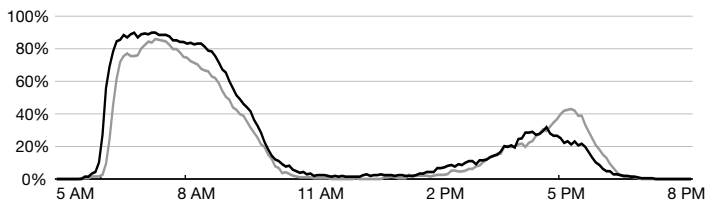
**SeaTac to Seattle via I-5**



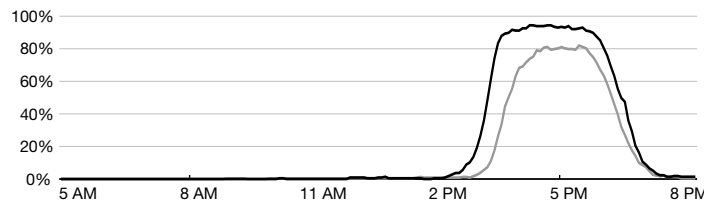
**Seattle to SeaTac via I-5**



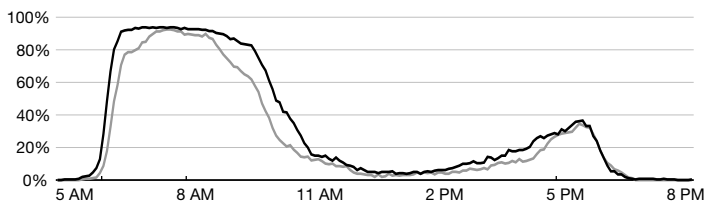
**Lynnwood to Bellevue via I-405**



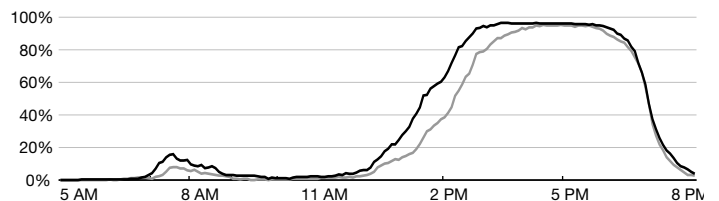
**Bellevue to Lynnwood via I-405**



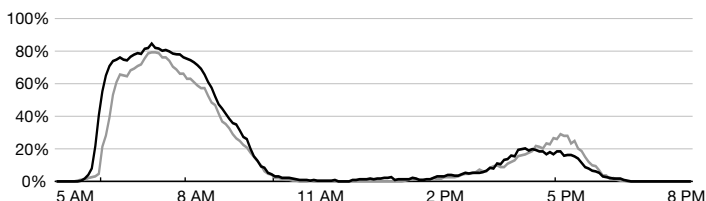
**Tukwila to Bellevue via I-405**



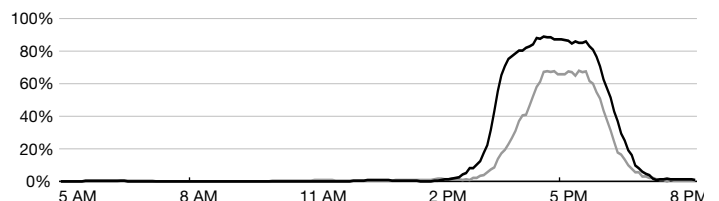
**Bellevue to Tukwila via I-405**



**Everett to Bellevue via I-5/I-405**



**Bellevue to Everett via I-405/I-5**



— 2013 — 2015

Data sources and analysis: WSDOT Northwest Region Traffic Office, Washington State Transportation Center, and WSDOT Office of Strategic Assessment and Performance Analysis.

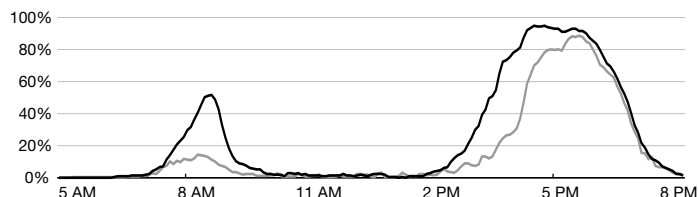
Note: See [p.2](#) for congestion definitions and how to read these graphs.

# Central Puget Sound Region

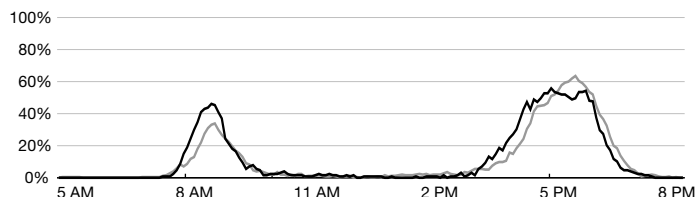
## Stamp graphs: Frequency, duration of SEVERE congestion

Stamp graphs of SEVERE congestion by time of day on central Puget Sound region freeways (part 2)  
2013 and 2015 weekdays; Percent of days average speed was slower than 36 mph

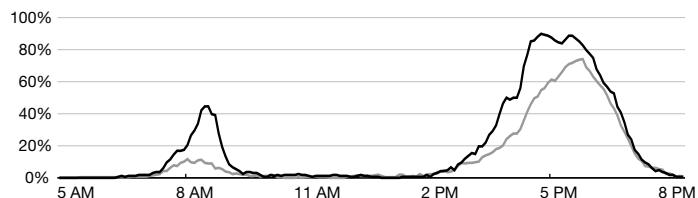
**Bellevue to Seattle via I-405/SR 520/I-5**



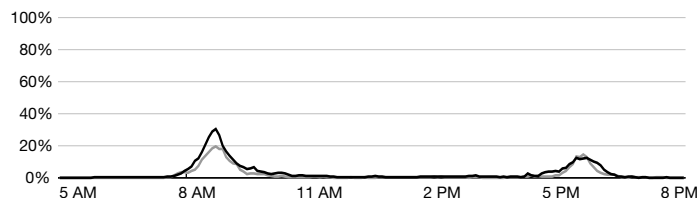
**Seattle to Bellevue via I-5/SR 520/I-405**



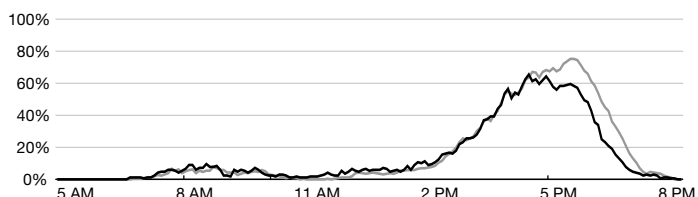
**Redmond to Seattle via SR 520/I-5**



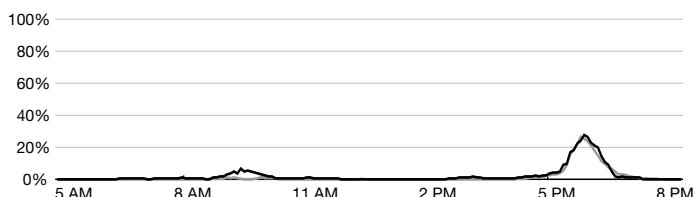
**Seattle to Redmond via I-5/SR 520**



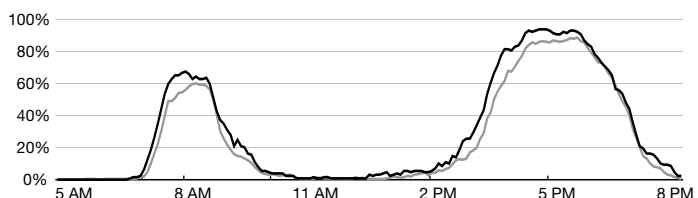
**Redmond to Bellevue via SR 520/I-405**



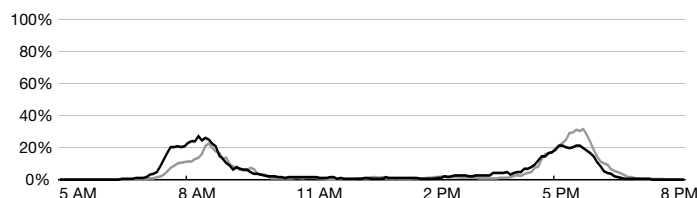
**Bellevue to Redmond via I-405/SR 520**



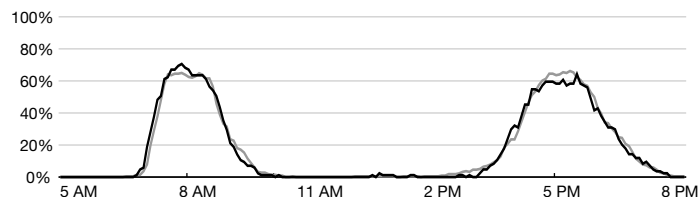
**Bellevue to Seattle via I-405/I-90/I-5**



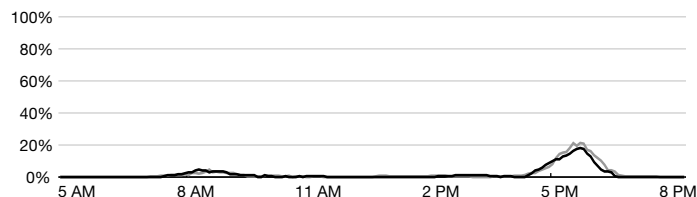
**Seattle to Bellevue via I-5/I-90/I-405**



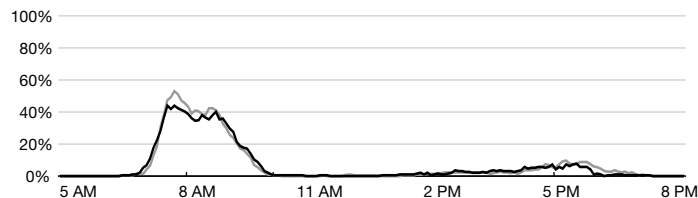
**Issaquah to Seattle via I-90/I-5**



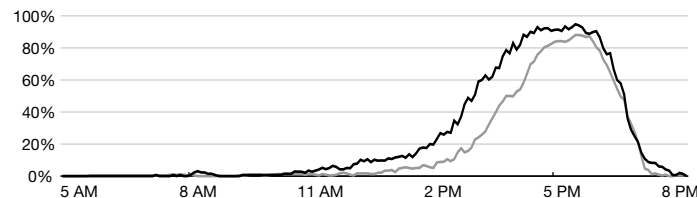
**Seattle to Issaquah via I-5/I-90**



**Issaquah to Bellevue via I-90/I-405**



**Bellevue to Issaquah via I-405/I-90**



— 2013 — 2015

Data sources and analysis: WSDOT Northwest Region Traffic Office, Washington State Transportation Center, and WSDOT Office of Strategic Assessment and Performance Analysis.

Note: See [p. 2](#) for congestion definitions and how to read these graphs.

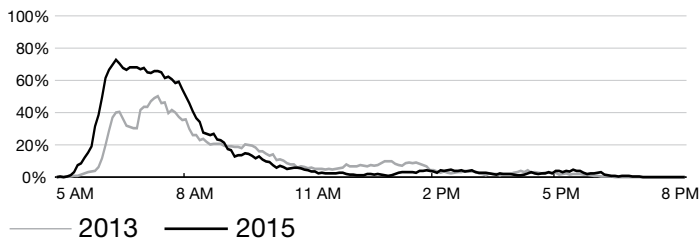


# Stamp graphs and how to read a heatmap

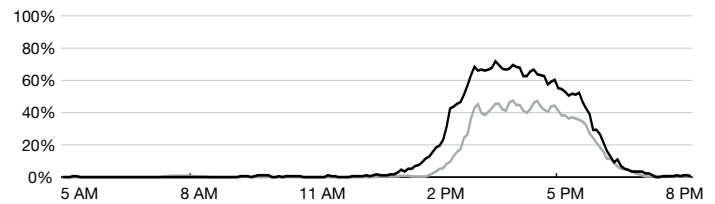
## Stamp graphs of SEVERE congestion by time of day on central Puget Sound region freeways (part 3)

2013 and 2015 weekdays; Percent of days average speed was slower than 36 mph

### Auburn to Renton via SR 167



### Renton to Auburn via SR 167



Data sources and analysis: WSDOT Northwest Region Traffic Office, Washington State Transportation Center, and WSDOT Office of Strategic Assessment and Performance Analysis.

Note: See [p. 2](#) for congestion definitions and how to read these graphs.

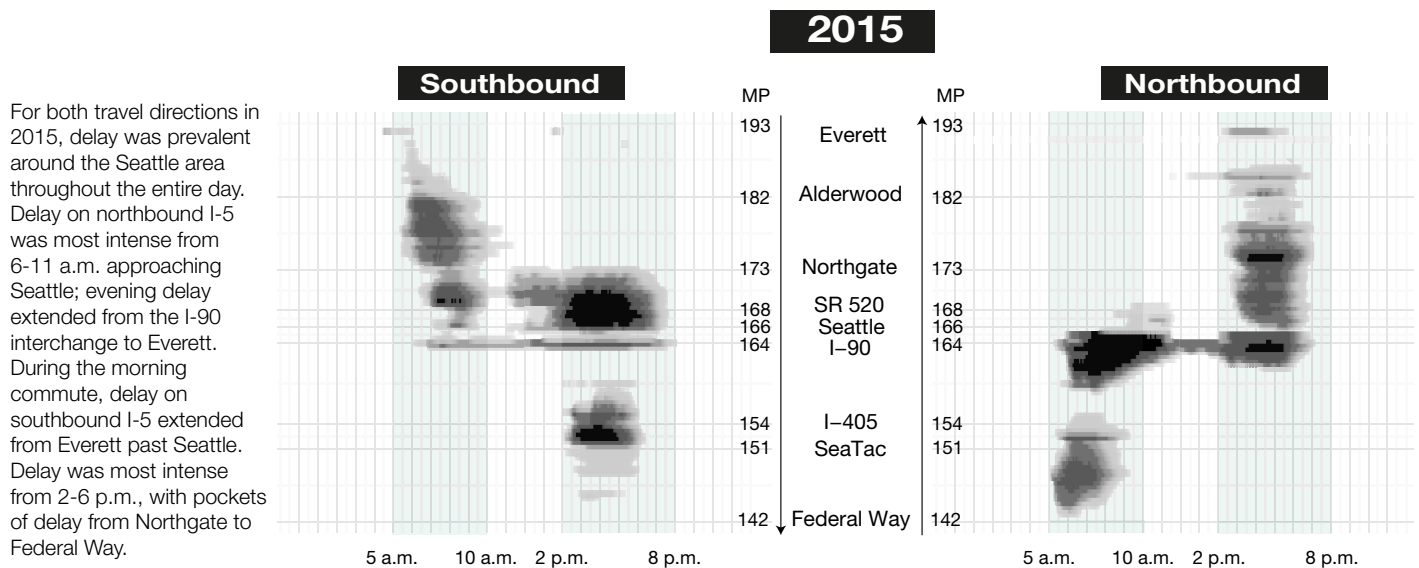
## How to read a heatmap graph

When and where was the most intense delay as measured by daily vehicle hours of delay? How does delay differ by direction of travel? What corridors experienced the most noticeable delay?

**Heatmap graphs** visualize the intensity of delay over an entire corridor throughout the day. The following example shows vehicle hours of delay by time of day (measured in 5-minute intervals) and location on the chosen corridor. The result is a map of the intensity of delay. Darker shading represents more intense delay on the commute corridor. Shading was standardized across all the corridors to allow for comparisons. In addition, the heatmaps were separated by direction on the corridor, supporting more detailed comparisons. Each direction is read in a different manner, as indicated by the arrows. The northbound graph to the right is read from the bottom to the top. The corresponding southbound graph is read from the top to the bottom. For the purposes of this report, the eastbound direction is read like northbound; the westbound direction like southbound.

## I-5 delay between Federal Way and Everett

2013 and 2015; Vehicle hours of delay; Weekdays only; By milepost (MP); Shading represents intensity of delay; Highlighted sections represent peak periods



For both travel directions in 2015, delay was prevalent around the Seattle area throughout the entire day. Delay on northbound I-5 was most intense from 6-11 a.m. approaching Seattle; evening delay extended from the I-90 interchange to Everett. During the morning commute, delay on southbound I-5 extended from Everett past Seattle. Delay was most intense from 2-6 p.m., with pockets of delay from Northgate to Federal Way.

On southbound I-5, delay intensified during the evening peak period, with longer lasting intense delay around Seattle and a new area of intense delay around SeaTac in 2015.

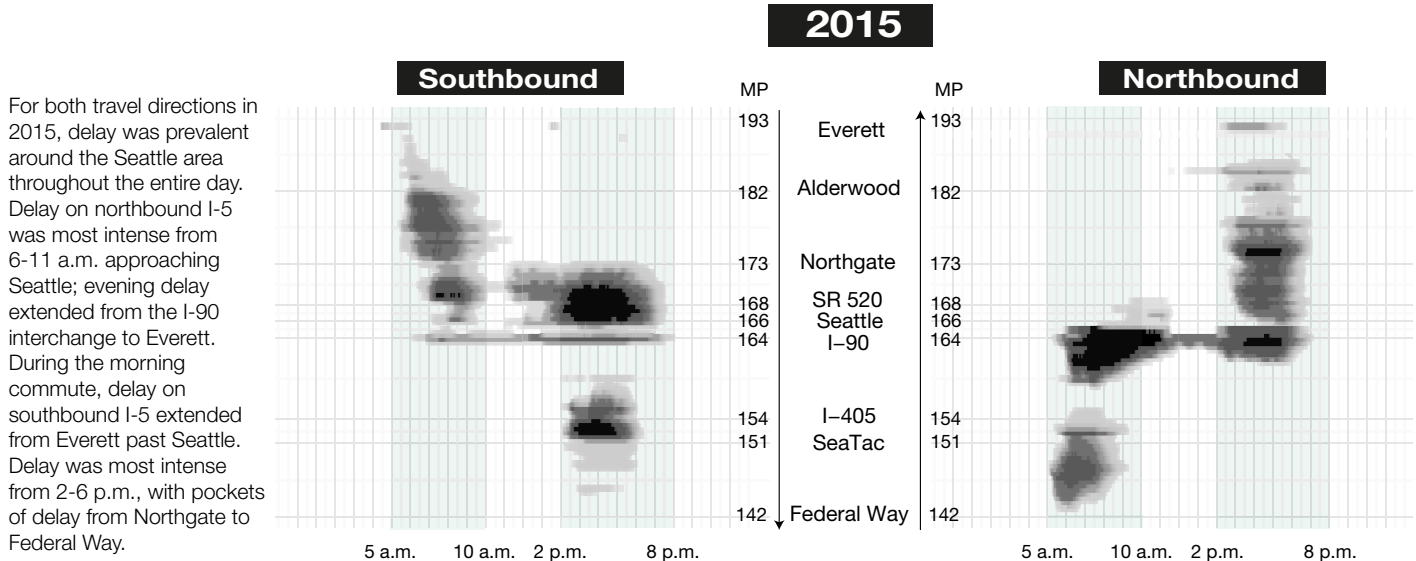
On northbound I-5, delay became both more intense and longer lasting in 2015 than in 2013, in particular around the I-90 interchange during the morning commute. During the evening commute, delay was less pocketed, with new 2015 areas of intense delay around Northgate and the I-90 interchange.

# Central Puget Sound Region

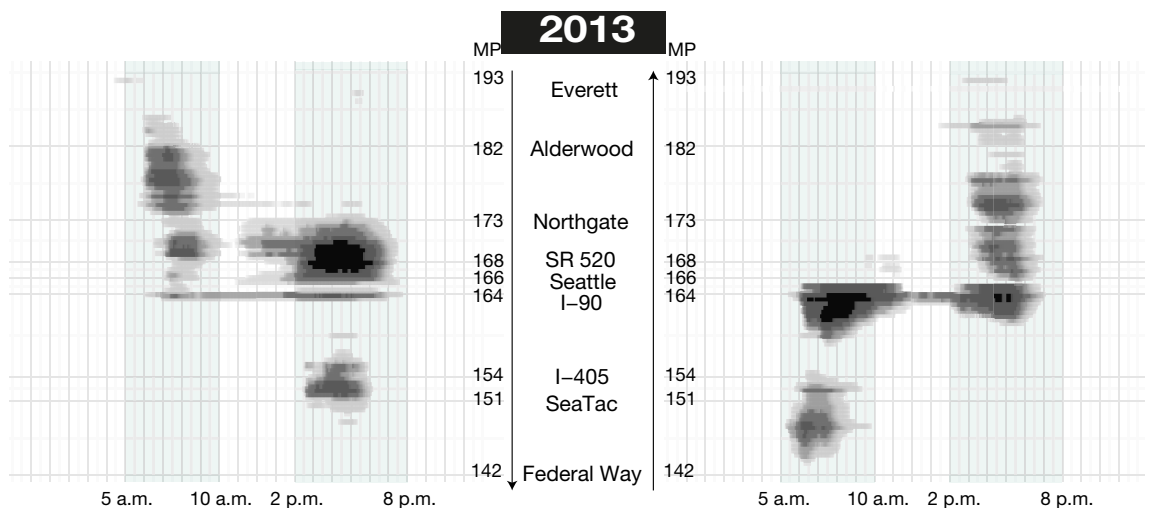
## Heatmaps: Daily vehicle hours of delay on I-5

### I-5 delay between Federal Way and Everett

2013 and 2015; Vehicle hours of delay; Weekdays only; By milepost (MP); Shading represents intensity of delay; Highlighted sections represent peak periods



For both travel directions in 2013, delay was prevalent around the Seattle area throughout the entire day. Delay on northbound I-5 was most intense from 7-10 a.m. approaching Seattle; evening delay extended from the I-90 interchange to Alderwood. During the morning commute, delay on southbound I-5 extended from Alderwood past Seattle. Delay was most intense from 3-6 p.m., with pockets of delay from Northgate to Federal Way.



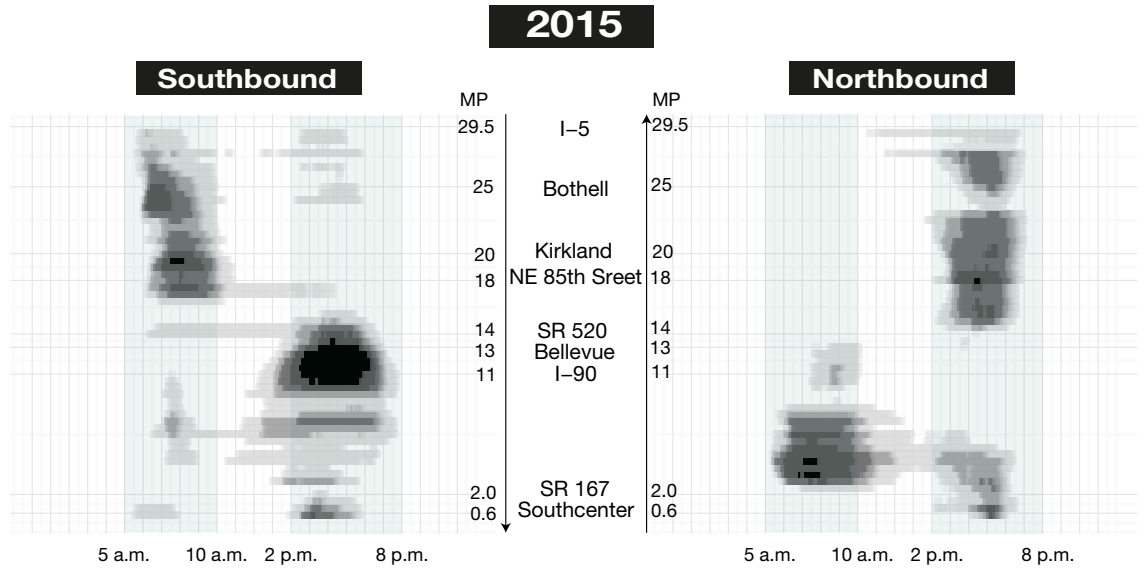
Data sources and analysis: Washington State Transportation Center and WSDOT Office of Strategic Assessment and Performance Analysis.

# Heatmaps: Daily vehicle hours of delay on I-405

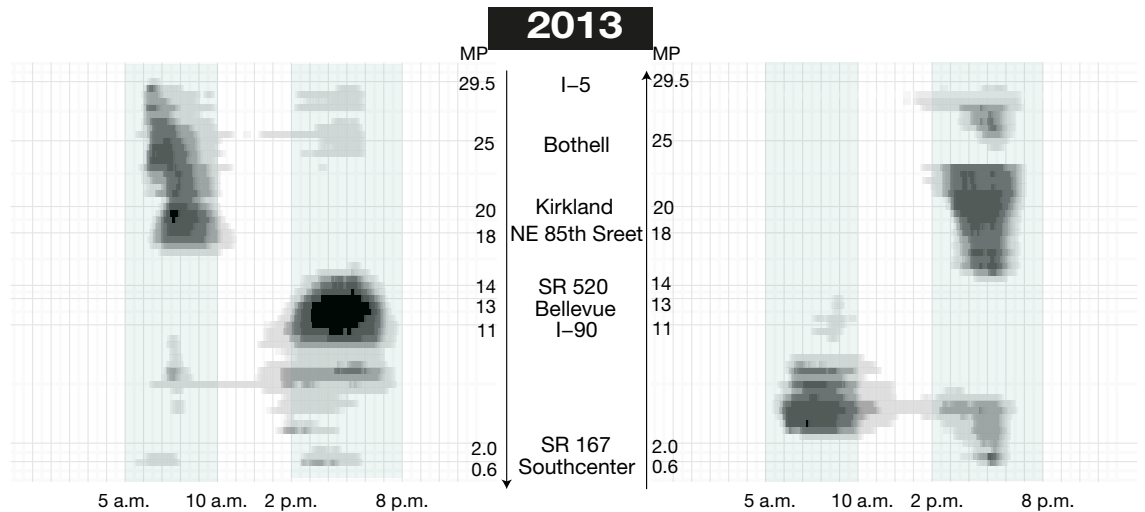
## I-405 delay between Tukwila and the Lynnwood I-5/I-405 interchange

2013 and 2015; Vehicle hours of delay; Weekdays only; By milepost (MP); Shading represents intensity of delay; Highlighted sections represent peak periods

In 2015 on northbound I-405, the most delay occurred during the morning peak period north of the SR 167 interchange. There were pockets of delay from SR 520 to I-5 during the evening commute. On southbound I-405, the most delay extended from SR 520 past I-90, and lasted from 3-6:30 p.m. There was also delay during the morning commute from I-5 past Kirkland. For both directions on I-405, at certain locations delay lasted for most of the peak periods.



In 2013 on northbound I-405, the most intense delay occurred during the morning peak period north of the SR 167 interchange. There were pockets of delay from SR 520 to I-5 during the evening commute. On I-405 southbound, the most intense delay extended from SR 520 past I-90, and lasted from 3-6:30 p.m. There was also intense delay during the morning commute from I-5 past Kirkland.



Data sources and analysis: Washington State Transportation Center and WSDOT Office of Strategic Assessment and Performance Analysis.

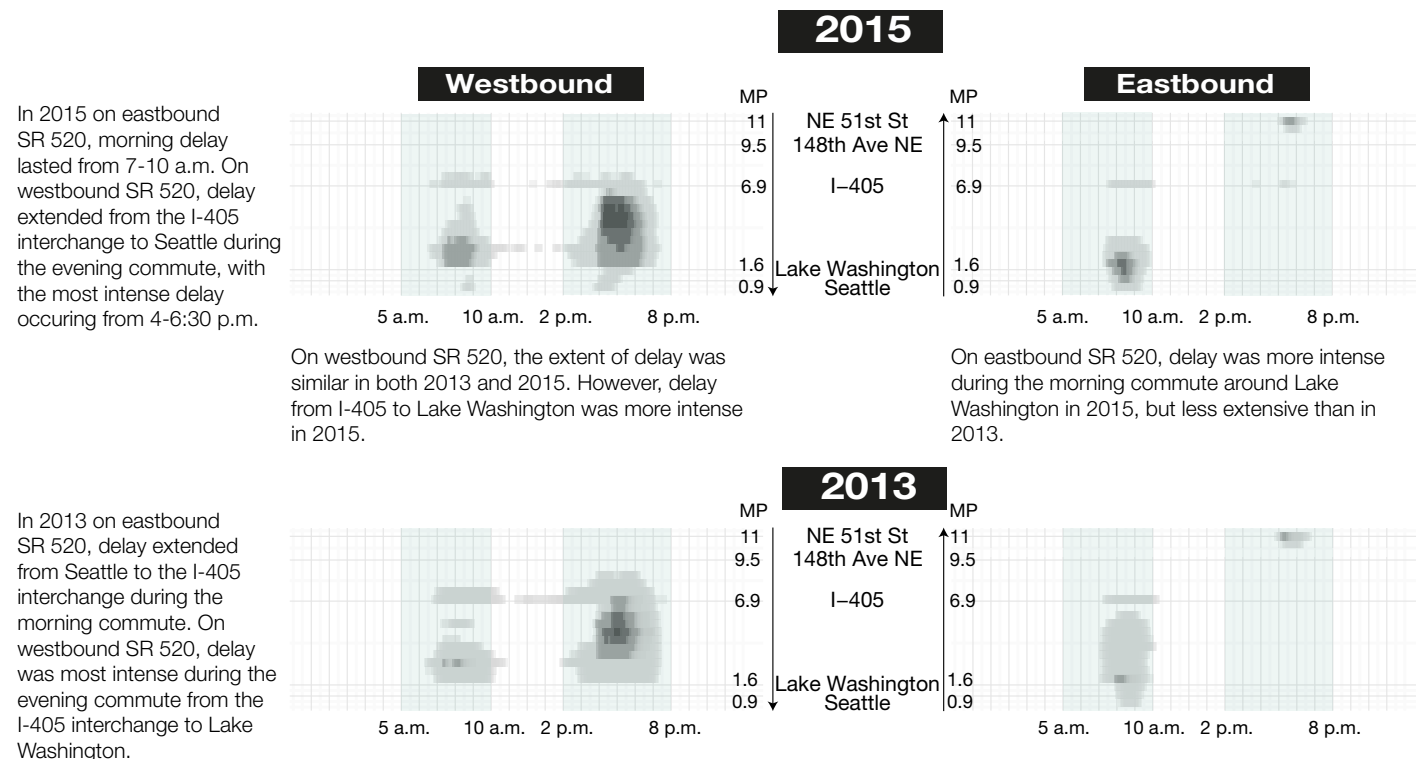


# Central Puget Sound Region

## Heatmaps: Daily vehicle hours of delay on SR 520

### SR 520 delay between Seattle and Redmond

2013 and 2015; Vehicle hours of delay; Weekdays only; By milepost (MP); Shading represents intensity of delay; Highlighted sections represent peak periods



Data sources and analysis: Washington State Transportation Center and WSDOT Office of Strategic Assessment and Performance Analysis.

# Heatmaps: Daily vehicle hours of delay on I-90

## I-90 delay between Seattle and Issaquah

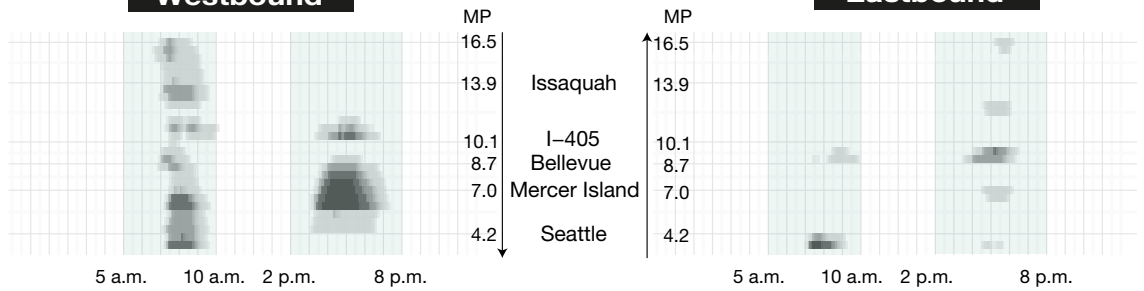
2013 and 2015; Vehicle hours of delay; Weekdays only; By milepost (MP); Shading represents intensity of delay; Highlighted sections represent peak periods

**2015**

**Westbound**

**Eastbound**

In 2015 on eastbound I-90, there were pockets of delay during both peak periods from Seattle to Issaquah. On westbound I-90, morning delay extended along the entire corridor. Delay during the evening commute extended from the I-405 interchange to Seattle, with the most intense delay occurring from 3-6 p.m.

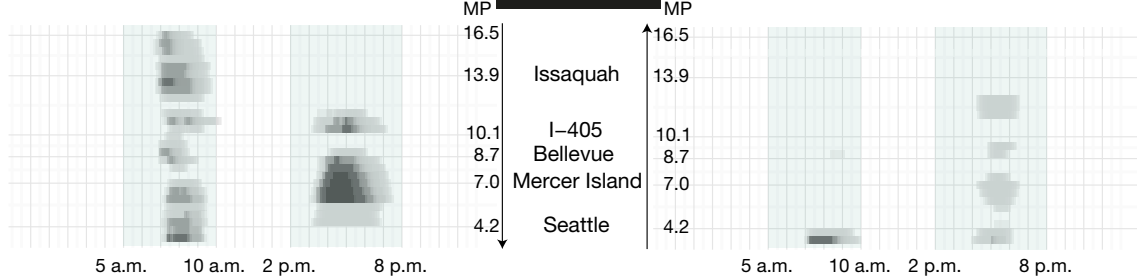


Delay followed similar trends in both 2013 and 2015.

Delay followed similar trends in both 2013 and 2015.

**2013**

In 2013 on eastbound I-90, there were pockets of delay during both peak periods from Seattle to Issaquah. On westbound I-90, morning delay extended along the entire corridor. Delay during the evening commute extended from the I-405 interchange to Seattle, with the most intense delay occurring from 3-5:30 p.m.



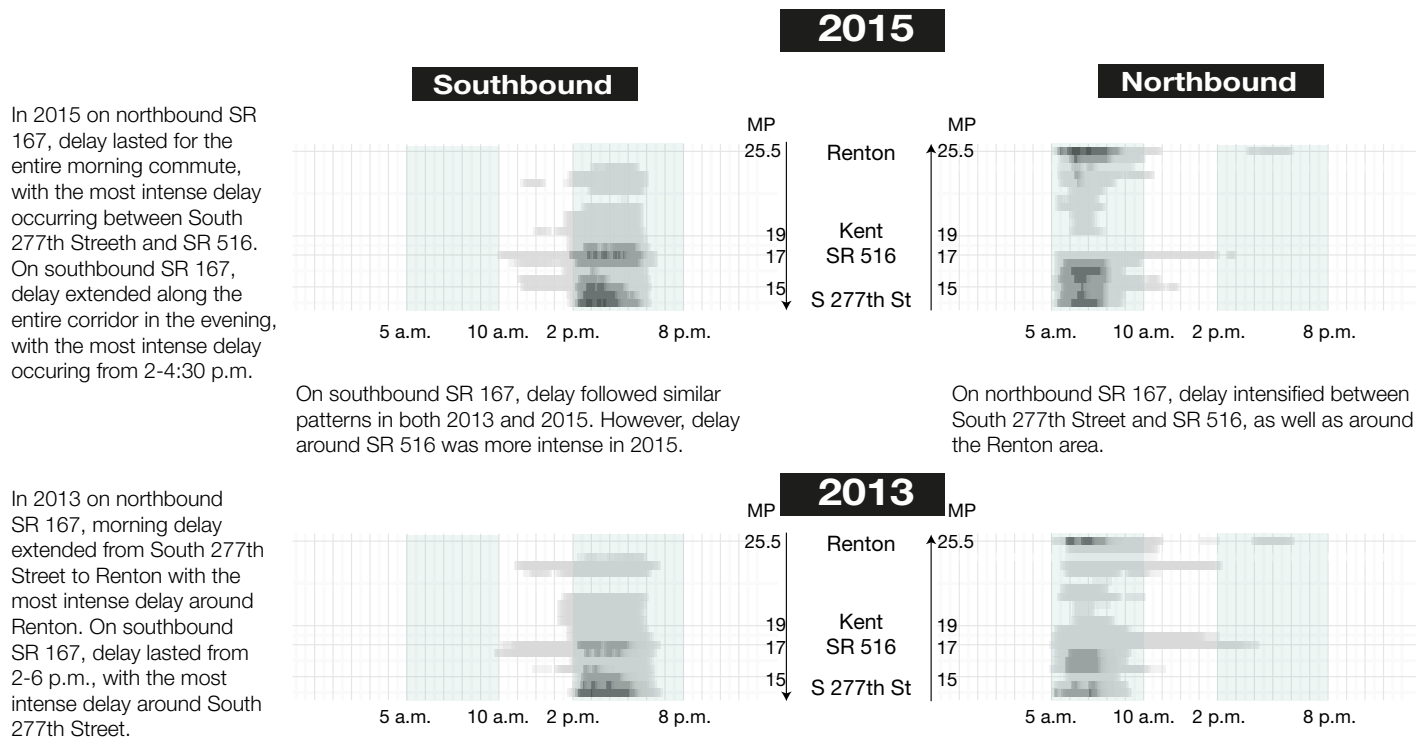
Data sources and analysis: Washington State Transportation Center and WSDOT Office of Strategic Assessment and Performance Analysis.

# Central Puget Sound Region

## Heatmaps: Daily vehicle hours of delay on SR 167

### SR 167 delay between Auburn and Renton

2013 and 2015; Vehicle hours of delay; Weekdays only; By milepost (MP); Shading represents intensity of delay; Highlighted sections represent peak periods



Data sources and analysis: Washington State Transportation Center and WSDOT Office of Strategic Assessment and Performance Analysis.



Commute trip analysis

**Morning commutes: Changes in travel time performance, congestion, reliability, emissions and transit performance for 19 morning high-demand commute trips in the central Puget Sound region**  
2013 and 2015; Morning peak (5-10 a.m.) for an annualized average weekday; 5-minute peak of commuter rush (individual peak times vary); Length of route in miles; All travel times in minutes; Peak of commuter rush and duration of congestion expressed in hours and minutes; Cost of congestion in dollars; Emissions in pounds of carbon dioxide equivalents (CO<sub>2</sub>e); Average transit ridership, average load, and emissions avoided based on the average maximum load during the peak period

Morning				Travel Times									Congestion					Reliability										Emissions							
Route	Direction of travel	Length of route	Peak commute time	Travel time at posted speed	Travel time at maximum throughput speed	Average travel time at peak of morning commute			Maximum throughput travel time index (MT <sup>3</sup> I)		Peak period %Δ in VMT	Duration of congestion: How long average speed is below 45 mph			Cost of congestion <sup>1</sup> per person <sup>2</sup> , per trip			2013 percentiles				2015 percentiles				Δ: 2013 vs. 2015				Greenhouse gas emissions <sup>3</sup> in pounds of CO <sub>2</sub> e					
						2013	2015	%Δ	2013	2015		2013	2015	%Δ	2013	2015	%Δ	50th	80th	90th	95th	50th	80th	90th	95th	50th	80th	90th	95th	2013	2015	%Δ	2013	2015	%Δ
To Seattle																																			
I-5 Everett to Seattle <sup>9</sup>	SB	24	7:15	24	28	50	56	12%	1.75	1.98	1%	2:50	3:30	0:40	\$4.30	\$5.56	29%	47	63	70	<b>80</b>	55	68	80	<b>92</b>	8	5	9	<b>12</b>	561,143	557,157	-1%	20.7	20.4	-1%
I-5 Federal Way to Seattle <sup>9</sup>	NB	22	7:20	22	27	49	54	10%	1.83	2.03	-1%	4:35	5:15	0:40	\$4.21	\$5.20	24%	48	60	65	<b>69</b>	55	63	67	<b>69</b>	7	4	2	<b>0</b>	654,449	634,108	-3%	21.7	21.2	-2%
I-90/I-5 Issaquah to Seattle	WB/NB	15	7:55	15	19	29	29	0%	1.55	1.59	2%	2:25	2:25	0:00	\$2.28	\$2.40	5%	29	34	39	<b>41</b>	29	36	39	<b>43</b>	0	1	0	<b>2</b>	290,234	282,434	-3%	13.5	12.9	-4%
SR 520/I-5 Redmond to Seattle	WB/SB	13	8:30	13	16	18	22	22%	1.14	1.38	3%	1:00	1:30	0:30	\$0.65	\$1.33	105%	17	19	22	<b>25</b>	21	26	30	<b>33</b>	5	6	8	<b>8</b>	127,193	131,079	3%	11.2	10.8	-4%
I-5 SeaTac to Seattle <sup>8</sup>	NB	13	7:45	13	16	31	36	16%	2.00	2.31	-2%	4:55	5:15	0:20	\$3.05	\$4.09	34%	32	38	41	<b>44</b>	36	42	44	<b>46</b>	4	4	4	<b>2</b>	370,910	362,757	-2%	12.9	12.8	-1%
I-405/I-90/I-5 Bellevue to Seattle	SB/WB/NB	10	8:20	10	12	18	19	6%	1.50	1.58	1%	2:35	2:40	0:05	\$1.30	\$1.53	18%	18	21	24	<b>26</b>	19	24	27	<b>28</b>	0	2	3	<b>2</b>	191,403	184,977	-3%	9.2	8.8	-4%
I-405/SR 520/I-5 Bellevue to Seattle	NB/WB/SB	10	8:35	10	12	15	19	27%	1.24	1.50	0%	2:00	2:30	0:30	\$0.80	\$1.18	48%	14	16	18	<b>21</b>	17	22	25	<b>28</b>	3	6	7	<b>7</b>	84,096	87,236	4%	8.8	8.5	-3%
To Bellevue																																			
I-5/I-405 Everett to Bellevue	SB	24	7:20	24	28	54	55	2%	1.90	1.93	-1%	3:35	3:55	0:20	\$5.05	\$5.41	7%	54	68	75	<b>84</b>	55	67	75	<b>79</b>	1	-1	0	<b>-5</b>	466,275	431,094	-8%	21.3	20.5	-4%
I-405 Lynnwood to Bellevue	SB	16	7:30	16	19	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	2.26	2.34	-3%	3:40	4:05	0:25	\$4.73	\$5.18	10%	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	
I-405 Tukwila to Bellevue	NB	13	7:30	13	16	36	42	17%	2.21	2.60	-1%	4:35	5:30	0:55	\$3.89	\$4.82	24%	36	42	46	<b>50</b>	43	48	53	<b>59</b>	6	6	7	<b>9</b>	243,580	245,651	1%	13.2	13.5	2%
I-5/I-90/I-405 Seattle to Bellevue	SB/EB/NB	11	8:15	11	13	16	16	0%	1.25	1.28	1%	1:45	2:20	0:35	\$0.79	\$0.86	9%	15	18	19	<b>22</b>	16	18	19	<b>21</b>	1	0	0	<b>-1</b>	177,063	173,379	-2%	9.4	9.0	-4%
I-5/SR 520/ I-405 Seattle to Bellevue	NB/EB/SB	10	8:45	10	12	17	17	0%	1.35	1.38	7%	1:55	2:00	0:05	\$0.86	\$0.98	14%	15	19	23	<b>25</b>	17	20	22	<b>23</b>	1	1	-1	<b>-2</b>	90,167	92,560	3%	8.8	8.4	-5%
I-90/I-405 Issaquah to Bellevue	WB/NB	9	7:40	9	11	16	16	0%	1.42	1.39	3%	2:20	2:30	0:10	\$1.07	\$1.05	-2%	16	19	22	<b>24</b>	15	18	22	<b>26</b>	-1	-1	0	<b>2</b>	178,772	175,441	-2%	8.2	7.8	-5%
SR 520/I-405 Redmond to Bellevue	WB/SB	6	8:45	6	7	8	9	13%	1.13	1.16	11%	0:25	2:10	1:45	\$0.29	\$0.33	14%	8	9	10	<b>11</b>	8	9	10	<b>11</b>	0	0	0	<b>0</b>	74,810	75,777	1%	5.2	5.0	-4%
Other																																			
I-405 Bellevue to Tukwila	SB	13	7:35	13	16	17	19	12%	1.10	1.20	2%	0:00	0:30	0:30	\$-	\$0.87	N/A	17	19	21	<b>24</b>	18	21	25	<b>31</b>	1	2	4	<b>7</b>	205,217	201,151	-2%	11.5	11.1	-3%
I-405/SR 520 Bellevue to Redmond	NB/EB	5	9:25	5	7	7	8	14%	1.09	1.15	1%	0:00	0:45	0:45	\$-	\$-	N/A	7	7	8	<b>8</b>	7	8	8	<b>9</b>	0	0	1	<b>1</b>	42,885	42,854	0%	4.6	4.4	-4%
SR 167 Auburn to Renton <sup>9</sup>	NB	10	7:20	10	12	17	19	12%	1.47	1.63	0%	4:00	4:15	0:15	\$1.09	\$1.47	35%	16	20	24	<b>28</b>	19	23	26	<b>29</b>	3	3	2	<b>1</b>	155,254	150,632	-3%	9.4	9.2	-2%
I-5/I-90 Seattle to Issaquah	SB/EB	16	8:15	16	19	20	20	0%	1.06	1.06	1%	0:00	0:00	0:00	\$-	\$-	N/A	19	22	23	<b>25</b>	19	22	23	<b>25</b>	0	0	0	<b>0</b>	217,280	211,075	-3%	13.2	12.6	-5%
I-5/SR 520 Seattle to Redmond	NB/EB	13	8:40	13	16	19	20	5%	1.18	1.24	4%	0:35	1:05	0:30	\$0.82	\$0.94	15%	18	22	25	<b>27</b>	20	23	25	<b>28</b>	2	1	0	<b>1</b>	113,292	116,051	2%	11.1	10.7	-4%

Data source: WSDOT Office of Strategic Assessment and Performance Analysis, WSDOT Northwest Region Traffic Office, Washington State Transportation Center (TRAC) at the University of Washington, King County Metro, Sound Transit, Community Transit and the Puget Sound Regional Council (PSRC).

Notes: The symbol “Δ” is used to denote change in a variable. Commute lengths and travel time values have been rounded to integer values for publication only. MT<sup>3</sup> Index values cannot be reproduced as published using the integer values in the table. Due to rounding, some percentages are not computable based on numbers in the table. 1 Commute congestion cost based on \$21.90 for every hour of congested conditions measured when commute speeds are slower than 45 mph, applied to the volume of traffic during the congested conditions on an average annual weekday commute. 2 Per-person metrics were estimated based on vehicle occupancy observed on the freeway in the single occupant vehicle lanes. 3 Greenhouse gas emissions were calculated based on emission factors developed by PSRC for different vehicle types at varying travel speeds for each analysis year. In addition, the emissions used the traffic volume and percent of trucks, the average speeds for every 5-minute interval during the peak period, and the average vehicle occupancy on the freeway. 4 Transit performance: Ridership was reported for the peak transit commute periods (6-9 a.m. and 3-6 p.m.). 5 Average load represents utilization of the available transit capacity based on the average maximum load of each bus or train trip and the total seats on the bus or train. Individual trips could show a load greater than 100% if there was standing-room only. Averaging the load for each commute levels out this variation across multiple trips, and may under-represent the load experienced during the peak utilization of transit. 6 Transit travel times include off-highway travel such as exiting to stop at a transit center and may not be directly comparable to private auto times which only include highway travel. 7 Greenhouse gas emissions avoided by transit use were estimated based on the following factors: a) the average maximum transit load; b) the assumption that for every transit passenger mile traveled, 0.62 miles of single-occupant vehicle travel is avoided; c) the distance traveled on the WSDOT-defined commute trip (not the entire transit trip); d) the average emissions of one pound of CO<sub>2</sub>e for every mile traveled; and e) the emissions from transit vehicle operations provided by the transit agencies. 8 Transit services include buses and Sounder commuter trains. 9 Transit services include buses and Link light rail trains. 10 In the fall of 2015, WSDOT deployed express toll lanes on I-405 between Bellevue and Lynnwood. Please see the special report on [pp. 19-20](#) of the 2016 *Corridor Capacity Report*. For detailed quarterly reports, see [www.wsdot.wa.gov/tolling/405/library.htm](http://www.wsdot.wa.gov/tolling/405/library.htm).

# Central Puget Sound Region

## Commute trip analysis

**Evening commutes: Changes in travel time performance, congestion, reliability, emissions and transit performance for 21 evening high-demand commute trips in the central Puget Sound region 2013 and 2015; Evening peak (2-8 p.m.) for an annualized average weekday; 5-minute peak of commuter rush (individual peak times vary); Length of route in miles; All travel times in minutes; Peak of commuter rush and duration of congestion expressed in hours and minutes; Cost of congestion in dollars; Emissions in pounds of carbon dioxide equivalents (CO<sub>2</sub>e)**

Evening				Travel Times								Congestion					Reliability												Emissions														
Route	Direction of travel	Length of route	Peak time	Travel time at posted speed	Travel time at maximum throughput speed	Average travel time at peak of morning commute			Maximum throughput travel time index (MT <sup>3</sup> I)		Peak period %Δ in VMT	Duration of congestion: How long average speed is below 45 mph			Cost of congestion <sup>1</sup> per person <sup>2</sup> , per trip			2013 percentiles				2015 percentiles				Δ: 2013 vs. 2015				Greenhouse gas emissions <sup>3</sup> in pounds of CO <sub>2</sub> e													
						2013	2015	%Δ	2013	2015		2013	2015	Δ	2013	2015	%Δ	Median				Median				Median				Emitted during peak period			Emitted per person <sup>2</sup>										
																		50th	80th	90th	95th	50th	80th	90th	95th	50th	80th	90th	95th	2013	2015	%Δ	2013	2015	%Δ								
From Seattle																																											
I-5 Seattle to Everett <sup>8</sup>	NB	23	16:25	23	28	39.5	47	21%	1.40	1.67	-2%	2:45	3:25	0:40	\$2.39	\$3.67	54%	39	47	51	<b>57</b>	46	55	60	<b>67</b>	8	8	9	<b>10</b>	730,705	701,441	-4%	17.9	17.5	-2%								
I-5 Seattle to Federal Way <sup>8</sup>	SB	22	16:10	22	27	32	37	16%	1.21	1.39	0%	1:55	3:05	1:10	\$1.39	\$2.29	65%	30	37	43	<b>48</b>	35	43	49	<b>53</b>	5	6	5	<b>5</b>	822,488	794,383	-3%	18.8	18.1	-4%								
I-5 Seattle to SeaTac <sup>9</sup>	SB	13	16:10	13	16	19	23	21%	1.24	1.50	0%	2:00	3:10	1:10	\$0.91	\$1.58	74%	19	22	26	<b>28</b>	22	27	33	<b>36</b>	3	5	7	<b>8</b>	470,025	452,040	-4%	11.1	10.7	-4%								
I-5/I-90/I-405 Seattle to Bellevue	SB/EB/NB	11	17:25	11	13	17	15	-12%	1.32	1.21	-2%	1:45	1:35	-0:10	\$0.88	\$0.64	-27%	15	19	24	<b>28</b>	14	18	21	<b>22</b>	-1	-1	-3	<b>-6</b>	255,596	239,560	-6%	8.7	8.3	-5%								
I-5/SR 520/I-405 Seattle to Bellevue	NB/EB/SB	10	17:05	10	12	18	18	0%	1.48	1.48	3%	3:25	3:20	-0:05	\$1.18	\$1.35	14%	18	22	23	<b>25</b>	17	23	25	<b>26</b>	-1	1	2	<b>1</b>	100,815	104,905	4%	8.4	8.1	-4%								
I-5/SR 520 Seattle to Redmond	NB/EB	13	17:35	13	16	18	18	0%	1.13	1.13	3%	0:20	0:25	0:05	\$0.60	\$0.63	5%	17	21	23	<b>24</b>	17	21	23	<b>25</b>	0	0	0	<b>1</b>	150,351	156,463	4%	10.5	10.0	-5%								
I-5/I-90 Seattle to Issaquah	SB/EB	16	17:30	16	19	23	22	-4%	1.21	1.16	-1%	1:05	0:45	-0:20	\$1.06	\$0.83	-22%	21	26	31	<b>34</b>	21	25	28	<b>32</b>	-1	-1	-2	<b>-2</b>	386,471	364,182	-6%	13.4	12.7	-5%								
From Bellevue																																											
I-405/I-5 Bellevue to Everett	NB	23	16:50	23	28	43	49	14%	1.52	1.75	-6%	3:20	4:00	0:40	\$3.05	\$4.12	35%	43	49	53	<b>55</b>	48	56	61	<b>65</b>	5	7	8	<b>10</b>	571,302	510,393	-11%	18.8	18.4	-2%								
I-405 Bellevue to Lynnwood	NB	16	16:50	16	19	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	1.77	2.08	-9%	3:35	4:10	0:35	\$3.12	\$4.19	34%	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>	-- <sup>10</sup>									
I-405 Bellevue to Tukwila	SB	13	16:15	13	16	35	38	9%	2.21	2.42	-2%	6:00	6:45	0:45	\$3.70	\$4.29	16%	36	39	42	<b>47</b>	38	44	48	<b>50</b>	3	5	5	<b>3</b>	290,961	288,571	-1%	12.0	12.2	2%								
I-405/I-90/I-5 Bellevue to Seattle	SB/WB/NB	10	17:20	10	12	28	30	7%	2.28	2.49	-3%	4:50	5:15	0:25	\$2.57	\$2.97	16%	28	35	39	<b>43</b>	31	37	41	<b>46</b>	3	2	2	<b>3</b>	247,712	238,185	-4%	9.2	9.0	-2%								
I-405/SR 520/I-5 Bellevue to Seattle	NB/WB/SB	10	17:25	10	12	22	30	36%	1.80	2.43	-5%	5:20	6:10	0:50	\$1.71	\$2.81	64%	21	25	29	<b>34</b>	31	35	37	<b>40</b>	10	9	8	<b>6</b>	135,251	133,385	-1%	8.7	8.9	2%								
I-405/I-90 Bellevue to Issaquah	SB/EB	9	17:20	9	11	19	20	5%	1.69	1.84	-1%	4:30	5:50	1:20	\$1.51	\$1.76	17%	19	21	22	<b>25</b>	20	23	25	<b>27</b>	1	2	4	<b>2</b>	254,595	246,377	-3%	8.3	8.0	-4%								
I-405/SR 520 Bellevue to Redmond	NB/EB	5	17:35	5	7	8	8	0%	1.28	1.29	3%	1:15	1:20	0:05	\$0.41	\$0.44	7%	7	10	11	<b>12</b>	8	10	11	<b>13</b>	0	0	0	<b>1</b>	79,353	82,491	4%	4.4	4.2	-5%								
Other																																											
I-5 Everett to Seattle	SB	24	16:00	24	28	50	52	4%	1.75	1.84	-2%	5:15	5:45	0:30	\$3.72	\$4.07	9%	49	60	67	<b>74</b>	52	62	70	<b>75</b>	3	1	3	<b>1</b>	642,395	606,359	-6%	18.8	18.2	-3%								
I-90/I-5 Issaquah to Seattle	WB/NB	15	17:20	15	19	30	30	0%	1.63	1.62	-2%	3:10	3:10	0:00	\$2.39	\$2.35	-2%	30	37	43	<b>47</b>	29	38	43	<b>46</b>	-1	1	0	<b>-1</b>	318,170	296,899	-7%	13.6	12.9	-5%								
SR 520/I-5 Redmond to Seattle	WB/SB	13	17:20	13	16	31	35	13%	1.92	2.18	-4%	4:15	4:45	0:30	\$2.40	\$3.19	33%	28	40	48	<b>53</b>	35	42	49	<b>54</b>	6	2	1	<b>1</b>	173,417	165,050	-5%	11.2	11.0	-2%								
SR 520/I-405 Redmond to Bellevue	WB/SB	6	16:30	6	7	19	15	-21%	2.60	2.03	6%	4:45	4:55	0:10	\$1.89	\$1.28	-32%	17	28	34	<b>39</b>	13	21	26	<b>30</b>	-5	-7	-9	<b>-9</b>	77,910	70,918	-9%	5.5	5.0	-9%								
I-5 SeaTac to Seattle <sup>9</sup>	NB	13	16:45	13	16	24	24	0%	1.51	1.51	-2%	3:30	3:35	0:05	\$1.43	\$1.67	17%	22	30	34	<b>39</b>	23	28	32	<b>36</b>	0	-2	-2	<b>-3</b>	386,869	361,213	-7%	11.2	10.7	-4%								
SR 167 Renton to Auburn <sup>8</sup>	SB	10	15:15	10	12	18	21	17%	1.51	1.81	0%	3:40	4:15	0:35	\$1.32	\$1.94	47%	16	22	26	<b>35</b>	20	27	32	<b>36</b>	4	5	6	<b>1</b>	191,698	188,363	-2%	8.7	8.5	-2%								
I-405 Tukwila to Bellevue	NB	13	17:20	13	16	21	21	0%	1.31	1.31	-1%	1:40	3:10	1:30	\$1.10	\$0.98	-11%	20	27	30	<b>34</b>	20	26	29	<b>32</b>	1	-1	-1	<b>-2</b>	292,267	278,034	-5%	11.0	10.6	-4%								

Data source: WSDOT Office of Strategic Assessment and Performance Analysis, WSDOT Northwest Region Traffic Office, Washington State Transportation Center (TRAC) at the University of Washington, King County Metro, Sound Transit, Community Transit and the Puget Sound Regional Council (PSRC).

Notes: The symbol “Δ” is used to denote change in a variable. Commute lengths and travel time values have been rounded to integer values for publication only. MT<sup>3</sup> Index values cannot be reproduced as published using the integer values in the table. Due to rounding, some percentages are not computable based on numbers in the table. 1 Commute congestion cost based on \$21.90 for every hour of congested conditions measured when commute speeds are slower than 45 mph, applied to the volume of traffic during the congested conditions on an average annual weekday commute. 2 Per-person metrics were estimated based on vehicle occupancy observed on the freeway in the single occupant vehicle lanes. 3 Greenhouse gas emissions were calculated based on emission factors developed by PSRC for different vehicle types at varying travel speeds for each analysis year. In addition, the emissions used the traffic volume and percent of trucks, the average speeds for every 5-minute interval during the peak period, and the average vehicle occupancy on the freeway. 4 Transit performance: Ridership was reported for the peak transit commute periods (6-9 a.m. and 3-6 p.m.). 5 Average load represents utilization of the available transit capacity based on the average maximum load of each bus or train trip and the total seats on the bus or train. Individual trips could show a load greater than 100% if there was standing-room only. Averaging the load for each commute levels out this variation across multiple trips, and may under-represent the load experienced during the peak utilization of transit. 6 Transit travel times include off-highway travel such as exiting to stop at a transit center and may not be directly comparable to private auto times which only include highway travel. 7 Greenhouse gas emissions avoided by transit use were estimated based on the following factors: a) the average maximum transit load; b) the assumption that for every transit passenger mile traveled, 0.62 miles of single-occupant vehicle travel is avoided; c) the distance traveled on the WSDOT-defined commute trip (not the entire transit trip); d) the average emissions of one pound of CO<sub>2</sub>e for every mile traveled; and e) the emissions from transit vehicle operations provided by the transit agencies. 8 Transit services include buses and Sounder commuter trains. 9 Transit services include buses and Link light rail trains. 10 In the fall of 2015, WSDOT deployed express toll lanes on I-405 between Bellevue and Lynnwood. Please see the special report on [pp. 19-20](#) of the 2016 *Corridor Capacity Report*. For detailed quarterly reports, see [www.wsdot.wa.gov/tolling/405/library.htm](http://www.wsdot.wa.gov/tolling/405/library.htm).

Transit commute trip analysis

**Morning transit commutes: Changes in transit travel time performance, ridership, and greenhouse gas (GHG) emissions for 19 morning high-demand commute trips in the central Puget Sound region 2013 and 2015; Morning peak (6-9 a.m.) for an annualized average weekday; 5-minute peak of commuter rush in hours and minutes (individual peak times vary); All travel times in minutes; Emissions in pounds of carbon dioxide equivalents (CO<sub>2</sub>e); Average transit ridership, average seats used, and emissions avoided based on the average maximum load during the peak period**

Morning				Travel Times									Ridership												Emissions													
				Travel times in minutes at peak of morning commute¹												Lane capacity savings³			Average percent of seats used⁴			Number of trips			Percent of trips over 90% capacity			Daily emissions avoided due to transit use⁵			Vehicle miles traveled avoided due to transit use							
Route	Direction of travel	Length of route	Peak time	Auto 95% reliable			Transit average			Transit 95% reliable			Ridership²			Passenger miles traveled																						
				2013	2015	Δ	2013	2015	Δ	2013	2015	Δ	2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ		
To Seattle																																						
I-5 Everett to Seattle⁷	SB	24	7:15	80	92	12	38	43	5	53	66	13	10,464	10,941	5%	161,910	172,521	7%	1.85	1.93	5%	68%	71%	4%	226	234	4%	23%	21%	-2%	80,143	85,304	6%	100,384	106,963	7%		
I-5 Federal Way to Seattle⁷	NB	22	7:20	69	69	0	38	41	3	47	50	3	6,328	6,562	4%	130,923	139,967	7%	1.12	1.16	4%	69%	71%	2%	152	141	-7%	15%	13%	-2%	65,839	70,975	8%	81,172	86,779	7%		
I-90/I-5 Issaquah to Seattle	WB/NB	15	7:55	41	43	2	26	26	0	27	31	4	3,475	3,495	1%	45,149	45,234	0%	0.61	0.61	1%	82%	105%	24%	79	59	-25%	37%	81%	45%	22,134	23,489	6%	27,992	28,045	0%		
SR 520/I-5 Redmond to Seattle	WB/SB	13	8:30	25	33	8	28	29	1	33	35	2	4,413	4,703	7%	41,695	44,404	6%	0.81	0.86	7%	68%	87%	19%	121	99	-18%	21%	44%	23%	20,015	22,294	11%	25,851	27,530	6%		
I-5 SeaTac to Seattle⁶	NB	13	7:45	44	46	2	37	37	0	39	39	0	5,181	5,734	11%	54,626	62,029	14%	0.91	1.01	11%	80%	92%	12%	77	71	-8%	38%	41%	3%	24,584	29,426	20%	33,868	38,458	14%		
I-405/I-90/I-5 Bellevue to Seattle	SB/WB/NB	10	8:20	26	28	2	28	29	1	30	34	4	2,182	2,512	15%	14,951	17,421	17%	0.39	0.45	15%	85%	97%	12%	47	44	-6%	45%	64%	19%	7,464	8,952	20%	9,269	10,801	17%		
I-405/SR 520/I-5 Bellevue to Seattle	NB/WB/SB	10	8:35	21	28	7	20	20	0	23	26	3	973	1,038	7%	6,230	6,539	5%	0.18	0.19	7%	60%	63%	3%	33	35	6%	6%	11%	5%	2,790	3,014	8%	3,863	4,054	5%		
To Bellevue																																						
I-5/I-405 Everett to Bellevue	SB	24	7:20	84	79	-5	45	46	1	58	58	0	662	745	13%	15,678	17,657	13%	0.12	0.13	13%	82%	95%	13%	14	14	0%	29%	64%	36%	7,957	9,161	15%	9,720	10,947	13%		
I-405 Lynnwood to Bellevue	SB	16	7:30	69	66	-3	45	47	2	55	58	3	847	1,018	20%	9,235	10,962	19%	0.15	0.18	20%	77%	72%	-5%	22	28	27%	27%	21%	-6%	4,528	5,272	16%	5,726	6,796	19%		
I-405 Tukwila to Bellevue	NB	13	7:30	50	59	9	23	27	4	26	31	5	818	780	-5%	9,272	8,766	-5%	0.15	0.14	-5%	72%	66%	-6%	27	27	0%	7%	4%	-4%	4,472	4,610	3%	5,749	5,435	-5%		
I-5/I-90/I-405 Seattle to Bellevue	SB/EB/NB	11	8:15	22	21	-1	26	27	1	30	31	1	784	842	7%	5,174	5,557	7%	0.14	0.15	7%	80%	91%	11%	17	16	-6%	18%	56%	39%	2,547	2,822	11%	3,208	3,445	7%		
I-5/SR 520/ I-405 Seattle to Bellevue	NB/EB/SB	10	8:45	25	23	-2	27	26	-1	33	32	-1	721	898	25%	4,163	5,507	32%	0.13	0.16	25%	59%	74%	15%	27	26	-4%	7%	27%	20%	1,802	2,556	42%	2,581	3,415	32%		
I-90/I-405 Issaquah to Bellevue	WB/NB	9	7:40	24	26	2	21	21	0	24	24	0	282	331	17%	2,338	2,747	18%	0.05	0.06	17%	69%	71%	2%	7	8	14%	14%	25%	11%	1,095	1,295	18%	1,449	1,703	18%		
SR 520/I-405 Redmond to Bellevue	WB/SB	6	8:45	11	11	0	18	18	0	21	22	1	133	144	8%	730	788	8%	0.02	0.03	8%	29%	29%	0%	11	11	0%	0%	0%	0%	195	228	17%	453	489	8%		
Other																																						
I-405 Bellevue to Tukwila	SB	13	7:35	24	31	7	18	19	1	20	21	1	138	209	51%	1,647	1,877	14%	0.03	0.04	51%	26%	29%	4%	13	16	23%	0%	0%	0%	363	546	51%	1,021	1,164	14%		
I-405/SR 520 Bellevue to Redmond	NB/EB	5	9:25	8	9	1	11	11	0	13	14	1	190	229	20%	889	1,083	22%	0.03	0.04	20%	23%	24%	1%	21	22	5%	0%	0%	0%	169	245	45%	551	671	22%		
SR 167 Auburn to Renton⁷	NB	10	7:20	28	29	1	34	34	0	52	41	-11	2,435	2,892	19%	23,613	27,120	15%	0.43	0.51	19%	53%	52%	-1%	19	25	32%	0%	0%	0%	13,210	15,130	15%	14,640	16,814	15%		
I-5/I-90 Seattle to Issaquah	SB/EB	16	8:15	25	25	0	25	27	2	27	30	3	423	467	10%	4,992	5,624	13%	0.07	0.08	10%	53%	59%	6%	14	14	0%	0%	0%	0%	2,114	2,479	17%	3,095	3,487	13%		
I-5/SR 520 Seattle to Redmond	NB/EB	13	8:40	27	28	1	27	28	1	30	34	4	1,930	2,037	6%	21,288	22,200	4%	0.35	0.37	6%	54%	57%	3%	62	62	0%	15%	13%	-2%	9,890	10,203	3%	13,198	13,764	4%		

Data sources and analysis: Sound Transit, Pierce Transit, King County Metro, Community Transit, WSDOT Olympic Region Traffic Office, Washington State Transportation Center, and WSDOT Office of Strategic Assessment and Performance Analysis.

Notes: The symbol “Δ” is used to denote change in a variable. Due to rounding, some percentages are not computable based on numbers in the table. 1 Transit travel times may not be directly comparable to SOV/HOV trips due to different start and end points or off-highway travel such as exiting to stop at a transit center. WSDOT attempts to match transit trips as closely as is practical to SOV/HOV. 2 Ridership was reported for the peak transit commute periods (6-9 a.m. and 3-6 p.m.). 3 Lane capacity savings is a measure of how many general purpose lanes' worth of capacity transit ridership provides during the peak periods. See the 2nd edition of the *Handbook for Corridor Capacity Evaluation* at [www.wsdot.wa.gov/publications/fulltext/graynotebook/CCR\\_methodology\\_2nd\\_edition.pdf](http://www.wsdot.wa.gov/publications/fulltext/graynotebook/CCR_methodology_2nd_edition.pdf) for more calculation methods. 4 Average percent of seats used is based on the average maximum load of each bus or train trip and the total seats on the bus or train. Individual trips could show a load greater than 100% if there was standing-room only. Averaging the load for each commute levels out this variation across multiple trips, and may under-represent the load experienced during the peak utilization of transit. 5 Greenhouse gas emissions avoided by transit use were estimated based on the following factors: a) the average maximum transit load; b) the assumption that for every transit passenger mile traveled, 0.62 miles of single-occupant vehicle travel is avoided; c) the distance traveled on the WSDOT-defined commute trip (not the entire transit trip); d) the average emissions of one pound of CO<sub>2</sub>e for every mile traveled; and e) the emissions from transit vehicle operations provided by the transit agencies. 6 Transit services include buses and Sounder commuter trains. 7 Transit services include buses and Link light rail trains. 8 Transit travel times for the commutes between Lynnwood and Bellevue were not available for the same timeline to compare to the before and after tolling analysis on [pp. 19-20](#) of the 2016 *Corridor Capacity Report*.

**WSDOT and partners standardizing transit ridership methodology**

Transit ridership data (and measures derived from it such as passenger miles traveled), will not be comparable between the 2015 and 2016 editions of the *Corridor Capacity Report* due to changes in methodology. WSDOT worked with its partners to implement the use of average maximum load as the standard for ridership data in the 2016 *Corridor Capacity Report* and future editions, as this measure gives the most accurate picture of weekday system performance.

# Central Puget Sound Region

## Transit commute trip analysis

**Evening transit commutes: Changes in transit travel time performance, ridership, and greenhouse gas (GHG) emissions for 21 evening high-demand commute trips in the central Puget Sound region**  
2013 and 2015; Evening peak (3-6 p.m.) for an annualized average weekday; 5-minute peak of commuter rush in hours and minutes (individual peak times vary); All travel times in minutes; Emissions in pounds of carbon dioxide equivalents (CO<sub>2</sub>e); Average transit ridership, average seats used, and emissions avoided based on the average maximum load during the peak period

Evening				Travel Times									Ridership												Emissions														
Route	Direction of travel	Length of route	Peak time	Travel times in minutes at peak of evening commute¹												Ridership²			Passenger miles traveled			Lane capacity savings³			Average percent of seats used⁴			Number of trips			Percent of trips over 90% capacity			Daily emissions avoided due to transit use⁵			Vehicle miles traveled avoided due to transit use		
				Auto 95% reliable			Transit average			Transit 95% reliable			2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ			
				2013	2015	Δ	2013	2015	Δ	2013	2015	Δ																											
From Seattle																																							
I-5 Seattle to Everett⁶	NB	23	16:25	57	67	10	31	36	5	40	45	5	10,265	10,713	4%	156,972	171,359	9%	1.61	1.68	4%	65%	68%	4%	234	244	4%	20%	19%	0%	76,535	83,448	9%	97,323	106,243	9%			
I-5 Seattle to Federal Way⁶	SB	22	16:10	48	53	5	39	47	8	51	61	10	5,058	5,390	7%	105,421	113,916	8%	0.83	0.88	7%	63%	65%	3%	132	125	-5%	6%	9%	3%	51,961	56,809	9%	65,361	70,628	8%			
I-5 Seattle to SeaTac⁷	SB	13	16:10	28	36	8	39	40	1	40	44	4	5,869	6,622	13%	61,273	72,478	18%	0.96	1.08	13%	85%	103%	18%	81	70	-14%	36%	57%	21%	27,943	35,296	26%	37,989	44,937	18%			
I-5/I-90/I-405 Seattle to Bellevue	SB/EB/NB	11	17:25	28	22	-6	26	26	0	30	30	0	2,280	2,437	7%	15,402	16,715	9%	0.38	0.41	7%	84%	94%	10%	50	44	-12%	42%	50%	8%	7,683	8,525	11%	9,549	10,363	9%			
I-5/SR 520/I-405 Seattle to Bellevue	NB/EB/SB	10	17:05	25	26	1	20	18	-2	25	25	0	1,106	904	-18%	5,779	5,149	-11%	0.19	0.16	-18%	61%	60%	-1%	37	33	-11%	5%	9%	4%	2,545	2,269	-11%	3,583	3,192	-11%			
I-5/SR 520 Seattle to Redmond	NB/EB	13	17:35	24	25	1	28	29	1	33	37	4	4,142	4,387	6%	39,770	42,289	6%	0.72	0.77	6%	61%	80%	19%	127	101	-20%	14%	39%	24%	18,478	20,829	13%	24,658	26,219	6%			
I-5/I-90 Seattle to Issaquah	SB/EB	16	17:30	34	32	-2	27	25	-2	30	28	-2	3,002	3,129	4%	38,838	40,684	5%	0.53	0.55	4%	78%	97%	19%	72	57	-21%	31%	61%	31%	18,753	20,826	11%	24,079	25,224	5%			
From Bellevue																																							
I-405/I-5 Bellevue to Everett	NB	23	16:50	55	65	10	51	56	5	62	65	3	681	735	8%	15,845	17,096	8%	0.11	0.12	8%	79%	88%	9%	15	15	0%	20%	40%	20%	7,965	8,722	9%	9,824	10,600	8%			
I-405 Bellevue to Lynnwood	NB	16	16:50	47	53	6	48	57	9	55	64	9	666	888	33%	6,953	9,152	32%	0.12	0.16	33%	71%	69%	-2%	19	26	37%	26%	19%	-7%	3,296	4,269	30%	4,311	5,675	32%			
I-405 Bellevue to Tukwila	SB	13	16:15	47	50	3	27	31	4	33	40	7	811	737	-9%	8,916	8,058	-10%	0.14	0.12	-9%	70%	65%	-5%	27	27	0%	15%	11%	-4%	4,233	3,864	-9%	5,528	4,996	-10%			
I-405/I-90/I-5 Bellevue to Seattle	SB/WB/NB	10	17:20	43	46	3	35	43	8	39	78	39	876	990	13%	5,869	6,633	13%	0.15	0.17	13%	84%	90%	6%	18	19	6%	28%	63%	35%	2,927	3,361	15%	3,639	4,112	13%			
I-405/SR 520/I-5 Bellevue to Seattle	NB/WB/SB	10	17:25	34	40	6	27	24	-3	35	33	-2	729	894	23%	4,249	5,271	24%	0.13	0.16	23%	57%	81%	24%	28	24	-14%	0%	38%	38%	1,810	2,552	41%	2,634	3,268	24%			
I-405/I-90 Bellevue to Issaquah	SB/EB	9	17:20	25	27	2	27	27	0	32	40	8	274	304	11%	2,302	2,554	11%	0.05	0.05	11%	67%	66%	-2%	7	8	14%	0%	0%	0%	1,053	1,153	9%	1,427	1,583	11%			
I-405/SR 520 Bellevue to Redmond	NB/EB	5	17:35	12	13	1	11	12	1	14	15	1	166	147	-12%	853	754	-12%	0.03	0.03	-12%	36%	43%	7%	11	8	-27%	0%	13%	13%	294	294	0%	529	467	-12%			
Other																																							
I-5 Everett to Seattle	SB	24	16:00	74	75	1	45	61	16	57	78	21	1,070	815	-24%	14,514	13,454	-7%	0.17	0.13	-24%	48%	50%	2%	38	29	-24%	3%	0%	-3%	5,882	5,695	-3%	8,998	8,341	-7%			
I-90/I-5 Issaquah to Seattle	WB/NB	15	17:20	47	46	-1	31	34	3	35	47	12	510	549	8%	6,399	6,974	9%	0.09	0.10	8%	59%	64%	5%	15	15	0%	0%	0%	0%	2,813	3,160	12%	3,967	4,324	9%			
SR 520/I-5 Redmond to Seattle	WB/SB	13	17:20	53	54	1	36	38	2	39	49	10	1,706	1,932	13%	18,803	21,185	13%	0.30	0.34	13%	53%	63%	11%	57	57	0%	14%	18%	4%	8,647	9,796	13%	11,658	13,134	13%			
SR 520/I-405 Redmond to Bellevue	WB/SB	6	16:30	39	30	-9	20	20	0	28	27	-1	131	143	9%	710	772	9%	0.02	0.02	9%	16%	16%	0%	20	21	5%	0%	0%	0%	9	31	227%	440	479	9%			
I-5 SeaTac to Seattle⁷	NB	13	16:45	39	36	-3	39	39	0	42	42	0	2,589	2,764	7%	27,916	31,407	13%	0.42	0.45	7%	44%	50%	6%	58	52	-10%	0%	2%	2%	7,876	10,286	31%	17,308	19,472	13%			
SR 167 Renton to Auburn⁶	SB	10	15:15	35	36	1	42	41	-1	52	49	-3	2,840	2,945	4%	27,570	27,514	0%	0.47	0.48	4%	62%	61%	-1%	17	23	35%	0%	13%	13%	15,693	15,572	-1%	17,093	17,058	0%			
I-405 Tukwila to Bellevue	NB	13	17:20	34	32	-2	22	23	1	24	27	3	156	202	30%	1,906	1,891	-1%	0.03	0.03	30%	25%	30%	5%	15	16	7%	0%	0%	0%	410	552	35%	1,182	1,173	-1%			

Data sources and analysis: Sound Transit, Pierce Transit, King County Metro, Community Transit, WSDOT Olympic Region Traffic Office, Washington State Transportation Center, and WSDOT Office of Strategic Assessment and Performance Analysis.  
Notes: The symbol “Δ” is used to denote change in a variable. Due to rounding, some percentages are not computable based on numbers in the table. 1 Transit travel times may not be directly comparable to SOV/HOV trips due to different start and end points or off-highway travel such as exiting to stop at a transit center. WSDOT attempts to match transit trips as closely as is practical to SOV/HOV. 2 Ridership was reported for the peak transit commute periods (6-9 a.m. and 3-6 p.m.). 3 Lane capacity savings is a measure of how many general purpose lanes' worth of capacity transit ridership provides during the peak periods. See the 2nd edition of the *Handbook for Corridor Capacity Evaluation* at [www.wsdot.wa.gov/publications/fulltext/graynotebook/CCR\\_methodology\\_2nd\\_edition.pdf](http://www.wsdot.wa.gov/publications/fulltext/graynotebook/CCR_methodology_2nd_edition.pdf) for more calculation methods. 4 Average percent of seats used is based on the average maximum load of each bus or train trip and the total seats on the bus or train. Individual trips could show a load greater than 100% if there was standing-room only. Averaging the load for each commute levels out this variation across multiple trips, and may under-represent the load experienced during the peak utilization of transit. 5 Greenhouse gas emissions avoided by transit use were estimated based on the following factors: a) the average maximum transit load; b) the assumption that for every transit passenger mile traveled, 0.62 miles of single-occupant vehicle travel is avoided; c) the distance traveled on the WSDOT-defined commute trip (not the entire transit trip); d) the average emissions of one pound of CO<sub>2</sub>e for every mile traveled; and e) the emissions from transit vehicle operations provided by the transit agencies. 6 Transit services include buses and Sounder commuter trains. 7 Transit services include buses and Link light rail trains. 8 Transit travel times for the commutes between Lynnwood and Bellevue were not available for the same timeline to compare to the before and after tolling analysis on [pp. 19-20](#) of the 2016 *Corridor Capacity Report*.



# Commute trip analysis

## Additional 12 commutes: Changes in travel time performance, congestion and reliability

2013 and 2015; Morning peak (5-10 a.m.) and evening peak (2-8 p.m.) for an annualized average weekday; 5-minute peak of commuter rush (individual peak times vary); Length of route in miles; All travel times in minutes; Peak of commuter rush and duration of congestion expressed in hours and minutes

### Morning

Morning				Travel Times									Congestion			Reliability		
Route	Direction of travel	Length of route	Peak time	Travel time at posted speed	Travel time at maximum throughput speed	Average travel time at peak of morning commute			Maximum throughput travel time index (MT <sup>3</sup> I)		Peak period %Δ in VMT	Duration of congestion - How long average speed is slower than 45 mph			95th percentiles			
						2013	2015	%Δ	2013	2015		2013	2015	Δ	2013	2015	%Δ	
From Seattle, Bellevue and Renton																		
I-5 Seattle to Everett	NB	23	9:40	23	28	24	25	4%	0.86	0.89	2%	0:00	0:00	0:00	26	27	4%	
I-5 Seattle to SeaTac	SB	13	7:50	13	16	15	14	-7%	0.93	0.92	2%	0:00	0:00	0:00	17	16	-6%	
I-405 Bellevue to Lynnwood	NB	16	7:35	16	19	-- <sup>1</sup>	-- <sup>1</sup>	-- <sup>1</sup>	0.86	0.85	-5%	0:00	0:00	0:00	-- <sup>1</sup>	-- <sup>1</sup>	-- <sup>1</sup>	
SR 167 Renton to Auburn	SB	10	9:45	10	12	10	11	10%	0.89	0.91	5%	0:00	0:00	0:00	11	12	9%	
I-5 Seattle to Federal Way	SB	22	7:50	22	27	24	23	-4%	0.89	0.88	3%	0:00	0:00	0:00	26	25	-4%	
I-405/I-5 Bellevue to Everett	NB	23	7:35	23	28	24	24	0%	0.87	0.86	-3%	0:00	0:00	0:00	25	25	0%	
I-405/I-90 Bellevue to Issaquah	EB	9	5:15	9	11	11	11	0%	0.96	1.03	2%	0:00	0:00	0:00	11	12	9%	

### Evening

#### To Seattle, Bellevue and Renton

I-405 Lynnwood to Bellevue	SB	16	16:30	16	19	-- <sup>1</sup>	-- <sup>1</sup>	-- <sup>1</sup>	1.37	1.31	-5%	2:25	2:40	0:15	-- <sup>1</sup>	-- <sup>1</sup>	-- <sup>1</sup>
SR 167 Auburn to Renton	NB	10	14:15	10	12	11	11	0%	0.95	0.96	2%	0:00	0:00	0:00	15	15	0%
I-90/I-405 Issaquah to Bellevue	WB	9	17:20	9	11	13	12	-8%	1.13	1.08	-1%	0:20	0:00	-0:20	17	16	-6%
I-5 Federal Way to Seattle	NB	22	16:35	22	27	33	32	-3%	1.23	1.21	0%	1:40	2:10	0:30	47	43	-9%
I-5/I-405 Everett to Bellevue	SB	24	16:20	24	28	36	34	-6%	1.25	1.21	-3%	1:50	2:05	0:15	51	50	-2%

Data sources and analysis: WSDOT Northwest Region Traffic Office, Washington State Transportation Center, and WSDOT Office of Strategic Assessment and Performance Analysis.

Notes: The symbol "Δ" is used to denote change in a variable. Commute lengths and travel time values have been rounded to integer values for publication only. MT<sup>3</sup> Index values cannot be reproduced as published using the integer values in the table. Due to rounding, some percentages are not computable based on numbers in the table. 1 In the fall of 2015, WSDOT deployed express toll lanes on I-405 between Bellevue and Lynnwood. Please see the special report on [pp. 19-20](#) of the 2016 *Corridor Capacity Report*. For detailed quarterly reports, see [www.wsdot.wa.gov/tolling/405/library.htm](http://www.wsdot.wa.gov/tolling/405/library.htm).

### Reliability percentiles in plain English

Analyzing reliability based on travel times recorded on approximately 260 weekdays in a calendar year during the peak 5-minute interval

	Definition	Why do we measure this?
<b>Average travel time (the mean)</b>	Average of all the recorded travel times.	Describes the "average" experience on the road that year.
<b>50th percentile travel time (the median)</b>	Half of recorded travel times were shorter, half longer, than this duration.	The median is not affected by very large times as an average is, so it gives a better sense of actual conditions.
<b>80th percentile travel time</b>	80% of recorded travel times were shorter than this duration.	WSDOT uses this percentile to track changes in reliable travel times over the years at a finer level, to better evaluate operational improvements.
<b>90th percentile travel time</b>	90% of recorded travel times were shorter than this duration.	WSDOT uses this percentile to track changes in reliable travel times over the years at a finer level, to better evaluate operational improvements.
<b>95th percentile travel time</b>	95% of recorded travel times were shorter than this duration.	Allows commuters to plan how much time will be required to make a trip and be on time 19 days a month, on average (late one of 20 days).



# Central Puget Sound Region

## High occupancy vehicle (HOV) trip analysis

**Morning commutes: HOV lane travel time performance compared to single occupant vehicle (SOV) lanes**  
 2013 and 2015; Morning peak (6-9 a.m.) for an annualized average weekday; 5-minute peak of commuter rush (individual peak times vary); Length of route in miles; All travel times and differences in minutes; Peak of commuter rush expressed in hours and minutes

### Morning

Morning				Travel times on the route at		Average travel time at peak of morning rush					95% reliable travel times					
				Posted speed	Maximum throughput speed	HOV lanes			SOV lanes		2015: Δ HOV vs. SOV	HOV lanes			SOV lanes	
Route	Direction of travel	Length of route	Peak time			2013	2015	Δ	2015	2013		2015	Δ	2015		
To Seattle																
I-5 Everett to Seattle																
Regular HOV lane		SB	24	7:15	24	28	39	47	8	56	-9	61	75	14	92	-17
Reversible lanes		SB	24	7:15	24	28	37	45	8	56	-11	55	72	17	92	-20
I-5 Federal Way to Seattle <sup>1</sup>		NB	22	7:20	22	27	36	43	7	54	-11	49	61	12	69	-8
I-90/I-5 Issaquah to Seattle																
HOV & SOV lanes <sup>1</sup>		WB/NB	14	8:00	14	17	18	20	2	26	-6	22	26	4	40	-14
HOV & reversible lanes <sup>1</sup>		WB/NB	14	8:00	14	17	16	16	0	26	-10	19	21	2	40	-19
SR 520/I-5 Redmond to Seattle		WB/SB	13	8:30	13	16	18	20	2	22	-2	23	26	3	33	-7
I-5 SeaTac to Seattle		NB	13	7:45	13	16	21	27	6	36	-9	30	37	7	46	-9
I-405/I-90/I-5 Bellevue to Seattle																
HOV & SOV lanes <sup>1</sup>		SB/WB/NB	9	8:25	9	11	14	15	1	16	-1	18	21	3	24	-3
HOV & reversible lanes <sup>1</sup>		SB/WB/NB	9	8:25	9	11	10	11	1	16	-5	12	13	1	24	-11
I-405/SR 520/I-5 Bellevue to Seattle		NB/WB/SB	10	8:35	10	12	14	16	2	19	-3	18	22	4	28	-6
To Bellevue																
I-5/I-405 Everett to Bellevue		SB	24	7:20	24	28	31	32	1	55	-23	41	42	1	79	-37
I-405 Lynnwood to Bellevue		SB	16	7:30	16	19	-- <sup>3</sup>	-- <sup>3</sup>	-- <sup>3</sup>	-- <sup>3</sup>	-- <sup>3</sup>	-- <sup>3</sup>	-- <sup>3</sup>	-- <sup>3</sup>	-- <sup>3</sup>	-- <sup>3</sup>
I-405 Tukwila to Bellevue		NB	13	7:30	13	16	18	24	6	42	-18	27	34	7	59	-25
I-5/I-90/I-405 Seattle to Bellevue <sup>1</sup>		SB/EB/NB	9	7:50	9	11	12	12	0	13	-1	15	15	0	17	-2
I-90/I-405 Issaquah to Bellevue		WB/NB	9	7:40	9	11	12	12	0	16	-4	15	15	0	26	-11
SR 520/I-405 Redmond to Bellevue		WB/SB	6	8:45	6	7	9	8	-1	8	0	11	10	-1	11	-1
To other locations																
I-405 Bellevue to Tukwila		SB	13	7:35	13	16	13	13	0	19	-6	13	14	1	31	-17
SR 167 Auburn to Renton (HOT)		NB	10	7:20	10	12	12	14	2	19	-5	17	19	2	29	-10
I-5/I-90 Seattle to Issaquah <sup>1</sup>		SB/EB/NB	14	8:35	14	16	16	15	-1	15	0	19	17	-2	19	-2
I-5/SR 520 Seattle to Redmond <sup>2</sup>		NB/EB	13	8:40	13	16	19	21	2	20	1	28	29	1	28	1

Data sources and analysis: WSDOT Northwest Region Traffic Office, Washington State Transportation Center, and WSDOT Office of Strategic Assessment and Performance Analysis.

Notes: Commute lengths have been rounded to integer values for publication purposes only. Trip routes on I-5 and I-90 include reversible lane options for the weekday time periods (morning or evening) and directions of travel when the reversible lanes are in effect. 1 Some HOV trips have modified trip lengths compared to the corresponding standard SOV trips in the central Puget Sound region due to the lack of data at the HOV trip's endpoints. Affected trips are on SR 167 between Renton and Auburn, on I-90 between Seattle and Issaquah, and on I-90 between Bellevue and Seattle. In each case, to enable a direct comparison, the lengths of the corresponding SOV trips have been adjusted to match the HOV trip length as closely as possible; this means travel times and time stamps for the peak of the commuter rush for these modified SOV trips will not necessarily match those in the SOV trip tables on [pp. 17-18](#). HOV trips with the same endpoints as SOV lane trips, but differing lengths, do not require any adjustment, since the difference in lengths is the result of HOVs using different roadways than SOVs (e.g., an HOV only interchange ramp). 2 The HOV trip on SR 520 eastbound from Seattle to Bellevue is no longer reported, because HOV lanes exist along only a very short portion of the route. 3 In the fall of 2015, WSDOT deployed express toll lanes on I-405 between Bellevue and Lynnwood. Please see the special report on [pp. 19-20](#) of the 2016 *Corridor Capacity Report*. For detailed quarterly reports, see [www.wsdot.wa.gov/tolling/405/library.htm](http://www.wsdot.wa.gov/tolling/405/library.htm).

# High occupancy vehicle (HOV) trip analysis

## Evening commutes: HOV lane travel time performance compared to single occupant vehicle (SOV) lanes

2013 and 2015; Evening peak (3-6 p.m.) for an annualized average weekday; 5-minute peak of commuter rush (individual peak times vary); Length of route in miles; All travel times and differences in minutes; Peak of commuter rush expressed in hours and minutes

### Evening

Evening				Travel times on the route at		Average travel time at peak of evening rush					95% reliable travel times					
				Posted speed	Maximum throughput speed	HOV lanes		SOV lanes		2015: Δ HOV vs. SOV	HOV lanes		SOV lanes		2015: Δ HOV vs. SOV	
Route	Direction of travel	Length of route	Peak time			2013	2015	Δ	2015		2013	2015	Δ	2015		
From Seattle																
I-5 Seattle to Everett																
Regular HOV lane		NB	23	16:25	23	28	35	42	7	47	-5	48	58	10	67	-9
Reversible lanes		NB	23	16:25	23	28	30	33	3	47	-14	39	44	5	67	-23
I-5 Seattle to Federal Way				SB	22	16:10	29	33	4	37	-4	41	44	3	53	-9
I-5 Seattle to SeaTac				SB	13	16:10	19	21	2	23	-2	27	31	4	36	-5
I-5/I-90/I-405 Seattle to Bellevue																
HOV & SOV lanes <sup>1</sup>		SB/EB/NB	9	17:15	9	11	12	11	-1	12	-1	18	17	-1	18	-1
HOV & reversible lanes <sup>1</sup>		SB/EB/NB	9	17:15	9	11	10	10	0	12	-2	11	11	0	18	-7
I-5/SR 520 Seattle to Redmond <sup>2</sup>				NB/EB	13	17:35	17	17	0	18	-1	22	22	0	25	-3
I-5/I-90 Seattle to Issaquah																
HOV & SOV lanes <sup>1</sup>		SB/EB	14	17:35	14	16	17	15	-2	18	-3	22	20	-2	26	-6
HOV & reversible lanes <sup>1</sup>		SB/EB	14	17:35	14	16	14	14	0	18	-4	15	16	1	26	-10
From Bellevue																
I-405 Bellevue to Everett				NB	23	16:50	30	32	2	49	-17	40	40	0	65	-25
I-405 Bellevue to Lynnwood				NB	16	16:50	-- <sup>3</sup>	-- <sup>3</sup>	-- <sup>3</sup>	-- <sup>3</sup>	-- <sup>3</sup>	-- <sup>3</sup>	-- <sup>3</sup>	-- <sup>3</sup>	-- <sup>3</sup>	-- <sup>3</sup>
I-405 Bellevue to Tukwila				SB	13	16:15	19	23	4	38	-15	29	33	4	50	-17
I-405/I-90/I-5 Bellevue to Seattle <sup>1</sup>		SB/WB/NB	9	16:45	9	11	17	17	0	25	-8	26	28	2	40	-12
I-405/SR 520/I-5 Bellevue to Seattle		NB/WB/SB	10	17:25	10	12	15	17	2	30	-13	19	23	4	40	-17
I-405/I-90 Bellevue to Issaquah				SB/EB	9	17:30	15	16	1	19	-3	20	22	2	25	-3
I-405/SR 520 Bellevue to Redmond				NB/EB	5	17:35	7	7	0	8	-1	9	9	0	13	-4
From other locations																
I-5 Everett to Seattle				SB	24	16:00	42	48	6	52	-4	58	67	9	75	-8
I-90/I-5 Issaquah to Seattle <sup>1</sup>				WB/NB	14	16:55	19	19	0	26	-7	28	28	0	44	-16
SR 520/I-5 Redmond to Seattle				WB/SB	13	17:20	21	21	0	35	-14	32	29	-3	54	-25
I-5 SeaTac to Seattle				NB	13	16:45	18	18	0	24	-6	27	25	-2	36	-11
SR 167 Renton to Auburn (HOT)				SB	10	15:15	12	13	1	20	-7	17	18	1	36	-18
I-405 Tukwila to Bellevue				NB	13	17:20	14	14	0	21	-7	15	15	0	32	-17

Data sources and analysis: WSDOT Northwest Region Traffic Office, Washington State Transportation Center, and WSDOT Office of Strategic Assessment and Performance Analysis.

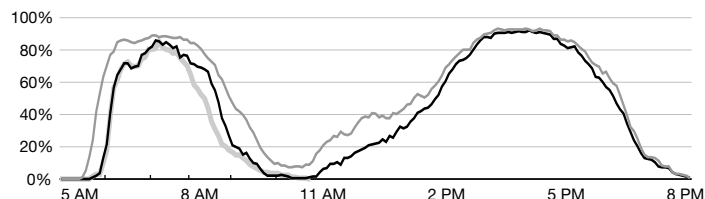
Notes: Commute lengths have been rounded to integer values for publication purposes only. Trip routes on I-5 and I-90 include reversible lane options for the weekday time periods (morning or evening) and directions of travel when the reversible lanes are in effect. 1 Some HOV trips have modified trip lengths compared to the corresponding standard SOV trips in the central Puget Sound region due to the lack of data at the HOV trip's endpoints. Affected trips are on SR 167 between Renton and Auburn, on I-90 between Seattle and Issaquah, and on I-90 between Bellevue and Seattle. In each case, to enable a direct comparison, the lengths of the corresponding SOV trips have been adjusted to match the HOV trip length as closely as possible; this means travel times and time stamps for the peak of the commuter rush for these modified SOV trips will not necessarily match those in the SOV trip tables on [pp. 17-18](#). 2 HOV trips with the same endpoints as SOV lane trips, but differing lengths, do not require any adjustment, since the difference in lengths is the result of HOVs using different roadways than SOVs (e.g., an HOV only interchange ramp). 3 The HOV trip on SR 520 eastbound from Seattle to Bellevue is no longer reported, because HOV lanes exist along only a very short portion of the route. 4 In the fall of 2015, WSDOT deployed express toll lanes on I-405 between Bellevue and Lynnwood. Please see the special report on [pp. 19-20](#) of the 2016 *Corridor Capacity Report*. For detailed quarterly reports, see [www.wsdot.wa.gov/tolling/405/library.htm](http://www.wsdot.wa.gov/tolling/405/library.htm).

## HOV stamp graphs: Frequency, duration of congestion

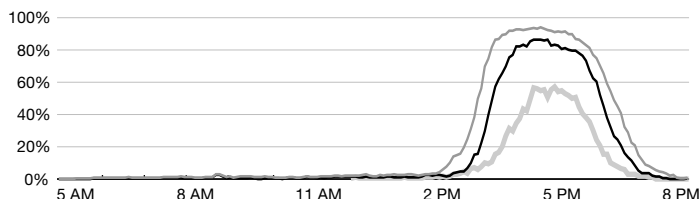
Comparing HOV and adjacent SOV lanes: Percent of weekdays experiencing congestion (part 1)

2015; Percent of days average speed was slower than 45 mph on HOV and SOV lanes

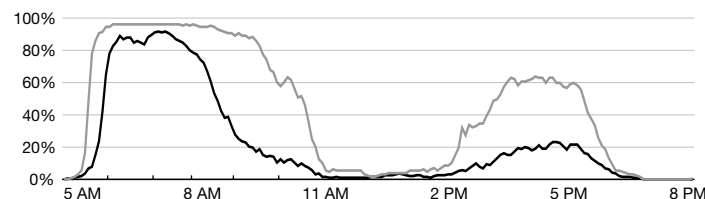
**Everett to Seattle via I-5<sup>1</sup>**



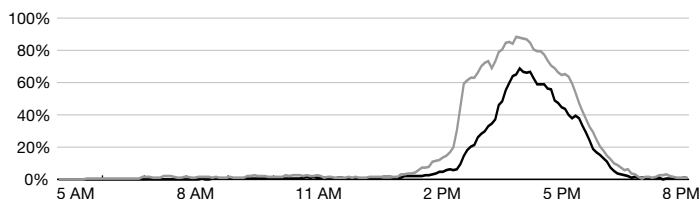
**Seattle to Everett via I-5<sup>2</sup>**



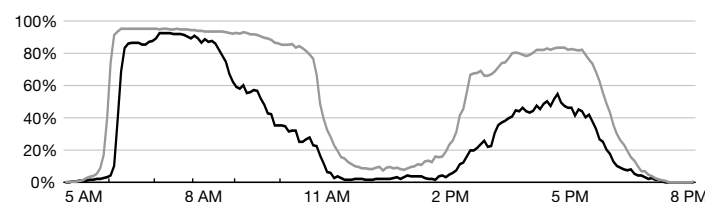
**Federal Way to Seattle via I-5**



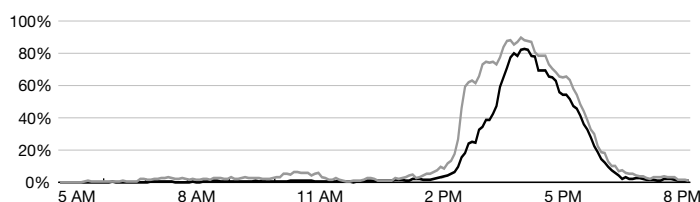
**Seattle to Federal Way via I-5**



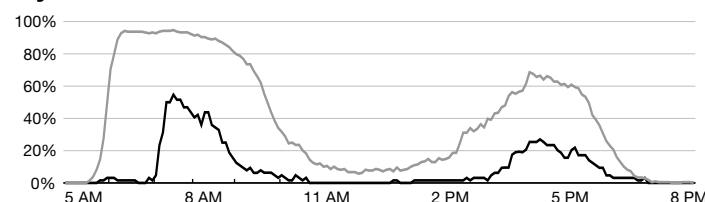
**SeaTac to Seattle via I-5**



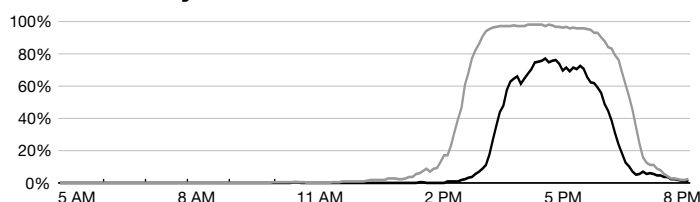
**Seattle to SeaTac via I-5**



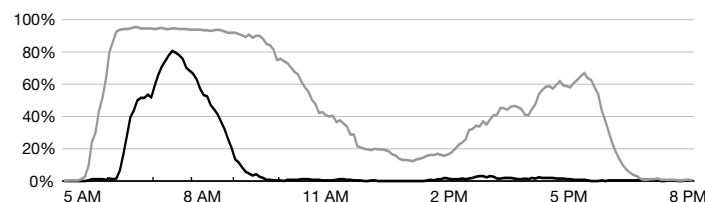
**Lynnwood to Bellevue via I-405**



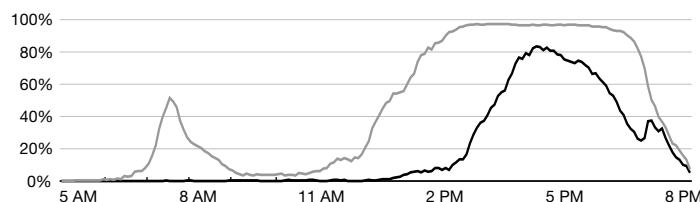
**Bellevue to Lynnwood via I-405**



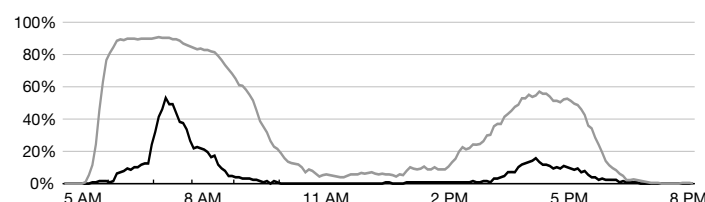
**Tukwila to Bellevue via I-405**



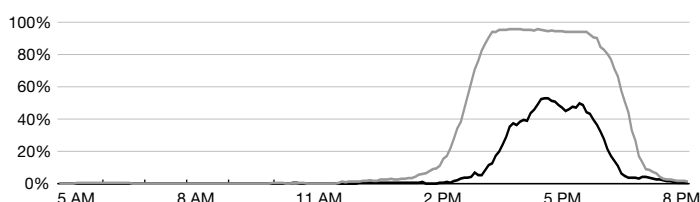
**Bellevue to Tukwila via I-405**



**Everett to Bellevue via I-5/I-405**



**Bellevue to Everett via I-405/I-5**



— SOV lanes — HOV lanes — Reversible lanes

Data sources and analysis: Washington State Transportation Center and WSDOT Office of Strategic Assessment and Performance Analysis.

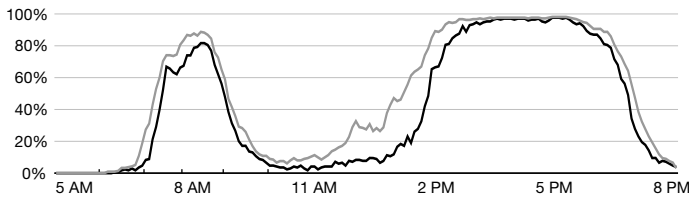
Note: See [p. 2](#) for congestion definitions and how to read these graphs. 1 Weekday hours of operation for the I-5 reversible lanes on the Everett to Seattle commute are 5 a.m. to 11 a.m. 2 Weekday hours of operation for the I-5 reversible lanes on the Seattle to Everett commute are noon to 11 p.m.

# HOV stamp graphs: Frequency, duration of congestion

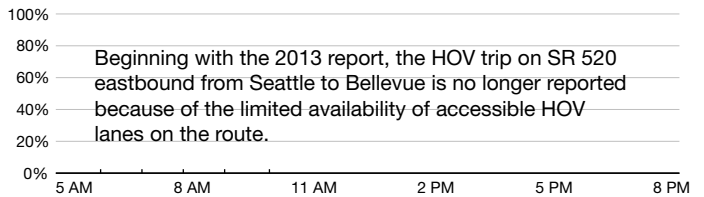
## Comparing HOV and adjacent SOV lanes: Percent of weekdays experiencing congestion (part 2)

2015; Percent of days average speed was slower than 45 mph on HOV and SOV lanes

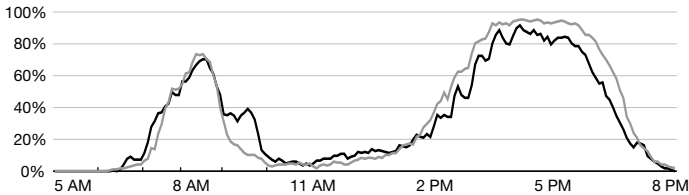
### Bellevue to Seattle via I-405/SR 520/I-5



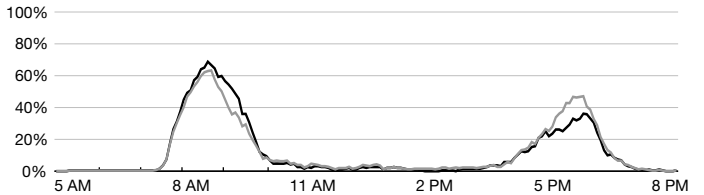
### Seattle to Bellevue via I-5/SR 520/I-405



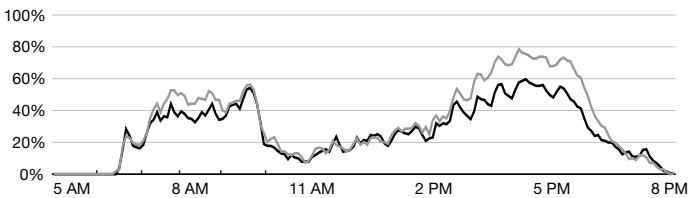
### Redmond to Seattle via SR 520/I-5



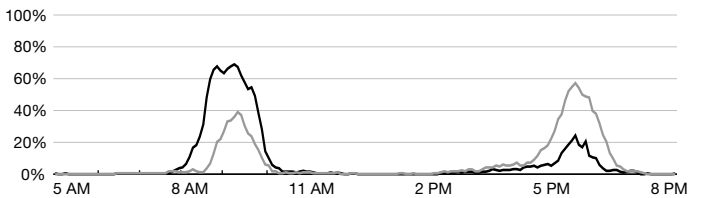
### Seattle to Redmond via I-5/SR 520



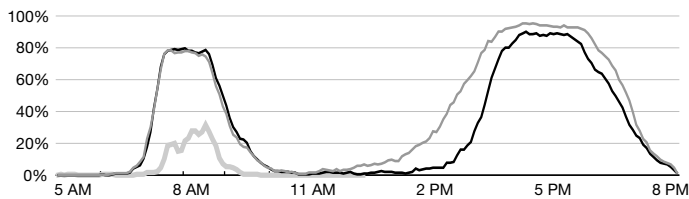
### Redmond to Bellevue via SR 520/I-405



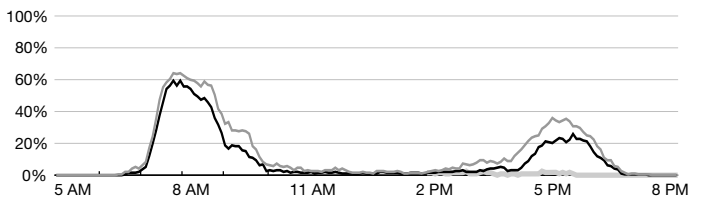
### Bellevue to Redmond via I-405/SR 520



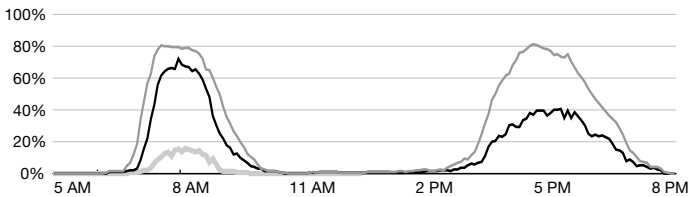
### Bellevue to Seattle via I-405/I-90/I-5<sup>3</sup>



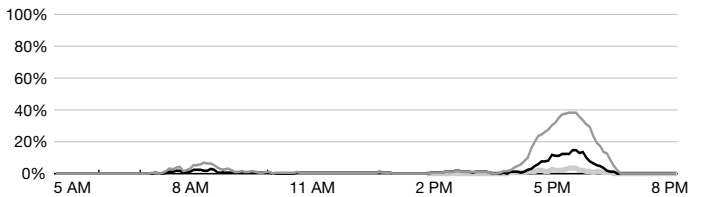
### Seattle to Bellevue via I-5/I-90/I-405<sup>4</sup>



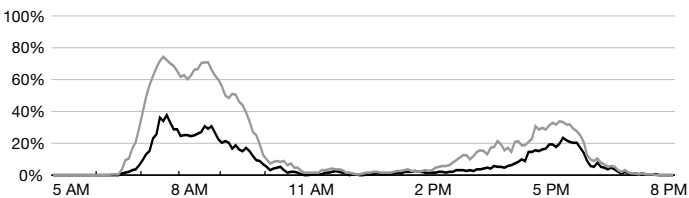
### Issaquah to Seattle via I-90/I-5<sup>5</sup>



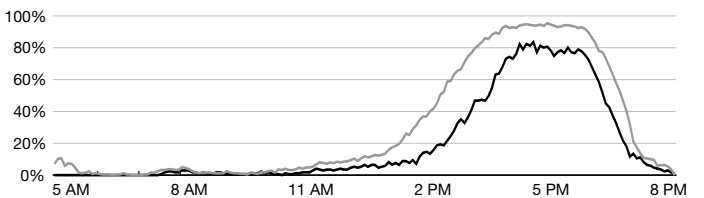
### Seattle to Issaquah via I-5/I-90<sup>6</sup>



### Issaquah to Bellevue via I-90/I-405



### Bellevue to Issaquah via I-405/I-90



— SOV lanes — HOV lanes — Reversible lanes

Data sources and analysis: Washington State Transportation Center and WSDOT Office of Strategic Assessment and Performance Analysis.

Note: See [p. 2](#) for congestion definitions and how to read these graphs. 3 Weekday hours of operation for the I-90 reversible lanes on the Bellevue to Seattle commute are 1 a.m. to 12:30 p.m. 4 Weekday hours of operation for the I-90 reversible lanes on the Seattle to Bellevue commute are 2 p.m. to midnight. 5 Weekday hours of operation for the I-90 reversible lanes on the Issaquah to Seattle commute are 1 a.m. to 12:30 p.m. 6 Weekday hours of operation for the I-90 reversible lanes on the Seattle to Issaquah commute are 2 p.m. to midnight.

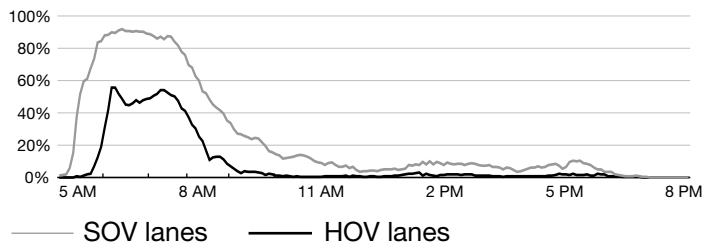
## Central Puget Sound Region

# HOV stamp graphs and reliability performance

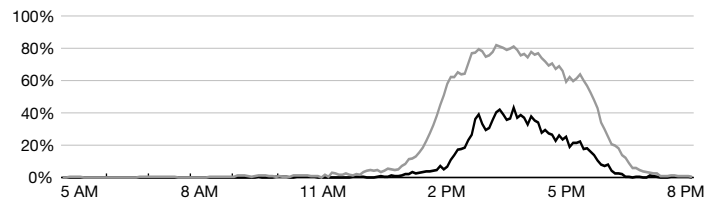
### Comparing HOV and adjacent SOV lanes: Percent of weekdays experiencing congestion (part 3)

2015; Percent of days average speed was slower than 45 mph on HOV and SOV lanes

**Auburn to Renton via SR 167**



**Renton to Auburn via SR 167**



Data sources and analysis: Washington State Transportation Center and WSDOT Office of Strategic Assessment and Performance Analysis.

Note: See [p. 2](#) for congestion definitions and how to read these graphs.

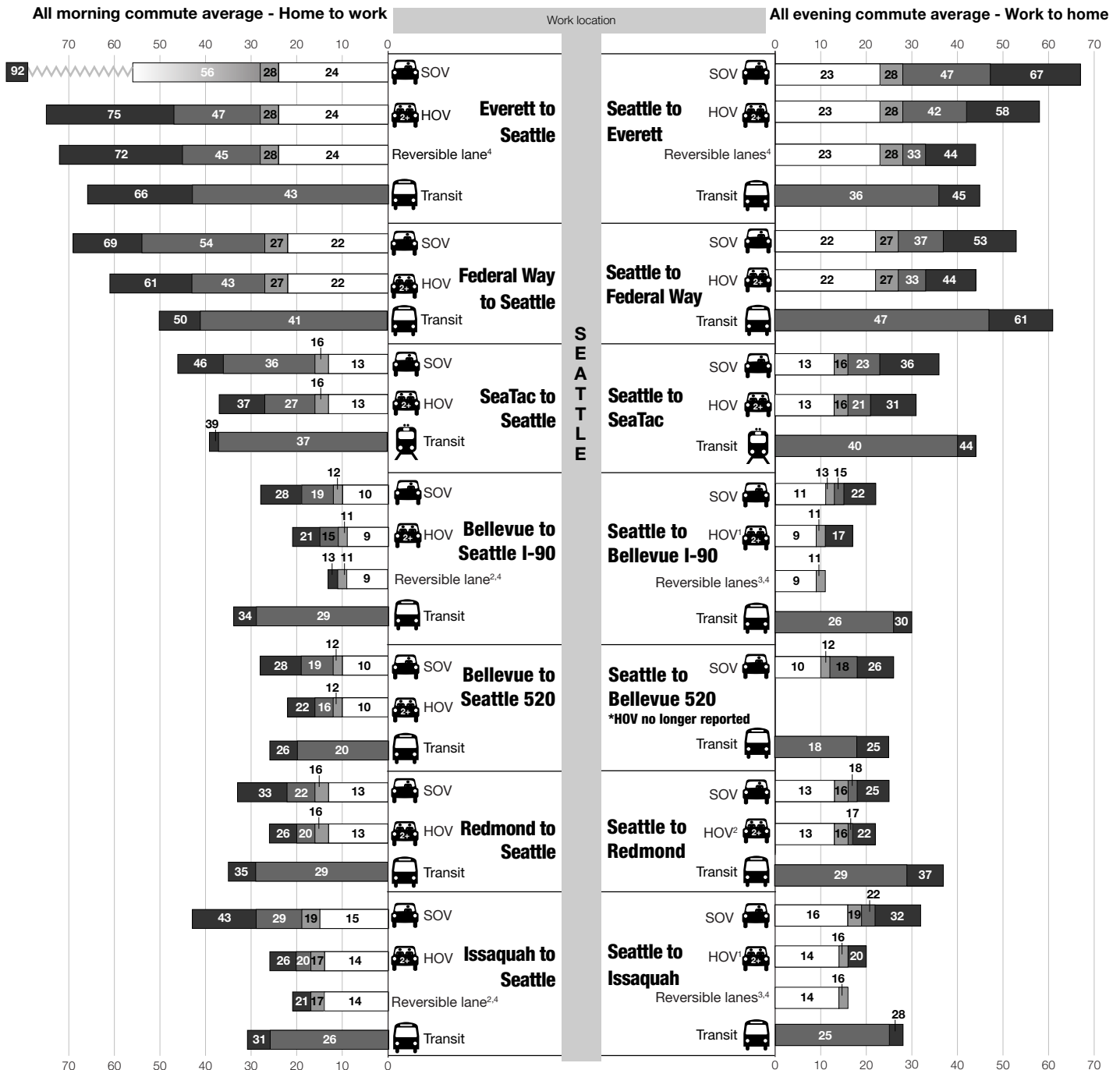
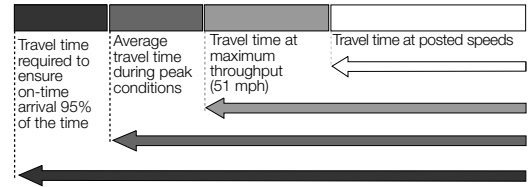


# HOV, SOV and transit trip analysis – Seattle

Travel times at posted speeds, maximum throughput speeds, peak travel times, and 95th percentile reliable travel times

## Morning and evening commutes by work location

2015; Single occupant vehicle (SOV), high occupancy vehicle (HOV) and public transit<sup>1</sup> commutes in the central Puget Sound area; Travel time in minutes



Data sources and analysis: Washington State Transportation Center and WSDOT Office of Strategic Assessment and Performance Analysis.

Notes: 1 Transit travel times by bus may not be directly comparable to SOV/HOV trips due to different start and end points or off-highway travel to stops. WSDOT attempts to match transit trips as closely as is practical to SOV/HOV. 2 Average travel times were equal to or faster than maximum throughput travel times on this route. 3 Average travel times and 95th percentile reliable travel times were equal to or faster than maximum throughput travel times on this route. 4 Monday through Friday reversible lane hours of operation: I-5 Southbound - 5:00 a.m.-11 a.m.; Northbound - 12-noon-11 p.m.; I-90 Westbound - 1 a.m.-12:30 p.m.; Eastbound - 2 p.m.-12-midnight.

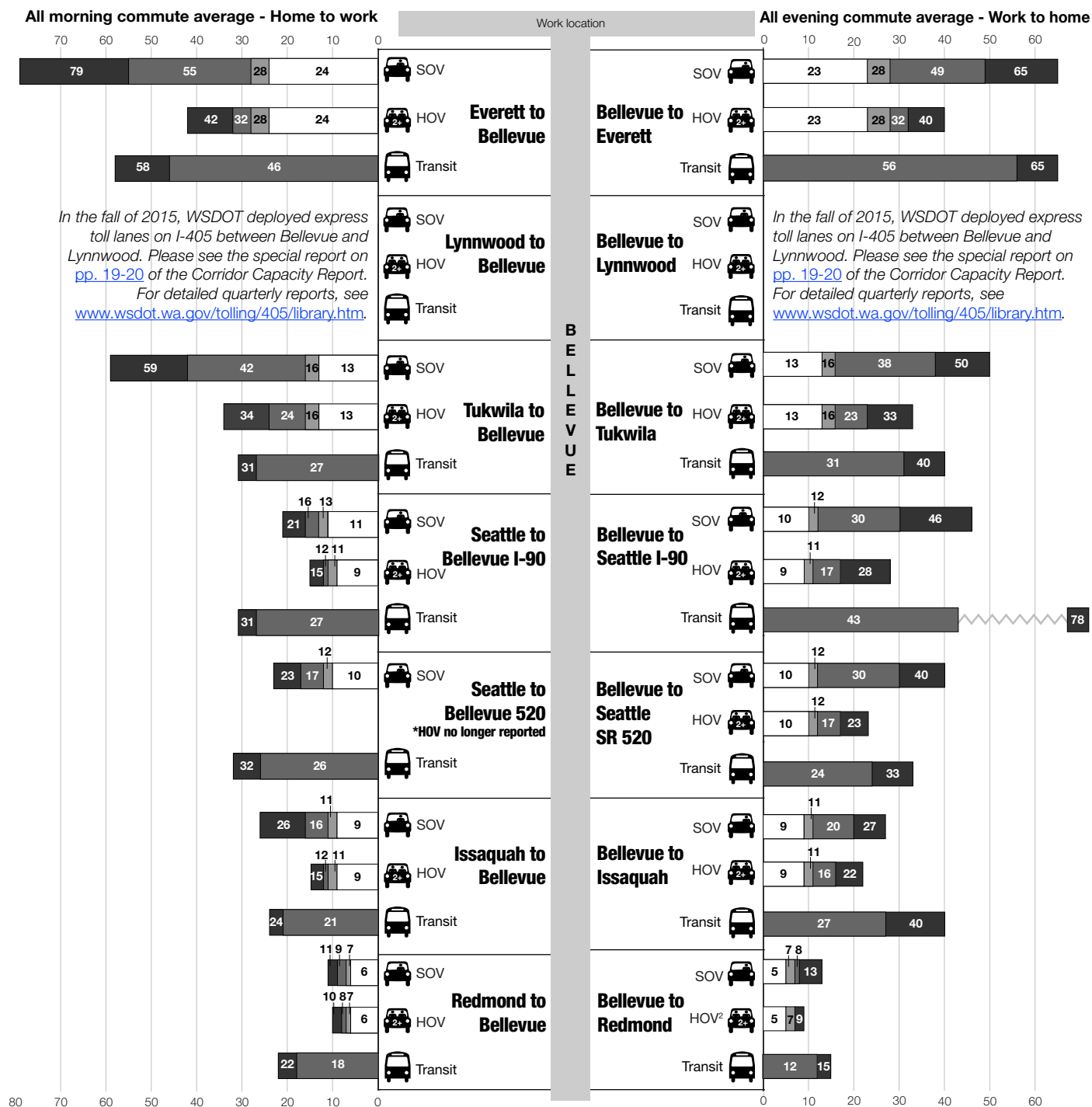
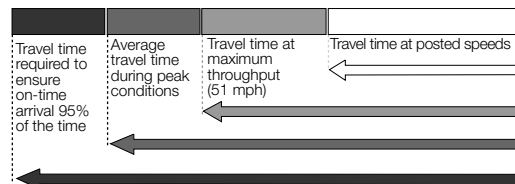
# Central Puget Sound Region

## HOV, SOV and transit trip analysis – Bellevue

Travel times at posted speeds, maximum throughput speeds, peak travel times, and 95th percentile reliable travel times

Morning and evening commutes by work location

2015; Single occupant vehicle (SOV), high occupancy vehicle (HOV) and public transit<sup>1</sup> commutes in the central Puget Sound area; Travel time in minutes



Data sources and analysis: Washington State Transportation Center and WSDOT Office of Strategic Assessment and Performance Analysis.

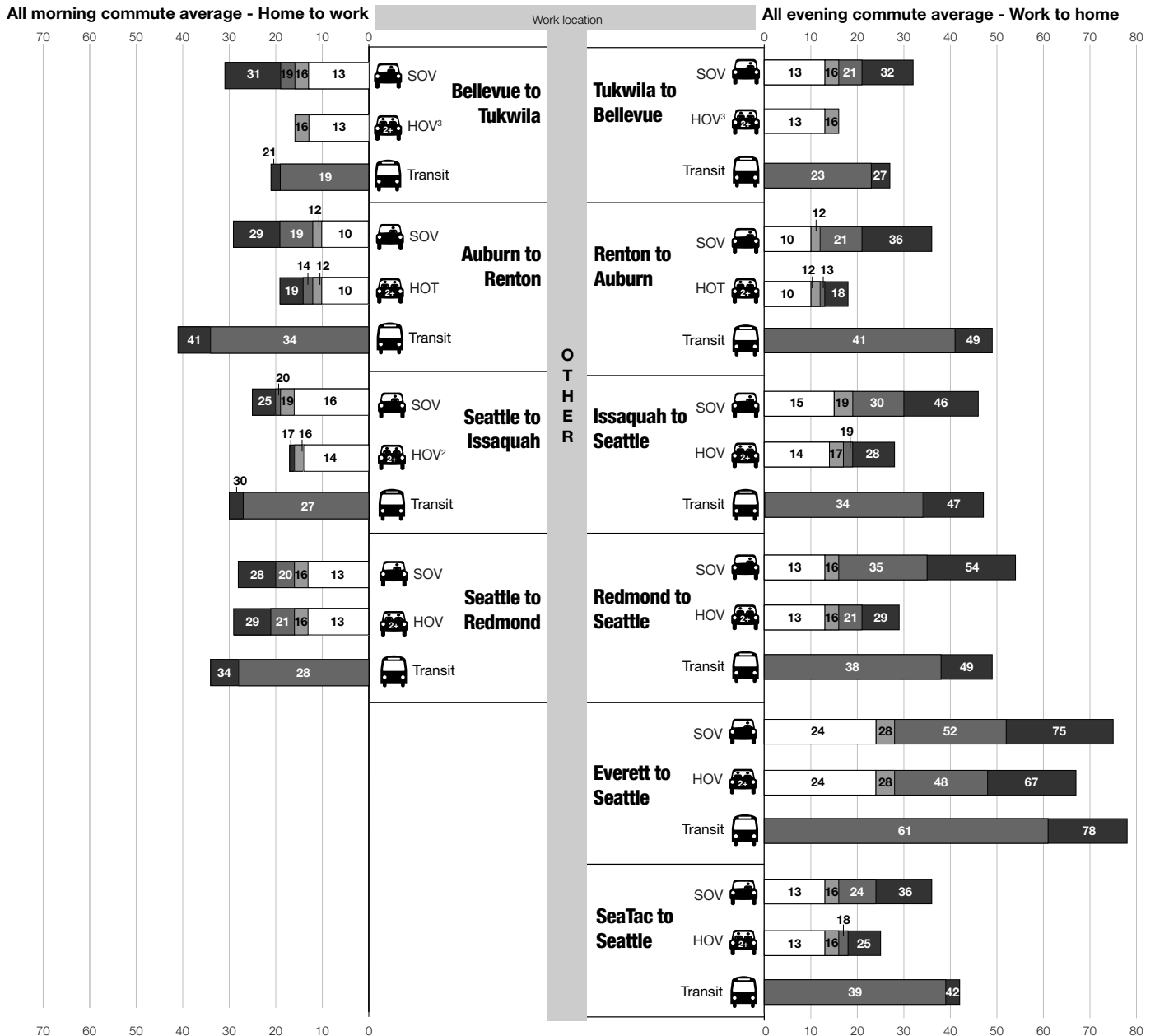
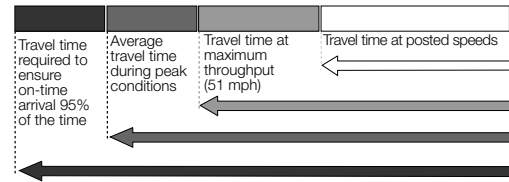
Notes: 1 Transit travel times by bus may not be directly comparable to SOV/HOV trips due to different start and end points or off-highway travel to stops. WSDOT attempts to match transit trips as closely as is practical to SOV/HOV. 2 Average travel times were equal to or faster than maximum throughput travel times on this route.

# HOV, SOV and transit trip analysis – Other locations

Travel times at posted speeds, maximum throughput speeds, peak travel times, and 95th percentile reliable travel times

## Morning and evening commutes by work location

2015; Single occupant vehicle (SOV), high occupancy vehicle (HOV), high occupancy toll (HOT), and public transit<sup>1</sup> commutes in the central Puget Sound area; Travel time in minutes



Data sources and analysis: Washington State Transportation Center and WSDOT Office of Strategic Assessment and Performance Analysis.

Notes: 1 Transit travel times by bus may not be directly comparable to SOV/HOV trips due to different start and end points or off-highway travel to stops. WSDOT attempts to match transit trips as closely as is practical to SOV/HOV. 2 Average travel times were equal to or faster than maximum throughput travel times on this route. 3 Average travel times and 95th percentile reliable travel times were equal to or faster than maximum throughput travel times on this route.

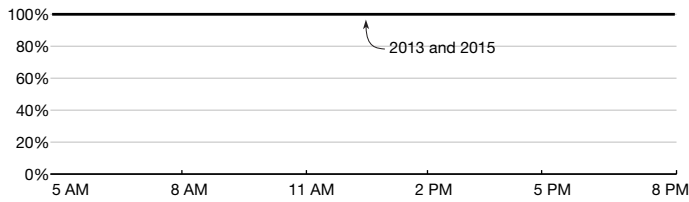
# South Puget Sound Region

## Throughput productivity

**Throughput productivity at select south Puget Sound region freeway locations by commute direction**  
 2013 and 2015; Based on the highest observed 5-minute (min.) flow rates; Vehicles per hour per lane (vphpl) at specific mileposts (MP)

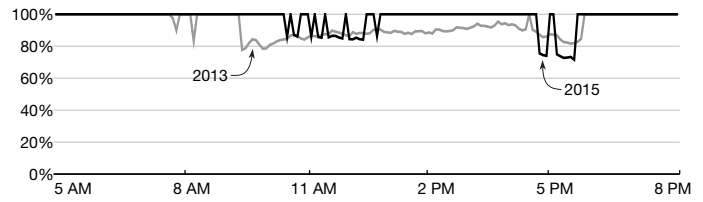
### Northbound I-5 in Olympia at 14th Avenue (MP 105.5)

Based on the highest observed 5 min. flow rate of 1,340 vphpl = 100%



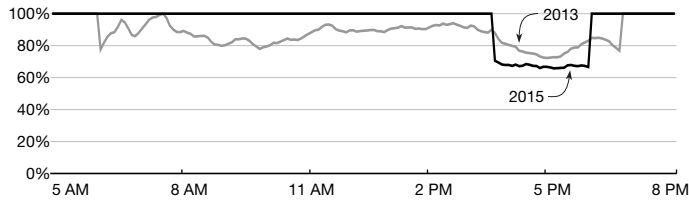
### Southbound I-5 in Olympia at 14th Avenue (MP 105.5)

Based on the highest observed 5 min. flow rate of 1,350 vphpl = 100%



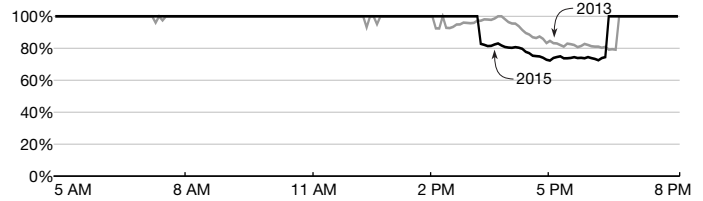
### Northbound I-5 at JBLM (MP 122.5)

Based on the highest observed 5 min. flow rate of 1,540 vphpl = 100%



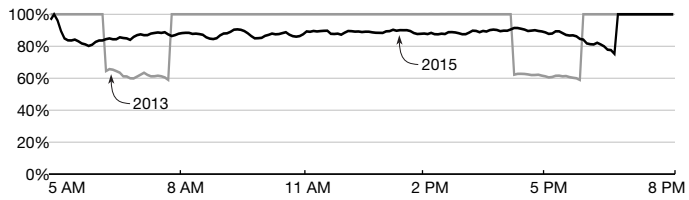
### Southbound I-5 at JBLM (MP 122.5)

Based on the highest observed 5 min. flow rate of 1,270 vphpl = 100%



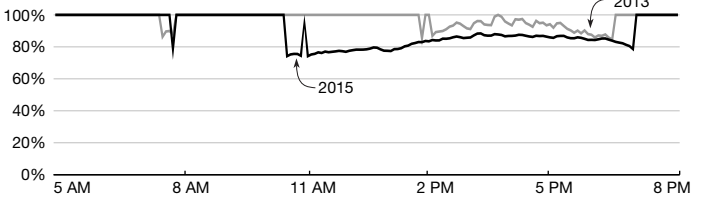
### Northbound I-5 south of Tacoma Dome (MP 133.5)

Based on the highest observed 5 min. flow rate of 1,570 vphpl = 100%



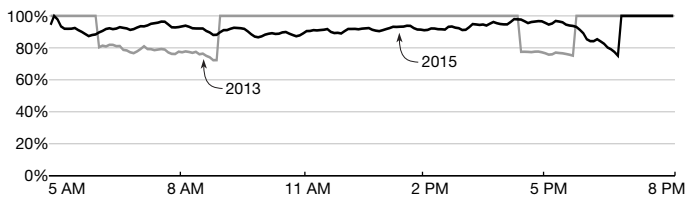
### Southbound I-5 south of Tacoma Dome (MP 133.5)

Based on the highest observed 5 min. flow rate of 1,680 vphpl = 100%



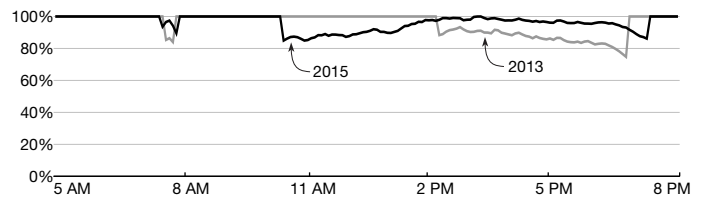
### Northbound I-5 north of Tacoma Dome (MP 134.5)

Based on the highest observed 5 min. flow rate of 1,810 vphpl = 100%



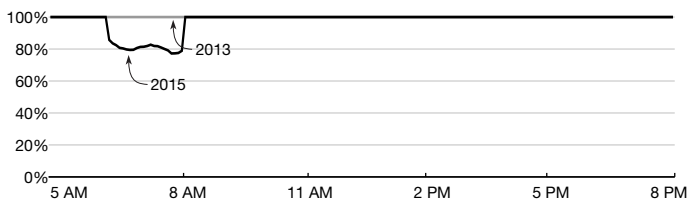
### Southbound I-5 north of Tacoma Dome (MP 134.5)

Based on the highest observed 5 min. flow rate of 1,410 vphpl = 100%



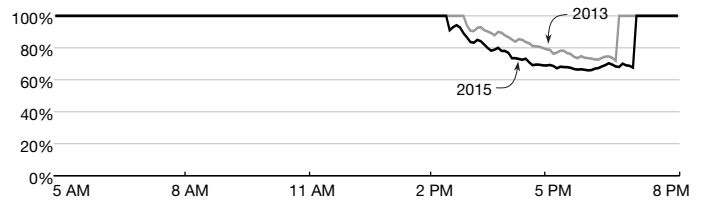
### Northbound I-5 at SR 18 (MP 140.5)

Based on the highest observed 5 min. flow rate of 1,600 vphpl = 100%



### Southbound I-5 at SR 18 (MP 140.5)

Based on the highest observed 5 min. flow rate of 1,560 vphpl = 100%



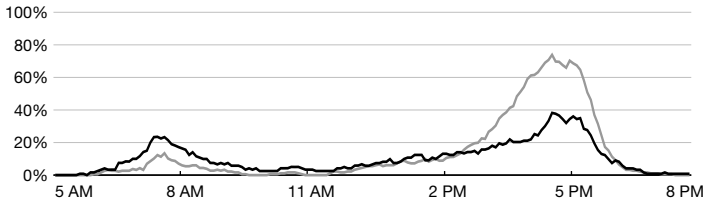
Data sources and analysis: WSDOT Olympic Region Traffic Office, Washington State Transportation Center, and WSDOT Office of Strategic Assessment and Performance Analysis.

Note: See [p. 2](#) for throughput definitions and how to read these graphs.

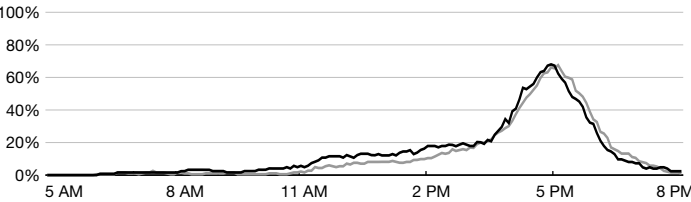
# Stamp graphs: Frequency, duration of congestion

Stamp graphs of congestion by time of day on south Puget Sound region freeways  
2013 and 2015 weekdays; Percent of days the average speed was slower than 45 mph

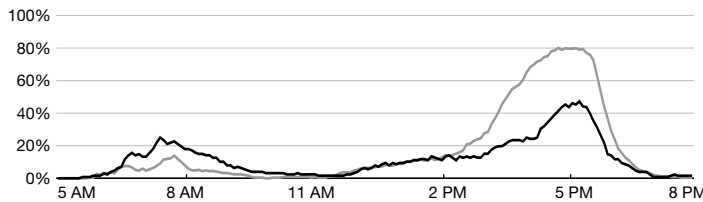
**I-5 Northbound: Olympia to Tacoma**



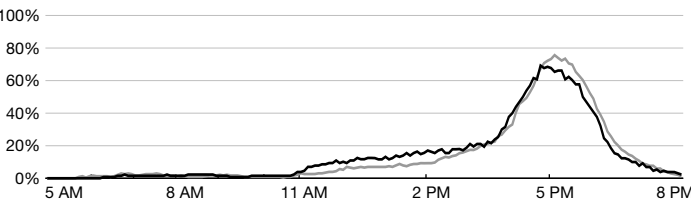
**I-5 Southbound: Tacoma to Olympia**



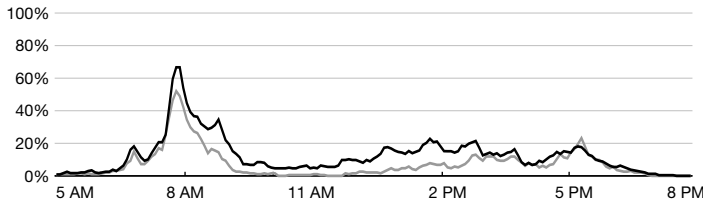
**I-5 Northbound: Lacey to Lakewood**



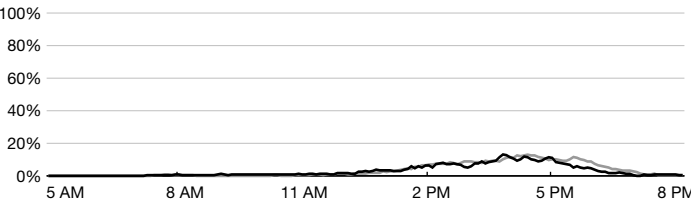
**I-5 Southbound: Lakewood to Lacey**



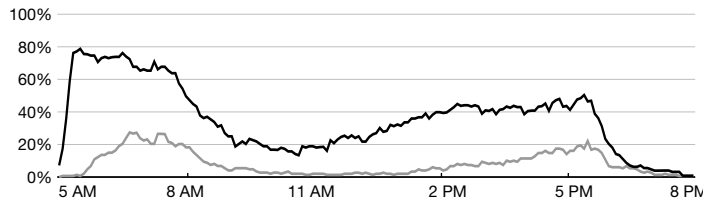
**I-5 Northbound: Lakewood to Tacoma**



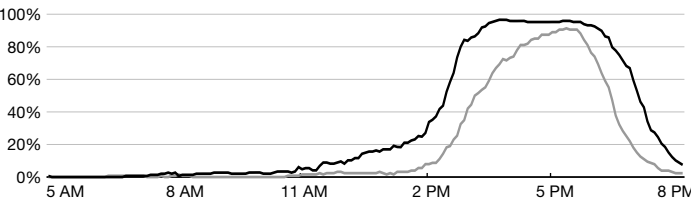
**I-5 Southbound: Tacoma to Lakewood**



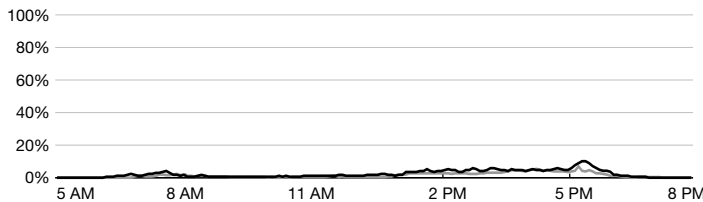
**I-5 Northbound: Tacoma to Federal Way**



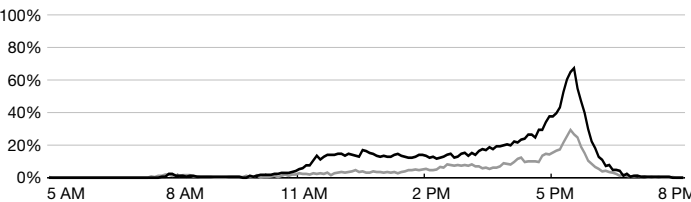
**I-5 Southbound: Federal Way to Tacoma**



**I-5 Northbound: Olympia to Lacey**



**I-5 Southbound: Lacey to Olympia**



— 2013 — 2015

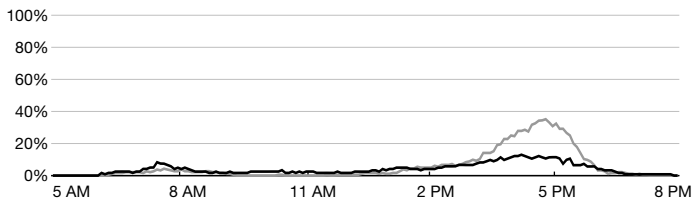
Data sources and analysis: WSDOT Olympic Region Traffic Office and WSDOT Office of Strategic Assessment and Performance Analysis.  
Note: See [p. 2](#) for congestion definitions and how to read these graphs.

## South Puget Sound Region

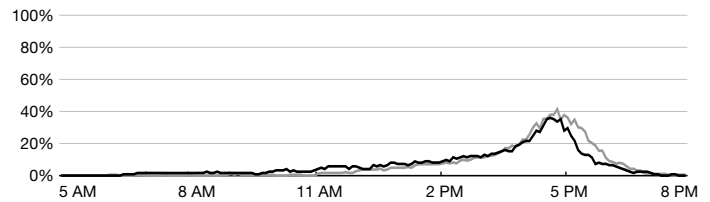
# Stamp graphs: Frequency, duration of SEVERE congestion

Stamp graphs of SEVERE congestion by time of day on south Puget Sound region freeways  
2013 and 2015 weekdays; Percent of days the average speed was slower than 36 mph

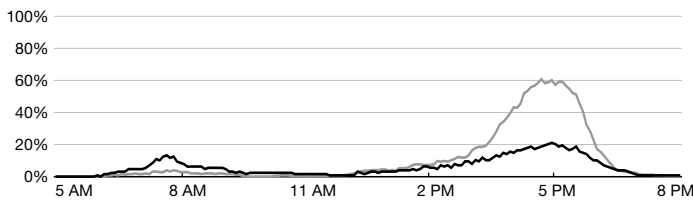
**I-5 Northbound: Olympia to Tacoma**



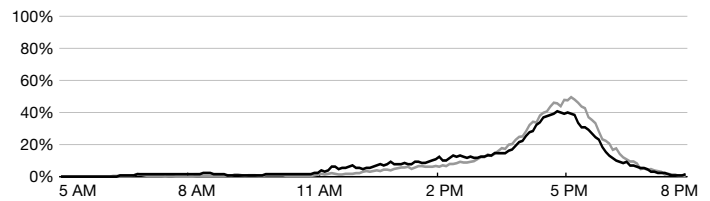
**I-5 Southbound: Tacoma to Olympia**



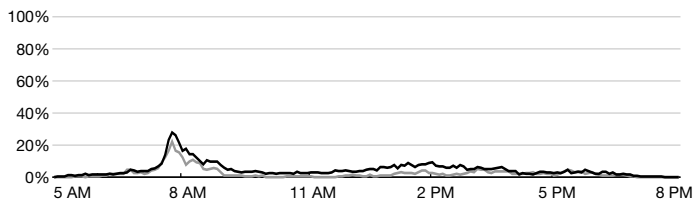
**I-5 Northbound: Lacey to Lakewood**



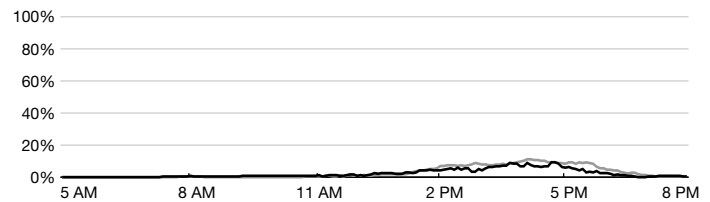
**I-5 Southbound: Lakewood to Lacey**



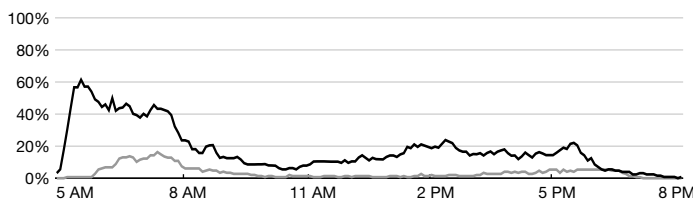
**I-5 Northbound: Lakewood to Tacoma**



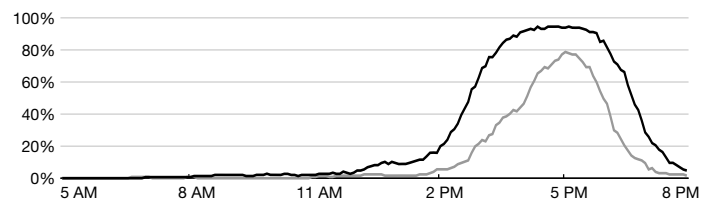
**I-5 Southbound: Tacoma to Lakewood**



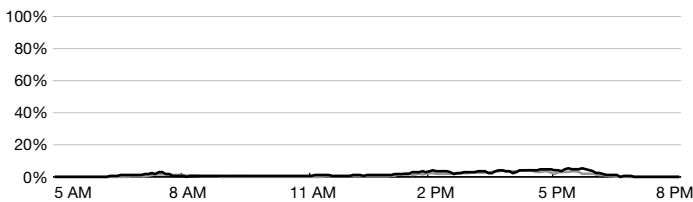
**I-5 Northbound: Tacoma to Federal Way**



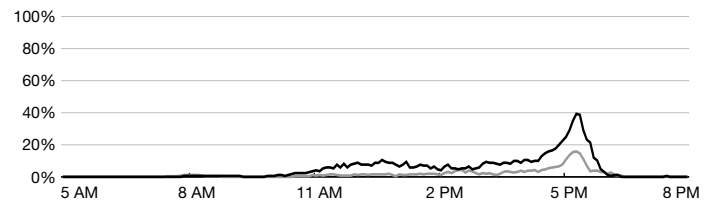
**I-5 Southbound: Federal Way to Tacoma**



**I-5 Northbound: Olympia to Lacey**



**I-5 Southbound: Lacey to Olympia**



— 2013 — 2015

Data sources and analysis: WSDOT Olympic Region Traffic Office and WSDOT Office of Strategic Assessment and Performance Analysis.

Note: See [p. 2](#) for congestion definitions and how to read these graphs.



# Routinely congested segments

## South Puget Sound region routinely congested segments of I-5

2013 weekdays; Length of congestion in miles; Duration of congestion in hours:minutes

Route and direction	Morning peak period				Evening peak period			
	Start and end times	Begin and end milepost	Length of congestion	Duration of congestion	Start and end times	Begin and end milepost	Length of congestion	Duration of congestion
I-5 northbound	7:45-7:55 a.m. <sup>1</sup>	130.5-131	0.5	0:10	3:20-6:10 p.m.	119-123.5	4.5	2:50
	6:35-7:35 a.m.	134-134.5	0.5	1:00				
I-5 southbound					2:45-6:35 p.m.	141-135.5	5.5	3:50
					3:35-5:40 p.m.	134.5-132.5	2	2:05
					3:55-6:05 p.m.	124.5-119.5	5	2:10
<b>Totals</b>			<b>1.0</b>	<b>1:10</b>			<b>17.0</b>	<b>10:55</b>

2015 weekdays; Length of congestion in miles; Duration of congestion in hours:minutes

Route and direction	Morning peak period				Evening peak period			
	Start and end times	Begin and end milepost	Length of congestion	Duration of congestion	Start and end times	Begin and end milepost	Length of congestion	Duration of congestion
I-5 northbound	7:40-8:10 a.m. <sup>1</sup>	130.5-132	1.5	0:30	2:00-5:55 p.m.	133-135.5	2.5	3:55
	5:05-8:40 a.m.	132.5-136.5	4	3:35				
	6:25-7:55 a.m.	141-141.5	0.5	1:30				
I-5 southbound					2:05-7:15 p.m.	141.5-135	6.5	5:10
					2:30-5:25 p.m.	134.5-133.5	1	2:55
					4:05-5:45 p.m.	124.5-122	2.5	1:40
					5:20-5:25 p.m. <sup>1</sup>	107-106.5	0.5	0:05
<b>Totals</b>			<b>6.0</b>	<b>5:35</b>			<b>13.0</b>	<b>13:45</b>

Data sources and analysis: Washington State Transportation Center and WSDOT Office of Strategic Assessment and Performance Analysis.

Note: Totals can include congestion at the same location at different times throughout the day. 1 Not reported on routinely congested segments map or narrative in main report due to duration of less than 50 minutes.

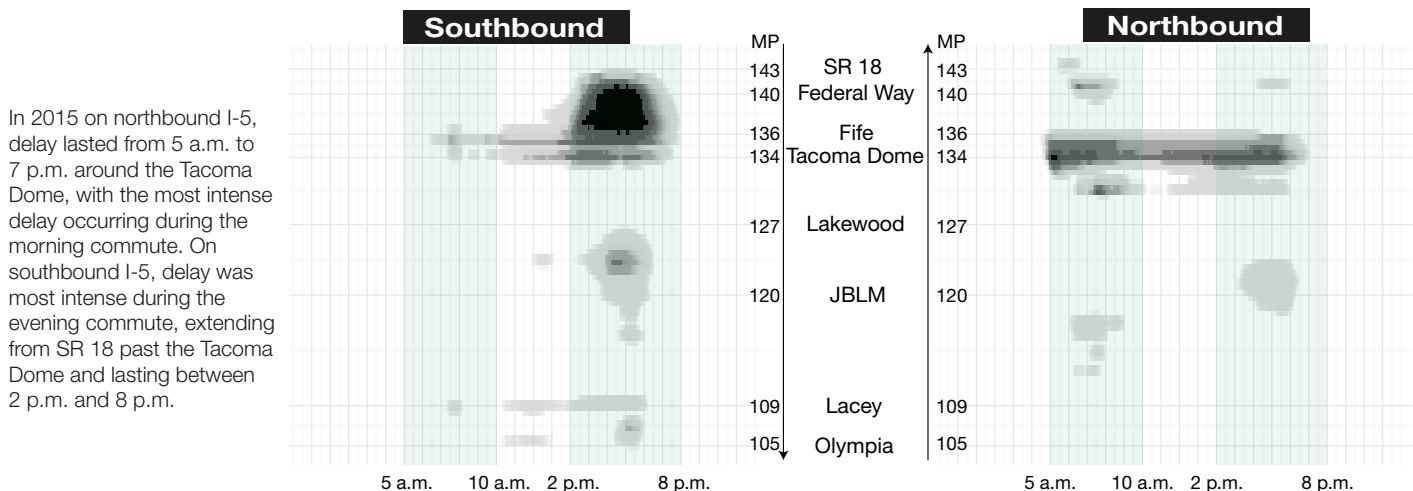
## South Puget Sound Region

# Heatmaps & line graph: Daily vehicle hours of delay on I-5

### I-5 delay between Olympia and Federal Way

2013 and 2015; Vehicle hours of delay; Weekdays only; By milepost (MP); Shading represents intensity of delay; Highlighted sections represent peak periods

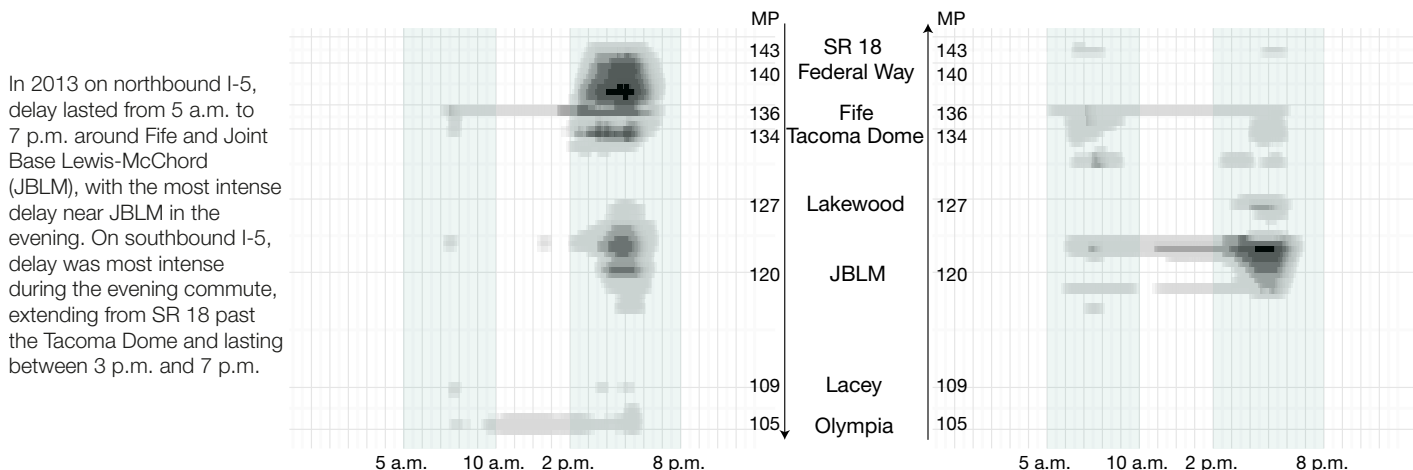
**2015**



On northbound I-5, delay was longer lasting in 2015 than in 2013, lasting from 5 a.m. to 7 p.m. around the Tacoma Dome. Delay around JBLM during the evening commute was less intense in 2015.

On southbound I-5, delay was more intense from SR 18 to the Tacoma Dome in 2015 than in 2013, with the most intense delay lasting from 3-6 p.m. Delay around JBLM was less intense in 2015.

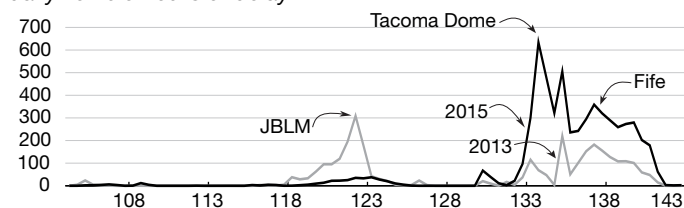
**2013**



Data sources and analysis: Washington State Transportation Center and WSDOT Office of Strategic Assessment and Performance Analysis.

### Delay along the I-5 corridor by milepost

2013 and 2015; Northbound and southbound combined; Average daily vehicle hours of delay



Data sources and analysis: WSDOT Olympic Region Traffic Office and WSDOT Office of Strategic Assessment and Performance Analysis.

Commute trip analysis

**Morning and evening commutes: Changes in travel time performance, congestion, reliability and emissions for 10 morning and evening high-demand commute trips in the south Puget Sound region 2013 and 2015; Morning peak (5-10 a.m.) and evening peak (2-8 p.m.) for an annualized average weekday; 5-minute peak of commuter rush (individual peak times vary); Length of route in miles; All travel times in minutes; Peak of commuter rush and duration of congestion expressed in hours and minutes; Cost of congestion in dollars; Emissions in pounds of carbon dioxide equivalents (CO<sub>2</sub>e)**

Morning				Travel Times									Congestion				Reliability												Emissions								
				Direction of travel	Length of route	Peak time	Travel time at posted speed	Travel time at maximum throughput speed	Average travel time at peak of morning commute			Maximum throughput travel time index (MT <sup>3</sup> I)		Peak period %Δ in VMT	Duration of congestion: How long average speed is below 45 mph			Cost of congestion <sup>1</sup> per person <sup>2</sup> , per trip			2013 percentiles				2015 percentiles				Δ: 2013 vs. 2015				Greenhouse gas emissions <sup>3</sup> in pounds of CO <sub>2</sub> e				
2013	2015	%Δ	2013						2015	2013	2015	Δ	2013		2015	%Δ	Median				Median				Median				Emitted during peak period			Emitted per person <sup>2</sup>					
																	50th	80th	90th	95th	50th	80th	90th	95th	50th	80th	90th	95th	2013	2015	%Δ	2013	2015	%Δ			
Route																																					
Northbound																																					
I-5 Olympia to Lacey		NB	6	7:20	6	7	6	6	0%	0.87	0.88	4%	0:00	0:00	0:00	\$0.00	\$0.00	N/A	6	6	6	6	6	6	6	6	0	0	0	0	93,121	91,976	-1%	5	5	0%	
I-5 Lacey to Lakewood		NB	17	7:40	17	20	20	21	5%	0.98	1.03	-2%	0:00	0:00	0:00	\$0.00	\$0.00	N/A	19	20	24	27	18	23	30	33	0	3	6	6	318,767	280,348	-12%	15	15	0%	
I-5 Lakewood to Tacoma		NB	3	7:50	3	4	5	5	0%	1.21	1.30	4%	0:30	0:50	0:20	\$0.18	\$0.23	28%	4	5	6	7	5	6	7	8	0	0	1	1	65,863	66,614	1%	3	3	0%	
I-5 Tacoma to Federal Way		NB	12	5:35	12	15	16	22	38%	1.08	1.48	3%	0:00	4:00	4:00	\$0.00	\$1.47	N/A	14	18	25	28	22	27	29	31	8	8	5	3	270,093	296,718	10%	11	11	0%	
I-5 Olympia to Tacoma		NB	26	7:30	26	31	30	32	7%	0.98	1.02	0%	0:00	0:00	0:00	\$0.00	\$0.00	N/A	29	32	35	37	29	36	42	46	0	4	6	9	476,771	439,678	-8%	23	22	-4%	
Southbound																																					
I-5 Lacey to Olympia		SB	6	7:50	6	7	6	6	0%	0.93	0.92	5%	0:00	0:00	0:00	\$0.00	\$0.00	N/A	6	7	7	7	6	7	7	7	0	0	0	0	86,180	86,036	0%	5	5	0%	
I-5 Lakewood to Lacey		SB	17	7:35	17	20	18	18	0%	0.87	0.88	5%	0:00	0:00	0:00	\$0.00	\$0.00	N/A	18	18	18	20	17	18	18	18	0	0	0	-2	254,193	226,803	-11%	15	14	-7%	
I-5 Tacoma to Lakewood		SB	3	9:30	3	4	3	3	0%	0.85	0.87	1%	0:00	0:00	0:00	\$0.00	\$0.00	N/A	3	3	3	3	3	3	3	3	0	0	0	0	55,108	55,149	0%	3	2	-33%	
I-5 FederalWay to Tacoma		SB	12	7:40	12	15	14	14	0%	0.92	0.93	4%	0:00	0:00	0:00	\$0.00	\$0.00	N/A	14	14	15	15	14	14	14	15	0	0	0	0	226,779	224,282	-1%	10	10	0%	
I-5 Tacoma to Olympia		SB	26	7:30	26	31	27	27	0%	0.88	0.88	5%	0:00	0:00	0:00	\$0.00	\$0.00	N/A	27	28	28	29	27	27	28	29	0	0	0	0	398,975	374,524	-6%	23	22	-4%	

Evening

Northbound																																					
I-5 Olympia to Lacey	NB	6	17:20	6	7	6	7	17%	0.92	0.99	3%	0:00	0:00	0:00	\$0.00	\$0.00	N/A	6	6	6	7	6	7	8	10	0	1	1	3	128,720	125,845	-2%	5	5	0%		
I-5 Lacey to Lakewood	NB	17	17:00	17	20	32	24	-25%	1.59	1.17	1%	3:00	1:15	-1:45	\$2.51	\$0.92	-63%	31	41	47	52	21	29	34	39	-9	-12	-13	-13	389,412	325,023	-17%	16	15	-6%		
I-5 Lakewood to Tacoma	NB	3	14:50	3	4	4	4	0%	1.00	1.05	2%	0:00	0:00	0:00	\$0.00	\$0.00	N/A	3	4	4	5	4	4	5	5	0	0	0	0	81,041	80,539	-1%	3	3	0%		
I-5 Tacoma to Federal Way	NB	12	17:25	12	15	15	18	20%	1.00	1.21	0%	0:00	4:25	4:25	\$0.00	\$0.70	N/A	14	16	18	20	17	21	24	25	3	5	6	5	287,139	301,381	5%	11	11	0%		
I-5 Olympia to Tacoma	NB	26	16:55	26	31	41	34	-17%	1.31	1.09	2%	2:15	0:00	-2:15	\$2.22	\$0.00	-100%	38	49	56	58	31	40	44	48	-7	-9	-12	-10	598,306	537,981	-10%	24	22	-8%		
Southbound																																					
I-5 Lacey to Olympia	SB	6	17:20	6	7	8	9	13%	1.11	1.36	-1%	0:00	1:05	1:05	\$0.00	\$0.50	N/A	7	9	11	13	8	12	14	15	2	3	3	2	140,651	133,316	-5%	5	5	0%		
I-5 Lakewood to Lacey	SB	17	16:50	17	20	31	28	-10%	1.52	1.37	-2%	2:45	2:20	-0:25	\$2.11	\$1.64	-22%	26	41	46	52	25	34	40	43	-1	-6	-6	-9	414,392	364,630	-12%	16	15	-6%		
I-5 Tacoma to Lakewood	SB	3	15:45	3	4	4	4	0%	1.13	1.04	-4%	0:20	0:00	-0:20	\$0.14	\$0.00	-100%	3	3	6	13	3	3	5	8	0	0	-1	-5	95,622	91,866	-4%	3	2	-33%		
I-5 FederalWay to Tacoma	SB	12	17:15	12	15	27	33	22%	1.82	2.23	1%	3:50	5:25	1:35	\$2.18	\$3.43	57%	27	33	36	39	34	39	41	44	7	5	5	5	413,091	408,379	-1%	11	12	9%		
I-5 Tacoma to Olympia	SB	26	16:50	26	31	43	41	-5%	1.38	1.31	-2%	2:20	1:55	-0:25	\$2.52	\$2.07	-18%	38	53	60	68	39	49	54	61	1	-4	-7	-7	664,264	604,796	-9%	24	23	-4%		

Data sources and analysis: Wsdot Olympic Region Traffic Office, Puget Sound Regional Council, Washington State Transportation Center, and WSDOT Office of Strategic Assessment and Performance Analysis.  
Notes: The symbol “Δ” is used to denote change in a variable. Commute lengths and travel time values have been rounded to integer values for publication only. MT<sup>3</sup> Index values cannot be reproduced as published using the integer values in the table. Due to rounding, some percentages are not computable based on numbers in the table. 1 Commute congestion cost based on \$21.90 for every hour of congested conditions measured when commute speeds are slower than 45 mph, applied to the volume of traffic during the congested conditions on an average annual weekday commute. 2 Per-person metrics were estimated based on vehicle occupancy observed on the freeway in the single occupant vehicle lanes. 3 Greenhouse gas emissions were calculated based on emission factors developed by PSRC for different vehicle types at varying travel speeds for each analysis year. In addition, the emissions used the traffic volume and percent of trucks, the average speeds for every 5-minute interval during the peak period, and the average vehicle occupancy on the freeway.

# South Puget Sound Region

## Transit commute trip analysis

**Morning and evening transit commutes: Changes in transit travel time performance, ridership, and greenhouse gas (GHG) emissions for 10 high-demand commute trips in the south Puget Sound region 2013 and 2015; Morning peak (6-9 a.m.) and evening peak (3-6 p.m.) for an annualized average weekday; 5-minute peak of commuter rush in hours and minutes (individual peak times vary); All travel times in minutes; Emissions in pounds of carbon dioxide equivalents (CO<sub>2</sub>e); Average transit ridership, average seats used, and emissions avoided based on the average maximum load during the peak period**

Morning				Travel Times									Ridership												Emissions											
				Travel times in minutes at peak of morning/evening commute <sup>1</sup>																																
Route	Direction of travel	Length of route	Peak time	Auto 95% reliable			Transit average			Transit 95% reliable			Ridership <sup>2</sup>			Passenger miles traveled			Lane capacity savings <sup>3</sup>			Average percent of seats used <sup>4</sup>			Number of trips			Percent of trips over 90% capacity			Daily emissions avoided due to transit use <sup>5</sup>			Vehicle miles traveled avoided due to transit use		
				2013	2015	Δ	2013	2015	Δ	2013	2015	Δ	2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ
Northbound																																				
I-5 Olympia to Lacey	NB	6	7:20	6	6	0	13	13	0	14	14	0	40	53	33%	229	306	33%	0.01	0.01	33%	17%	14%	-4%	6	10	67%	0%	0%	0%	67	42	-38%	142	189	33%
I-5 Lacey to Lakewood	NB	17	7:40	27	33	6	20	20	0	25	24	-1	156	135	-14%	2,294	2,124	-7%	0.03	0.02	-14%	22%	18%	-4%	18	18	0%	0%	0%	0%	779	552	-29%	1,422	1,317	-7%
I-5 Lakewood to Tacoma	NB	3	7:50	7	8	1	14	15	1	16	19	3	228	202	-11%	708	628	-11%	0.04	0.04	-11%	33%	30%	-4%	14	14	0%	0%	0%	0%	298	249	-17%	439	389	-11%
I-5 Tacoma to Federal Way <sup>6</sup>	NB	12	5:35	28	31	3	15	16	1	16	21	5	3,493	3,684	5%	43,005	45,465	6%	0.65	0.68	5%	61%	67%	6%	86	81	-6%	2%	1%	-1%	21,892	23,611	8%	26,663	28,188	6%
I-5 Olympia to Tacoma	NB	26	7:30	37	46	9	45	41	-4	53	52	-1	282	260	-8%	4,210	3,824	-9%	0.05	0.05	-8%	24%	22%	-3%	26	26	0%	0%	0%	0%	1,547	1,160	-25%	2,610	2,371	-9%
Southbound																																				
I-5 Lacey to Olympia	SB	6	7:50	7	7	0	13	12	-1	17	17	0	97	86	-12%	562	495	-12%	0.02	0.02	-12%	28%	25%	-3%	9	9	0%	0%	0%	0%	236	196	-17%	348	307	-12%
I-5 Lakewood to Lacey	SB	17	7:35	20	18	-2	19	19	0	23	23	0	131	112	-15%	2,061	1,774	-14%	0.02	0.02	-15%	27%	24%	-3%	13	12	-8%	0%	0%	0%	837	681	-19%	1,278	1,100	-14%
I-5 Tacoma to Lakewood	SB	3	9:30	3	3	0	13	14	1	16	16	0	200	175	-12%	622	544	-12%	0.04	0.03	-12%	26%	23%	-3%	16	16	0%	0%	0%	0%	220	173	-21%	385	337	-12%
I-5 Federal Way to Tacoma <sup>6</sup>	SB	12	7:40	15	15	0	15	15	0	16	16	0	406	371	-9%	4,820	4,151	-14%	0.07	0.07	-9%	23%	21%	-2%	25	23	-8%	0%	0%	0%	1,621	1,305	-20%	2,989	2,574	-14%
I-5 Tacoma to Olympia	SB	26	7:30	29	29	0	50	51	1	55	59	4	254	256	1%	4,355	4,166	-4%	0.05	0.05	1%	24%	25%	1%	23	22	-4%	0%	0%	0%	1,707	1,606	-6%	2,700	2,583	-4%

## Evening

Northbound <sup>8</sup>																																				
I-5 Olympia to Lacey	NB	6	17:20	7	10	3	17	16	-1	24	23	-1	124	102	-17%	718	592	-17%	0.02	0.02	-17%	33%	27%	-6%	10	10	0%	0%	0%	0%	321	244	-24%	445	367	-17%
I-5 Lacey to Lakewood	NB	17	17:00	52	39	-13	34	32	-2	48	47	-1	137	117	-14%	2,035	1,767	-13%	0.03	0.02	-14%	33%	25%	-8%	11	12	9%	0%	0%	0%	897	697	-22%	1,262	1,096	-13%
I-5 Lakewood to Tacoma	NB	3	14:50	5	5	0	13	14	1	15	18	3	172	181	5%	535	564	5%	0.03	0.03	5%	19%	22%	3%	19	18	-5%	0%	0%	0%	134	163	21%	332	350	5%
I-5 Tacoma to Federal Way <sup>6</sup>	NB	12	17:25	20	25	5	16	18	2	19	23	4	637	693	9%	7,475	7,978	7%	0.12	0.13	9%	34%	40%	5%	27	25	-7%	0%	0%	0%	3,187	3,621	14%	4,634	4,946	7%
I-5 Olympia to Tacoma	NB	26	16:55	58	48	-10	47	48	1	61	63	2	258	233	-10%	4,556	3,991	-12%	0.05	0.04	-10%	23%	21%	-2%	25	25	0%	0%	0%	0%	1,772	1,421	-20%	2,824	2,474	-12%
Southbound <sup>8</sup>																																				
I-5 Lacey to Olympia	SB	6	17:20	13	15	2	16	16	0	41	37	-4	54	58	7%	297	323	9%	0.01	0.01	7%	24%	19%	-5%	6	8	33%	0%	0%	0%	111	87	-22%	184	200	9%
I-5 Lakewood to Lacey	SB	17	16:50	52	43	-9	34	31	-3	59	49	-10	241	222	-8%	3,145	3,250	3%	0.04	0.04	-8%	38%	35%	-3%	17	16	-6%	6%	0%	-6%	1,375	1,371	0%	1,950	2,015	3%
I-5 Tacoma to Lakewood	SB	3	15:45	13	8	-5	19	18	-1	26	24	-2	264	243	-8%	821	754	-8%	0.05	0.04	-8%	33%	35%	2%	17	15	-12%	0%	0%	0%	329	312	-5%	509	468	-8%
I-5 Federal Way to Tacoma <sup>6</sup>	SB	12	17:15	39	44	5	24	31	7	34	48	14	2,896	3,356	16%	35,620	41,333	16%	0.54	0.62	16%	56%	61%	6%	77	75	-3%	3%	4%	1%	17,796	21,159	19%	22,084	25,626	16%
I-5 Tacoma to Olympia	SB	26	16:50	68	61	-7	46	46	0	65	65	0	455	425	-6%	6,143	5,797	-6%	0.08	0.08	-6%	34%	35%	1%	31	28	-10%	3%	0%	-3%	2,621	2,406	-8%	3,809	3,594	-6%

Data sources and analysis: Intercity Transit, Pierce Transit, Sound Transit, WSDOT Olympic Region Traffic Office, Washington State Transportation Center, and WSDOT Office of Strategic Assessment and Performance Analysis.

Notes: The symbol “Δ” is used to denote change in a variable. Due to rounding, some percentages are not computable based on numbers in the table. 1 Transit travel times include off-highway travel such as exiting to stop at a transit center and may not be directly comparable to private auto times which only include highway travel. 2 Ridership was reported for the peak transit commute periods (6-9 a.m. and 3-6 p.m.). 3 Lane capacity savings is a measure of how many general purpose lanes’ worth of capacity transit ridership provides during the peak periods. See the second edition of WSDOT’s *Handbook for Corridor Capacity Evaluation* at [www.wsdot.wa.gov/publications/fulltext/graynotebook/CCR\\_methodology\\_2nd\\_edition.pdf](http://www.wsdot.wa.gov/publications/fulltext/graynotebook/CCR_methodology_2nd_edition.pdf) for more calculation methods. 4 Average percent of seats used is based on the average maximum load of each bus or train trip and the total seats on the bus or train. Individual trips could show a load greater than 100% if there was standing-room only. Averaging the load for each commute levels out this variation across multiple trips, and may under-represent the load experienced during the peak utilization of transit. 5 Greenhouse gas emissions avoided by transit use were estimated based on the following factors: a) the average maximum transit load; b) the assumption that for every transit passenger mile traveled, 0.62 miles of single-occupant vehicle travel is avoided; c) the distance traveled on the WSDOT-defined commute trip (not the entire transit trip); d) the average emissions of one pound of CO<sub>2</sub>e for every mile traveled; and e) the emissions from transit vehicle operations provided by the transit agencies. 6 Transit services include buses and Sounder commuter trains.

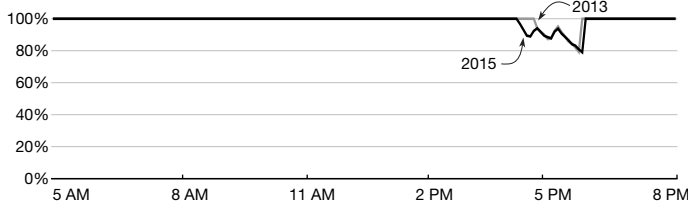
# Throughput productivity and stamp graphs

## Throughput productivity at select Spokane region freeway locations by commute direction

2013 and 2015; Based on the highest observed 5-minute (min.) flow rates; Vehicles per hour per lane (vphpl) at specific mileposts (MP)

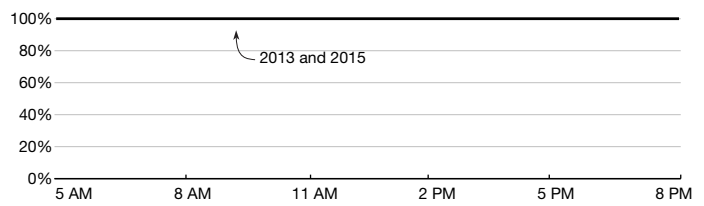
### Eastbound I-90 near Freya Street (MP 283.79)

Based on the highest observed 5 min. flow rate of 1,740 vphpl = 100%



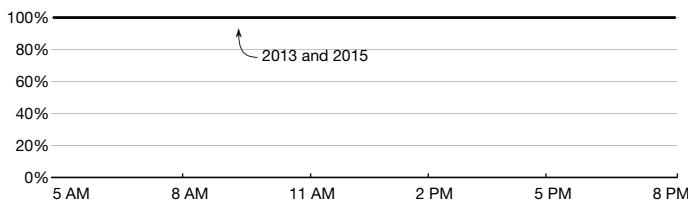
### Westbound I-90 near Freya Street (MP 283.79)

Based on the highest observed 5 min. flow rate of 1,660 vphpl = 100%



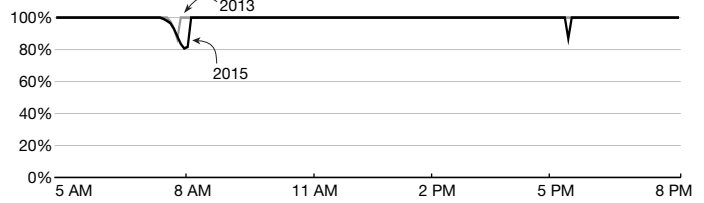
### Eastbound I-90 near Custer Road (MP 284.59)

Based on the highest observed 5 min. flow rate of 1,970 vphpl = 100%



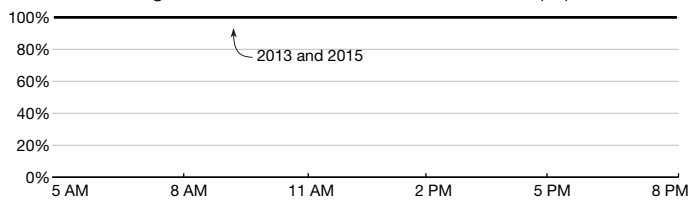
### Westbound I-90 near Custer Road (MP 284.59)

Based on the highest observed 5 min. flow rate of 1,940 vphpl = 100%



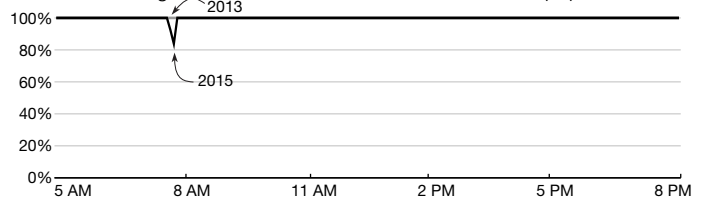
### Eastbound I-90 near Broadway Avenue (MP 286.19)

Based on the highest observed 5 min. flow rate of 1,630 vphpl = 100%



### Westbound I-90 near Broadway Avenue (MP 286.19)

Based on the highest observed 5 min. flow rate of 1,700 vphpl = 100%



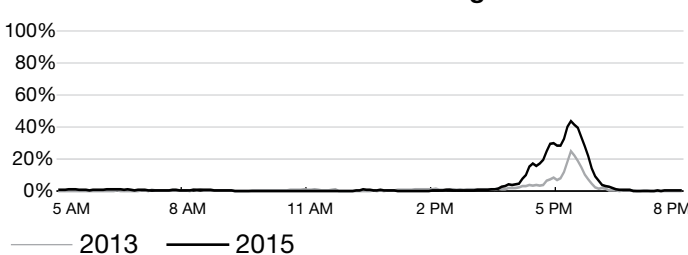
Data sources and analysis: WSDOT Eastern Region Planning Office and WSDOT Office of Strategic Assessment and Performance Analysis.

Note: See [p. 2](#) for throughput definitions and how to read these graphs.

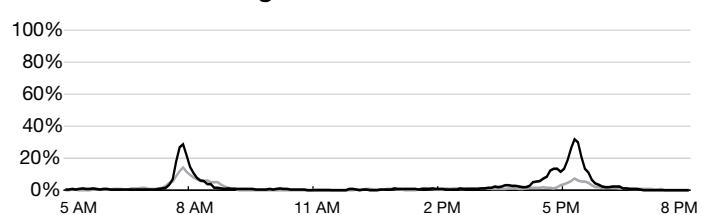
## Stamp graphs of congestion by time of day on Spokane region freeways

2013 and 2015 weekdays; Percent of days the average speed was slower than 45 mph

### I-90 Eastbound: Division Street to Argonne Road



### I-90 Westbound: Argonne Road to Division Street



Data sources and analysis: WSDOT Eastern Region Traffic Office and WSDOT Office of Strategic Assessment and Performance Analysis.

Note: See [p. 2](#) for congestion definitions and how to read these graphs.

## Spokane Region

# Routinely congested segments

### Spokane region routinely congested segments of I-90<sup>1</sup>

2013 weekdays; Length of congestion in miles; Duration of congestion in hours:minutes

Route and direction	Morning peak period				Evening peak period			
	Start and end times	Begin and end milepost	Length of congestion	Duration of congestion	Start and end times	Begin and end milepost	Length of congestion	Duration of congestion
I-90 westbound	7:45-8:00 a.m. <sup>1</sup>	284.6-284.1	0.5	0:15				
I-90 eastbound					5:15-5:40 p.m. <sup>1</sup>	283.3-283.8	0.5	0:25
<b>Totals</b>			<b>0.5</b>	<b>0:15</b>			<b>0.5</b>	<b>0:25</b>

2015 weekdays; Length of congestion in miles; Duration of congestion in hours:minutes

Route and direction	Morning peak period				Evening peak period			
	Start and end times	Begin and end milepost	Length of congestion	Duration of congestion	Start and end times	Begin and end milepost	Length of congestion	Duration of congestion
I-90 westbound	7:40-8:05 a.m. <sup>1</sup>	285.6-284.1	1.5	0:25				
I-90 eastbound					4:45-5:45 p.m.	280.8-284.6	3.8	1:00
<b>Totals</b>			<b>1.5</b>	<b>0:25</b>			<b>3.8</b>	<b>1:00</b>

Data sources and analysis: WSDOT Eastern Region Traffic Office and WSDOT Office of Strategic Assessment and Performance Analysis.

Notes: Totals can include congestion at the same location at different times throughout the day. 1 Not reported on routinely congested segments map or narrative in main report due to duration of less than 50 minutes.



# Commute and transit commute trip analysis

**Morning and evening commutes: Changes in travel time performance, congestion, reliability and emissions for four high-demand commute trips in the Spokane region**  
2013 and 2015; Morning peak (7-10 a.m.) and evening peak (3-6 p.m.) for an annualized average weekday; 5-minute peak of commuter rush (individual peak times vary); Length of route in miles; All travel times in minutes; Peak of commuter rush and duration of congestion expressed in hours and minutes; Cost of congestion in dollars; Emissions in pounds of carbon dioxide equivalents (CO<sub>2</sub>e)

Morning				Travel Times								Congestion					Reliability										Emissions								
Route	Direction of travel	Length of route	Peak time	Travel time at posted speed	Travel time at maximum throughput speed	Average travel time at peak of morning commute			Maximum throughput travel time index (MT <sup>3</sup> I)		Peak period %Δ in VMT	Duration of congestion How long average speed is below 45 mph			Cost of Congestion <sup>1</sup> per person <sup>2</sup> , per trip			2013 percentiles				2015 percentiles				Δ: 2013 vs. 2015				Greenhouse gas emissions <sup>3</sup> in pounds of CO <sub>2</sub> e					
						2013	2015	%Δ	2013	2015		2013	2015	Δ	2013	2015	%Δ	Median				Median				Median				Emitted during peak period			Emitted per person <sup>2</sup>		
																		50th	80th	90th	95th	50th	80th	90th	95th	50th	80th	90th	95th	2013	2015	%Δ	2013	2015	%Δ
I-90 Argonne Road to Division Street	WB	7.5	7:50	8	9	9	10	11%	0.98	1.07	-1%	0:00	0:00	0:00	\$0.00	\$0.00	N/A	8	9	10	12	9	11	11	12	1	2	1	0	73,247	76,048	4%	6.1	6.3	3%
I-90 Division Street to Argonne Road	EB	7.5	9:05	8	9	8	8	0%	0.86	0.87	4%	0:00	0:00	0:00	\$0.00	\$0.00	N/A	8	8	8	8	8	8	8	8	0	0	0	0	61,302	61,921	1%	6.1	5.9	-3%

## Evening

I-90 Argonne Road to Division Street	WB	7.5	17:15	8	9	8	9	13%	0.90	1.04	-1%	0:00	0:00	0:00	\$0.00	\$0.00	N/A	8	9	9	<b>10</b>	9	11	12	<b>12</b>	1	2	3	<b>2</b>	76,148	80,064	5%	6.0	6.3	5%
I-90 Division Street to Argonne Road	EB	7.5	17:20	8	9	10	10	0%	1.09	1.12	-1%	0:00	0:05	0:05	\$0.00	\$0.35	N/A	9	10	12	<b>13</b>	9	12	13	<b>15</b>	0	2	1	<b>2</b>	92,887	91,443	-2%	6.2	6.1	-2%

Data sources and analysis: WSDOT Eastern Region Traffic Office and WSDOT Office of Strategic Assessment and Performance Analysis.  
Notes: The symbol “Δ” is used to denote change in a variable. Commute lengths and travel time values have been rounded to integer values for publication only. MT<sup>3</sup> Index values cannot be reproduced as published using the integer values in the table. Due to rounding, some percentages are not computable based on numbers in the table. 1 Commute congestion cost based on \$21.90 for every hour of congested conditions measured when commute speeds are slower than 45 mph, applied to the volume of traffic during the congested conditions on an average annual weekday commute. 2 Per-person metrics were estimated based on vehicle occupancy observed on the freeway in the single occupant vehicle lanes. 3 Greenhouse gas emissions were calculated based on emission factors developed by PSRC for different vehicle types at varying travel speeds for each analysis year. In addition, the emissions used the traffic volume and percent of trucks, the average speeds for every 5-minute interval during the peak period, and the average vehicle occupancy on the freeway.

**Morning and evening transit commutes: Changes in transit travel time performance, ridership, and greenhouse gas (GHG) emissions for two high-demand commute trips in the Spokane region**  
2013 and 2015; Morning peak (6-9 a.m.) and evening peak (3-6 p.m.) for an annualized average weekday; 5-minute peak of commuter rush in hours and minutes (individual peak times vary); All travel times in minutes; Emissions in pounds of carbon dioxide equivalents (CO<sub>2</sub>e); Average transit ridership, average seats used, and emissions avoided based on the average maximum load during the peak period

Morning				Travel Times									Ridership														Emissions									
				Travel times in minutes at peak of morning/evening commute <sup>1</sup>															Lane capacity savings <sup>3</sup>			Average percent of seats used <sup>4</sup>			Number of trips			Percent of trips over 90% capacity			Daily emissions avoided due to transit use <sup>5</sup>			Vehicle miles traveled avoided due to transit use		
Route	Direction of travel	Length of route	Peak time	Auto 95% reliable			Transit average			Transit 95% reliable			Ridership <sup>2</sup>			Passenger miles traveled																				
				2013	2015	Δ	2013	2015	Δ	2013	2015	Δ	2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ
I-90 Argonne Road to Division Street	WB	7.5	7:50	12	12	0	N/A	17	N/A	N/A	19	N/A	617	573	-7%	4,237	3,935	-7%	0.11	0.10	-5%	58%	57%	-1%	23	23	0%	0%	0%	0%	1,917	1,711	-11%	2,627	2,440	-7%

## Evening

I-90 Division Street to Argonne Road	EB	7.5	17:20	13	15	2	N/A	17	N/A	N/A	20	N/A	456	400	-12%	3,192	2,800	-12%	0.08	0.07	-12%	64%	56%	-8%	17	17	0%	0%	0%	0%	1,478	1,207	-18%	1,979	1,736	-12%
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Data sources and analysis: Spokane Transit Authority, WSDOT Eastern Region Traffic Office, and WSDOT Office of Strategic Assessment and Performance Analysis.  
Notes: The symbol “Δ” is used to denote change in a variable. Due to rounding, some percentages are not computable based on numbers in the table. 1 Transit travel times include off-highway travel such as exiting to stop at a transit center and may not be directly comparable to private auto times which only include highway travel. 2 Ridership was reported for the peak transit commute periods (6-9 a.m. and 3-6 p.m.). 3 Lane capacity savings is a measure of how many general purpose lanes' worth of capacity transit ridership provides during the peak periods. See the second edition of WSDOT's *Handbook for Corridor Capacity Evaluation* at [www.wsdot.wa.gov/publications/fulltext/graynotebook/CCR\\_methodology\\_2nd\\_edition.pdf](http://www.wsdot.wa.gov/publications/fulltext/graynotebook/CCR_methodology_2nd_edition.pdf) for more calculation methods. 4 Average percent of seats used is based on the average maximum load of each bus or train trip and the total seats on the bus or train. Individual trips could show a load greater than 100% if there was standing-room only. Averaging the load for each commute levels out this variation across multiple trips, and may under-represent the load experienced during the peak utilization of transit. 5 Greenhouse gas emissions avoided by transit use were estimated based on the following factors: a) the average maximum transit load; b) the assumption that for every transit passenger mile traveled, 0.62 miles of single-occupant vehicle travel is avoided; c) the distance traveled on the WSDOT-defined commute trip (not the entire transit trip); d) the average emissions of one pound of CO<sub>2</sub>e for every mile traveled; and e) the emissions from transit vehicle operations provided by the transit agencies.

Vancouver Region

Commute and transit commute trip analysis

**Morning and evening commutes: Changes in travel time performance, congestion, reliability, emissions and transit performance for eight high-demand commute trips in the Vancouver region 2013 and 2015; Morning peak (6-9 a.m.) and evening peak (3-6 p.m.) for an annualized average weekday; 5-minute peak of commuter rush (individual peak times vary); Length of route in miles; All travel times in minutes; Peak of commuter rush and duration of congestion expressed in hours and minutes; Cost of congestion in dollars; Emissions in pounds of carbon dioxide equivalents (CO<sub>2</sub>e); Average transit ridership, average load, and emissions avoided based on the average maximum load during the peak period**

Morning

Morning				Travel Times									Congestion						Reliability										Emissions								
Route	Direction of travel	Length of route	Peak time	Travel time at posted speed	Travel time at maximum throughput speed	Average travel time at peak of morning commute			Maximum throughput travel time index (MT <sup>3</sup> I)		Peak period %Δ in VMT	Duration of congestion How long average speed is below 45 mph			Cost of Congestion <sup>1</sup> Per person <sup>2</sup> , per trip			2013 percentiles				2015 percentiles				Δ: 2013 vs. 2015				Greenhouse gas emissions <sup>3</sup> in pounds of CO <sub>2</sub> e							
						2013	2015	%Δ	2013	2015		Δ	2013	2015	%Δ	Median		90th	95th	Median		90th	95th	Median		90th	95th	Emitted during peak period			Emitted per person <sup>2</sup>						
																50th	80th			50th	80th			50th	80th			2013	2015	%Δ	2013	2015	%Δ				
Southbound: To Portland Oregon (Washington state line)																																					
I-5 (I-205 interchange to I-5 bridge [Oregon])	SB	8	6:40	8	9	19	22	16%	2.07	2.42	-6%	1:55	2:20	0:25	\$2.11	\$2.59	23%	18	22	26	<b>30</b>	21	27	29	<b>34</b>	3	4	3	<b>4</b>	89,421	82,347	-8%	8	8	0%		
I-5 (SR 500 interchange to I-5 bridge [Oregon])	SB	2	6:35	2	2	9	10	11%	3.61	4.09	-6%	3:50	5:55	2:05	\$0.95	\$0.86	-9%	9	11	11	<b>12</b>	10	11	12	<b>12</b>	1	1	0	<b>0</b>	35,470	33,830	-5%	3	3	0%		
I-205 (I-5 interchange to Glenn Jackson Bridge [Oregon])	SB	10	7:45	10	12	13	15	15%	1.08	1.25	1%	0:00	0:15	0:15	\$0.00	\$0.99	N/A	11	16	18	<b>21</b>	13	20	22	<b>24</b>	2	4	4	<b>3</b>	113,341	117,536	4%	9	9	0%		
I-205 (SR 500 interchange to Glenn Jackson Bridge [Oregon])	SB	4	7:30	4	5	5	6	20%	1.05	1.29	2%	0:00	0:35	0:35	\$0.00	\$0.41	N/A	4	6	7	<b>8</b>	6	8	9	<b>9</b>	1	2	1	<b>1</b>	53,357	56,417	6%	4	4	0%		

Evening

Northbound: From Portland, Oregon (Washington state line)																																			
I-5 (I-5 bridge [Oregon] to I-205 interchange)	NB	8	17:15	8	9	8	8	0%	0.88	0.90	1%	0:00	0:00	0:00	\$0.00	\$0.00	N/A	8	8	8	9	8	8	9	9	0	0	0	0	85,767	82,125	-4%	6	6	0%
I-5 (I-5 bridge [Oregon] to SR 500 interchange)	NB	2	17:15	2	2	2	2	0%	0.96	1.01	1%	0:00	0:00	0:00	\$0.00	\$0.00	N/A	2	2	3	3	2	3	3	3	0	0	0	0	26,732	25,678	-4%	2	2	0%
I-205 (Glenn Jackson Bridge [Oregon] to I-5 interchange)	NB	10	17:20	10	12	12	13	8%	0.97	1.04	1%	0:00	0:00	0:00	\$0.00	\$0.00	N/A	11	13	15	16	12	15	16	18	1	1	2	2	122,215	120,842	-1%	8	8	0%
I-205 (Glenn Jackson Bridge [Oregon] to SR 500 interchange)	NB	4	17:25	4	5	5	6	20%	1.07	1.20	3%	0:00	0:00	0:00	\$0.00	\$0.00	N/A	5	6	7	8	5	7	9	10	0	1	2	2	59,020	58,620	-1%	3	3	0%

Data sources and analysis: National Performance Management Research Data Set, WSDOT Southwest Region Traffic Office, and WSDOT Office of Strategic Assessment and Performance Analysis.  
Notes: The symbol “Δ” is used to denote change in a variable. Commute lengths and travel time values have been rounded to integer values for publication only. MT<sup>3</sup> Index values cannot be reproduced as published using the integer values in the table. Due to rounding, some percentages are not computable based on numbers in the table. 1 Commute congestion cost based on \$21.90 for every hour of congested conditions measured when commute speeds are slower than 45 mph, applied to the volume of traffic during the congested conditions on an average annual weekday commute. 2 Per-person metrics were estimated based on vehicle occupancy observed on the freeway in the single occupant vehicle lanes. 3 Greenhouse gas emissions were calculated based on emission factors developed by the PSRC for different vehicle types at varying travel speeds for each analysis year. In addition, the emissions used the traffic volume and percent of trucks, the average speeds for every 5-minute interval during the peak period, and the average vehicle occupancy on the freeway.

**Morning and evening transit commutes: Changes in transit travel time performance, ridership, and greenhouse gas (GHG) emissions for six high-demand commute trips in the Vancouver region 2013 and 2015; Morning peak (6-9 a.m.) and evening peak (3-6 p.m.) for an annualized average weekday; 5-minute peak of commuter rush in hours and minutes (individual peak times vary); All travel times in minutes; Emissions in pounds of carbon dioxide equivalents (CO<sub>2</sub>e); Average transit ridership, average seats used, and emissions avoided based on the average maximum load during the peak period**

Morning

Morning				Travel Times									Ridership															Emissions									
Route	Direction of travel	Length of route	Peak time	Travel times in minutes at peak of morning/evening commute¹									Ridership²			Passenger miles traveled			Lane capacity savings³			Average percent of seats used⁴			Number of trips			Percent of trips over 90% capacity			Daily emissions avoided due to transit use⁵			Vehicle miles traveled avoided due to transit use			
				Auto 95% reliable			Transit average			Transit 95% reliable			2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ				
				2013	2015	Δ	2013	2015	Δ	2013	2015	Δ																									
Southbound: To Portland Oregon (Washington state line)																																					
I-5 (I-205 interchange to I-5 bridge [Oregon])		SB	8	6:40	30	34	4	N/A	N/A	N/A	N/A	N/A	N/A	694	628	-9%	4,186	3,878	-7%	0.12	0.11	-9%	53%	49%	-4%	34	32	-6%	3%	0%	-3%	1,720	1,589	-8%	2,595	2,404	-7%
I-5 (SR 500 interchange to I-5 bridge [Oregon])		SB	2	6:35	12	12	0	N/A	N/A	N/A	N/A	N/A	N/A	129	103	-21%	258	205	-21%	0.02	0.02	-21%	60%	48%	-12%	5	5	0%	0%	0%	0%	119	86	-28%	160	127	-21%
I-205 (SR 500 interchange to Glenn Jackson Bridge [Oregon])		SB	4	7:30	8	9	1	N/A	N/A	N/A	N/A	N/A	N/A	424	385	-9%	208	196	-6%	0.07	0.07	-9%	52%	50%	-2%	19	18	-5%	0%	0%	0%	86	80	-7%	129	122	-6%

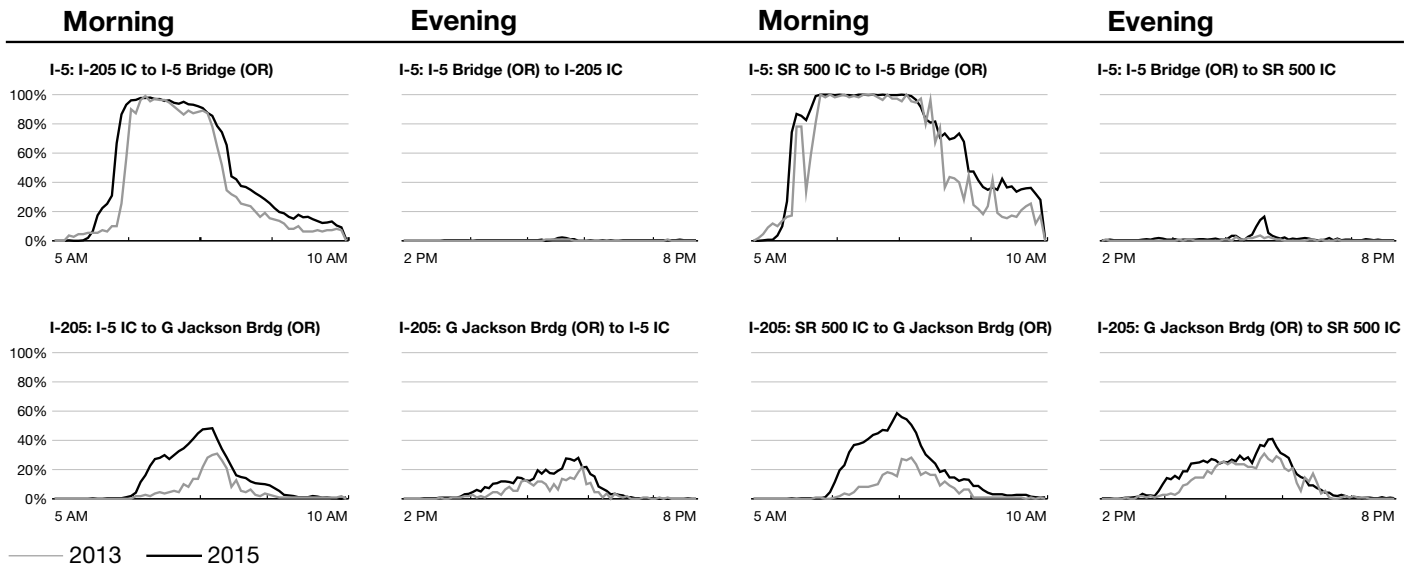
Evening

Northbound: From Portland, Oregon (Washington state line)																																									
I-5 (I-5 bridge [Oregon] to I-205 interchange)	NB	8	17:15	9	9	0	N/A	N/A	N/A	N/A	N/A	N/A	483	436	-10%	3,118	2,853	-8%	0.08	0.07	-10%	41%	34%	-8%	30	32	7%	0%	0%	0%	1,123	921	-18%	1,933	1,769	-8%					
I-5 (I-5 bridge [Oregon] to SR 500 interchange)	NB	2	17:15	3	3	0	N/A	N/A	N/A	N/A	N/A	N/A	377	259	-31%	86	78	-10%	0.06	0.04	-31%	38%	32%	-6%	24	19	-21%	0%	0%	0%	30	25	-17%	53	48	-10%					
I-205 (Glenn Jackson Bridge [Oregon] to SR 500 interchange)	NB	4	17:25	8	10	2	N/A	N/A	N/A	N/A	N/A	N/A	41	39	-4%	12	12	-4%	0.01	0.01	-4%	41%	34%	-8%	3	3	0%	0%	0%	0%	4	4	-8%	8	7	-4%					

Data sources and analysis: C-TRAN, National Performance Management Research Data Set, WSDOT Southwest Region Traffic Office, and WSDOT Office of Strategic Assessment and Performance Analysis.  
Notes: The symbol “Δ” is used to denote change in a variable. Due to rounding, some percentages are not computable based on numbers in the table. 1 Due to constraints with sample size, transit travel time data for I-5 and I-205 were not published for 2013 and 2015. Regardless, transit travel times by bus may not be directly comparable to SOV/HOV trips due to different start and end points or off-highway travel to stops. WSDOT attempts to match transit trips as closely as is practical to SOV/HOV. 2 Ridership was reported for the peak transit commute periods (6-9 a.m. and 3-6 p.m.). 3 Lane capacity savings is a measure of how many general purpose lanes’ worth of capacity transit ridership provides during the peak periods. See the second edition of WSDOT’s *Handbook for Corridor Capacity Evaluation* at [www.wsdot.wa.gov/publications/fulltext/graynotebook/CCR\\_methodology\\_2nd\\_edition.pdf](http://www.wsdot.wa.gov/publications/fulltext/graynotebook/CCR_methodology_2nd_edition.pdf) for more calculation methods. 4 Average percent of seats used is based on the average maximum load of each bus or train trip and the total seats on the bus or train. Individual trips could show a load greater than 100% if there was standing-room only. Averaging the load for each commute levels out this variation across multiple trips, and may under-represent the load experienced during the peak utilization of transit. 5 Greenhouse gas emissions avoided by transit use were estimated based on the following factors: a) the average maximum transit load; b) the assumption that for every transit passenger mile traveled, 0.62 miles of single-occupant vehicle travel is avoided; c) the distance traveled on the WSDOT-defined commute trip (not the entire transit trip); d) the average emissions of one pound of CO<sub>2</sub>e for every mile traveled; and e) the emissions from transit vehicle operations provided by the transit agencies.

# Stamp graphs: Frequency, duration of (SEVERE) congestion

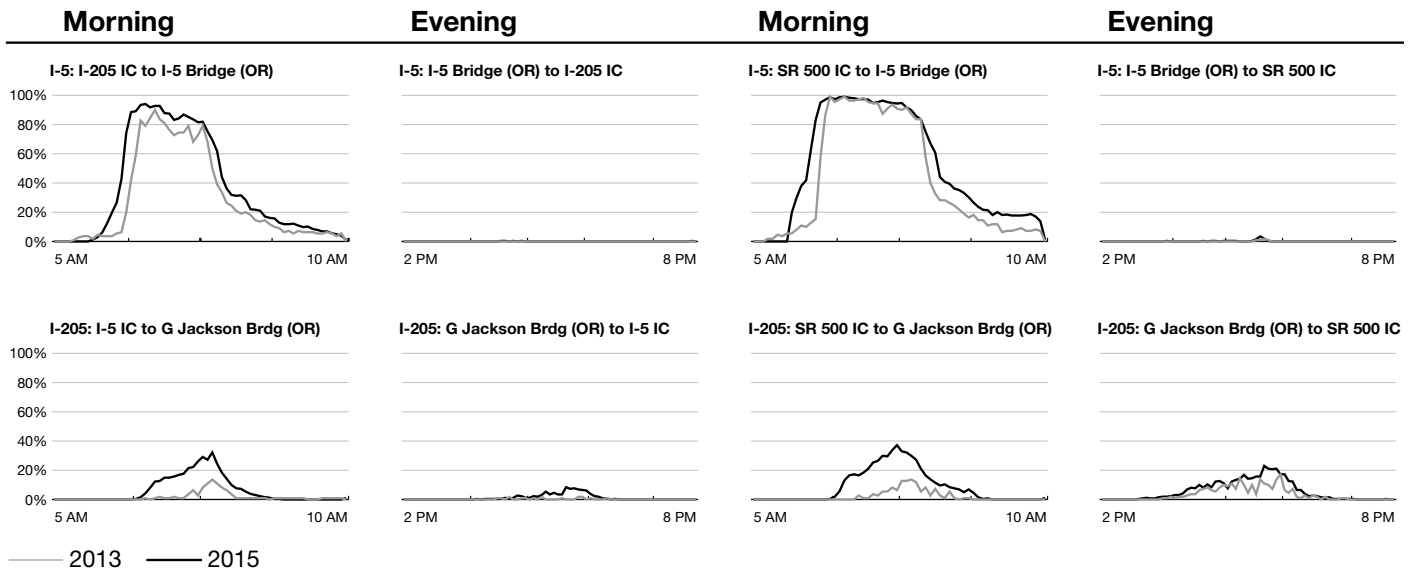
**Stamp graphs of congestion by time of day on Vancouver region freeways**  
 2013 and 2015 weekdays; Percent of days the average speed was slower than 45 mph



Data sources and analysis: National Performance Management Research Data Set and WSDOT Office of Strategic Assessment and Performance Analysis.

Notes: IC stands for interchange, OR stands for the Oregon/Washington state border, G Jackson Brdg stands for Glenn Jackson Bridge. See [p. 2](#) for congestion definitions and how to read these graphs.

**Stamp graphs of SEVERE congestion by time of day on Vancouver region freeways**  
 2013 and 2015 weekdays; Percent of days the average speed was slower than 36 mph



Data sources and analysis: National Performance Management Research Data Set and WSDOT Office of Strategic Assessment and Performance Analysis.

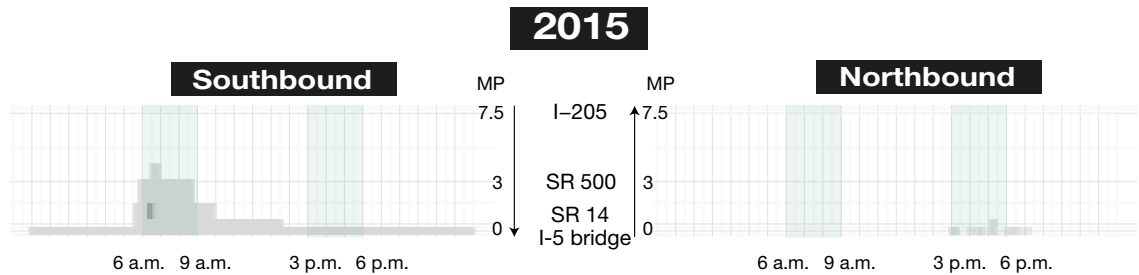
Notes: IC stands for interchange, OR stands for the Oregon/Washington state border, G Jackson Brdg stands for Glenn Jackson Bridge. See [p. 2](#) for congestion definitions and how to read these graphs.

## Heatmaps: Daily vehicle hours of delay on I-5, I-205

### I-5 delay between the I-5 bridge and the I-205 interchange

2013 and 2015; Vehicle hours of delay; Weekdays only; By milepost (MP); Shading represents intensity of delay; Highlighted sections represent peak periods

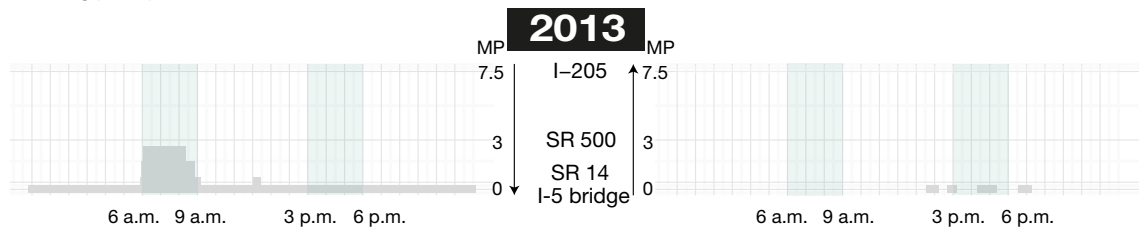
In 2015 on northbound I-5, delay lasted from 2:30 to 7:30 p.m. around the I-5 bridge. On southbound I-5, morning delay extended from before State Route 500 to the I-5 bridge. Delay around the I-5 bridge lasted all day.



In 2015, delay was more extensive from SR 500 to the I-5 bridge than in 2013, lasting beyond the morning peak period.

Delay followed similar trends in both 2013 and 2015.

In 2013 on northbound I-5, there were pockets of delay around the I-5 bridge during the evening commute. On southbound I-5, morning delay extended from before State Route 500 to the I-5 bridge. Delay around the I-5 bridge lasted all day.

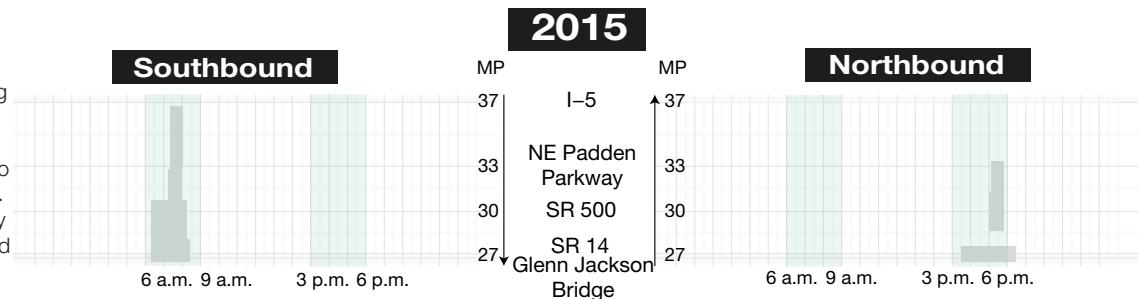


Data sources and analysis: National Performance Management Research Data Set and WSDOT Office of Strategic Assessment and Performance Analysis.

### I-205 delay between Glenn Jackson Bridge and the I-5 interchange

2013 and 2015; Vehicle hours of delay; Weekdays only; By milepost (MP); Shading represents intensity of delay; Highlighted sections represent peak periods

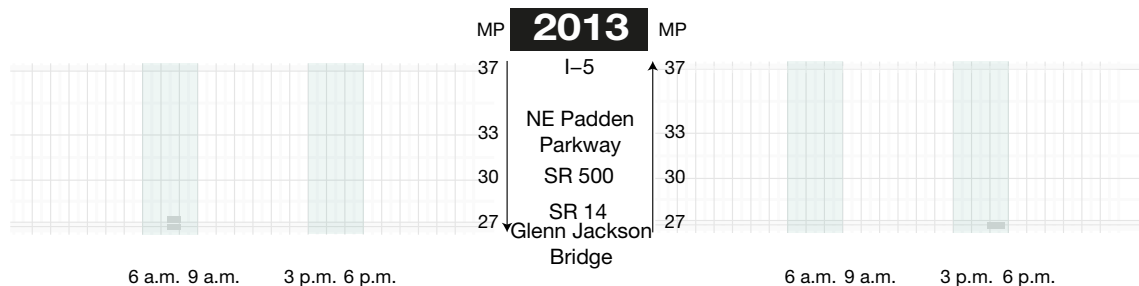
In 2015 on northbound I-205, delay occurred during the evening peak period, with pockets of delay from the Glenn Jackson Bridge to Northeast Padden Parkway. On I-205 southbound, delay lasted from 6-8:30 a.m., and extended from the I-5 interchange to the Glenn Jackson Bridge.



In 2015, there was more extensive delay along the I-205 corridor in the morning peak period compared to 2013, with delay from the I-5 interchange to the Glenn Jackson Bridge.

In 2015, there was more extensive delay along the I-205 corridor in the evening peak period compared to 2013, with pockets of delay from the Glenn Jackson Bridge to Northeast Padden Parkway.

In 2013, there was limited delay around the Glenn Jackson Bridge for both directions of I-205.



Data sources and analysis: National Performance Management Research Data Set and WSDOT Office of Strategic Assessment and Performance Analysis.

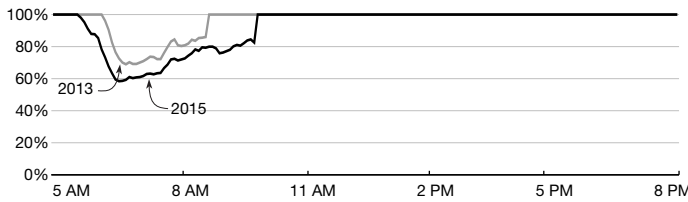
# Throughput productivity and routinely congested segments

## Throughput productivity at select Vancouver region freeway locations by commute direction

2013 and 2015; Based on the highest observed 5-minute (min.) flow rates; Vehicles per hour per lane (vphpl) at specific mileposts (MP)

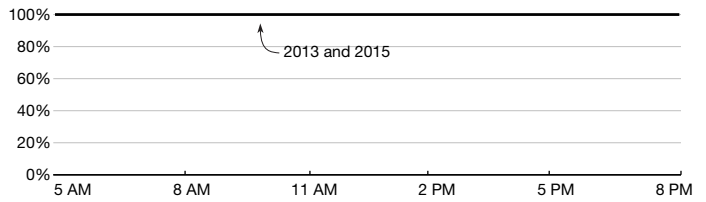
### Southbound I-5 near Fourth Plain Boulevard (MP 1.41)

Based on the highest observed 5 min. flow rate of 1,490 vphpl = 100%



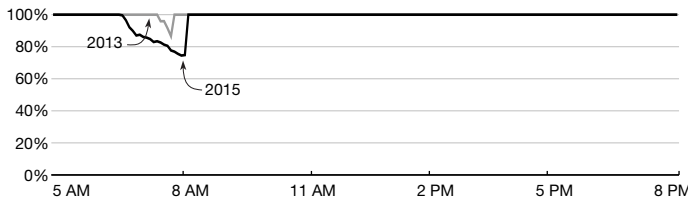
### Northbound I-5 near Fourth Plain Boulevard (MP 1.41)

Based on the highest observed 5 min. flow rate of 1,910 vphpl = 100%



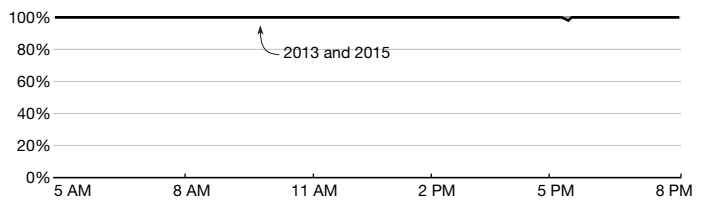
### Southbound I-205 near 10th Street (MP 27.80)

Based on the highest observed 5 min. flow rate of 1,990 vphpl = 100%



### Northbound I-205 near 10th Street (MP 27.80)

Based on the highest observed 5 min. flow rate of 1,630 vphpl = 100%



Data sources and analysis: WSDOT Southwest Region Planning Office and WSDOT Office of Strategic Assessment and Performance Analysis.

Note: See [p. 2](#) for throughput definitions and how to read these graphs.

## 2013 Vancouver region routinely congested segments<sup>1</sup>

2013 weekdays; Length of congestion in miles; Duration of congestion in hours:minutes

Route and direction	Morning peak period				Evening peak period			
	Start and end times	Begin and end milepost	Length	Duration	Start and end times	Begin and end milepost	Length	Duration
I-5 southbound	6:10-8:50 a.m.	2.91-0	4.1 <sup>2</sup>	2:40				
<b>Totals</b>			<b>4.1</b>	<b>2:40</b>			<b>0.0</b>	<b>0:00</b>

## 2015 Vancouver region routinely congested segments<sup>1</sup>

2015 weekdays; Length of congestion in miles; Duration of congestion in hours:minutes

Route and direction	Morning peak period				Evening peak period			
	Start and end times	Begin and end milepost	Length	Duration	Start and end times	Begin and end milepost	Length	Duration
I-5 southbound	5:40-9:00 a.m.	2.91-0	4.1 <sup>2</sup>	3:20				
I-205 northbound					5:15-5:40 p.m. <sup>2</sup>	28.8-31.4	2.6	0:25
I-205 southbound	6:45-8:00 a.m.	30.43-27.01	3.4	1:15				
<b>Totals</b>			<b>7.5</b>	<b>4:35</b>			<b>2.6</b>	<b>0:25</b>

Data sources and analysis: WSDOT Office of Strategic Assessment and Performance Analysis, Private sector data

Notes: Totals can include congestion at the same location at different times throughout the day. 1 These tables only include routine congestion that occurs in Washington state. Significant congestion occurs in Oregon on I-5 and I-205 that affects commuters in the Vancouver area (see [44-45](#)).

2 This routinely congested segment continues 1.2 miles into Oregon to the Jantzen Beach exit. Mileposts shown are in Washington state. 3 Not reported on routinely congested segments map or narrative in main report due to duration of less than 50 minutes.

# Routinely congested segments for Portland in 2013

## 2013 Portland region routinely congested segments

2013 weekdays; Length of congestion in miles; Duration of congestion in hours:minutes

Route and direction	Morning peak period				Evening peak period			
	Start and end times	Approximate landmark	Approximate length	Duration	Start and end times	Approximate landmark	Approximate length	Duration
I-5 northbound	6:50-9:10 a.m.	99W to SW Corbett Ave	5.0	2:20	2:40-6:35 p.m.	SW Terwilliger Blvd to Marquam Bridge	3.5	3:55
	6:30-11:59 a.m.	I-405/ Marquam Bridge interchange	0.5	5:30	12:00-7:10 p.m.	Marquam Bridge to Fremont Bridge	3.0	7:10
	6:25-10:00 a.m.	I-84 to I-405 interchange	1.0	3:35	2:10-7:15 p.m.	Fremont Bridge to Hayden Island	5.0	5:05
					12:05-7:15 p.m.	Hayden Island to State Line	1.0	7:10
I-5 southbound	7:20-10:00 a.m.	Marquam Bridge	0.5	2:40	2:30-6:30 p.m.	Marquam Bridge to SW Terwilliger Blvd	3.5	4:00
	6:45-11:59 a.m.	I-405 to I-84	1.0	5:15	4:10-6:15 p.m.	I-84 to SE Hawthorne Blvd	1.0	2:05
	6:25-10:00 a.m.	State Line to I-405	4.0	3:35	12:00-6:35 p.m.	I-405 to I-84	1.0	6:35
					2:40-6:05 p.m.	N Going St to I-405	1.0	3:25
I-205 northbound	6:40-8:55 a.m.	SE Otty Rd to I-84	4.5	2:15	3:15-7:00 p.m.	SE Flavel St to State Line	9.0	3:45
	7:40-8:00 a.m.	I-84 to US 30	0.5	0:20				
I-205 southbound	7:30-7:45 a.m.	E Burnside St to SE Market St	1.0	0:15	2:50-6:00 p.m.	US 30 Bypass to US 26	5.0	3:10
<b>Totals</b>			<b>18.0</b>	<b>25:45</b>			<b>33.0</b>	<b>46:20</b>

Data sources and analysis: National Performance Measurement Research Data Set, WSDOT Southwest Region Planning Office, WSDOT Office of Strategic Assessment and Performance Analysis, and endorsed by Oregon Department of Transportation.

Note: The above information is represented on the map in a generalized format on [p. 44](#) of the *Corridor Capacity Report*. Totals can include congestion at the same location at different times throughout the day.



# Routinely congested segments for Portland in 2015

## 2015 Portland region routinely congested segments

2015 weekdays; Length of congestion in miles; Duration of congestion in hours:minutes

Route and direction	Morning peak period				Evening peak period			
	Start and end times	Approximate landmark	Approximate length	Duration	Start and end times	Approximate landmark	Approximate length	Duration
I-5 northbound	6:45-9:25 a.m.	99W to Exit 298	5.0	2:40	2:45-6:50 p.m.	SW Capitol Hwy to Ross Island Bridge	4.5	4:05
	6:35-11:59 a.m.	Marquam Bridge	0.5	5:25	12:00-7:15 p.m.	Marquam Bridge to I-405 interchange	3.0	7:15
	6:35-11:59 a.m.	E Burnside St to I-405 interchange	1.0	5:25	2:10-7:10 p.m.	I-405 interchange to 99E	4.5	5:00
	10:20-11:59 a.m.	State Line	0.5	1:40	12:00-7:15 p.m.	99E to State Line	1.5	7:15
I-5 southbound	6:35-11:55 a.m.	Marquam Bridge	0.5	5:20	2:15-6:30 p.m.	Marquam Bridge to SW Terwilliger Blvd	4.0	4:15
	6:30-11:59 a.m.	NE Columbia Blvd to I-84	4.5	5:30	4:25-6:10 p.m.	I-84 to SE Hawthorne Blvd	1.0	1:45
	6:45-9:15 a.m.	State Line to NE Columbia Blvd	1.5	2:30	12:00-6:40 p.m.	US 30/ N Lombard St to I-84	3.5	6:40
					12:00-7:15 p.m.	NE Columbia Blvd	0.5	7:15
I-205 northbound	6:30-8:50 a.m.	E Burnside St to SE Johnson Creek Blvd	4.5	2:20	2:55-6:45 p.m.	SE Johnson Creek Blvd to State Line	10.5	3:50
	7:35-7:55 a.m.	I-84 to US 30	0.5	0:20				
I-205 southbound	7:30-8:05 a.m.	I-84 interchange	1.0	0:35	2:40-6:00 p.m.	NE Airport Way to US 26/ Powell	5.5	3:20
	6:45-8:10 a.m.	State Line to NE Airport Way	2.5	1:25				
<b>Totals</b>			<b>22.0</b>	<b>33:10</b>			<b>38.5</b>	<b>50:40</b>

Data sources and analysis: National Performance Measurement Research Data Set, WSDOT Southwest Region Planning Office, WSDOT Office of Strategic Assessment and Performance Analysis, and endorsed by Oregon Department of Transportation.

Note: The above information is represented on the map in a generalized format on [p. 44](#) of the *Corridor Capacity Report*. Totals can include congestion at the same location at different times throughout the day.

## Ferries

# Commute trip analysis

**Ferry system route utilization for people and vehicles by route, and number of vessel trips taken**  
2013 and 2015; Annual utilization for passengers and vehicles

	Passengers + drivers			Vehicles			Number of trips		
	2013	2015	Δ	2013	2015	Δ	2013	2015	%Δ
Anacortes – San Juan domestic <sup>1</sup>	10%	11%	1%	54%	57%	3%	26,801	27,050	0.9%
Anacortes – San Juan – Sidney, B.C.	18%	17%	-1%	57%	51%	-6%	728	752	3.3%
Edmonds – Kingston	10%	12%	2%	65%	69%	4%	17,142	17,154	0.1%
Fauntleroy – Vashon – Southworth <sup>2</sup>	9%	9%	0%	61%	57%	-4%	40,917	40,630	-0.7%
Mukilteo – Clinton	12%	12%	0%	68%	67%	-1%	26,753	26,762	0.0%
Point Defiance – Tahlequah	7%	7%	0%	47%	54%	7%	13,827	13,906	0.6%
Port Townsend – Coupeville (Keystone)	11%	12%	1%	65%	70%	5%	8,484	8,602	1.4%
Seattle – Bainbridge Island	15%	16%	1%	61%	61%	0%	16,527	16,501	-0.2%
Seattle – Bremerton	13%	15%	2%	43%	49%	6%	10,853	10,874	0.2%
<b>Total</b>	<b>12%</b>	<b>12%</b>	<b>0%</b>	<b>60%</b>	<b>62%</b>	<b>2%</b>	<b>162,032</b>	<b>162,231</b>	<b>0.1%</b>

Data source and analysis: WSDOT Ferries Division.

Notes: Utilization data is based on the cumulative capacity (in terms of the number of vehicle spaces and room for passengers) on all vessels serving that route, and is measured for all sailings in a calendar year. 1 Route utilization for the San Juan inter-island route is measured at Anacortes. 2 Route utilization for the Fauntleroy - Vashon - Southworth "triangle route" is measured at Fauntleroy. 2013 utilization data for the triangle route has been updated to show a change in allotment assumptions.

**Ferry system trip reliability and on-time performance by route**  
2013 and 2015; System-wide goals are: Reliability = 99% and on-time = 95%

	System-wide reliability			On-time performance		
	2013	2015	Δ	2013	2015	Δ
Anacortes – San Juan domestic	99.6%	99.7%	0.1%	91.4%	91.3%	-0.1%
Anacortes – San Juan – Sidney, B.C.	99.5%	99.5%	0.0%	88.7%	93.3%	4.6%
Edmonds – Kingston	99.9%	99.7%	-0.2%	99.3%	98.3%	-1.0%
Fauntleroy – Vashon – Southworth	99.4%	99.4%	0.0%	93.9%	92.0%	-1.9%
Mukilteo – Clinton	99.8%	99.9%	0.1%	92.9%	94.6%	1.7%
Point Defiance – Tahlequah	99.7%	99.9%	0.2%	99.1%	97.1%	-2.0%
Port Townsend – Coupeville (Keystone)	95.8%	95.7%	-0.1%	99.1%	99.3%	0.2%
Seattle – Bainbridge Island	100.0%	99.8%	-0.2%	95.3%	91.0%	-4.3%
Seattle – Bremerton	99.6%	99.8%	0.2%	96.6%	97.6%	1.0%
<b>Total</b>	<b>99.5%</b>	<b>99.5%</b>	<b>0.0%</b>	<b>95.6%</b>	<b>94.4%</b>	<b>-1.2%</b>

Data source and analysis: WSDOT Ferries Division.

Notes: Reliability is the percent of scheduled trips that were made; On-time performance is the percent of trips departing within 10 minutes of the scheduled departure time

**Ferry system ridership by route**  
2013 and 2015; Annual ridership for passengers and vehicles

	Number of passengers			Number of vehicles/drivers			Combined ridership		
	2013	2015	%Δ	2013	2015	%Δ	2013	2015	%Δ
Anacortes – San Juan domestic	933,842	1,065,044	14%	868,416	909,195	5%	1,802,258	1,974,239	10%
Anacortes – San Juan – Sidney, B.C.	91,783	91,981	0%	50,051	47,058	-6%	141,834	139,039	-2%
Edmonds – Kingston	1,817,926	1,978,586	9%	2,036,982	2,124,721	4%	3,854,908	4,103,307	6%
Fauntleroy – Vashon – Southworth	1,222,993	1,252,026	2%	1,684,348	1,722,982	2%	2,907,341	2,975,008	2%
Mukilteo – Clinton	1,787,254	1,878,082	5%	2,119,716	2,234,947	5%	3,906,970	4,113,029	5%
Point Defiance – Tahlequah	275,714	318,316	15%	406,030	450,258	11%	681,744	768,574	13%
Port Townsend – Coupeville (Keystone)	355,206	425,188	20%	323,416	362,203	12%	678,622	787,391	16%
Seattle – Bainbridge Island	4,304,850	4,404,227	2%	1,965,114	1,957,700	0%	6,269,964	6,361,927	1%
Seattle – Bremerton	1,665,013	1,989,125	19%	628,375	670,688	7%	2,293,388	2,659,813	16%
<b>Total</b>	<b>12,454,581</b>	<b>13,402,575</b>	<b>8%</b>	<b>10,082,448</b>	<b>10,479,752</b>	<b>4%</b>	<b>22,537,029</b>	<b>23,882,327</b>	<b>6%</b>

Data source and analysis: WSDOT Ferries Division.

# Publication Information

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WSDOT's *Annual Corridor Capacity Report Appendix* is prepared by the

Office of Strategic Assessment and Performance Analysis  
Washington State Department of Transportation  
310 Maple Park Ave SE, Olympia, WA 98504

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The *Corridor Capacity Report* is developed and produced by a small team of data scientists at the WSDOT Office of Strategic Assessment and Performance Analysis each year, with the help of dozens of individuals both at WSDOT and across the state's transportation community. WSDOT gratefully acknowledges their contributions.

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