



Data Quality Monitoring in PORTAL 2.0

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June 23, 2010



Portland OR metro region

1,400,000 urban area residents living
65,600 businesses
33,229 acres of parks and natural areas
3,210 miles of roadway
2,686 signalized intersections
830 miles of rivers and streams
66 miles of light rail track
25 cities
3 counties
1 region



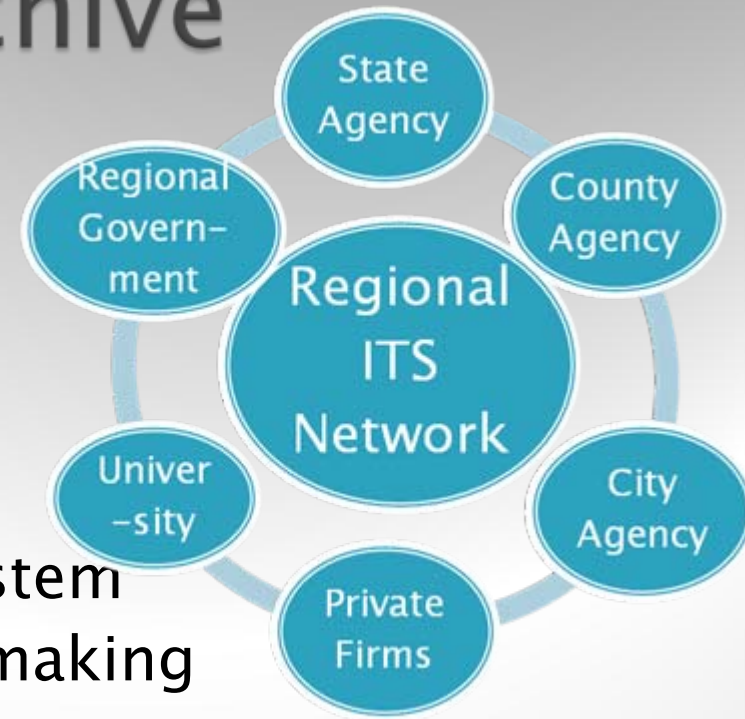
Regional Data Archive

▶ Why Now?

- Building a performance-based long-range transportation plan
- Increased focus on better management of transportation system
- Beyond level-of-service decision making

▶ Key benefits

- Transportation data is more accessible
- Sharing data in a central location saves money
- Provides critical data to support transportation planning, operations and investment decisions



PORTAL Background

- ▶ Official ADUS for Portland-Vancouver Metro Region
- ▶ Established 2004; Now (2010) – working on PORTAL 2.0
- ▶ Wide-variety of Users
 - Local transportation professionals
 - Regional Transportation Plan
 - Local news media
 - Research projects
- ▶ Funding
 - TransPort MTIP (OR), RTC (WA), OTREC, NSF, FHWA

Think the commute's bad now?
More jobs may mean more jams

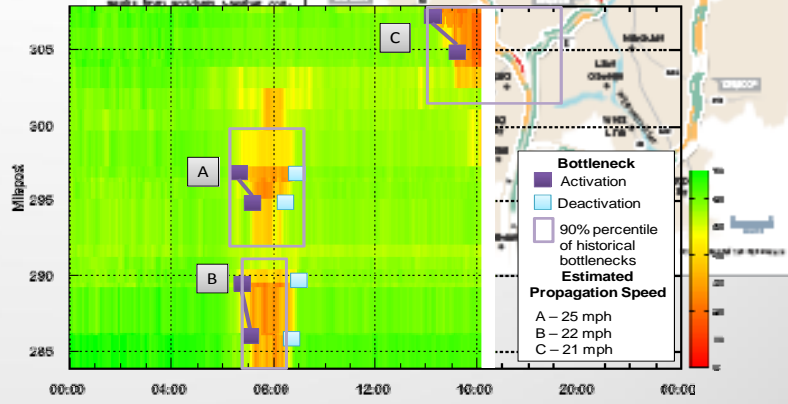
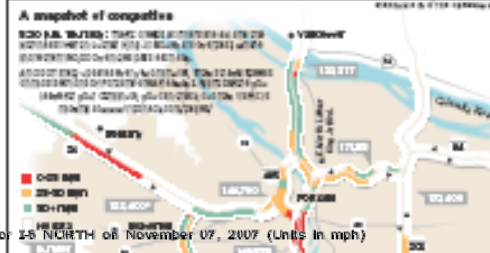
Ramp meters, aid trucks, other traffic tools help, but adding more workers could quickly drive metro-area roads to capacity



By JAMES HAYES
Traffic Editor

It was also on a recent weekday and the metro-area's first time you see the kind of traffic jams that can cause road users to be frustrated. And with its status, which usually pulled up in a state truck and helped him to find a spare, saving a potential headache or frustration.

Just how long does it take to get stuck in traffic? It's not just a matter of minutes, but it's also a matter of hours. And it's not just a matter of minutes, but it's also a matter of hours. And it's not just a matter of minutes, but it's also a matter of hours.



PORTAL Database and Web Site



OR & WA Loop Detector Data



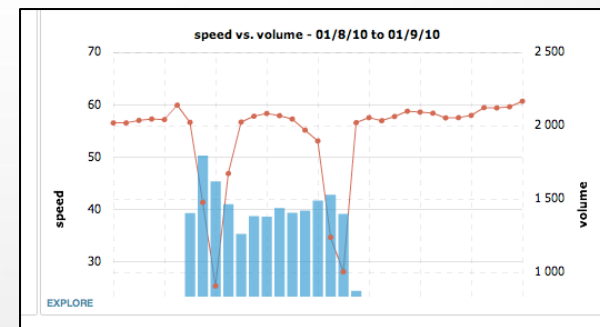
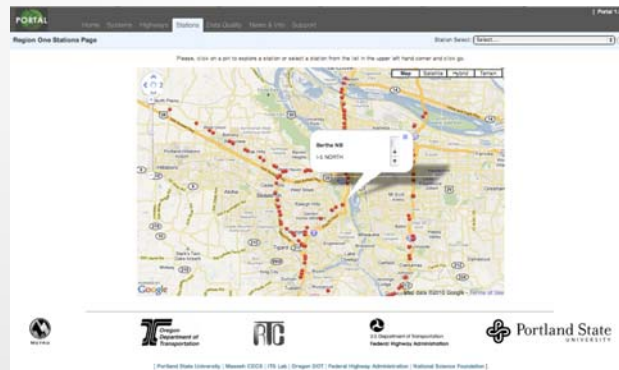
Incident & Crash Data



Arterial Data – Transit, Probe, Signal



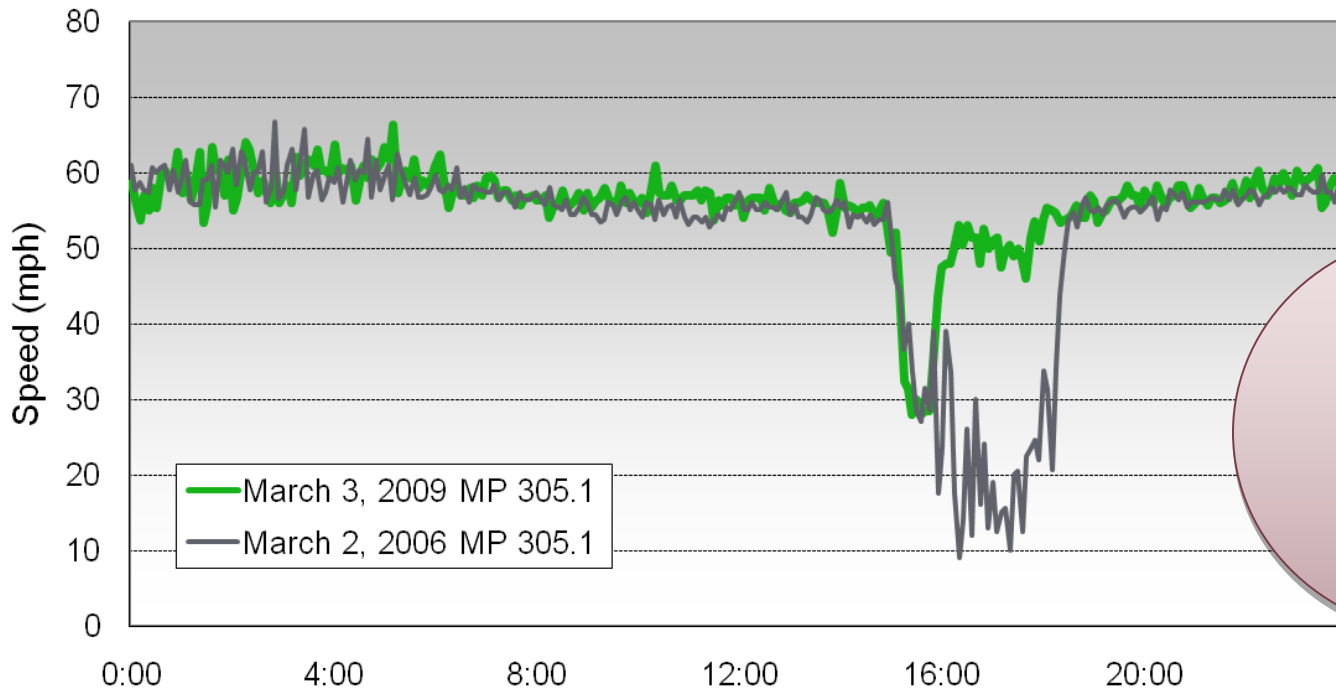
WIM Data



Performance Metrics; Map-Based; Graphical Data Visualization

PORTAL compares data across time

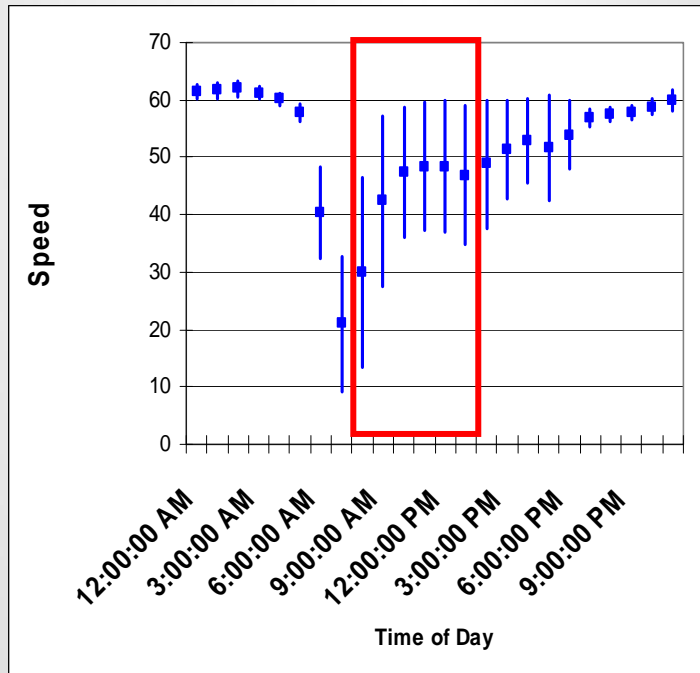
Speed Profile of I-5 NB near Portland Blvd (March 2006 vs March 2009)



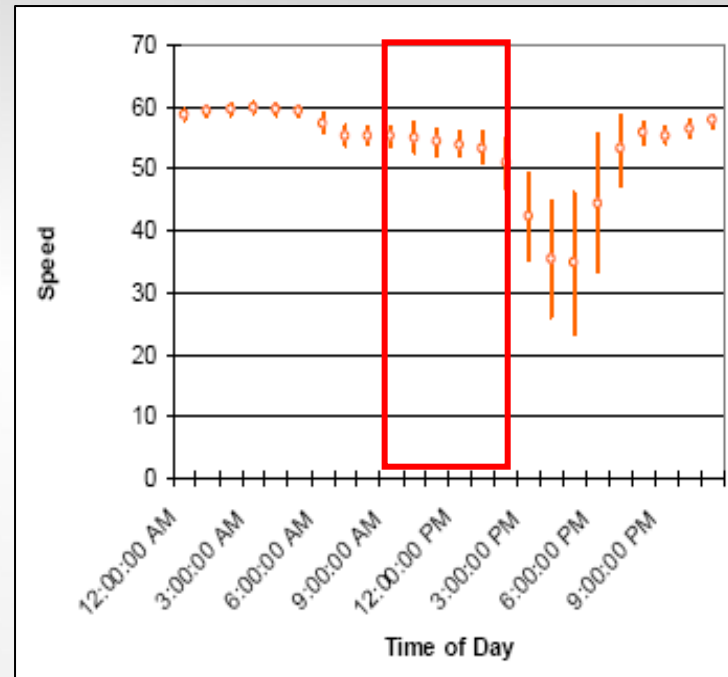
Reduced volumes in 2009 improved speeds during the PM peak period

PORTAL measures reliability

I-5 SB at Marine Drive (2006)



I-84 EB at 60th (2006)



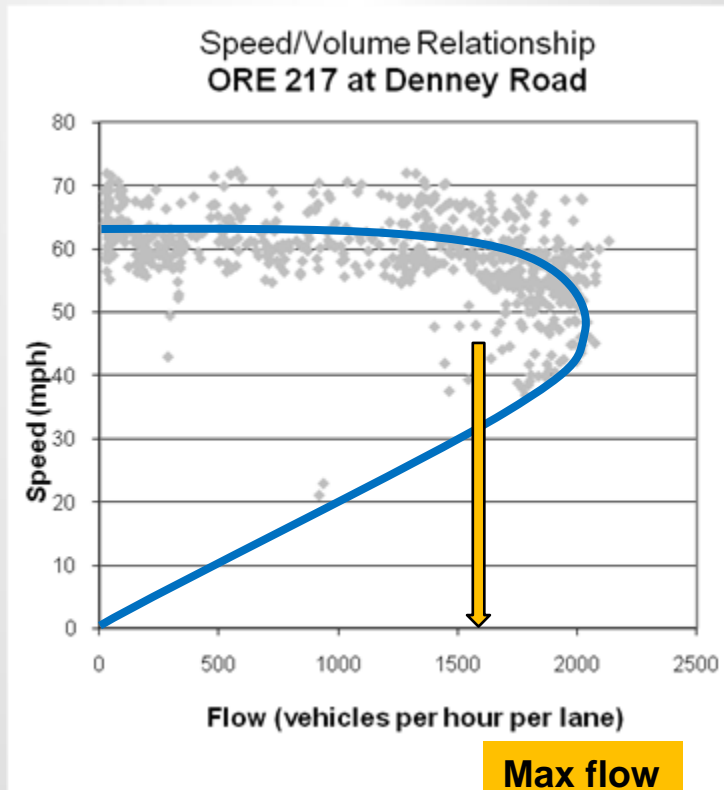
The longer the vertical bar the more variability in travel speed.



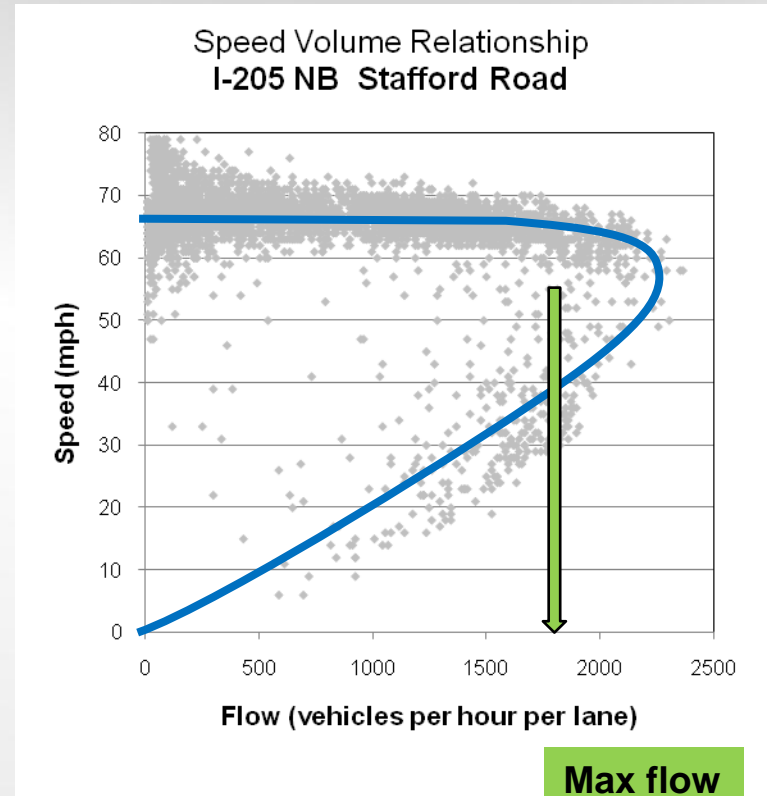
PORTAL compares design performance

Interchange spacing =
0.15 miles

Interchange spacing =
2 miles



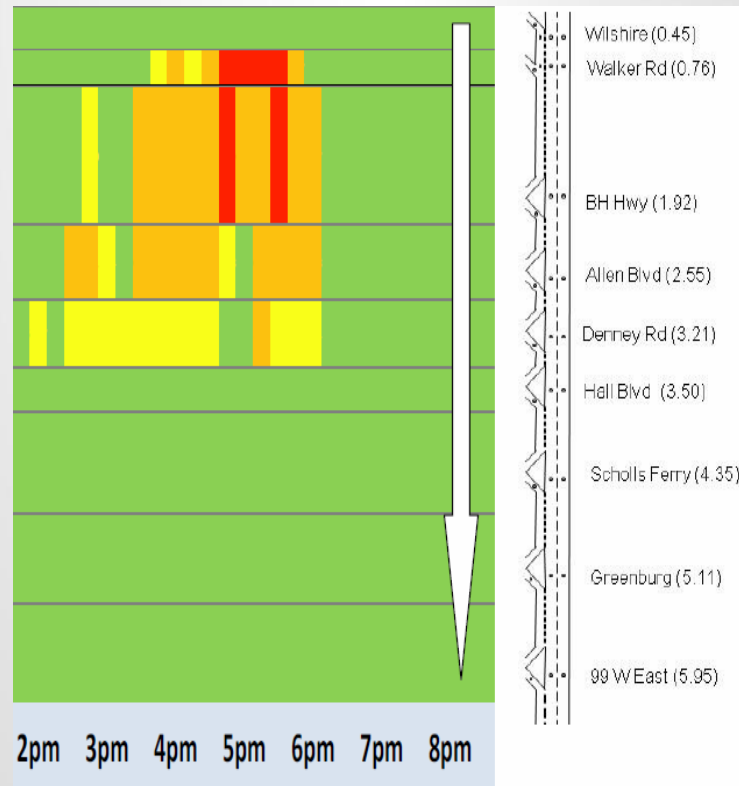
Max flow
= 2000



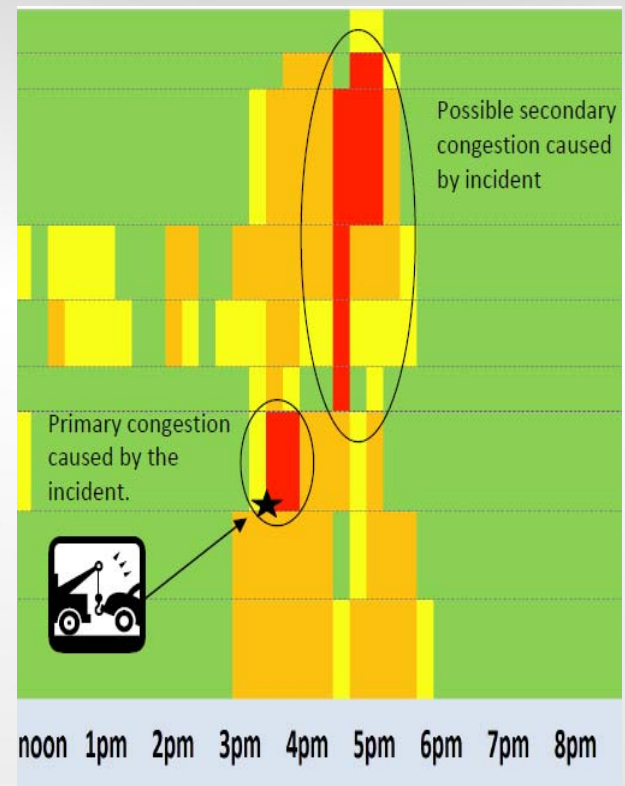
Max flow
= 2250

PORTAL measures traffic incident impacts

No incident
(total delay cost \$7,000)



With Incident
(total delay and incident cost \$58,000)





Data Quality

- ▶ Goal: Efficient use of maintenance resources
 - Prioritize detectors to be visited
- ▶ Field Visits
 - Correlate anomalies observed in the data with issues in the field
- ▶ Web site
 - Detectors producing suspicious data
 - Detectors not producing data
 - Detectors with data failing pre-set criteria (i.e. 20-sec vol > 17, speed > 100 mph, etc.) at a high rate
 - Offline detectors (construction, damage, etc.)

Field Visits – Low Occupancy

[Portal 1.0]

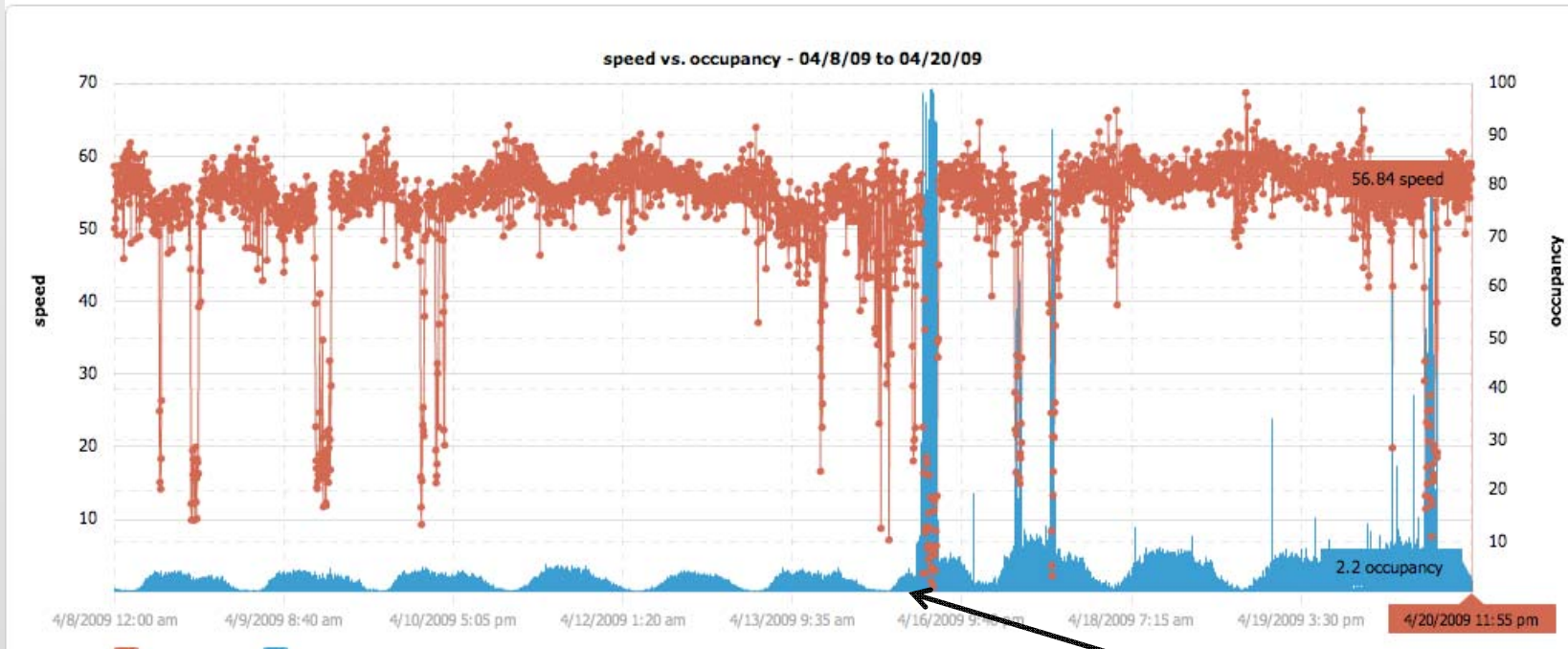


Home Systems Highways **Stations** Data Quality News & Info Support

Region One Stations Page --> Greeley Ave SB --> Two Quantity Chart

Station Select:

Start Date: End Date: First Quantity: Second Quantity: Resolution: Lane:
[Save As Image](#) | [Download Data](#)



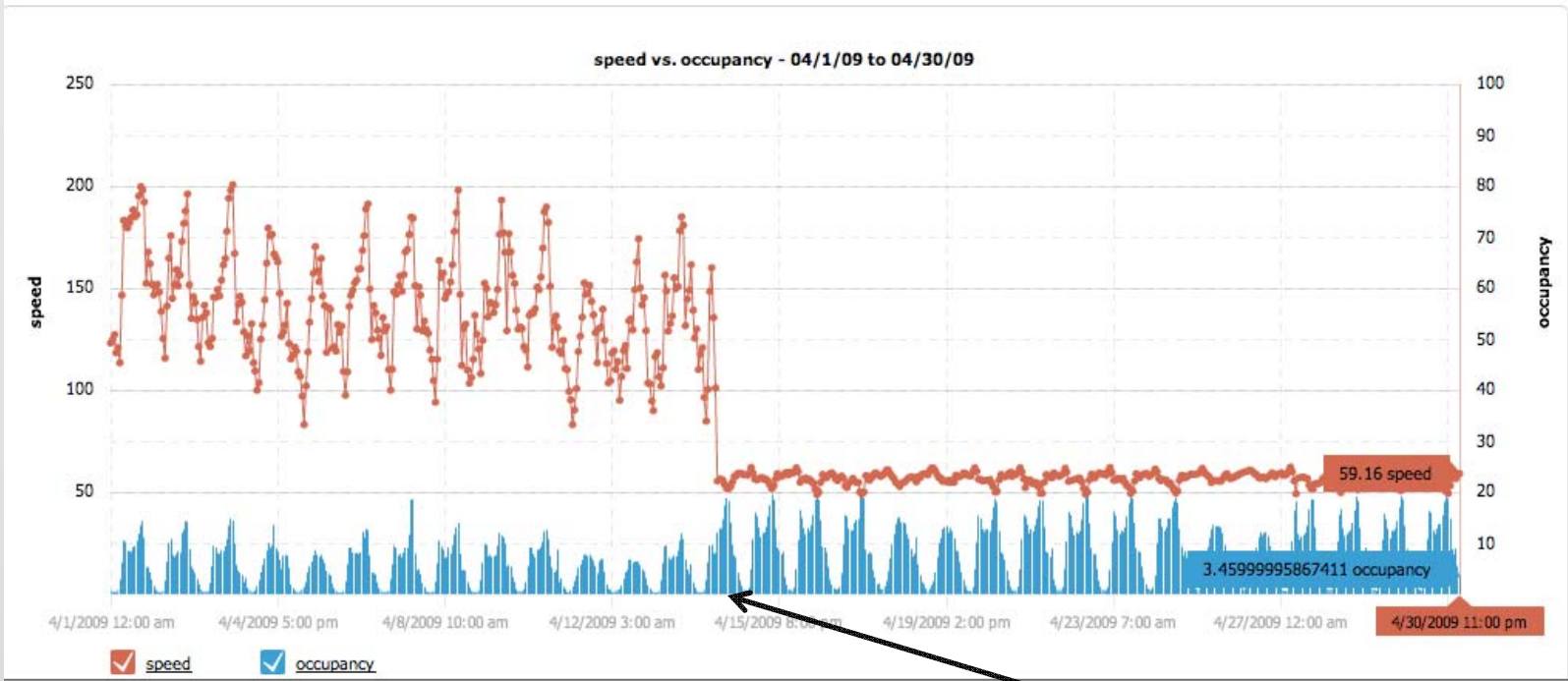
Amplifier Card Update, AM April 14, 2009



Field Visits – High Speed

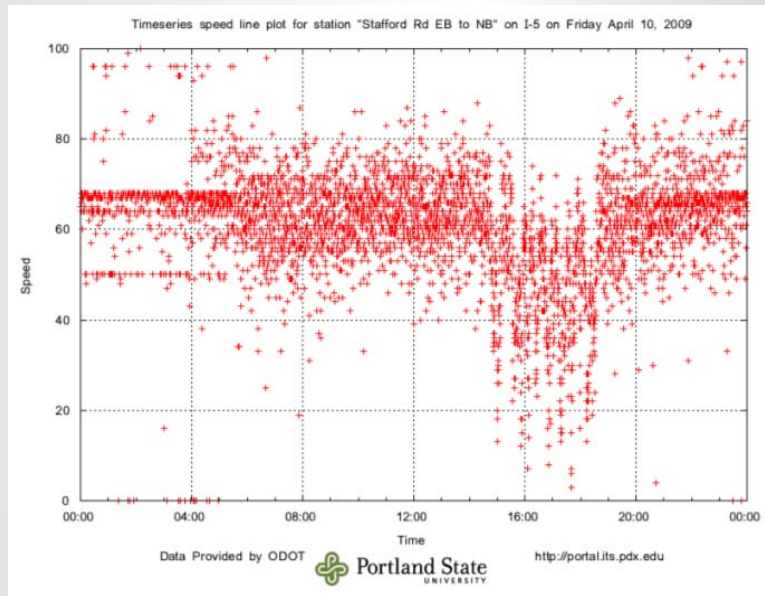
Region One Stations Page --> Jefferson to Sunset WB --> Two Quantity Chart Station Select: US 26 WEST at Jefferson to Sunset WB Go

Start Date: 04/01/2009 End Date: 04/30/2009 First Quantity: speed Second Quantity: occupancy Resolution: 1hr Lane: all Save As Image | Download Data

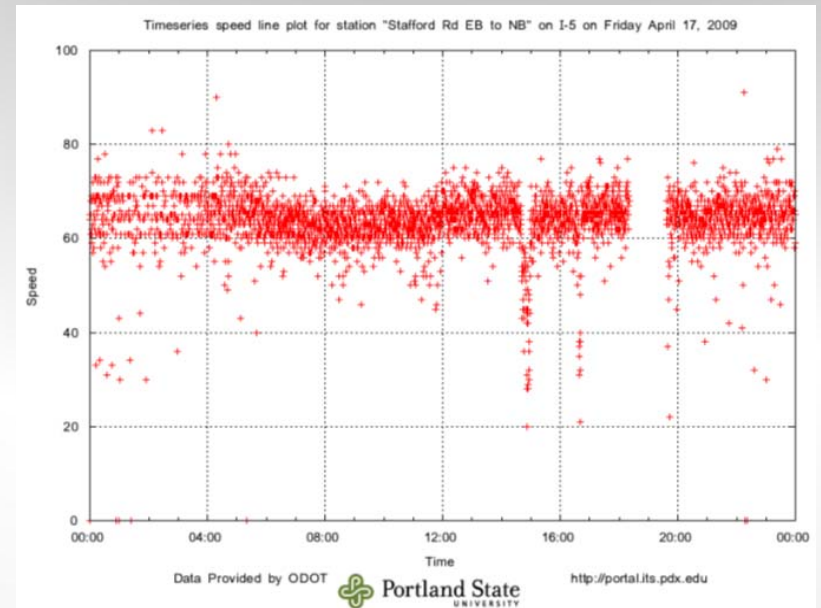


Controller Update, April 15, 2009

Field Visits – Variability



**I-5 NB at Stafford
Lane 2 – Speed – April 10, 2009
Before Controller Card Update**



**I-5 NB at Stafford
Lane 2 – Speed – April 17, 2009
After Controller Card Update**



Data Quality - Offline Detectors

PORTAL

Home Systems Highways Stations **Data Quality** News & Info Support

Detector Data Quality Control

Date: Resolution:

The following tables were constructed by processing loop detector data on 2010_06_22. For monthly or weekly reports, the data used to generate the report will include one month or week of data prior to the selected day. For a day report, the data of the selected date is used to generate the report.

Offline Detectors

Offline Detectors							
detectorid	stationid	highwayid	rampid	locationtext	milepost	count	description
1009	1002	1	1002	Stafford Rd WB to NB	286.3	4319	construction-related
1010	1002	1	1002	Stafford Rd WB to NB	286.3	4319	construction-related
1011	1002	1	1002	Stafford Rd WB to NB	286.3	4319	construction-related
1017	1003	1	1003	Nyberg EB to NB	289.4	4319	construction-related
1018	1003	1	1003	Nyberg EB to NB	289.4	4319	construction-related
1019	1003	1	1003	Nyberg EB to NB	289.4	4319	construction-related
1022	5003	1	1003	Nyberg EB to NB	289.4	4319	Temporary off until repaired by E.C(was damaged by an auto accident)
1025	1004	1	1004	Nyberg WB to NB	289.63	4319	construction-related
1026	1004	1	1004	Nyberg WB to NB	289.63	4319	construction-related
1027	1004	1	1004	Nyberg WB to NB	289.63	4319	construction-related
1028	1004	1	1004	Nyberg WB to NB	289.63	4319	construction-related



Data Quality – Damaged Detectors

Damaged Detectors

Damaged Detectors								
detectorid	stationid	highwayname	locationtext	ATMS lane number	field lane number	startdate	enddate	description
1671	1089	US 26 EAST	Parkway EB	1	3	2009-10-22		construction interruption
1253	1028	I-5 SOUTH	Columbia Blvd SB	2	2	2009-05-11		construction interruption
1256	5028	I-5 SOUTH	Columbia Blvd SB	1	3	2009-05-11		construction interruption
1675	5089	US 26 EAST	Parkway EB	1	3	2009-10-22		construction interruption
1022	5003	I-5 NORTH	Nyberg EB to NB	1	3			Temporary off until repaired by E.C(was damaged by an auto accident)
1026	1004	I-5 NORTH	Nyberg WB to NB	2	2	2009-10-13		construction-related
1033	1040	I-5 SOUTH	Nyberg SB	1	3	2009-10-15		construction-related
1303	5034	I-5 SOUTH	Greeley Ave SB	1	3			Micro loops bad
1615	1081	US 26 EAST	Helvetia EB	1	3			Loops out again due to construction until the project can fix them
1786	1110	I-205 NORTH	ORE 43 NB-NB	1	3			Video detection problems
1672	1089	US 26 EAST	Parkway EB	2	2	2009-10-22		construction interruption
1017	1003	I-5 NORTH	Nyberg EB to NB	1	3	2009-10-14		construction-related
1236	1026	I-5 SOUTH	Jantzen Beach SB	1	3	2009-06-25		The loops were either ground out or paved over due to repairs to the road surface from winter damage. The contractor will be installing new loops.
1002	1001	I-5 NORTH	Stafford Rd	2	2	2009-10-16		construction-related



Suspicious Data Criteria

- ▶ 20-second Volume > 17
- ▶ Occupancy $> 95\%$
- ▶ Speed > 100 MPH
- ▶ Speed < 5 MPH (?)
- ▶ Low maximum occupancy
- ▶ Low average occupancy during peaks



Data Quality – Configuration and Communication Errors

Detector Data Quality Control

Date: Resolution:

The following tables were constructed by processing loop detector data on 2010-01-08. For monthly or weekly reports, the data used to generate the report will include one month or week of data prior to the selected day. For a day report, the data of the selected date is used to generate the report.

Configuration Errors

Volume > 17 – Volume Too High

detectorid	stationid	highwayname	locationtext	ATMS lane number	field lane number	percentage
1291	1033			1	3	3.92
1228	1025	I-5 NORTH	Jantzen Beach NB	1	3	1.50
1466	1060	I-84 WEST	58th WB	3	1	1.06
1803	1115	I-205 SOUTH	10th Street to I-205 SB	1	2	0.26
1835	1122	US 26 WEST	US26 WB @ I-405 Count Station	1	1	0.23
1551	1080	OR 217 SOUTH	Walker Rd SB	1	3	0.23
1717	1095	US 26 WEST	Murray Rd WB	3	1	0.21
1432	1056	I-84 EAST	16th EB	1	3	0.14
1830	1121	I-405 SOUTH	Montgomery to I-405 SB	2	2	0.14
1765	1104	I-205 SOUTH	ORE 43 SB	1	2	0.12

Occupancy > 95 – Detector Always Occupied

detectorid	stationid	highwayname	locationtext	ATMS lane number	field lane number	percentage
1474	1061	I-84 WEST	Sandy WB	3	1	99.95



System-Wide Data Quality Metric

▶ Uses

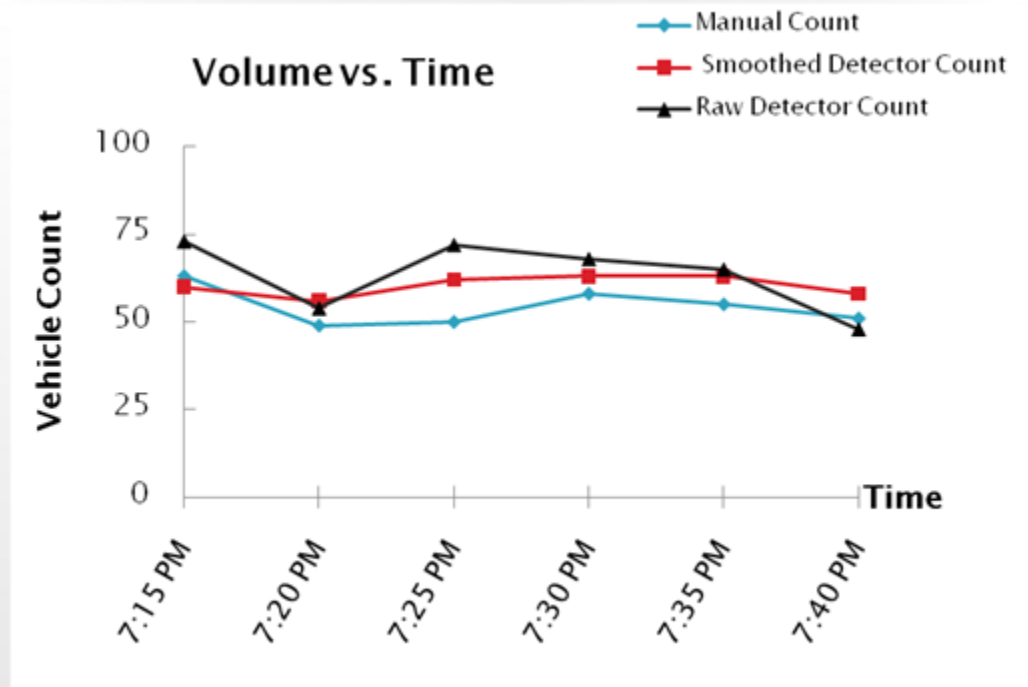
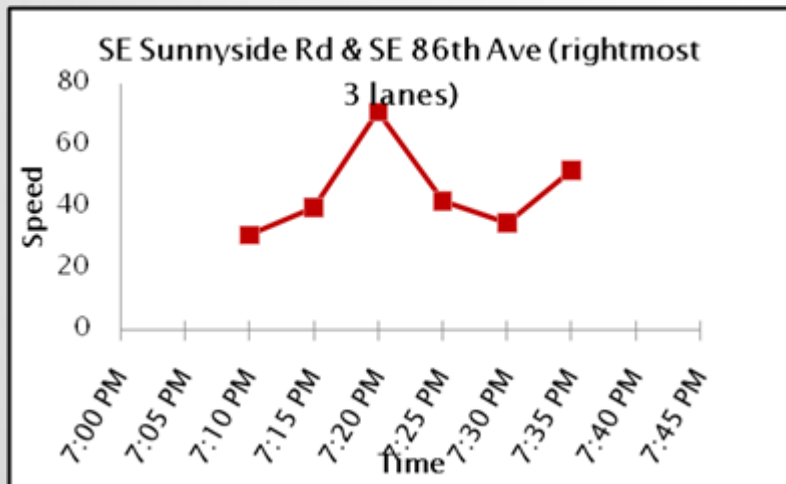
- Performance measure for maintenance group
- Determine to which detectors to direct maintenance visits

▶ Metric

- Percent of offline data readings
- Percent of suspicious data readings
- System-level, highway-level and station-level
- Separate damaged detectors from those that can be improved with a maintenance visit

Arterial Data Quality

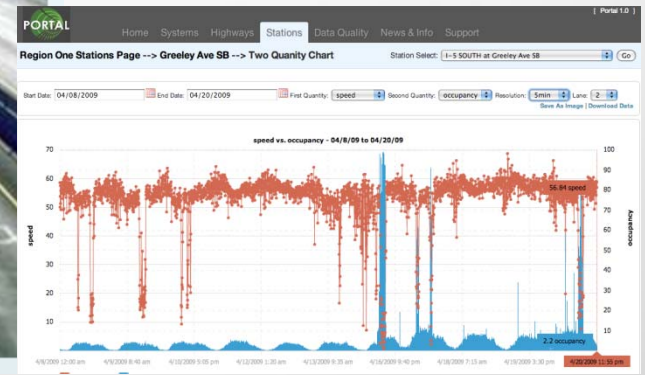
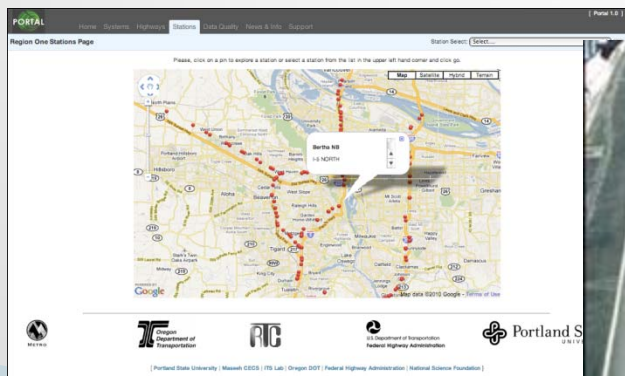
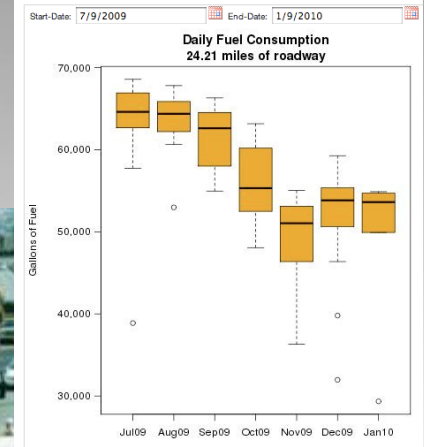
- ▶ System detectors can be count stations
- ▶ Validate data collection
- ▶ Establish feedback loop and web site for arterial signal detectors





Thank you!

<http://portal.its.pdx.edu>





Acknowledgments

- R.L. Bertini – ITS Lab and PORTAL founder
- Colleagues –
 - Chris Monsere, Miguel Figliozzi, Kelly Clifton, Ashley Haire, Portland State University
 - Peter Koonce, Shaun Quayle, Kittelson and Associates
- Students –
 - Dan Colish, John Chee, Rafael J. Fernandez–Moctezuma, Sathish Periasamy, Shreemoyee Sarkar, Poonam Singh, James Whiteneck, Spicer Matthews, Nevin Freeman, Sirisha Kothuri, Bryan Handgartner
- Sponsors –
 - Transport ITS Coordinating Committee
 - RTC (Southwest Washington Regional Transportation Council)
 - OTREC
 - City of Portland, Office of Transportation
 - Oregon Department of Transportation
 - TriMet
 - Federal Highway Administration
 - National Science Foundation
 - Oregon Engineering and Technology Industry Council