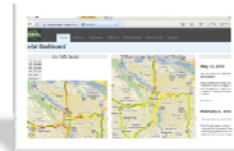


**Portland OR Regional
Transportation Archive Listing**

PORTAL 2.0

**Towards a Next-Generation
Archived Data User Service**

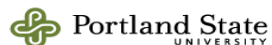


FHWA Travel Model Improvement Program

June 16, 2010

Dr. Kristin Tufte

Deena Platman



Presentation overview

- ☐ Setting the stage for a regional data archive
- ☐ PORTAL – the back story
- ☐ PORTAL 101
- ☐ PORTAL in the real world



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



City of Portland

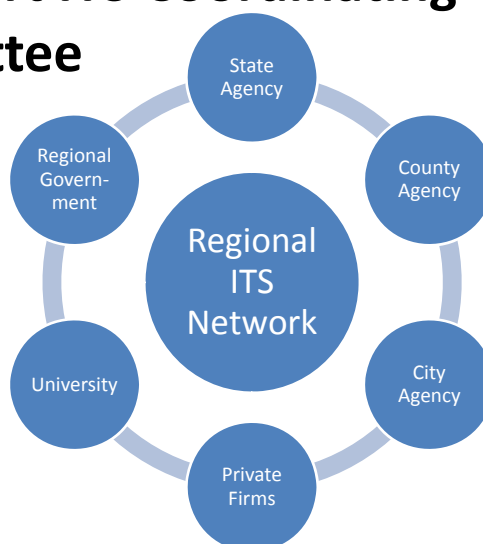
Regional data archive: why now?

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

Key benefits of a centralized transportation data archive

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

A Regional Approach: TransPort ITS Coordinating Committee



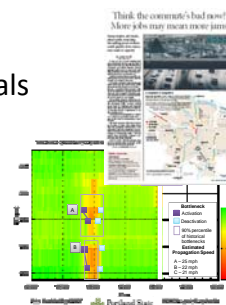
Funding PORTAL 2.0

- ❑ \$6 million in dedicated funding for system management and operations
- ❑ \$100 K per year to fund PORTAL enhancements



PORTAL 1.0 Background

- ❑ PORTAL established 2004
 - Simple web interface, single data source
- ❑ Now - 2010
 - 1 TB data; large web site
 - Data: freeway, transit, weather, incident, freight, traffic counts
- ❑ Uses
 - Local transportation professionals
 - Regional Transportation Plan
 - Local news media
 - Research projects
- ❑ Initial Goals Achieved

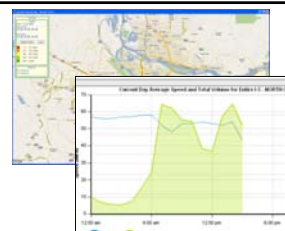


PORTAL 1.0 Funding

- ❑ Developed with CAREER grant from National Science Foundation to Dr. Robert L. Bertini, PORTAL founder, on leave at US DOT
- ❑ Additional financial support from NSF, FHWA
- ❑ Large investment in developing regional transportation archive
- ❑ Approx \$1 million in external funding (NSF, FHWA)

PORTAL 2.0 Next-Generation ADUS

- ❑ Objectives
 - ❑ Official Transportation Data Archive for the Portland-Vancouver Metropolitan Region
 - ❑ Produce tools and performance measures useful to local transportation professionals
 - ❑ Explore new, innovative uses of data
- ❑ Funding
 - ❑ TransPort MTIP (OR), RTC (WA), OTREC, NSF, FHWA
- ❑ Updated Interface
- ❑ Data Quality Enhancements



What's in the PORTAL Database?



Loop Detector Data
20 s count, lane occupancy,
speed from
500 detectors (1.2 mi spacing)



Incident Data
140,000 since 1999



Bus Data
1 year stop level data
140,000,000 rows



VMS Data
19 VMS since 1999



WIM Data
22 stations since 2005
30,026,606 trucks



Crash Data
All state-reported crashes
since 1999 - ~580,000

Data Archive: About 1 TB - 7.1 Million Detector Intervals

PORTAL 2.0 Web Site

- ☐ Graphical display of archived data
- ☐ Performance, Traffic Counts, Freight Data, ...



Performance Measures Used



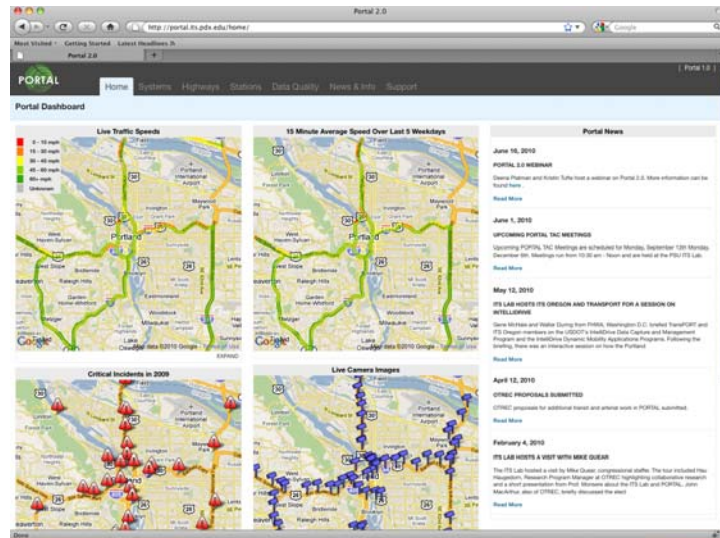
- ☐ Volume
- ☐ Speed
- ☐ Occupancy
- ☐ *Vehicle Miles Traveled*
- ☐ *Vehicle Hours Traveled*
- ☐ *Travel Time*
- ☐ *Delay*
- ☐ Initial Green PORTAL work:
emissions, energy consumption

PORTAL 2.0 Interface

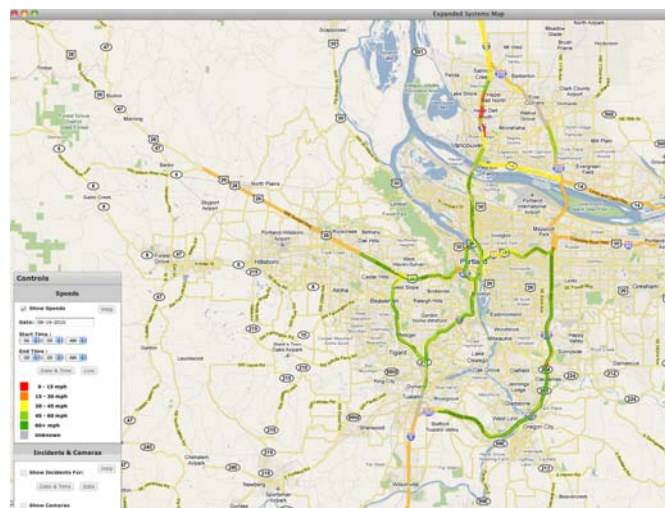
- ☐ Wide variety of users; different needs and interests
 - ☐ Analysis or understanding of a current event (traffic managers)
 - ☐ Trending and forecast information (planners)
 - ☐ In-depth analysis (researchers)
- ☐ Design Principles
 - ☐ Intuitive, interactive, user-driven graphical interface
 - ☐ User-driven selections and advanced options
 - ☐ Good set of defaults



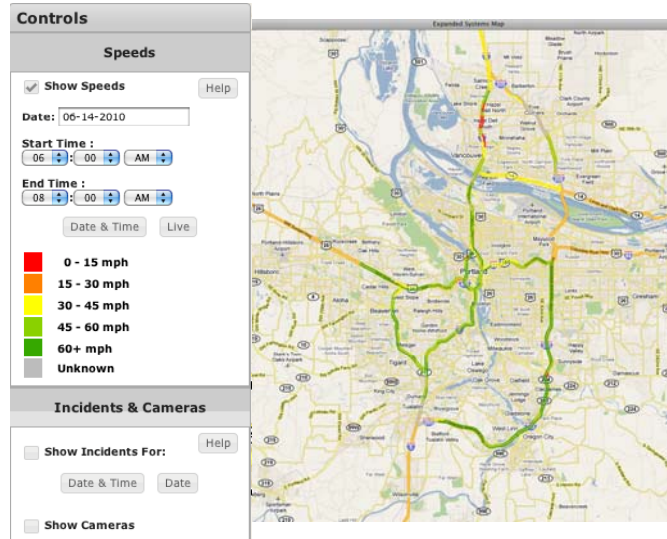
Tour of PORTAL 2.0



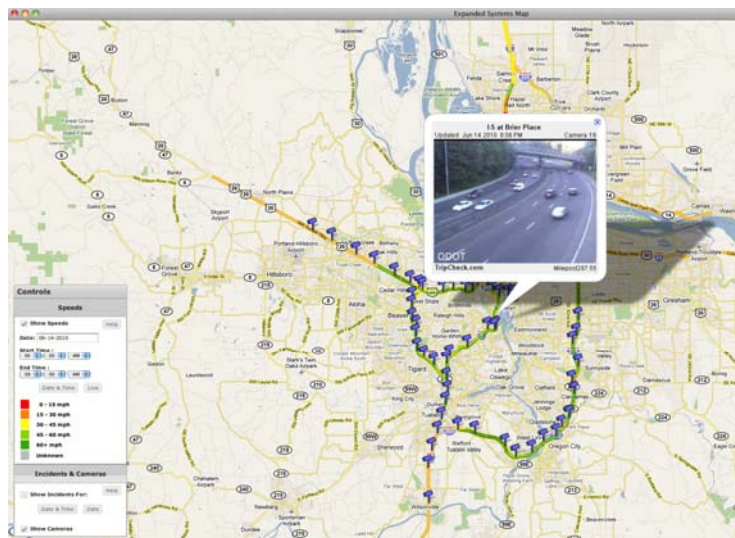
Expanded Systems Map



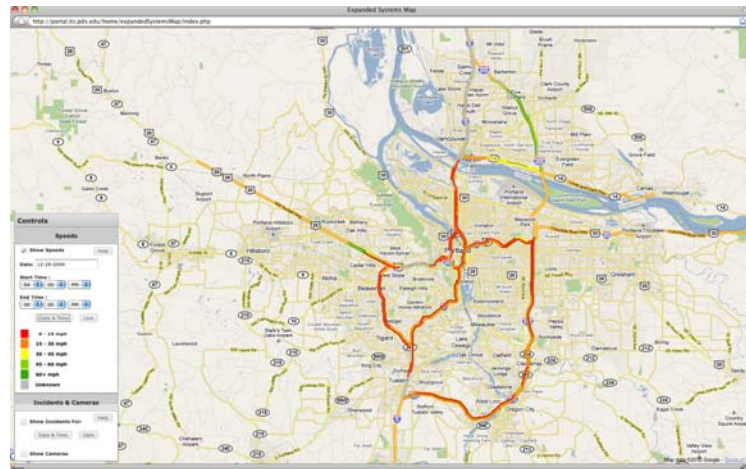
Expanded Systems Map



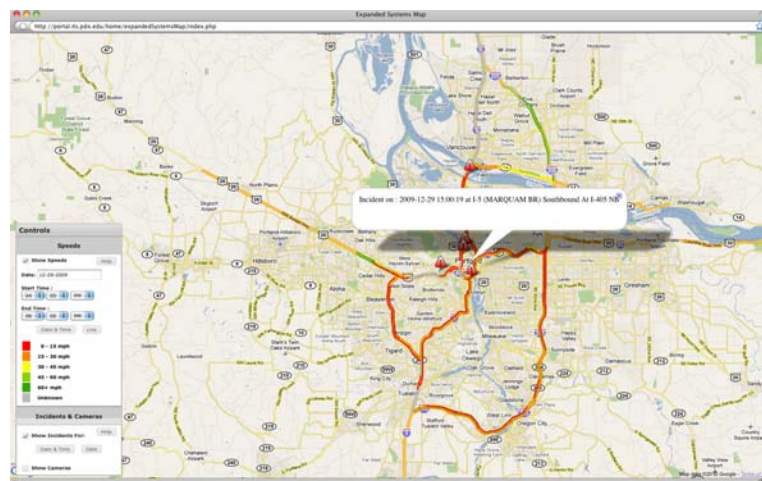
Live Speeds & Cameras



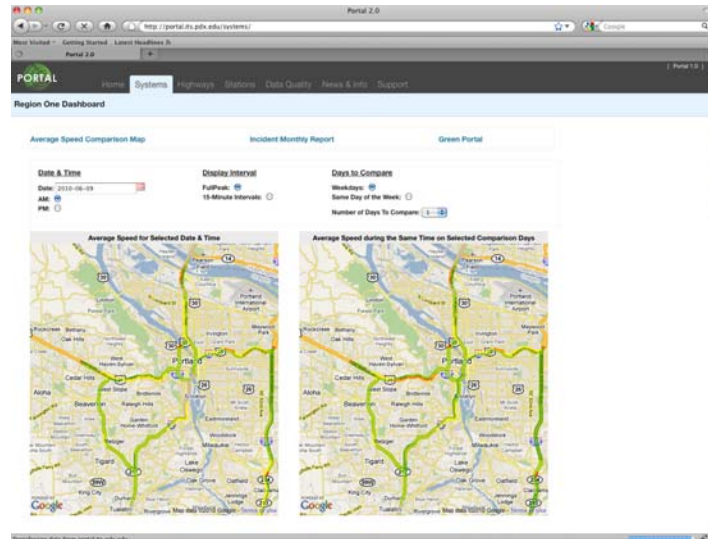
December 29, 2009 4-6PM



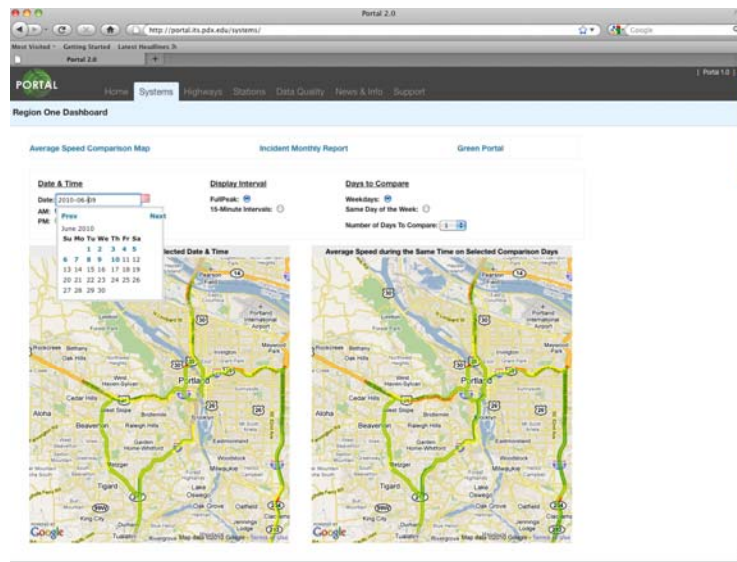
Dec 29, 2009 - Incidents



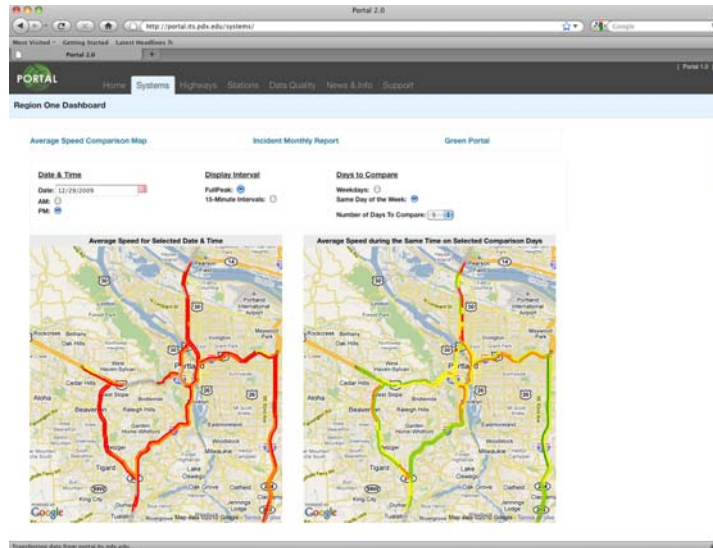
PORTAL 2.0 – Systems Page



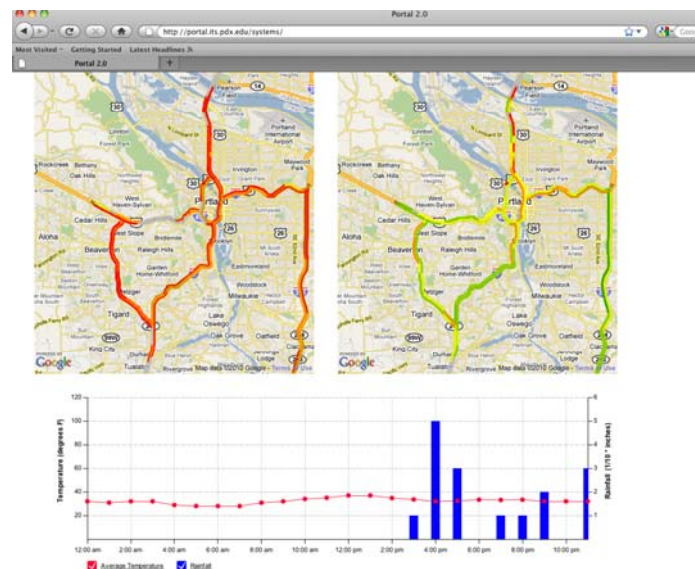
Systems Page – Date Selection



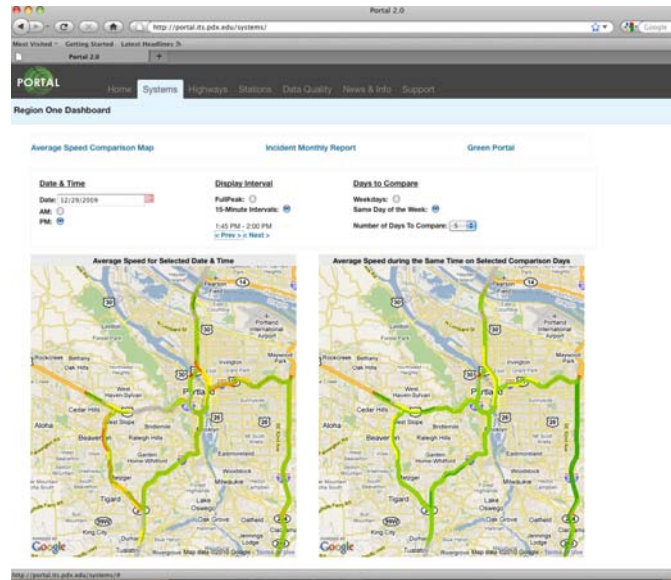
Dec 29, 2010 - Comparison



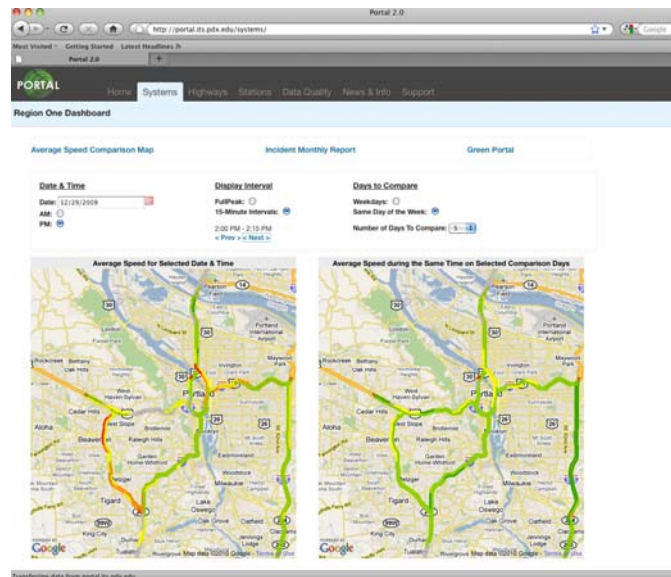
Weather



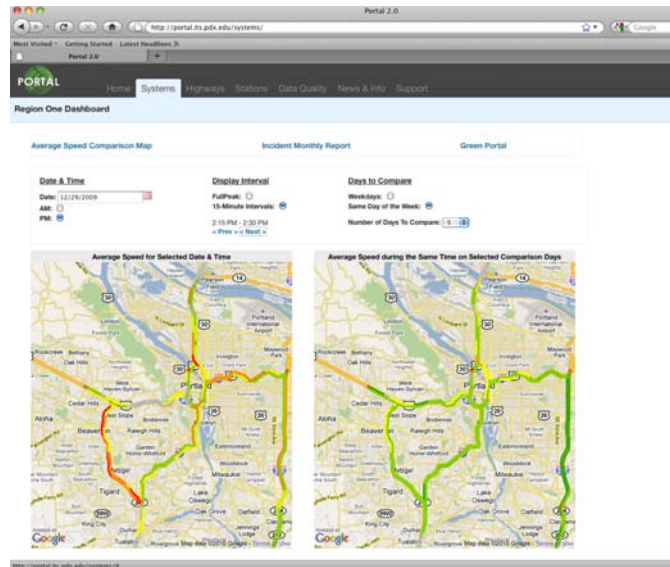
Dec 29, 2009 1:45PM-2:00PM



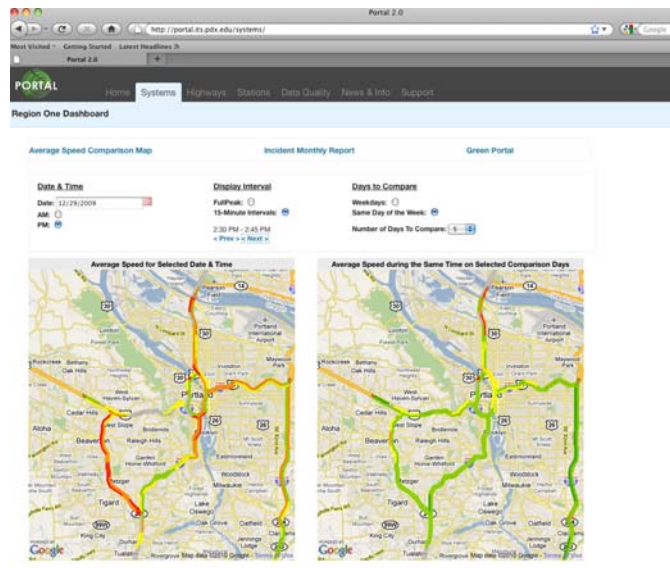
Dec 29, 2009 2:00PM-2:15PM



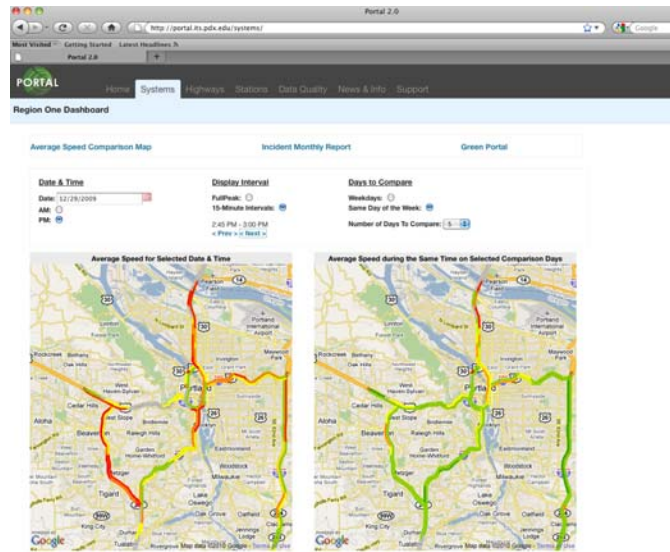
Dec 29, 2009 2:15PM-2:30PM



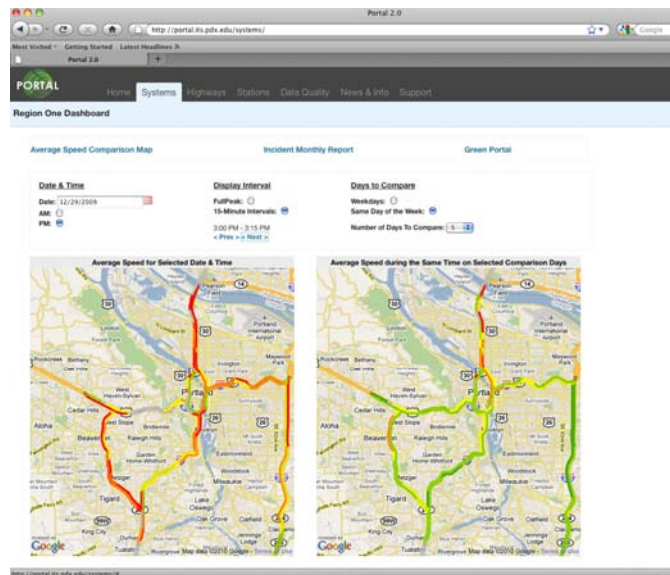
Dec 29, 2009 2:30PM-2:45PM



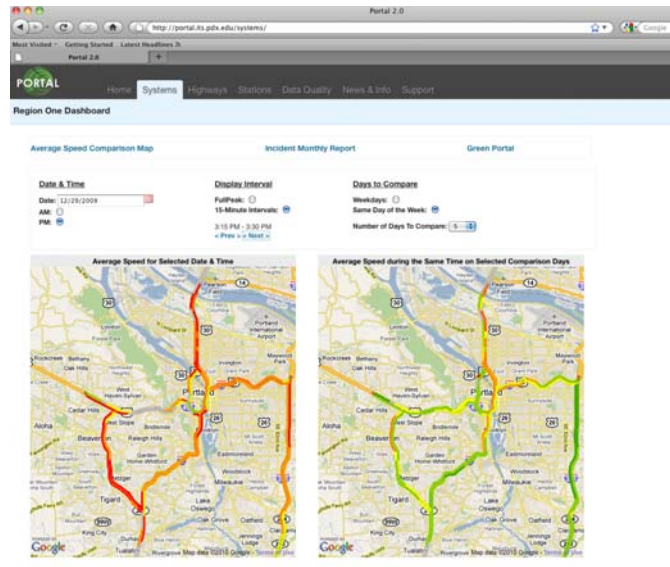
Dec 29, 2009 2:45PM-3:00PM



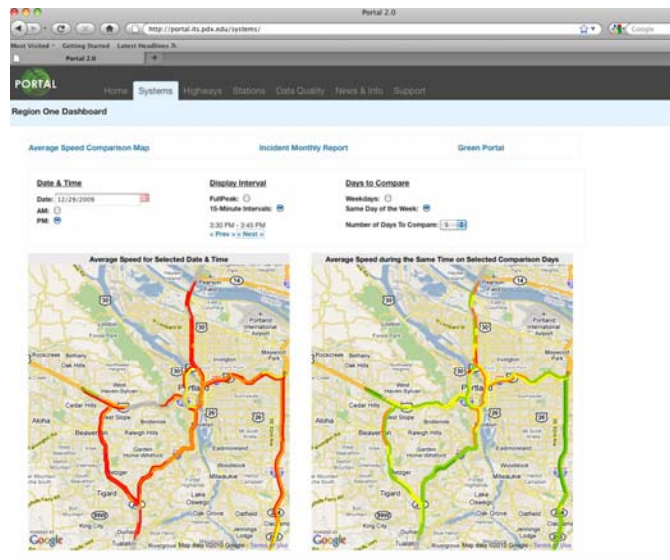
Dec 29, 2009 3:00PM-3:15PM



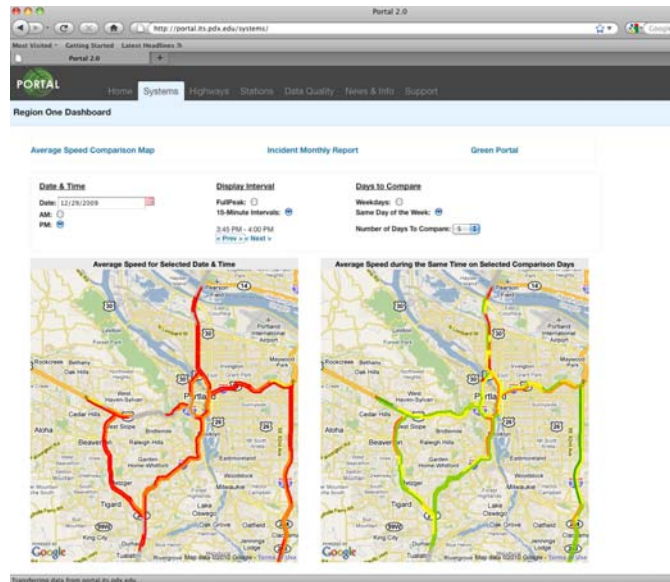
Dec 29, 2009 3:15PM-3:30PM



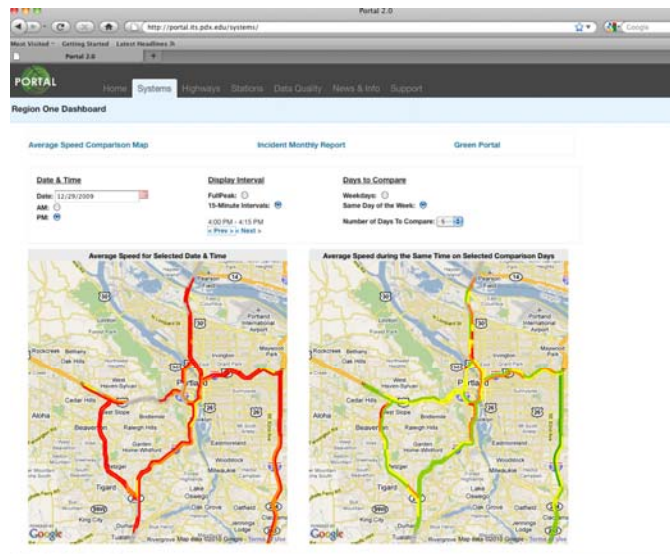
Dec 29, 2009 3:30PM-3:45PM



Dec 29, 2009 3:45PM-4:00PM



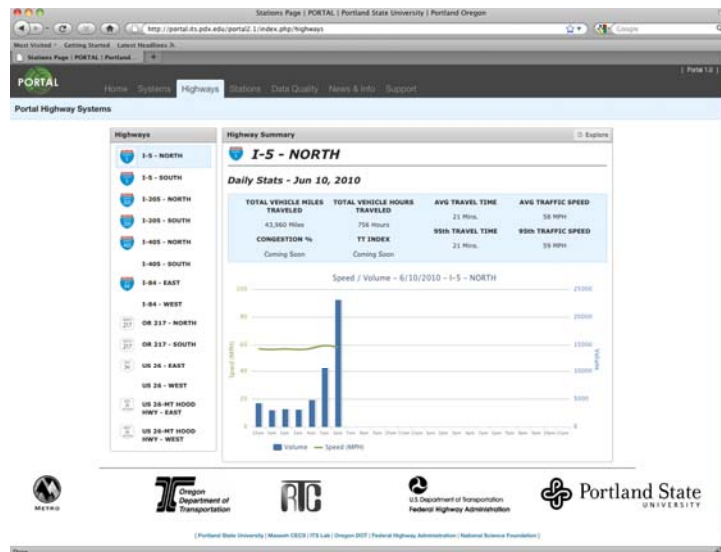
Dec 29, 2009 4:00PM-4:15PM



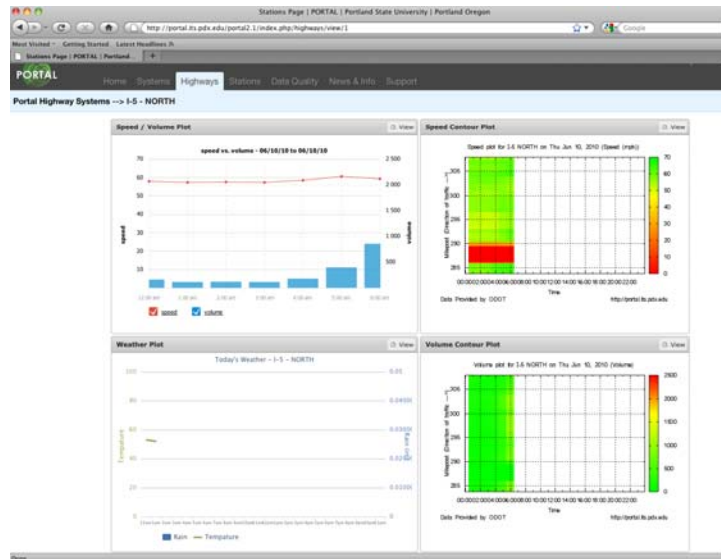
Sustainability Metrics



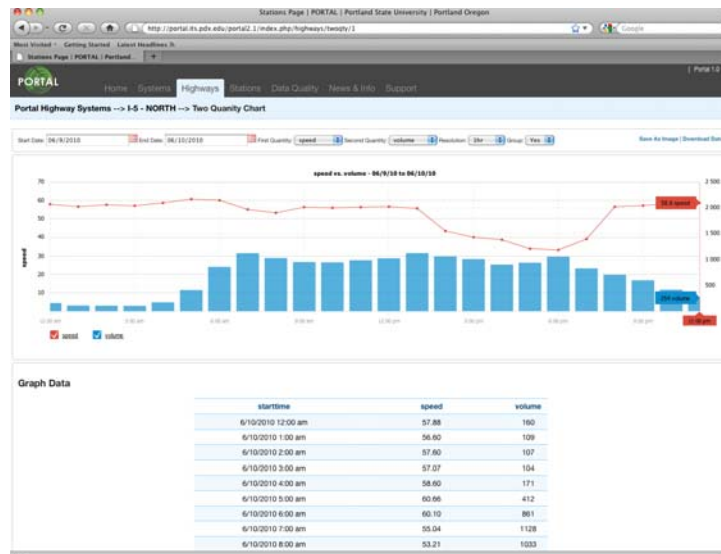
Highways Page



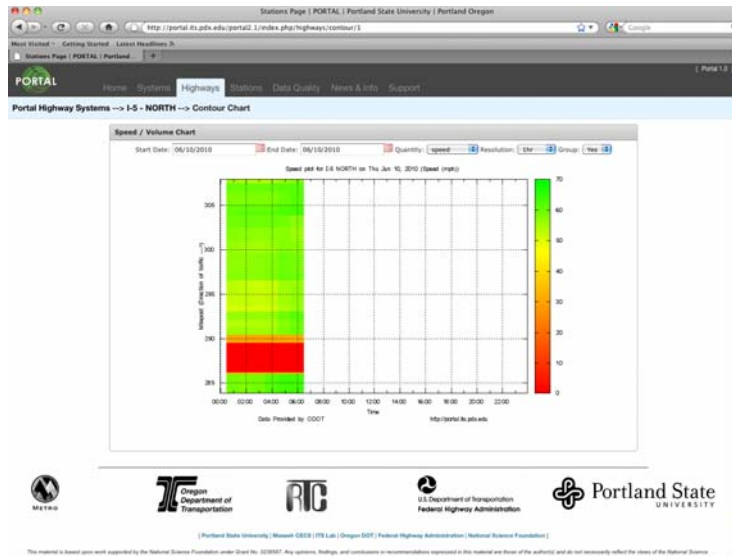
Highways - Expanded



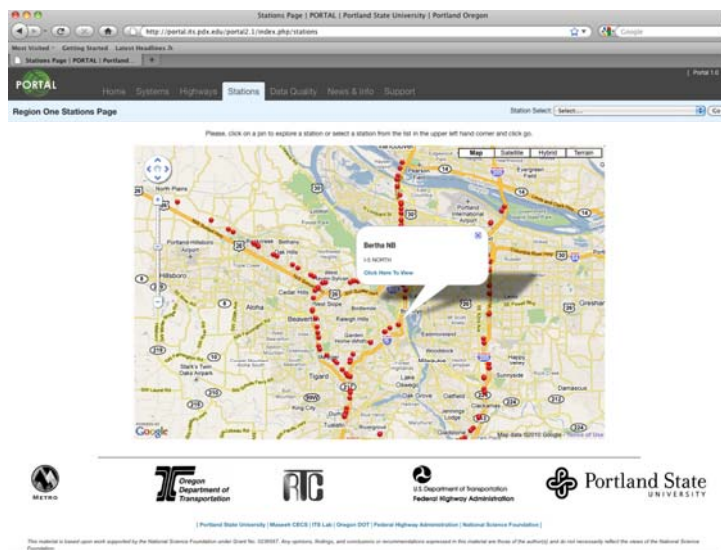
Highways – Two Quantity



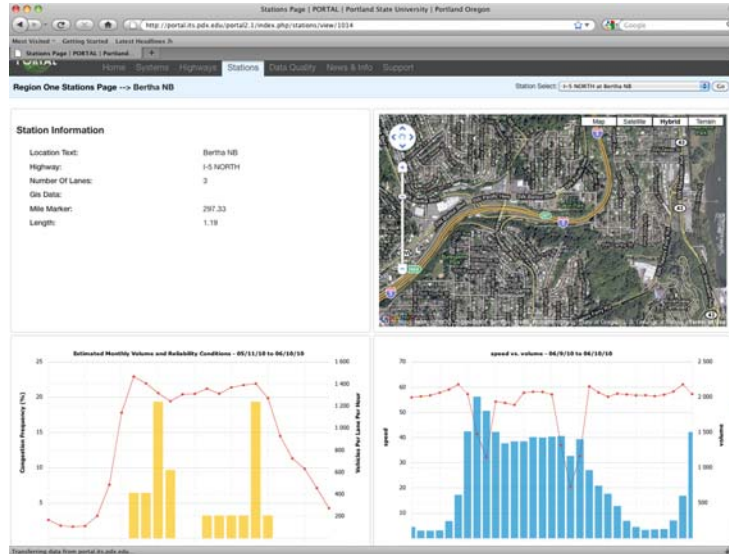
Highways – Speed Contour



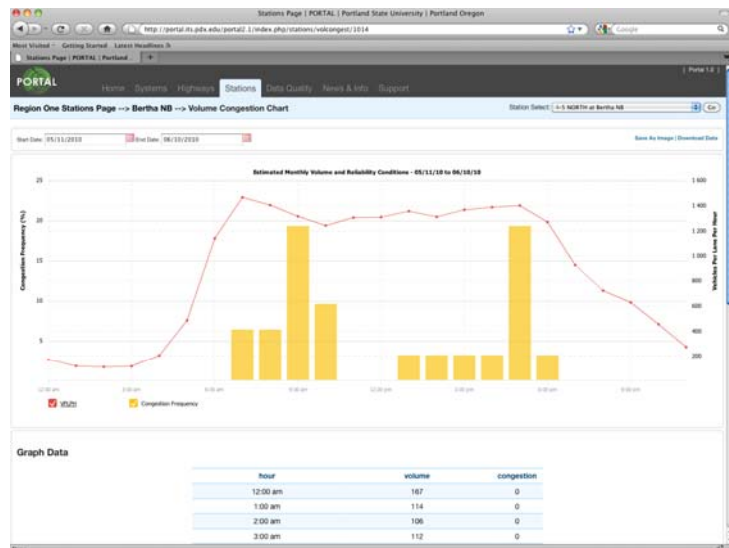
Stations Page - Map



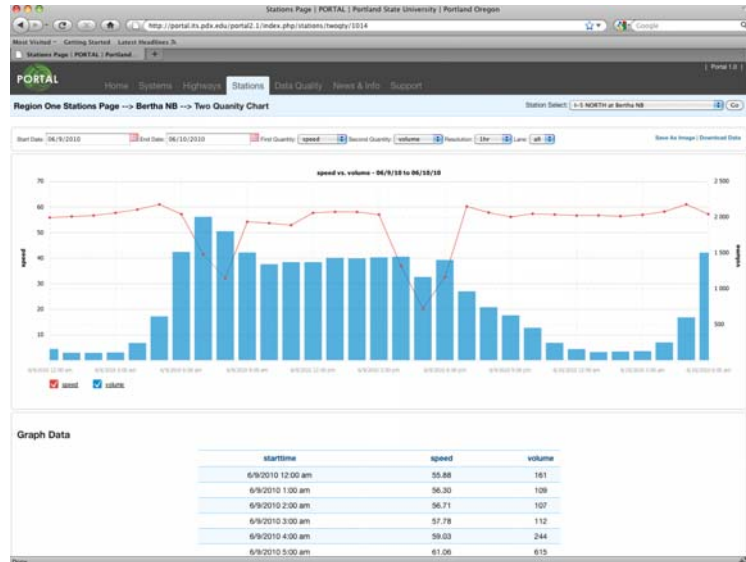
Stations - Expanded



Stations – Volume/Congestion



Stations – Two Quantity



Data Quality

Portal 2.0

http://portal.its.pdx.edu/dataquality/

PORTAL Home Systems Highways Stations Data Quality News & Info Support

Detector Data Quality Control

Date: 6/13/2010 Resolution: day

The following tables were constructed by processing loop detector data on 2010_06_11. 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 day is used to generate the report.

Offline Detectors

selectorid	stationid	highwayid	rampid	locationtext	milepost	count	description
1009	1002	1	1002	Stafford Rd WB to NB	286.3	4320	construction-related
1010	1002	1	1002	Stafford Rd WB to NB	286.3	4320	construction-related
1011	1002	1	1002	Stafford Rd WB to NB	286.3	4320	construction-related
1017	1003	1	1003	Nyberg EB to NB	289.4	4320	construction-related
1018	1003	1	1003	Nyberg EB to NB	289.4	4320	construction-related
1019	1003	1	1003	Nyberg EB to NB	289.4	4320	construction-related
1022	1003	1	1003	Nyberg WB to NB	289.4	4320	Temporary off until repaired by E.Ciwas damaged by an auto accident
1025	1004	1	1004	Nyberg WB to NB	289.63	4320	construction-related
1026	1004	1	1004	Nyberg WB to NB	289.63	4320	construction-related
1027	1004	1	1004	Nyberg WB to NB	289.63	4320	construction-related
1033	1040	2	1040	Nyberg SB	289.38	4320	construction-related
1034	1040	2	1040	Nyberg SB	289.38	4320	construction-related
1035	1040	2	1040	Nyberg SB	289.38	4320	construction-related
1070	5038	2	1038	Upper Boones SB	291.25	4320	
1236	1026	2	1026	Jantzen Beach SB	307.9	4320	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.
1237	1026	2	1026	Jantzen Beach SB	307.9	4320	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.

News & Info

Portal 2.0

http://portal.its.pdx.edu/newsandinfo/

Apple Yahoo! Google Maps YouTube Wikipedia News (1049) Popular

PORTAL Home Systems Highways Stations Data Quality News & Info Support

What is Portal?

The Portal Story

Welcome to Portal, the official transportation archive for the Portland-Vancouver metropolitan region. The purpose of this project is to implement the U.S. National ITS Architecture's Archived Data User Service for the Portland-Vancouver metropolitan region. This system is being developed at Portland State University by students and faculty in the Intelligent Transportation Systems Laboratory under the direction of Dr. Kristin Tufte. We are working in close cooperation with the Oregon Department of Transportation, Metro, the City of Portland, TriMet, the Southwest Washington Regional Transportation Council and other regional partners. This work is supported by grants distributed through Metro and by the Southwest Washington Regional Transportation Council, the Oregon Transportation, Research and Education Consortium, the National Science Foundation, and the Federal Highway Administration.

We welcome your participation in our project. The current PORTAL system archives a wide variety of transportation-related data including the freeway loop detector data from the Portland-Vancouver metropolitan region, weather data, incident data, transit data and freight data. We plan to expand the capabilities of our system and to include multimodal data sources, including additional transit data, arterial data and bicycle-pedestrian data from oregon and washington. Please explore the site and let us know what you think. Feedback can be submitted on the Support tab.

PORTAL was founded by **Dr. Robert L. Bertini**. Dr. Bertini is currently on leave and is serving as the Deputy Administrator of the Research and Innovative Technology Administration (RITA) at the U.S. Department of Transportation.

News

Portal 2.0 Webinar - June 2010

Deena Platman and Kristin Tufte host a webinar on Portal 2.0. More information can be found [here](#).

Upcoming PORTAL TAC Meetings - June 2010

Upcoming PORTAL TAC Meetings are scheduled for Monday, September 13th Monday, December 6th. Meetings run from 10:30 am - Noon and are held at the PSU ITS Lab.

ITS Lab Hosts ITS Oregon and TRANSPORT for a session on Intelidrive - May 2010

Gene McHale and Walter During from FHWA, Washington D.C. briefed TRANSPORT and ITS Oregon members on the USDOT's Intelidrive Data Capture and Management Program and the Intelidrive Dynamic Mobility Applications Programs. Following the briefing, there was an interactive session on how the Portland area could participate and leverage the federal programs. McHale and During were also given a "Test Drive" of PORTAL by Dr. Tufte, Dr. Monsere, Peter Koonce (PBOT), Deena Platman

Faculty and Staff

Kristin Tufte, Ph.D.

Research Assistant Professor
Department of Computer Science and Department of Civil & Environmental Engineering

Ph.D., Computer Science, University of Wisconsin Madison, 2005
M.S., Computer Science, University of Wisconsin Madison, 1996

Support

Portal 2.0

http://portal.its.pdx.edu/support/

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PORTAL Home Systems Highways Stations Data Quality News & Info Support

Portal Support and Documentation

Screencasts

[Portal 2.0 Release Screencast](#) October 2009

[Portal Data Quality Screencast](#) August 2009

[Portal 2.0 Preliminary Screencast](#) June 2009

Documentation and Reports

Kristin Tufte; [PORTAL Aggregation Analysis and Documentation](#)

Kristin A. Tufte, Robert L. Bertini; [PORTAL Data Quality Analysis](#) (October 2008)

Presentations

James Whiteneck, Shreemoyee Sarkar, Sathish Periasamy; [Portal 2.0 Update](#)

Poonam Singh; [Data Quality Metrics](#)

Monsere, C., K. Tufte, R.L. Bertini, S. Ahn; [Techniques for Establishing and Measuring Data Quality in an Archived Data User Service](#)

Steven Hansen, Andrew Byrd, Andy Delcambre, Andy Rodriguez, Spicer Matthews, Robert L. Bertini; [Using an Intelligent Transportation System Data Archive to Improve Student Learning at Portland State University](#)

Kristin Tufte; [PORTAL TAC Kickoff Meeting](#)

Additional Products

Conference proceedings and additional products available on the ITS Lab Web Site

Support and Feedback

[Click here to report an issue or submit a comment.](#)

[Data Download API User Guide](#)

Links

Loop Detector Information: [Locations & Future Plans](#)

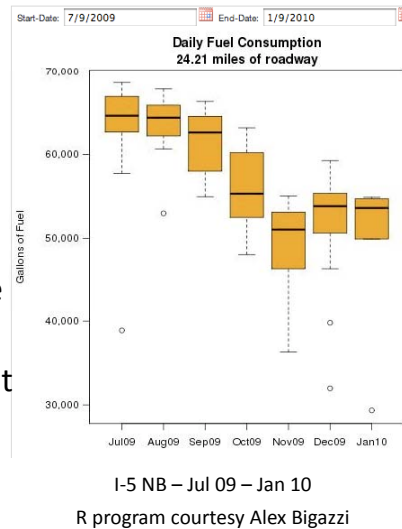
Facebook: [Portal Archive](#)

Collaborating Agencies

- Metro
- Southwest Washington Regional Transportation Council
- Oregon Department of Transportation
- City of Portland
- TriMet
- VAST

Custom APIs-R

- ❑ R graphics from ITS Lab projects semi-automatically integrated into PORTAL 2.0
- ❑ R is the primary ITS Lab graphics tool
- ❑ “Static” plots become dynamic
- ❑ Capitalize on the great work done by ITS Lab researchers



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 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



Data Quality – Web Site

Portal 2.0

http://portal.its.pdx.edu/dataquality/

Configuration Errors

Volume > 17 – Volume Too High

detectorid	stationid	highwayname	locationtext	ATMS lane number	field lane number	percentage
1228	1035	I-5 NORTH	Jordan Beach NB	1	3	2.25
1291	1033	I-5 SOUTH	Going St SB	1	3	1.69
1835	1113	US 26 WEST	US26 WB @ I-405 Count Station	1	1	1.27
1466	1060	I-84 WEST	58th WB	3	1	0.95
1123	1012	I-5 NORTH	Midtown Blvd NB	3	1	0.91
1131	1013	I-5 NORTH	Tenaville Blvd NB	3	1	0.69
1139	1014	I-5 NORTH	Bertha NB	3	1	0.46
1803	1115	I-205 SOUTH	10th Street to I-205 SB	1	2	0.42
1785	1104	I-205 SOUTH	ORE 42 SB	1	2	0.39
1807	1116	I-205 NORTH	10th Street to I-205 NB	2	1	0.37

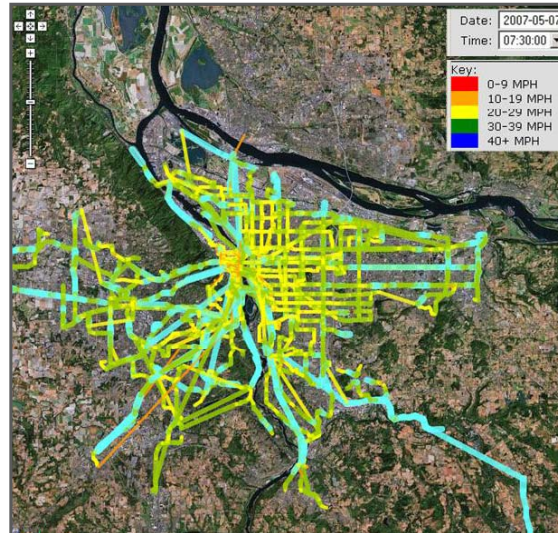
Occupancy > 99 – Detector Always Occupied

detectorid	stationid	highwayname	locationtext	ATMS lane number	field lane number	percentage
1274	1051	I-84 WEST	Sandy WB	3	1	99.95
1841	1123	US 26 EAST	US26 EB @ I-405 Count Station	2	1	99.40
1836	1084	US 26 EAST	185th Ave SB to EB	1	2	98.89
1837	1084	US 26 EAST	185th Ave SB to EB	2	1	98.89
1454	1055	I-84 WEST	82nd/Halsey WB	1	3	46.18
1300	1034	I-5 SOUTH	Greeley Ave SB	2	1	3.90
1822	1016	I-5 NORTH	Marine Dr NB	3	1	2.91
1201	1034	I-5 NORTH	Marine Dr NB	2	3	2.13
1213	1033	I-5 NORTH	Delta Park NB	3	0	1.76
1205	1022	I-5 NORTH	Denver Ave NB	3	0	1.76

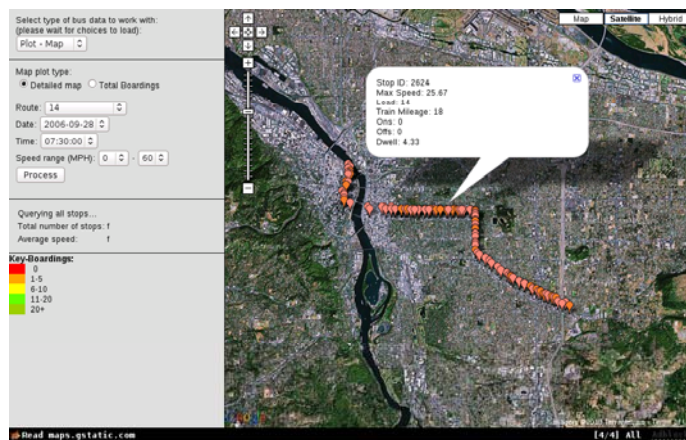
Speed > 100 – Speed Too High

detectorid	stationid	highwayname	locationtext	ATMS lane number	field lane number	percentage
1715	1095	US 26 WEST	Murray Rd WB	1	3	3.39
1717	1095	US 26 WEST	Murray Rd WB	3	1	0.49
1742	1100	I-205 SOUTH	Cockamoyne Hwy SB	1	3	1.08
1803	1115	I-205 SOUTH	10th Street to I-205 SB	1	2	1.00
1838	1089	I-205 SOUTH	ORE 224/2nd Ave SB	1	3	0.93
1815	1135	I-405 SOUTH	Broadway to I-405 SB	2	2	0.88
1850	1134	I-205 NORTH	Sunnybrook NB	1	3	0.86
1388	1060	I-205 SOUTH	Airportway EB to SB	1	3	0.46

Speed Map from Transit AVL



Transit Data - Boardings



Arterial Data Fusion

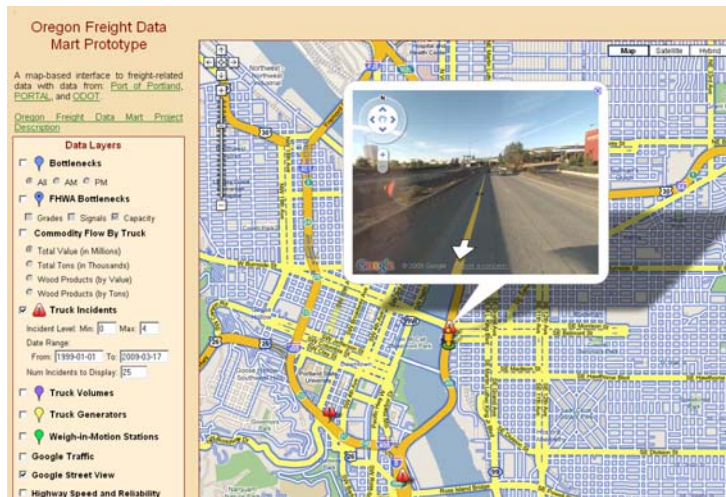
- ☐ Create framework to fuse into one complete picture for archiving
 - ☐ Transit Bus AVL Data
 - ☐ Matched Vehicle Probe Data (i.e. Bluetooth)
 - ☐ Adaptive Signal System Data
- ☐ Report
 - ☐ Speeds
 - ☐ Travel times
 - ☐ Performance measures

Arterial Data Access

- ☐ Access to City of Portland signal system data
- ☐ Obtaining data from Bluetooth collection
- ☐ Data will be archived in PORTAL



Oregon Freight Data Mart

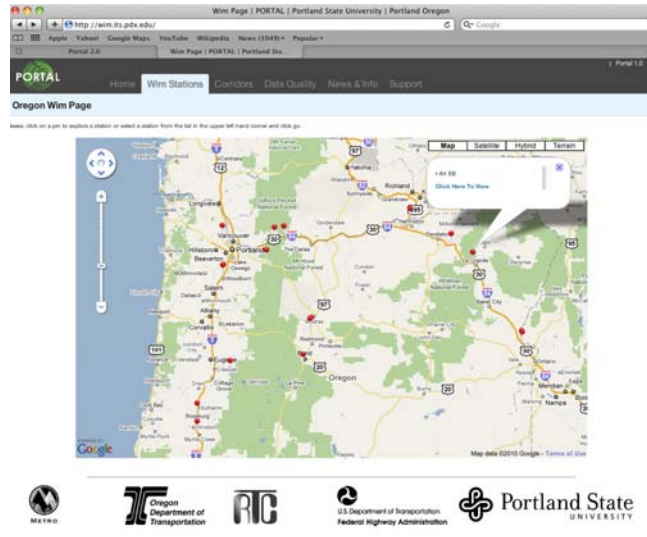


Oregon Traffic Safety Data Archive

- ☐ Make data accessible
- ☐ Help “casual user”
- ☐ Make things quicker for advanced users
- ☐ Provide open-source tools for analysis and exploration
- ☐ Once we figure something out, let’s keep it!

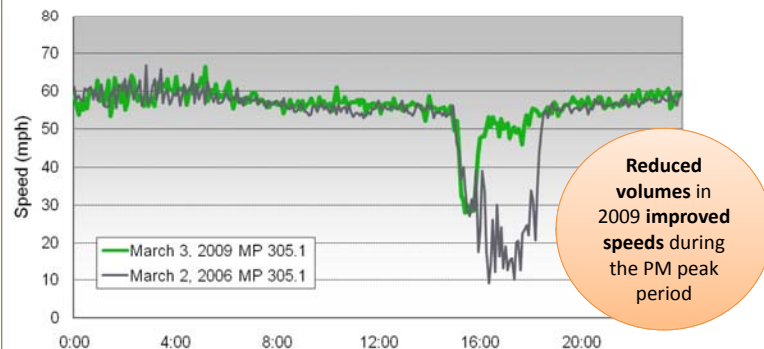


WIM Data Archive



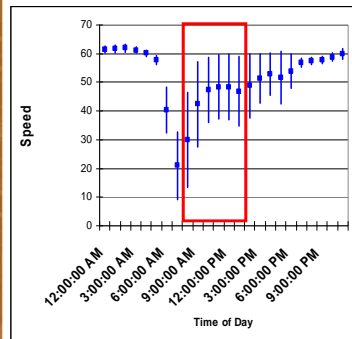
PORTAL compares data across time

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

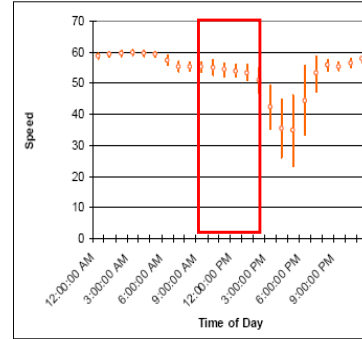


PORTAL measures reliability

I-5 SB at Marine Drive (2006)



I-84 EB at 60th (2006)

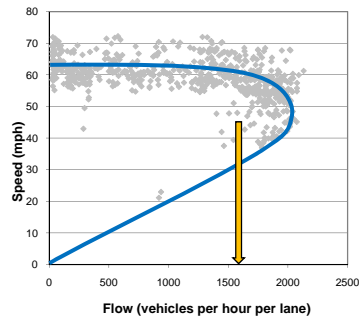


The longer the vertical bar the more variability in travel speed.

PORTAL compares design performance

Interchange spacing =
0.15 miles

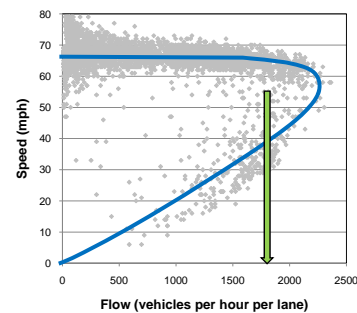
Speed/Volume Relationship
ORE 217 at Denney Road



Max flow
= 2000

Interchange spacing =
2 miles

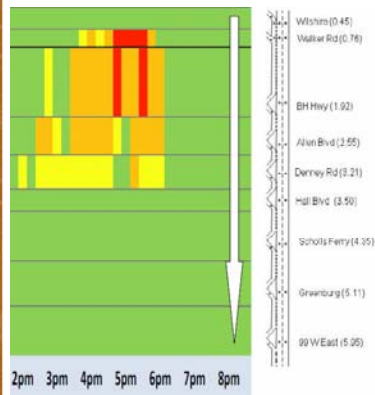
Speed Volume Relationship
I-205 NB Stafford Road



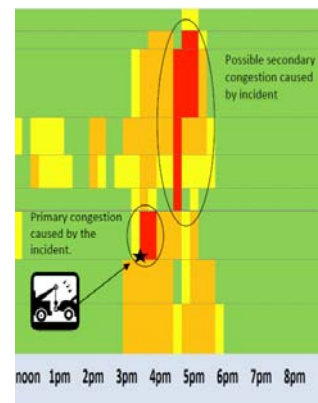
Max flow
= 2250

PORTAL measures traffic incident impacts

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

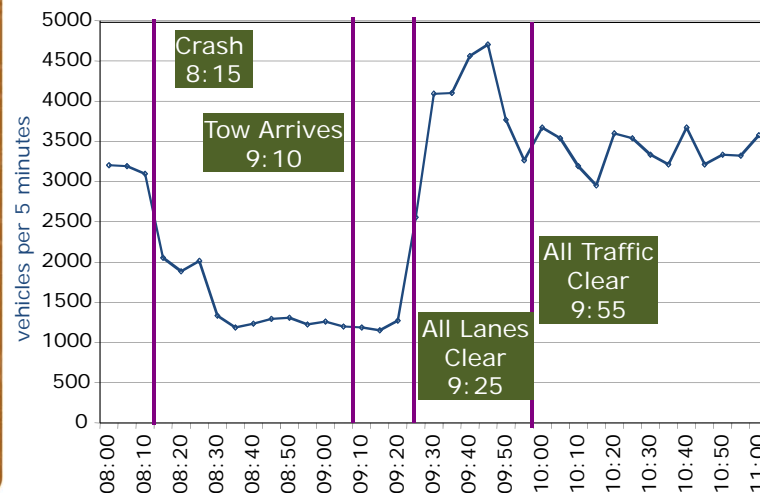


With Incident
(total delay and incident cost \$58,000)



PORTAL monitors performance

Data measures incident response time, clearance time, and return to normal travel conditions.

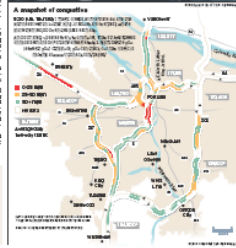


PORTAL informs the traveling public

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

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

By JAMES HALL
It will take a more complex and expensive effort to keep the region's roads from becoming gridlocked, even with the new toll trucks, ramp meters and other traffic tools that are being deployed by the Metro Area Council of Governments (MTCOG) and the Oregon Department of Transportation (ODOT). The region's roads are already at capacity, and adding more workers could quickly drive metro-area roads to capacity.



A snapshot of congestion

5:30 p.m. Thursday: Traffic creeps at Interstate 84 and the Northeast Martin Luther King Jr. Boulevard overpass, where more than 150,000 vehicles pass each day. An ODOT map, updated every two minutes, shows travel speeds on most sections of Portland-area freeways. Right before you leave for your commute, you can check out how traffic is moving at www.itspdx.com/page/.



Learn more!

To see PORTAL in action, go to
www.portal.its.pdx.edu

Thank you!

Kristin Tufte  Portland State
UNIVERSITY

Deena Platman  Metro

