

Monitoring System Performance and Data Driven Investment Decisions

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June 2, 2021

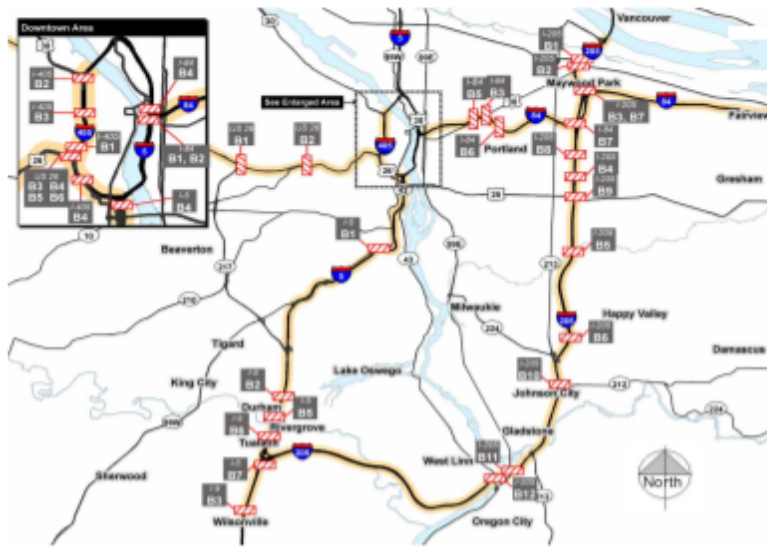


System Performance Monitoring

- Prior to 2012
 - System performance was monitored in piece meal at corridor and sub-corridor level
- Since 2012
 - Investment in commercial probe data (INRIX, HERE)
 - Federal Localized Bottleneck Reduction program
 - Monitor traffic performance on all Portland Metro freeways

System Performance Monitoring

Regional Recurring Bottleneck Location Summary



 Recurring Bottleneck Location

Recurring Bottleneck ID	Recurring Bottleneck Locations	Cause		Congestion Speed (MPH)	Congestion Duration (Hours)	See Bottleneck Detail sheet on page #
		Decision Point	Physical Constraint			
I-5 Bottlenecks						
B1	I-5 NB: Terwilliger Boulevard Entrance Ramp (AM & PM)	X	X	20	4	Page 3-5
B2	I-5 NB: Lower Boones Ferry Road Exit Ramp (AM)	X		30	1.25	Page 3-5
B3 *	I-5 NB: Westbound Ellingsen Road Entrance Ramp (PM)	X		*	*	Page 3-5
B4	I-5 SB: Hood Avenue Exit Ramp (PM)	X		10	2.75	Page 3-6
B5	I-5 SB: Carman Drive Lane Drop (PM)	X		10	2.25	Page 3-6
B6	I-5 SB: Nyberg Street Exit Ramp (PM)	X		25	2.5	Page 3-6
B7 **	I-5 SB: I-205 Entrance Ramp (PM)	X		**	**	Page 3-6
I-205 Bottlenecks						
B1	I-205 NB: Sandy Boulevard/Columbia Boulevard Entrance Ramp (PM)	X		20	3	Page 3-7
B2	I-205 NB: Columbia Boulevard/Hwy 30 Exit Ramp (PM)	X		35	Inconclusive	Page 3-7
B3	I-205 NB: Westbound I-84 Entrance Ramp (PM)	X		5	5.25	Page 3-7
B4	I-205 NB: Division Street Entrance Ramp and Hwy 26/Powell Blvd. Entrance	X		10	2.75	Page 3-7
B5	I-205 NB: Foster Road Exit Ramp (AM & PM)	X		20	4	Page 3-7
B6	I-205 NB: Sunnybrook Road Entrance Ramp (PM)	X		30	2.25	Page 3-7
B7	I-205 SB: Westbound I-84 Exit Ramp (AM & PM)	X		5	4.25	Page 3-8
B8	I-205 SB: Stark/Washington Street Entrance Ramp (PM)	X		10	3.25	Page 3-8
B9	I-205 SB: Hwy 26/Division Street/Powell Boulevard Exit Ramp (PM)	X		25	3.25	Page 3-8
B10	I-205 SB: 212/224 Entrance Ramp (PM)	X		35	1	Page 3-8
B11	I-205 SB: 99E/McLoughlin Boulevard Exit Ramp (AM)	X		20	1.25	Page 3-8
B12	I-205 SB: Hwy 43 Entrance Ramp (AM)	X		30	2	Page 3-8
I-84 Bottlenecks						
B1	I-84 EB: I-5 SB Entrance Ramp (AM & PM)	X		10	12	Page 3-9
B2	I-84 EB: I-5 SB/NB Merge (PM)		X	5	4	Page 3-9
B3	I-84 EB: 39th Avenue Entrance Ramp (PM)	X		Inconclusive	Inconclusive	Page 3-9
B4	I-84 WB: I-5 Diverge (AM & PM)	X		20	8+	Page 3-10
B5	I-84 WB: 33rd Avenue Entrance Ramp (AM)	X		15	4	Page 3-10
B6	I-84 WB: Gilsan Entrance Ramp (AM)	X		Inconclusive	Inconclusive	Page 3-10
B7	I-84 WB: I-205 SB to I-84 WB Ramp	X		Inconclusive	Inconclusive	Page 3-10
I-405 Bottlenecks						
B1	I-405 NB: US 26/12th Ave (PM)	X		5	3	Page 3-11
B2	I-405 SB: US 30 Entrance Ramp (PM)	X		5	3	Page 3-12
B3	I-405 SB: Everett Street Entrance Ramp to US 26 Exit Ramp Weave (PM)	X		5	3	Page 3-12
B4	I-405 SB: US 26 Entrance Ramp to Broadway Exit Ramp Weave (PM)	X		5	3	Page 3-12
US 26 Bottlenecks						
B1	US 26 EB: Oregon 217 Entrance Ramp (AM)	X		10	3	Page 3-13
B2	US 26 EB: Skyline/Schoffs Ferry Entrance Ramp (AM & PM)	X		Inconclusive	Inconclusive	Page 3-13
B3	US 26 EB: I-405 Positioning/Curves/Tunnel (AM & PM)	X	X	15	8	Page 3-13
B4	US 26 EB: Ramp to I-405 SB (AM & PM)	X	X	5	8	Page 3-13
B5	US 26 EB: Ramp to I-405 NB (AM & PM)	X	X	5	7	Page 3-13
B6	US 26 WB: I-405 Ramps/US 26 merge (PM)	X	X	10	3	Page 3-14

* Construction of NB Auxiliary Lane in 2011

** Construction of SB Auxiliary Lane in 2010

Traffic Performance Reports



Portland Region 2016 Traffic Performance Report

Oregon Department of Transportation
Region 1



June 2017



Portland Region

2018

Traffic Performance Report



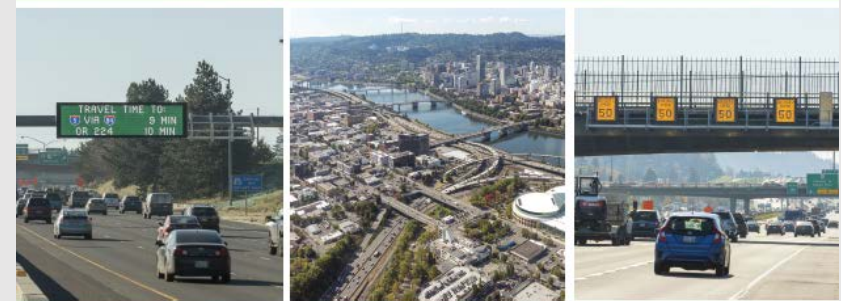
Oregon Department of Transportation: Region 1
December 2018



Portland Region

2020

Traffic Performance Report



Oregon Department of Transportation: Region 1
March 2021

Purpose

- Monitor freeway system performance over time
- Inform freeway system management
- Support/prioritize projects
- Project implementation analysis (before/after)

Report on performance indicators

- Congestion
- Reliability
- Safety
- Freight



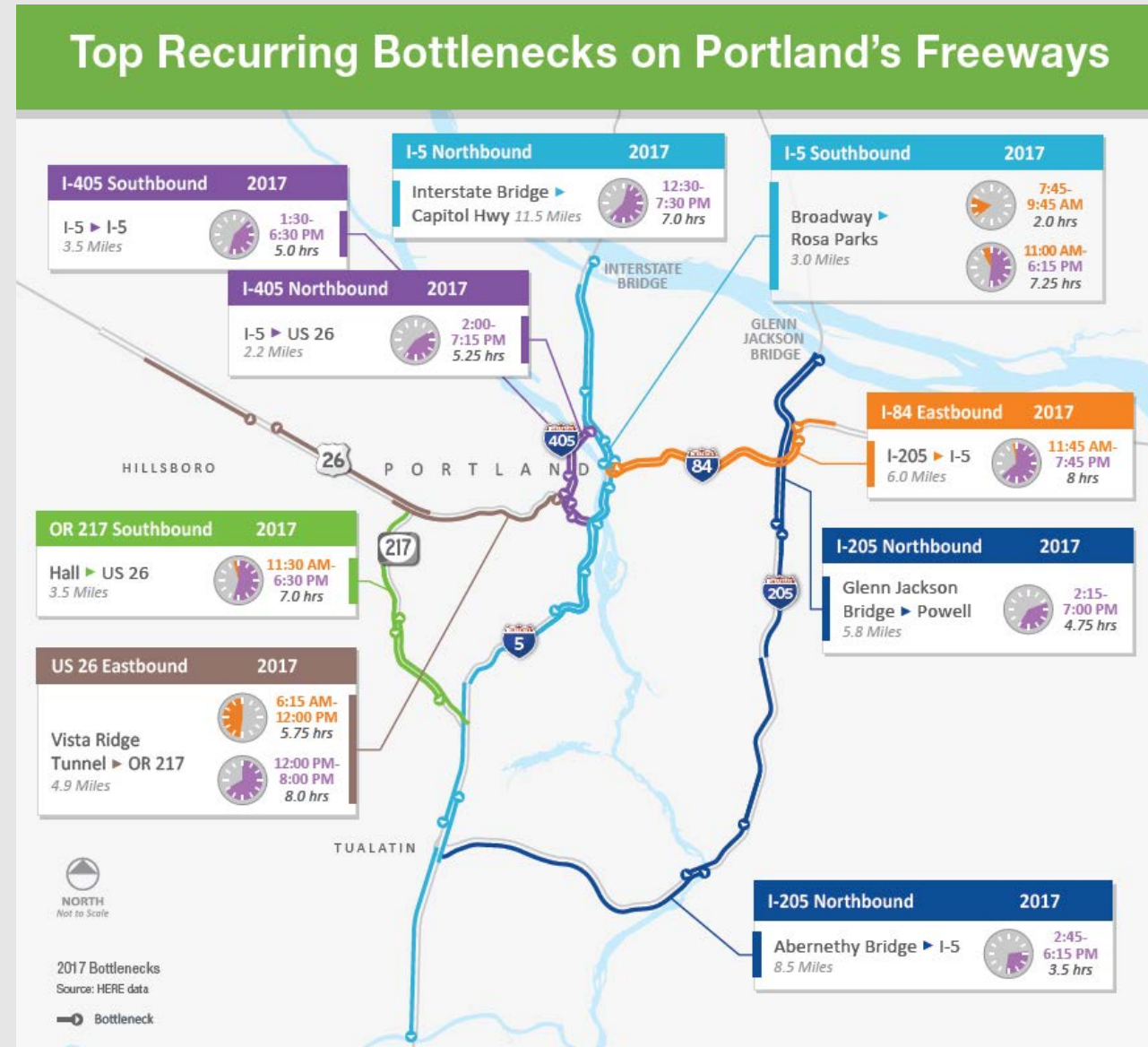
Extent of Bottlenecks

38 bottlenecks on
Portland area
freeways



Bottleneck Characteristics

- Location
- Duration
- Length of Queue



Reliability

- More buffer needed to ensure on-time arrival
- Mid-day trip reliability decreased the most (26%)
- PM peak is least reliable
- Some corridors have less reliability in mid-day than AM peak

Top corridors with unreliable travel*

Source: HERE data

Corridor location	2017 Travel time buffer (minutes)		
	AM	Mid-day	PM
I-5 NB	15.3	16.1	29.2
I-5 SB	9.1	15.9	44.4
I-84 WB	15.0	7.2	15.1
I-205 NB	8.9	10.3	27.5
I-205 SB	11.2	13.7	23.8
I-405 NB	1.2	2.5	3.5
US 26 EB	16.4	7.9	15.2

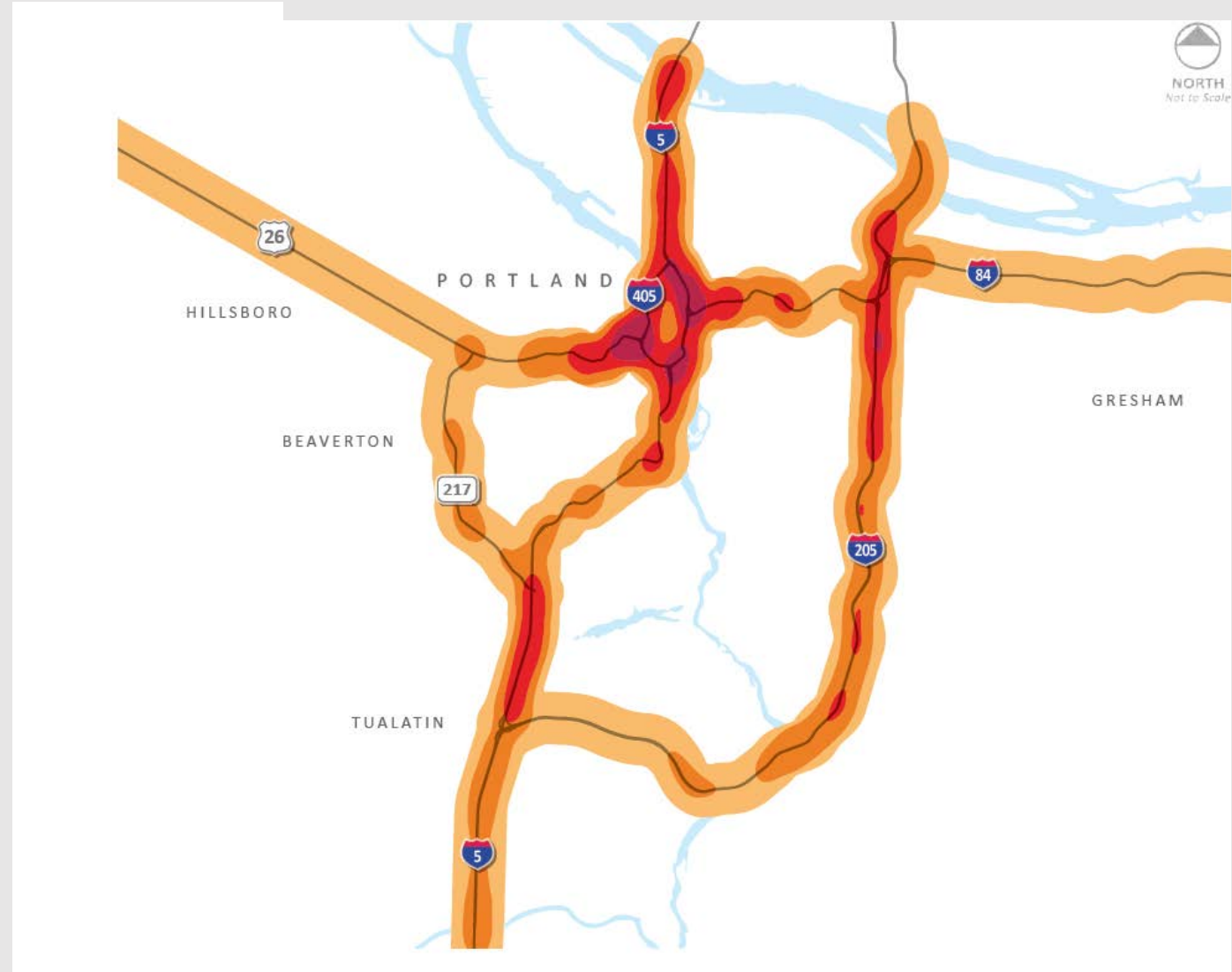
Motorists in these corridors experience the most variations in travel time, all of which fall within the PM peak period. Motorists have to buffer in the highest extra time per corridor length in order to ensure on-time arrival.

**Selection based on buffer time weighted for length of corridor*

Safety – Crashes and Non-crash Incidents

- Crash hot spots (2013-2017)
 - 16,833 crashes
- Incident hot spots (not shown)
 - 71,506 incidents

INCIDENT FREQUENCY INCREASES during mid-day and shoulder PM peak periods, contributing to congestion and less reliable travel.



Cost of Congestion



**THE DAILY COST OF CONGESTION
IN THE PORTLAND METRO REGION
HAS INCREASED**

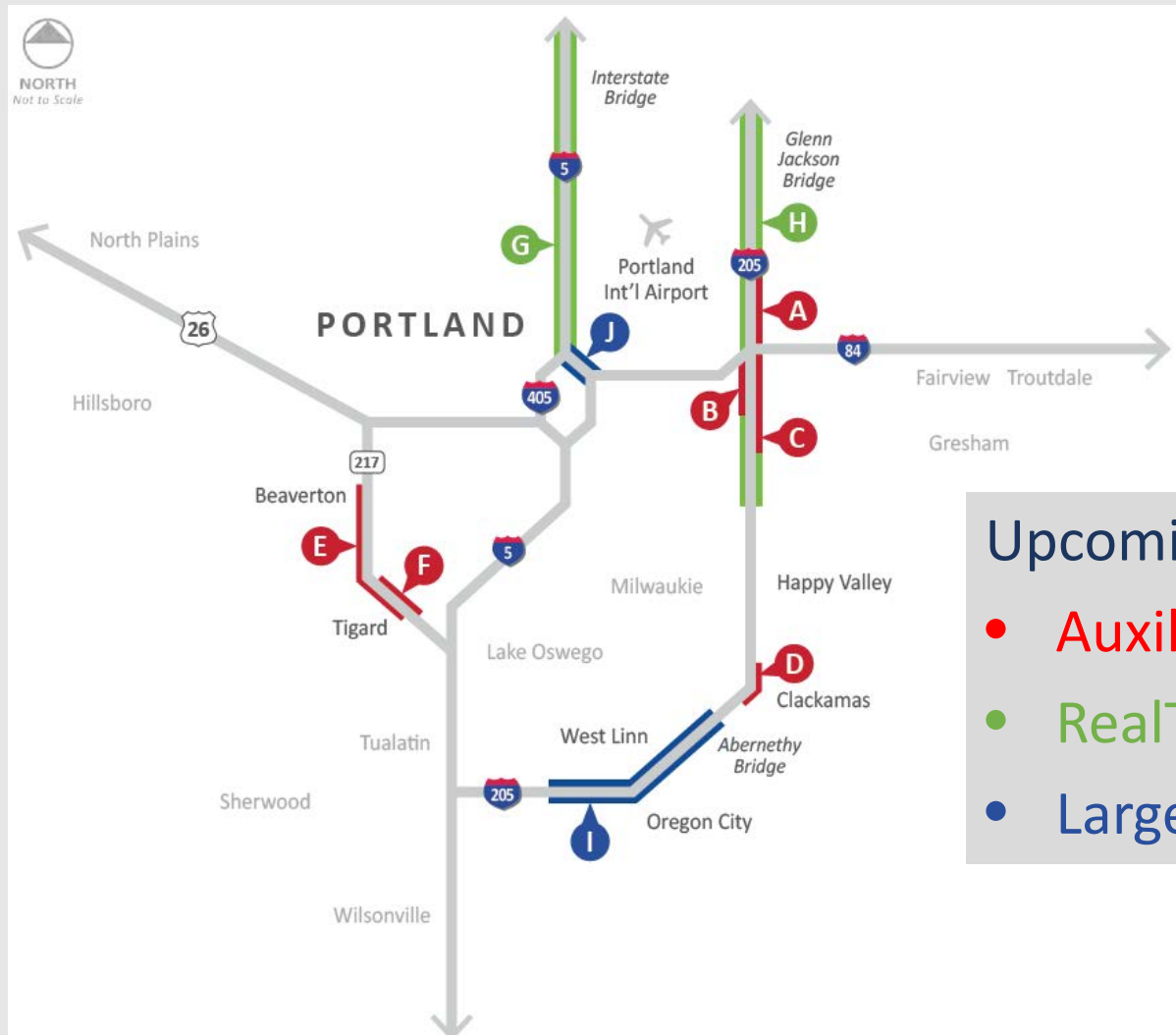
Cost of Daily Congestion <i>(thousands of dollars)</i>			
Corridor Location	2015	2017	% Change
I-5	\$623	\$734	+17.8%
I-84	\$219	\$264	+20.5%
I-205	\$401	\$498	+24.2%
I-405	\$114	\$130	+14.0%
US 26	\$218	\$291	+33.5%
OR 217	\$132	\$133	+1.0%

\$1.7M
IN 2015



\$2.0M
IN 2017

Projects and Programs

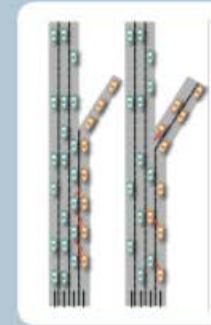
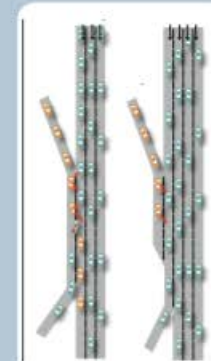
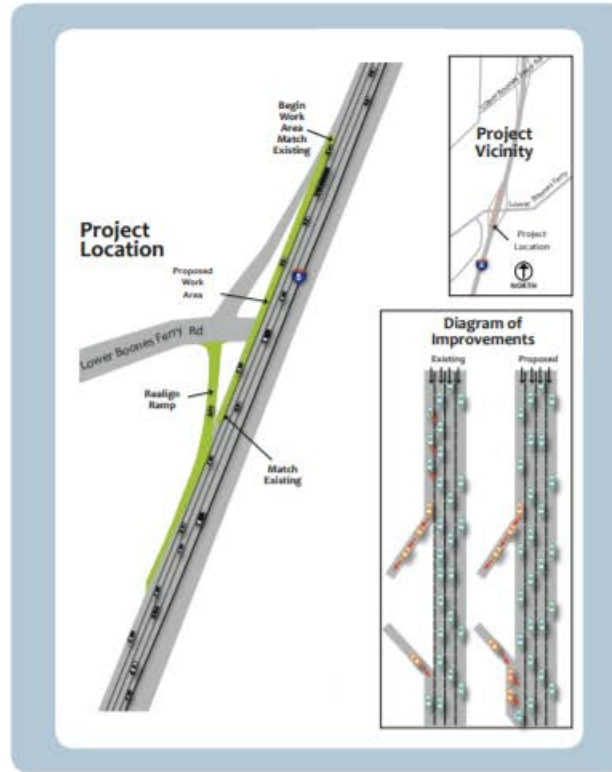


- Upcoming Projects:
- Auxiliary lanes
 - RealTime Signs and ATM
 - Larger-scale projects

Corridor Bottleneck Operations Study (CBOS) Atlas

Project Atlas

Corridor Bottleneck Operations Study - ODOT Region 1

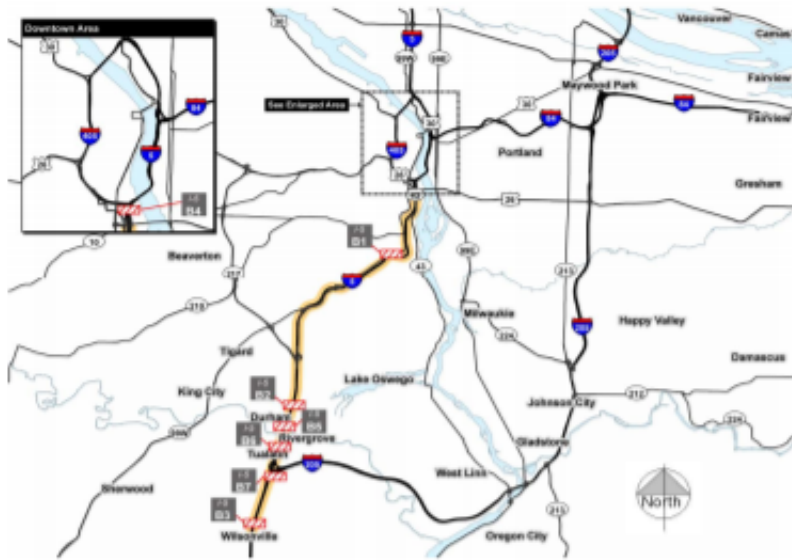


Corridor Bottleneck Operations Study (CBOS)

- Original CBOS completed in 2013
 - Response to federal Localized Bottleneck Reduction program
 - Focus on freeways
 - Identified 36 recurring bottlenecks and 21 project opportunities
 - Majority of prioritized projects in the original atlas have been built
- CBOS 2 (in progress)
 - Current effort looks at next batch of problem areas and potential solutions

Corridor Bottleneck Operations Study (CBOS) Atlas

Figure 4-1: I-5 Recurring Bottleneck Locations



Recurring Bottleneck Location

Bottleneck ID	Recurring Bottleneck Location	Cause		Congestion Speed (MPH)	Congestion Duration (Hours)	See Bottleneck Detail Sheet on page #
		Decision Point	Physical Constraint			
I-5 Bottlenecks						
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B3*	I-5 NB: Westbound Elgin Road Entrance Ramp (PM)	X		*	*	Page 3-5
B4	I-5 SB: Hood Avenue Exit Ramp (PM)	X		10	2.75	Page 3-6
B5	I-5 SB: Carman Drive Lane Drop (PM)	X		10	2.25	Page 3-6
B6	I-5 SB: Nyberg Street Exit Ramp (PM)	X		25	2.5	Page 3-6
B7**	I-5 SB: I-205 Entrance Ramp (PM)	X		**	**	Page 3-6

* Construction of NB Auxiliary Lane in 2011

** Construction of SB Auxiliary Lane in 2010

Figure 4-2: I-5 Recommended Projects



Recommended Project Location (indicates Potential Solution Recommendation)

Map ID	Bottleneck ID	Potential Solution Identified	Recommended Projects	Est. Cost	See Project sheet on page #
I-5 Recommended Projects to Move Forward					
B	I-5: B2	Yes	I-5 NB: Phase 1 - Lower Boones Ferry Road Exit Ramp Reconfiguration	\$1M - \$2M	Page 4-8
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	Page 4-9
D	I-5: B2	Yes	I-5 NB: Phase 3 - Lower Boones Ferry Rd. Interchange to Carman Dr. Interchange - Auxiliary Lane Extension	\$17M - \$21M	Page 4-10
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	Page 4-12
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	Page 4-13
H	I-5: B6	Yes	I-5 SB: Phase 3 - Lower Boones Ferry Rd. to I-205 Auxiliary Lane Extension	\$10M - \$18M	Page 4-14
I-5 Recommended Projects for Additional Analysis and Evaluation					
A	I-5: B1	Further Analysis	I-5 NB: Terwilliger Blvd. Entrance Ramp Extension.	\$30M - \$40M	Page 4-7

Project Phased

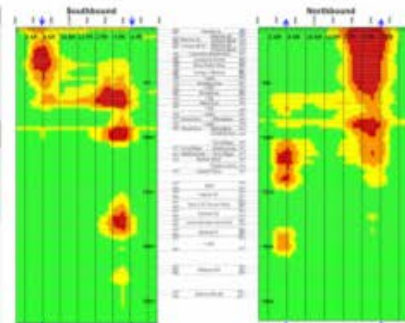
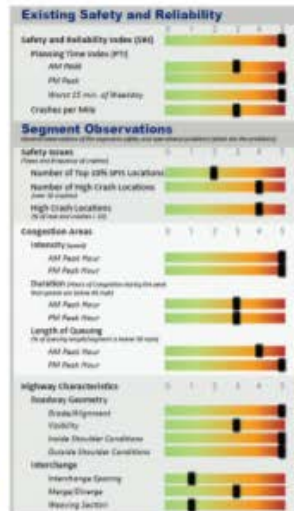
E	I-5: B2	Project Phased	This Project is Phased into I-5 NB Projects B, C and D.	\$18M - \$22M	Page 4-11
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Active Traffic Management Atlas

ATM Project Atlas - Executive Summary Active Traffic Management Strategy - ODOT Region 1



Let's Keep it Moving

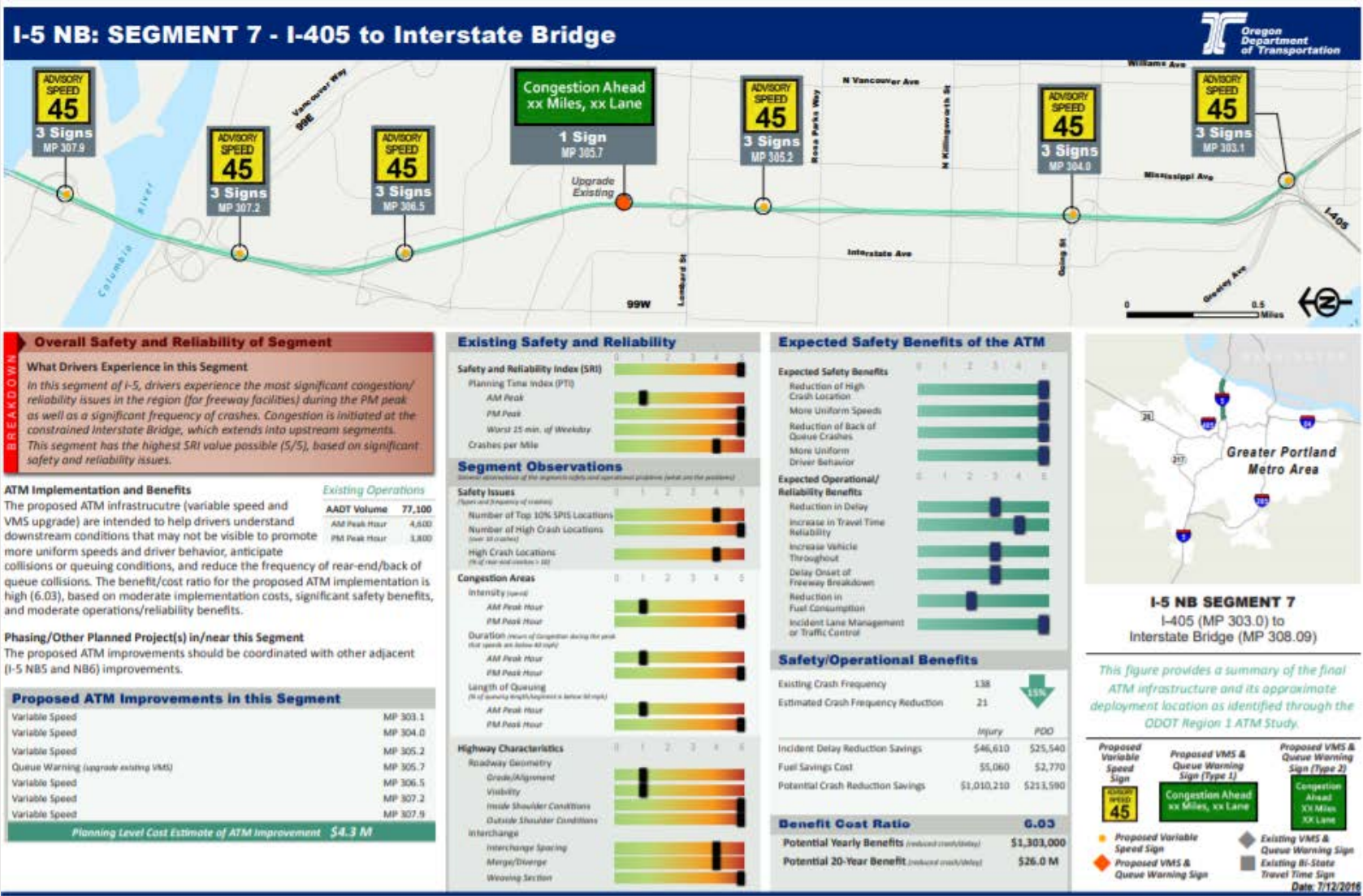


CORE ATM TOOLS

- TRAVEL TIME TO 15 MIN**
Traveler Information: Providing information to travelers, using variable message signs, related to travel time, congestion, crashes, speeds, road closures, etc.
- 45**
Variable Speed: Variable speeds based on current condition for congestion or weather to help manage traffic flow.
- Congestion Ahead 2 Miles**
Queue Warning: Warning to drivers of slowing or stopped vehicles ahead to reduce crashes.
- Ramp Metering**: Adjustment of entry ramp volumes and vehicle spacing based on current freeway conditions to maximize throughput on the freeway.

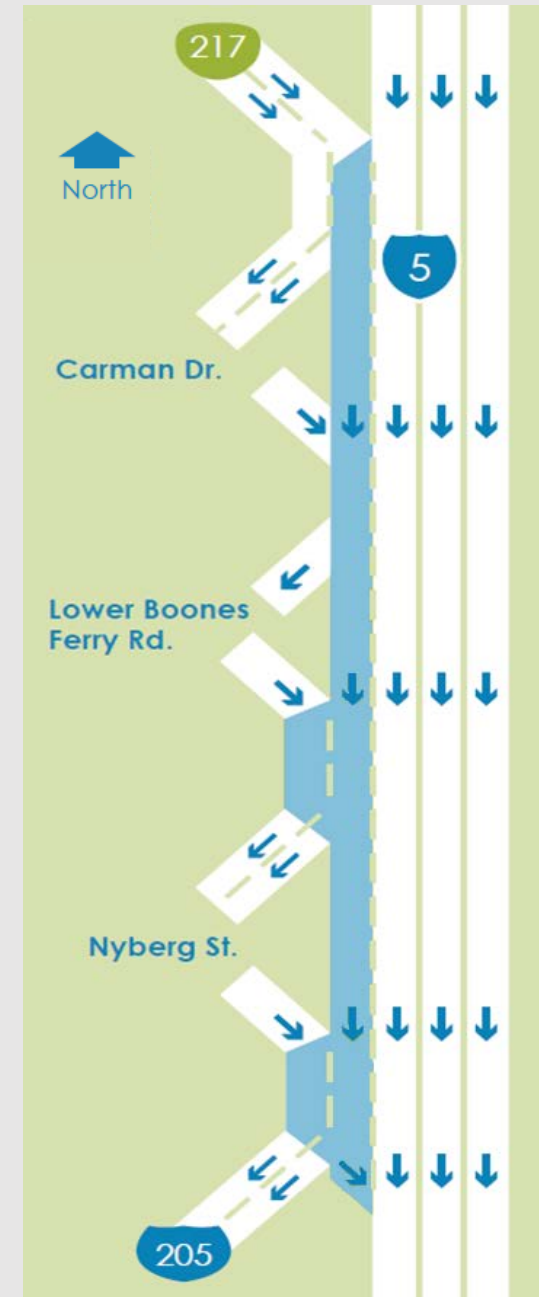


Active Traffic Management Atlas

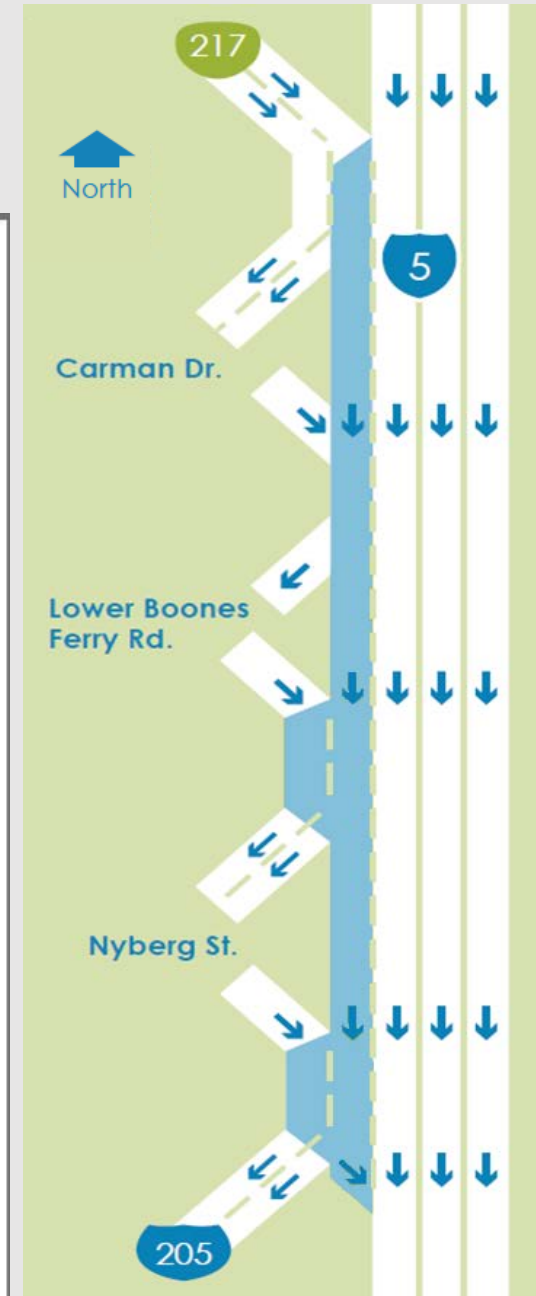
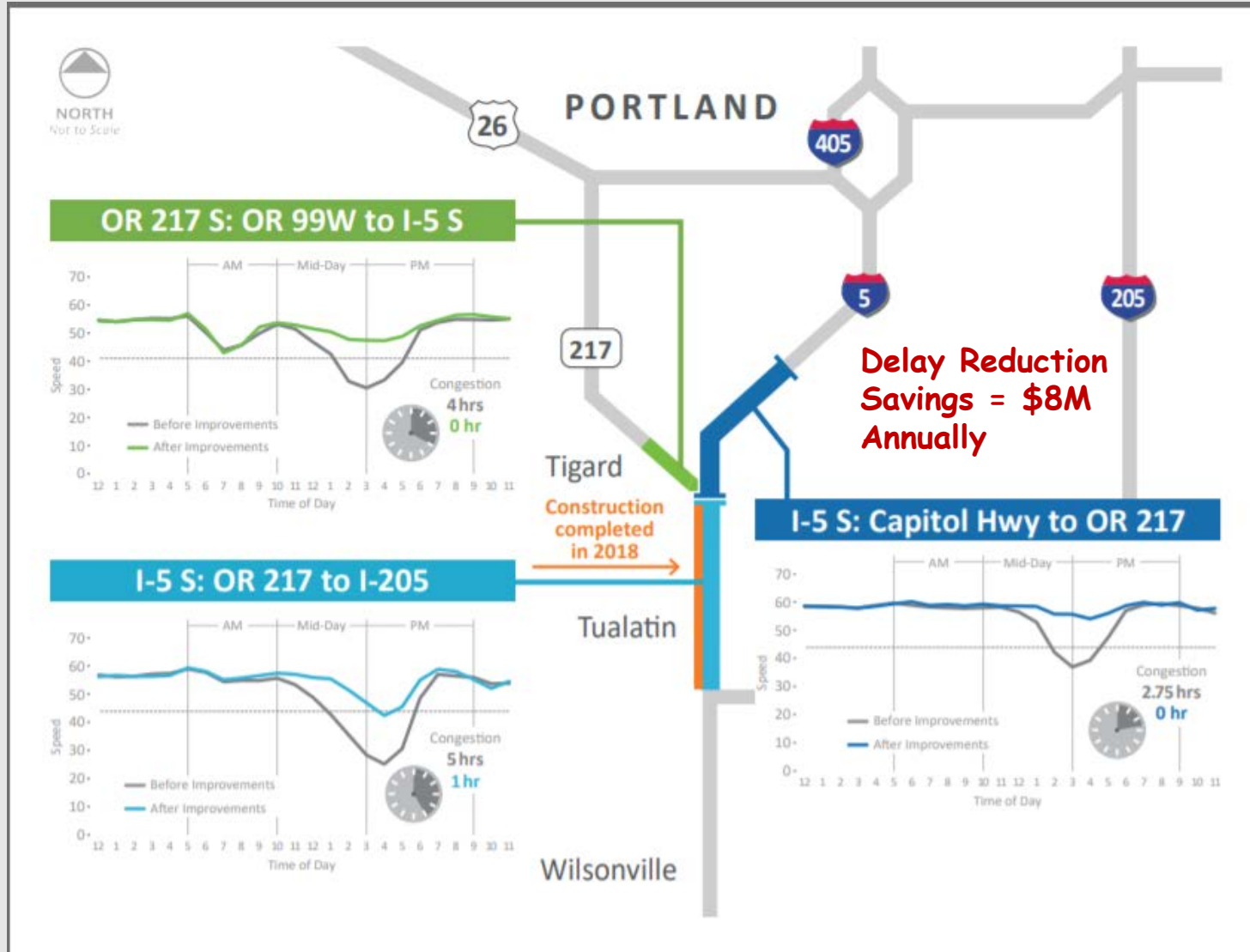


Before-After Analysis

- Completed CBOS Project
 - I-5 SB Auxiliary Lane
 - System-to-system connectivity between OR217 SB and I-205 NB

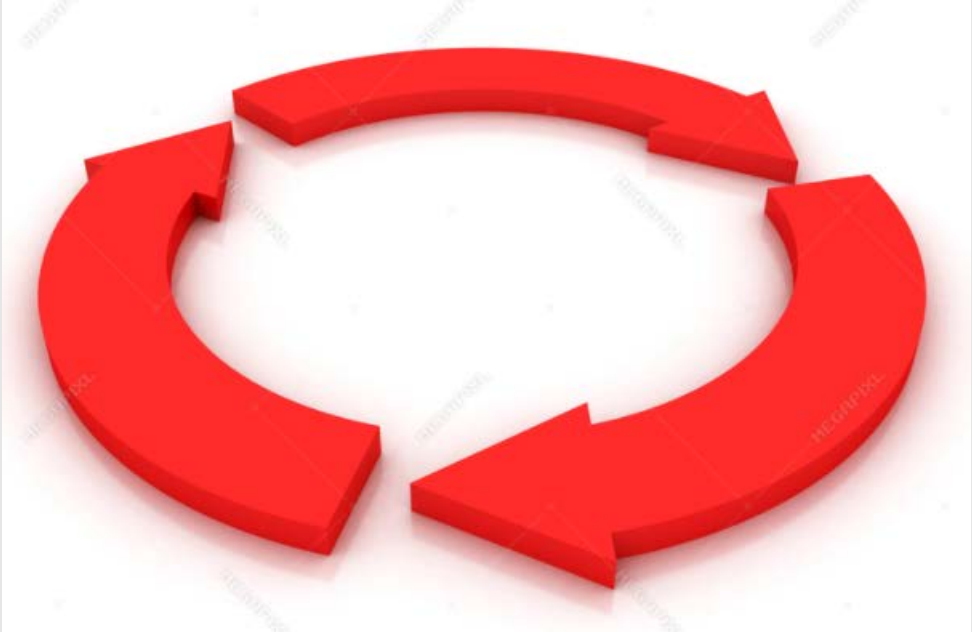


Before-After Analysis



Full Cycle: Monitoring System Performance and Investment Decisions

Monitoring System
Performance – Identify
Problem Locations



Before-After
Analysis –
Influence
Future
Investments

Develop Solutions
Based on Prioritized
Locations

Thank you