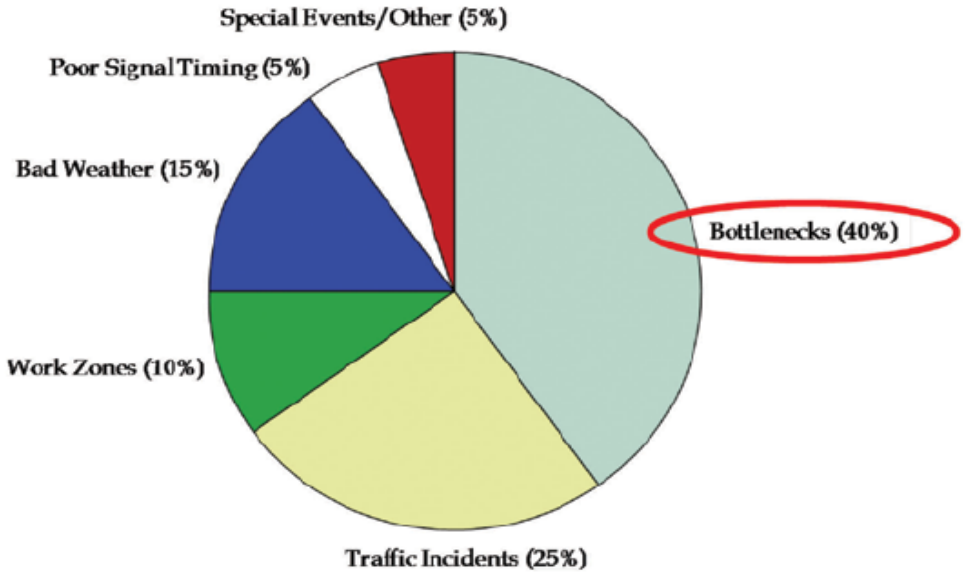
Corridors Bottleneck Operations Study (CBOS)

A Focused Approach to.....

Identifying Low Cost and Highly Effective Solutions to Recurring Bottlenecks in Region 1



Source: FHWA – http://ops.fhwa.dot.gov/congestion_report/congestion_report_05.pdf

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Recurring bottlenecks **are caused by**

decision points……
entrances and exit-ramps, merge areas, weave areas or drop lanes

physical constraints…..
curves, underpasses, narrow structures or no shoulders.

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The Goal…..is to improve safety at these recurring bottleneck locations

Historical evaluation of Safety Improvements where auxiliary lanes were built within the last 20 years

Improvement Type	Comparable Improvement	Before	After	Reduction
Short Auxiliary Section	I-205 Southbound at Sunnyside Road Interchange	12	8	32%
Long Auxiliary Section (Across multiple interchanges)	US 26 Eastbound, Cornell Road to OR 217	37	10	73%

Our studies indicate we could achieve at least a 30% or better reduction in crashes at this sites

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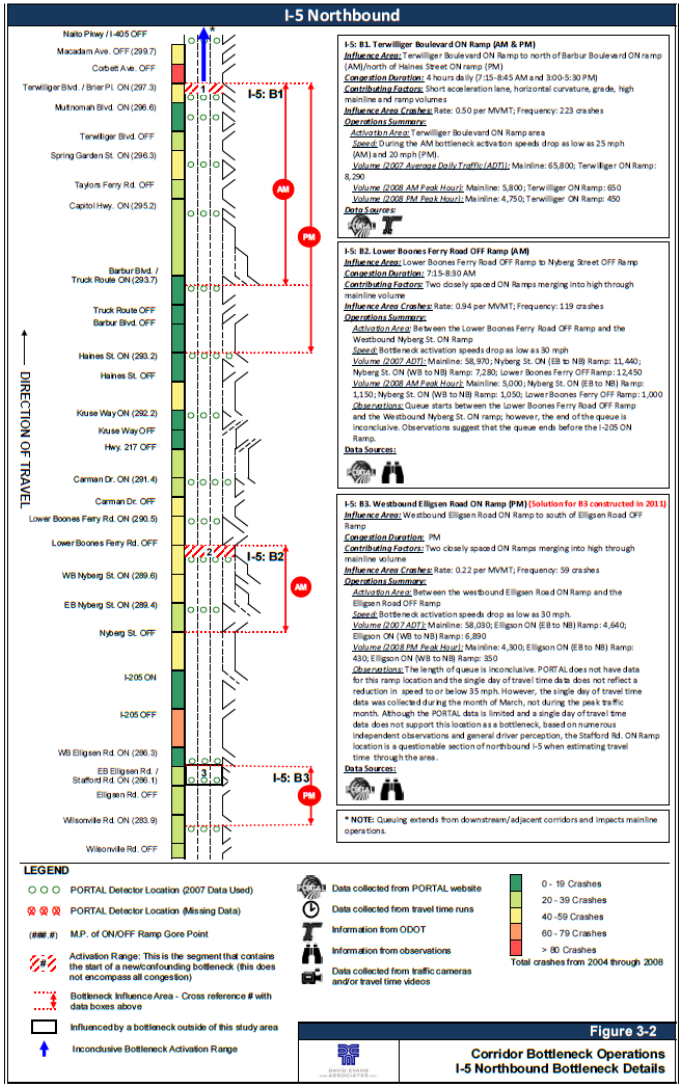

A Comprehensive Analysis and Evaluation of the Recurring Bottlenecks

I-5, I-205, I-84, I-405 and US26

These recurring bottlenecks were defined by:

Influence area
such as, location of interchange and ramps, curve or tunnel

Congestion Duration
how long had it last

Contributing factors
mainline volumes, spacing of interchange and ramps or speed change

Speed
less than 30mph as the indicator of congestion

Area crashes
number of crashes Rate per MVMT and frequency

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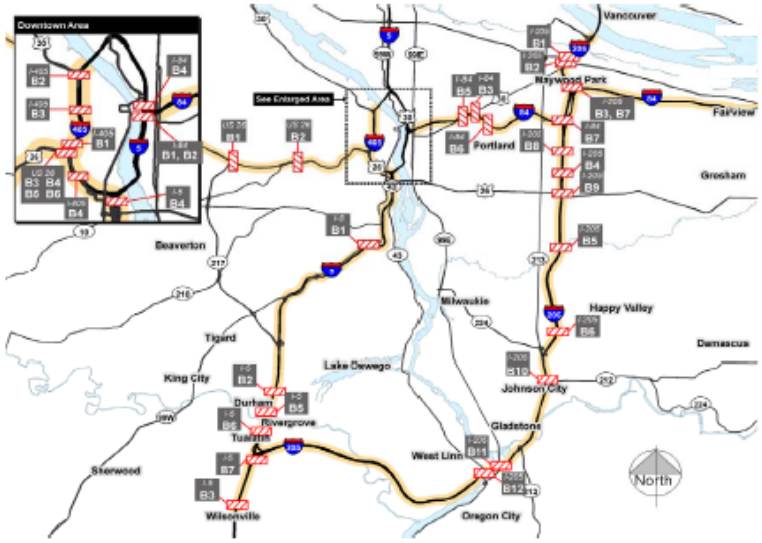
Figure 3-12: Regional Recurring Bottleneck Locations



Recurring Bottleneck Location

Over 30 recurring bottleneck locations were indentified by a design panel of experts

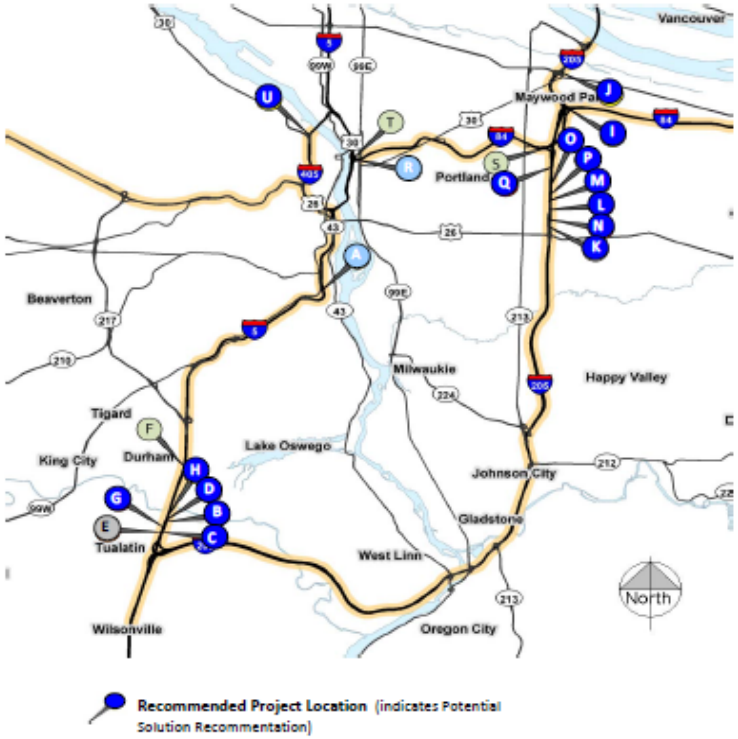
Recurring Bottleneck ID	Recurring Bottleneck Locations	Cause		Congestion Speed (MPH)	Congestion Duration (Hours)
		Decision Point	Physical Constraint		
I-5 Bottlenecks					
B1	I-5 NB: Terwilliger Boulevard Entrance Ramp (AM & PM)	X	X	20	4
B2	I-5 NB: Lower Boones Ferry Road Exit Ramp (AM)	X		30	1.25
B3 *	I-5 NB: Westbound Elligsen Road Entrance Ramp (PM)	X		*	*
B4	I-5 SB: Hood Avenue Exit Ramp (PM)	X		10	2.75
B5	I-5 SB: Carman Drive Lane Drop (PM)	X		10	2.25
B6	I-5 SB: Nyberg Street Exit Ramp (PM)	X		25	2.5
B7 **	I-5 SB: I-205 Entrance Ramp (PM)	X		**	**
I-205 Bottlenecks					
B1	I-205 NB: Sandy Boulevard/Columbia Boulevard Entrance Ramp (PM)	X		20	3
B2	I-205 NB: Columbia Boulevard/Hwy 30 Exit Ramp (PM)	X		35	Inconclusive
B3	I-205 NB: Westbound I-84 Entrance Ramp (PM)	X		5	5.25
B4	I-205 NB: Division Street Entrance Ramp and Hwy 26/Powell Blvd. Entrance Ramp (AM & PM)	X		10	2.75
B5	I-205 NB: Foster Road Exit Ramp (AM & PM)	X		20	4
B6	I-205 NB: Sunnybrook Road Entrance Ramp (PM)	X		30	2.25
B7	I-205 SB: Westbound I-84 Exit Ramp (AM & PM)	X		5	4.25
B8	I-205 SB: Stark/Washington Street Entrance Ramp (PM)	X		10	3.25
B9	I-205 SB: Hwy 26/Division Street/Powell Boulevard Exit Ramp (PM)	X		25	3.25
B10	I-205 SB: 212/224 Entrance Ramp (PM)	X		35	1
B11	I-205 SB: 99E/McLoughlin Boulevard Exit Ramp (AM)	X		20	1.25
B12	I-205 SB: Hwy 43 Entrance Ramp (AM)	X		30	2
I-84 Bottlenecks					
B1	I-84 EB: I-5 SB Entrance Ramp (AM & PM)	X		10	12
B2	I-84 EB: I-5 SB/NB Merge (PM)		X	5	4
B3	I-84 EB: 39th Avenue Entrance Ramp (PM)	X		Inconclusive	Inconclusive
B4	I-84 WB: I-5 Diverge (AM & PM)	X		20	8+
B5	I-84 WB: 33rd Avenue Entrance Ramp (AM)	X		15	4
B6	I-84 WB: Glisan Entrance Ramp (AM)	X		Inconclusive	Inconclusive
B7	I-84 WB: I-205 SB to I-84 WB Ramp	X		Inconclusive	Inconclusive
I-405 Bottlenecks					
B1	I-405 NB: US 26/12th Ave (PM)	X		5	3
B2	I-405 SB: US 30 Entrance Ramp (PM)	X		5	3
B3	I-405 SB: Everett Street Entrance Ramp to US 26 Exit Ramp Weave (PM)	X		5	3
B4	I-405 SB: US 26 Entrance Ramp to Broadway Exit Ramp Weave (PM)	X		5	3
US 26 Bottlenecks					
B1	US 26 EB: Oregon 217 Entrance Ramp (AM)	X		10	3
B2	US 26 EB: Skyline/Scholls Ferry Entrance Ramp (AM & PM)	X		Inconclusive	Inconclusive
B3	US 26 EB: I-405 Positioning/Curves/Tunnel (AM & PM)	X	X	15	8
B4	US 26 EB: Ramp to I-405 SB (AM & PM)	X	X	5	8
B5	US 26 EB: Ramp to I-405 NB (AM & PM)	X	X	5	7
B6	US 26 WB: I-405 Ramps/US 26 merge (PM)	X	X	10	3

* Construction of NB Auxiliary Lane in 2011

** Construction of SB Auxiliary Lane in 2010

Corridors Bottleneck Operations Study (C-BOS)

Figure 3-13: Potential Regional Projects



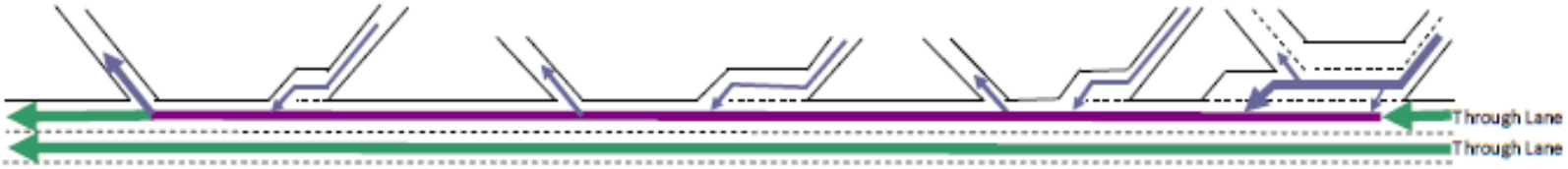
Map ID	Bottleneck ID	Potential Solution Identified	Potential Regional Projects	Est. Cost
I-5 Bottlenecks				
A	I-5: B1	Further Analysis	I-5 NB: Terwilliger Blvd. Entrance Ramp Extension.	$30M - $40M
B	I-5: B2	Yes	I-5 NB: Phase 1 - Lower Boones Ferry Road Exit Ramp Reconfiguration	$1M - $2M
C	I-5: B2	Yes	I-5 NB: Phase 2 - Nyberg Rd. Interchange to Lower Boones Ferry Rd. Interchange - Auxiliary Lane Extension	$11.5M - $13.5M
D	I-5: B2	Yes	I-5 NB: Phase 3 - Lower Boones Ferry Rd. Interchange to Carman Dr. Interchange - Auxiliary Lane Extension	$17M - $21M
E	I-5: B2	Project Phased	This Project is Phased into I-5 NB Projects B, C and D.	$18M - $22M
F	I-5: B5	Constructed August 2012	I-5 SB: Phase 1 - Carman Dr Entrance Ramp to Lower Boones Ferry Exit Ramp - Auxiliary Lane	$1.25M
G	I-5: B6	Yes	I-5 SB: Phase 2 - Lower Boones Ferry Rd. Exit to Lower Boones Ferry Rd. Entrance Auxiliary Lane	$7.2M - $8.5M
H	I-5: B6	Yes	I-5 SB: Phase 3 - Lower Boones Ferry Rd. to I-205 Auxiliary Lane Extension	$10M - $18M
I-205 Bottlenecks				
I	I-205: B3	Yes	I-205 NB: Phase 1 - I-84 WB Entrance Ramp to Sandy Blvd. Exit Ramp - Auxiliary Lane	$6.7M
J	I-205: B3	Yes	I-205 NB: Phase 2 - Sandy Blvd. Exit Ramp to Columbia Blvd. Exit Ramp - Auxiliary Lane Extension	$6.5M
K	I-205: B4	Yes	I-205 NB: Powell Blvd. Entrance Ramp to Division St. Entrance Ramp - Auxiliary Lane Extension and 2-Lane Exit at Washington St.	6.5M - $7.5M
L	I-205: B4	Yes	I-205 NB: Phase 1 - Powell Blvd Entrance Lane to Washington St. Exit Ramp - Auxiliary Lane Extension	$6.0M - $6.9M
M	I-205: B4	YES	I-205 NB: Phase 2 - Washington St. Exit Ramp to Glisan St. Exit Ramp - Auxiliary Lane Extension	$2.4M - $2.8M
N	I-205: B4	Yes	I-205 NB: Phase 3 - Glisan St. Exit to I-84 WB Exit Ramp - Auxiliary Lane Extension	$2.2M - $2.5M
O	I-205: B4	Yes	I-205 NB: Phase 4 - Division Street Entrance Ramp to Stark St./Washington St. Exit Ramp - Auxiliary Lane Extension w/ 2-lane Exit at Washington Street	$1.7M - $2.0M
P	I-205: B4	Yes	I-205 NB: Division St. entrance ramp to I-84 WB Exit Ramp - Auxiliary Lane Extension w/2-lane Exit at Washington St.	$7.6M - $8.M
Q	I-205: B8/B9	Yes	I-205 SB: I-84 EB Entrance ramp to Stark St./Washington St. exit Ramp - Auxiliary Lane	$7.0M - $8.5M
I-84 Bottlenecks				
R	I-84: B2	Further Analysis	I-84 EB: Grand Ave. Entrance Ramp Extension	$4.4M - $5.2M
S	I-84: B3	Construction 2013	I-84 EB: Halsey St.Exit Ramp to I-205 NB Entrance Ramp - Auxiliary Lane	$5.9M
T	I-84: B4	Construction 2013	I-84 WB: I-5 NB and I-5 SB Diverge Re-striping	$0.5M
I-405 Bottlenecks				
U	I-405: B2	Yes	I-405 SB/US30 EB: Entrance Ramp Lane Re-arrangement	$0.5M - $1.0M

Of the recurring bottlenecks identified only about 20 potential solutions were recommended to move forward

Corridors Bottleneck Operations Study (C-BOS)

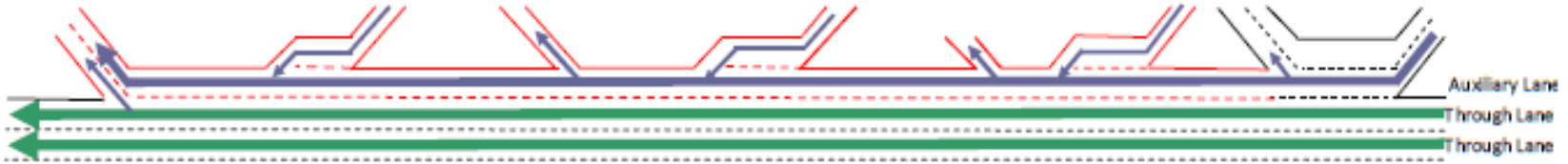
What is the Most Frequent Cause for Recurring Bottlenecks in Region 1?

Inadequate Interchange Spacing…….



Vehicles entering or exiting must merge and weave using the freeway through-lane resulting in congestion and overall slowing of the freeway traffic.

Provide Additional Space ……..



Vehicles entering or exiting can use the auxiliary lane to merge and weave outside of the freeway through-lane improving safety and freeway traffic flow.

Corridors Bottleneck Operations Study (CBOS)

Recently Completed Improvements

I-5 SB auxiliary lane built in 2010

This auxiliary lane is 1.5 miles long from I-205 to Elligsen Rd. This section of I-5 was ranked 125th on the national freight congestion list. The construction cost was approximately $5.0 million.

I-5 SB exit-ramp to Nyberg Road built in 2010

The improvement widened the southbound Nyberg Road exit-ramp from one lane to two lanes. The ramp widening resulted in significant crash reduction and operational improvement.
The construction cost was approximately $500,000.

I-5 SB: Phase 1 - Carman Dr Entrance Ramp to Lower Boones Ferry Exit Ramp - Auxiliary Lane Completed in 2012

This project extended the current lane drop just south of the Carman Dr. exit-ramp to the Lower Boones Ferry Rd. exit-ramp, where it would become a drop lane.

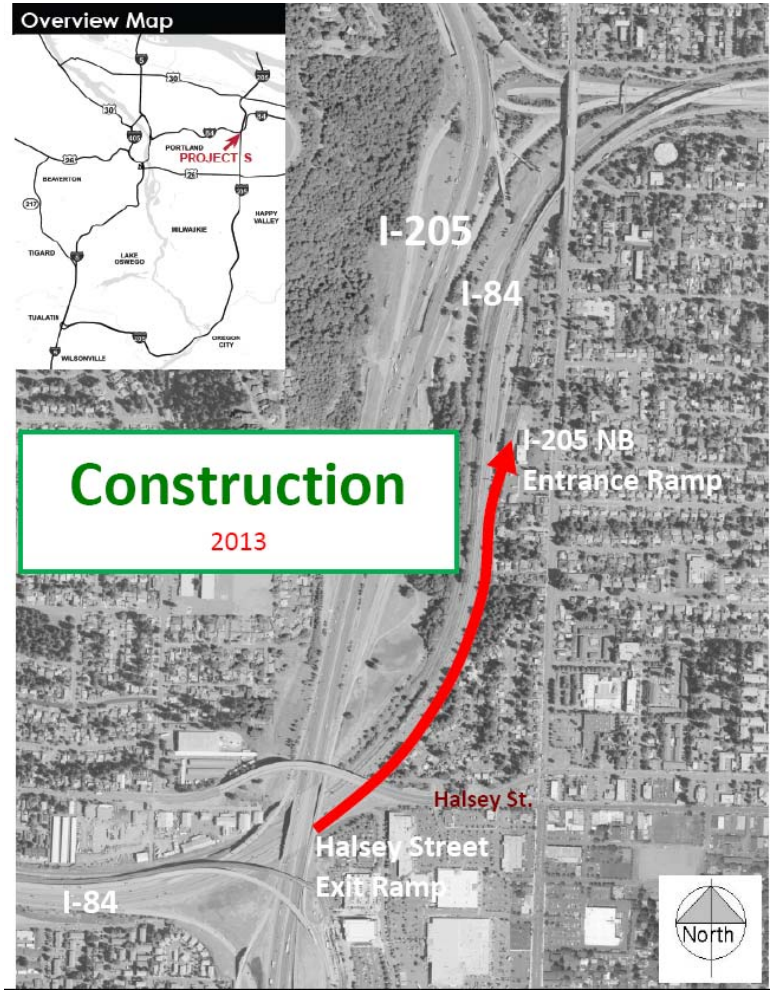
The construction cost was approximately $1.25 million.

Corridors Bottleneck Operations Study (CBOS)

Improvements Under Construction

I-84 EB: Halsey St. Exit Ramp to I-205 NB Entrance Ramp - Auxiliary Lane

Project Cost:
$5.9M

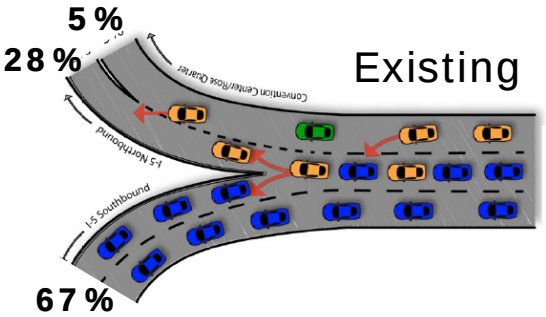


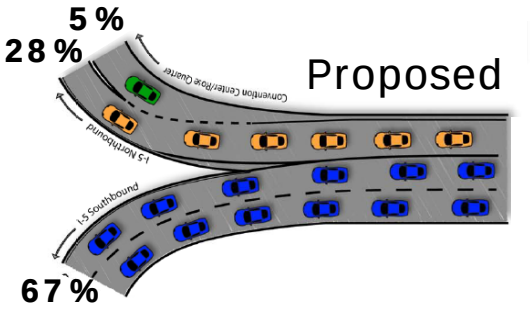
Corridors Bottleneck Operations Study (CBOS)

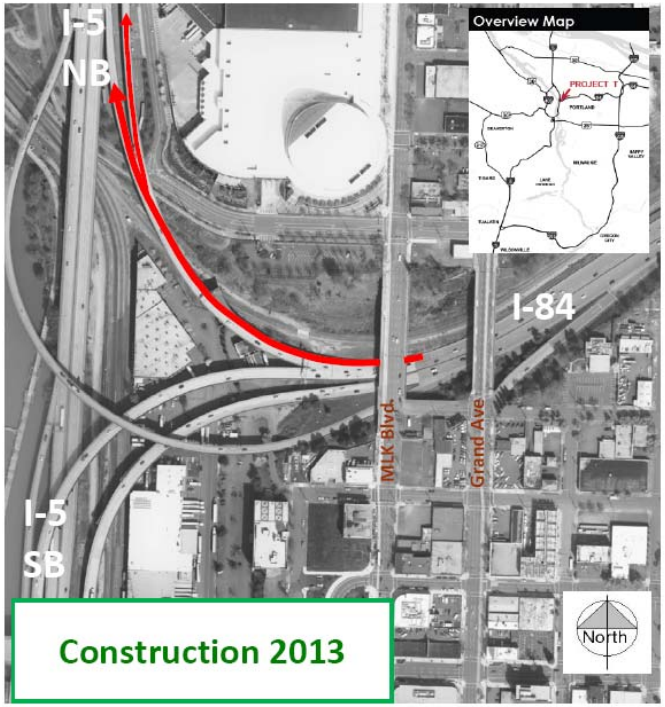
Improvements Under Construction

I-84 WB: I-5 NB and I-5 SB Diverge Re-striping

Project Cost:
$0.5M







I-5 Southbound	51,330 ADT
I-5 Northbound	21,150 ADT
Convention Ctr/ Rose Quarter	3,800 ADT

Corridors Bottleneck Operations Study (CBOS)

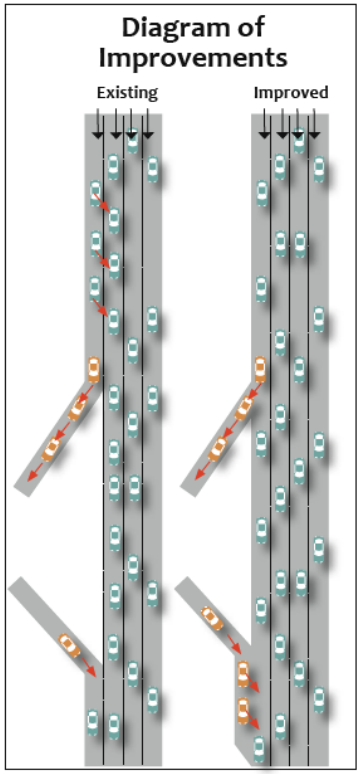
We expect similar results from the following CBOS Projects that have been Submitted to the STIP Enhance

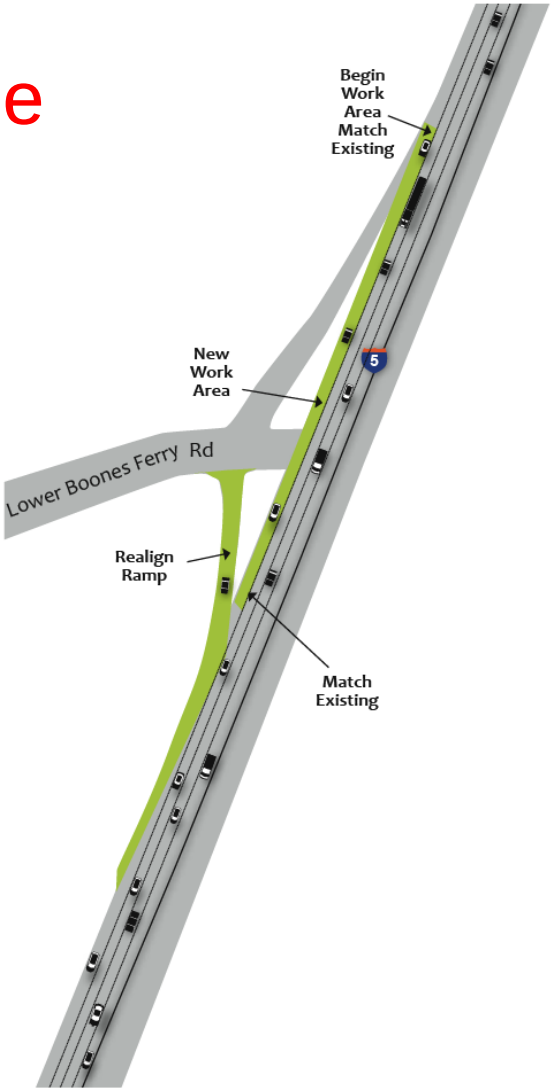
Corridors Bottleneck Operations Study (CBOS)

Submitted for the STIP Enhance
Recommended for the 150% List

I-5 SB: Phase 2 - Lower Boones Ferry Rd. Exit to Lower Boones Ferry Rd. Entrance Auxiliary Lane

Project Cost:
$7.0 to $8.5M



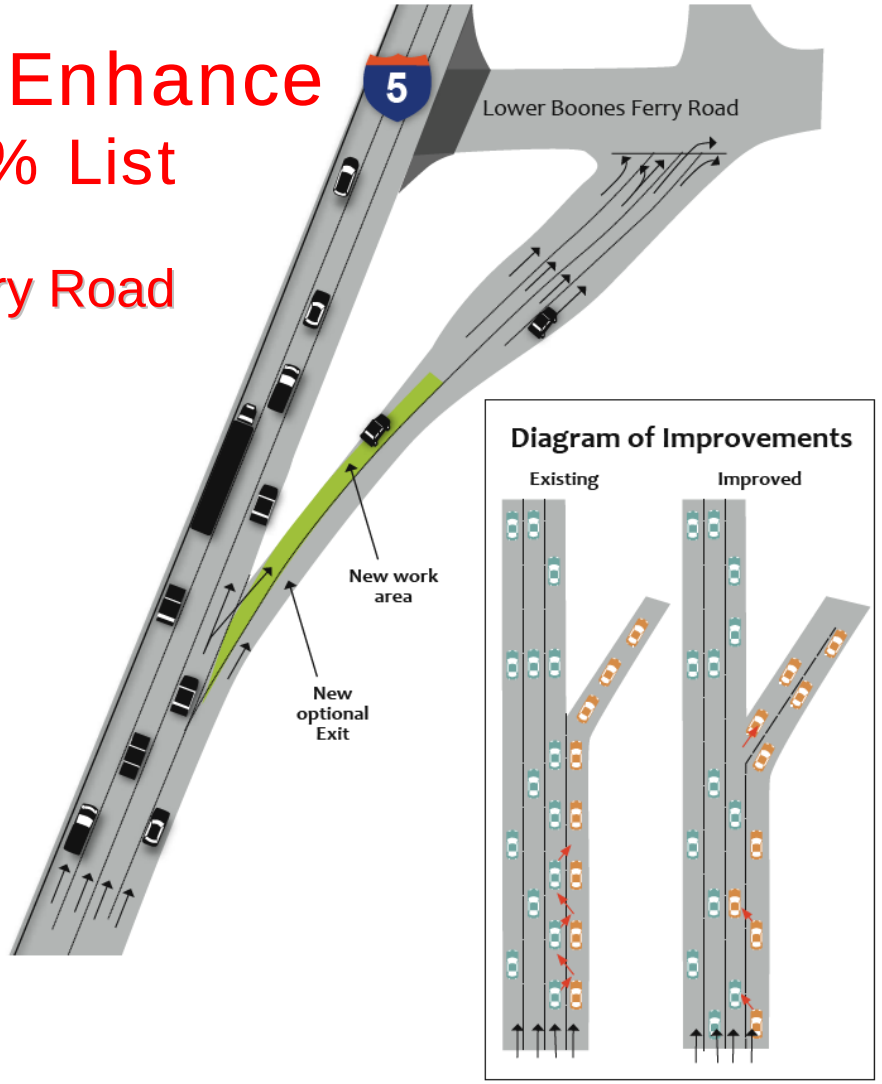


Corridors Bottleneck Operations Study (CBOS)

Submitted for the STIP Enhance Recommended for the 150% List

I-5 NB: Phase 1 - Lower Boones Ferry Road Exit Ramp Reconfiguration

Project Cost:
$1.0 to $2.0M

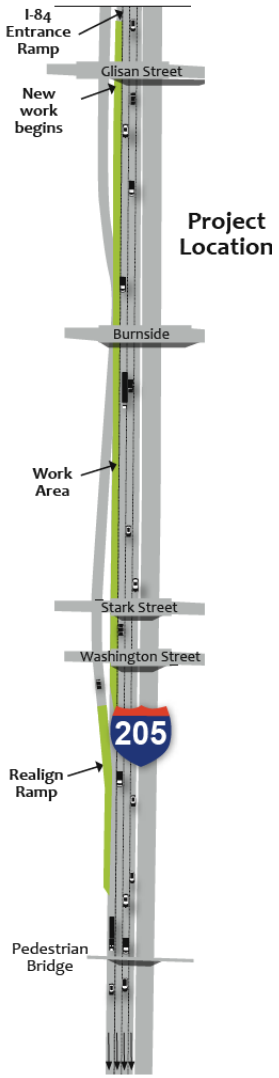


Corridors Bottleneck Operations Study (CBOS)

Submitted to the STIP Enhance
Recommended for the 150% List

I-205 SB: I-84 EB Entrance ramp to Stark St./Washington St. Exit Ramp - Auxiliary Lane

Cost:
$6.0M to $7.0M



Corridors Bottleneck Operations Study (CBOS)

Questions We Have Heard:

Do these improvements add to the capacity of the freeway?

No…..CBOS improvements do not add capacity to thru capacity to the freeway system. The CBOS improvements are designed to improve operations and safety at localized recurring bottleneck locations. By improving these locations the existing through lanes operated better.

Will these improvements to the freeway just encourage more thru trips?

No…..CBOS improvements are designed to address specific bottleneck areas. They do not attract more thru trips to the freeway system. These improvements do improve safety, and reduce diversion and out of direction travel.

Corridors Bottleneck Operations Study (CBOS)

The CBOS Atlas is available at the ODOT FTP site.

ftp.odot.state.or.us/outgoing/cbos2013/

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