

Urban Traffic Engineers Council (UTEC) / Institute of Transportation Engineers Washington State Section

Fall Westside Meeting
11/12/14

Good morning

- Please take this time to network with each other from 8:30-9:00 a.m.
- Our meeting and webinar begin at 9:00 a.m. and last until 12:30 p.m.



Fall in Western Washington. Photo by Bruce Ikenberry at flickr.com/photos/bruceikenberryphotography/



Fall wheat harvest near Pullman, WA www.art.com



Fallubous Fall & Thanksgiving cookies Bokenmetaboy425.blogspot.com

Hello and welcome to:

UTEC / ITE-WA

Webinar attendees



Freephoto.com

and

In person attendees





Signatures.com/federal-way.php

2

Instructions for webinar attendees

- Press the orange arrow toggle button to show and hide the GoToWebinar screen.
- You are in listen-only mode. Please still ask questions and make comments by typing them in the "Questions" box. We will read your question to the speaker for an answer.
- If using the telephone, please put your phone on mute, not on hold.
- Please take breaks when needed.
- Have fun connecting across the state!



Photo courtesy of Pacific Technologies, Inc.

3

Instructions for in person attendees

- Turn wireless devices to silent mode.
- Please move side conversations out of the room so that the webinar attendees and in-person attendees can hear better.
- Please speak loudly and clearly into the hand held microphone. We will try to repeat all questions.
- Feel free to move around the room and take breaks when needed.
- Restroom locations.
- Fire exits.
- Have fun connecting across the state!



Introductions

Please tell us your:

- Name
- Agency/Business name
- Announcement? (10 seconds or less)




5

Urban Traffic Engineers Council (UTEC)

- Founded ~1978-1979. We are more than 30 years old.
- Formed by city traffic engineers who met informally for lunch to discuss common issues.
- Group grew as other cities and also counties learned about the group. Consultants and vendors joined next.
- Now = 425 members who are traffic, transportation, and public works engineers, technicians, directors, managers, supervisors, planners, and related professionals.
- Approx. 250 current members (60%) attended a meeting in the past 8 years either in person or by webinar.
- Results of 2013 strategic planning effort = new name, more networking, planning committee.



6

Overview / Agenda

- The state of transportation issues in the City of Seattle
- Ideas on bicycle infrastructure design from Copenhagen, Denmark; Malmö, Sweden; and Vancouver, British Columbia
- 10 minute break
- Quantifying bicycle exposure: A mapping tool
- Ideas on bicycle infrastructure design from the Netherlands



Overview / Agenda

- City of Pasco's Americans with Disabilities Act Sidewalk Transition Plan
- 10 minute break
- City of Spokane's photo red in school zones program and using it as a funding source for neighborhood traffic calming programs



- City of Spokane's photo red in school zones program and using it as a funding source for neighborhood traffic calming programs
- Roundabouts – signs, markings, and landscaping: City of Kennewick's experience
- Optional unofficial guided tour of City of Kennewick roundabouts, rectangular rapid flashing beacons, and flashing yellow arrows

Practical Solutions Moving Washington Forward



Nancy Boyd, P.E.
Director
Engineering Policy and Innovation Division

Lynn Peterson
Secretary of Transportation

Andrew Beagle, P.E.
Geometric Engineer
Development Division
Policy, Standards and Research Unit

Urban Traffic Engineers Council (UTEC) Institute of Transportation Engineers Meeting
November 12, 2014

Why Practical Solutions? Why now?

- Trends: technological, environmental, societal, financial
- Transportation heritage, transportation future
- Mission and vision
- Performance management: "Build many good projects rather than a few great projects"

Practical Solutions at WSDOT

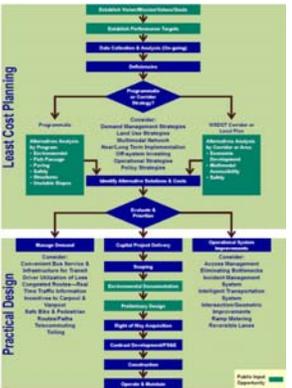
Least Cost Planning

...an approach to making planning decisions that considers a variety of **conceptual strategies** to achieve the desired system **performance targets** for the least cost.

Practical Design

...an approach to making project decisions that focuses on the **need for the project** and looks for the lowest cost solutions.

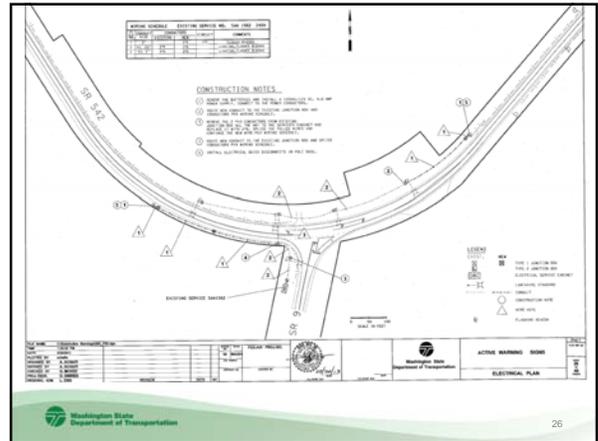
How a collaborative transportation solution is implemented



The diagram illustrates a multi-stage process:

- Establish Transportation Objectives:** Establish Performance Targets, State Performance Measures (the group), and Objectives.
- Program Design:** A decision diamond asks "Program Design Strategy?". It branches into:
 - Programmatic:** Allocation Methods, Performance Measures, Funding, and Revenue Sources.
 - Conceptual:** Conceptual Management Strategies, Least Cost Alternatives, Multi-Modal Network, Near Long Term Implementation, Off-system Funding, Operational Strategies, Policy Strategies, and Identify Operating Business & Costs.
 - WSPOT Center as "Toolbox":** Allocation Methods, Performance Measures, Funding, and Revenue Sources.
- Practical Design:** A decision diamond asks "Practical Design?". It branches into:
 - Range of Alternatives:** Expansion Bus Services & Infrastructure for Shared, Better Utilization of Lane, Conceptual Station-to-Station, High Capacity Alternatives, and Transit to Carpool & Vertical.
 - Capital and Safety:** Safety, Security, and Access Management, Operational Strategies, and System.
 - Operational Strategies:** Access Management, Operational Strategies, System, Operational Strategies, and System.
- Construction & Maintenance:** Construction, Operation, and Operation & Maintenance.

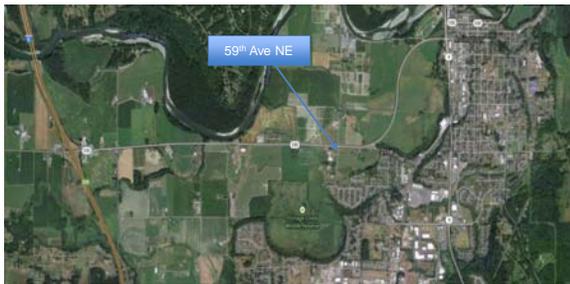
Access Point, Flashing Beacon



SR 542, SR 9 – Entering Traffic Ahead



SR 530, 59th Ave NE – Stopped Traffic Ahead



SR 526, Boeing – Cross Traffic Ahead



Washington State Department of Transportation

31

SR526, BOEING ENTRANCE (MP 0.97)



http://maps.google.com/maps?hl=en&tab=wl

Washington State Department of Transportation

32

Active Warning Signs



Washington State Department of Transportation

SR526 @ Boeing Entrance MP 1.00

33

SR 524, Larch Way – Stopped Traffic Ahead



Washington State Department of Transportation

34

SR 542, SR 9



Washington State Department of Transportation

36



Washington State Department of Transportation

SR524 & Larch Way MP 6.77

35

SR 542, SR 9



SR 530, 59th Street



After Data – SR 542, SR 9

- Installed 8/30/2012
- 2012 Speeds
 - EB 85% 54 mph (posted 55 mph)
 - WB 85% 53 mph (posted 55 mph)
- 2014 Speeds
 - EB 85% 48 mph (posted 55 mph)
 - WB 85% 51 mph (posted 55 mph)

Questions??

Dynamic Intersection Warning Sign System



SR 9, Van Zandt

– Innovate on the innovation



A Practical Design! – 5 yrs ago

Nizam, Ahmer

To: Swires, Dina; Damitio, Chris

Cc: Klapp, Cheryl

Attachments: (2) Download all attachments
 Executed RR-00440 Amendment.pdf (200 KB) [Open as Web Page]; RR-00440 Amendment Exhibit B.pdf (422 KB) [Open as Web Page]

Inbox Friday, September 26, 2014 11:25 AM

- You forwarded this message on 10/1/2014 3:14 PM.

Dina - Your photo jogged my memory regarding a past project.

The attached agreement is with BNSF for construction of the H2K Phases of AWV in 2010. Please see Section 5 of the agreement and the accompanying Exhibit B. This was a temporary application, but it has been used at a BNSF crossing before.

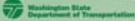
The application is different, but worth mentioning to you.

Ahmer

A Practical Design! - Now

5. During construction of the State's Project, the State, in coordination with the City of Seattle, plans to establish an active advisory system whereby motorists at a certain location along East Marginal Way will be advised of a train occupying the Atlantic Street grade crossing and therefore have an opportunity to use alternate routes. This system requires a small magnetometer device, as shown on Exhibit B to this Amendment, attached hereto and incorporated herein, to be affixed to BNSF's tracks on either side of the Atlantic Street grade crossing in order that the device may detect the presence of a train and activate the remote sign. BNSF hereby agrees to allow the State to install this device within its franchise area, provided that:

- (a) The device shall be installed in such a manner as to not interfere with any movement of BNSF trains or equipment, and shall not protrude from the ground above the top of the tie to which it is affixed;
- (b) The device shall be installed under the supervision of BNSF's Roadmaster and shall be installed to the satisfaction of the Roadmaster;
- (c) The device shall be removed upon completion of the State's Project; and


43

Pioneer Highway/Fir Island Road Intersection Roundabout Project

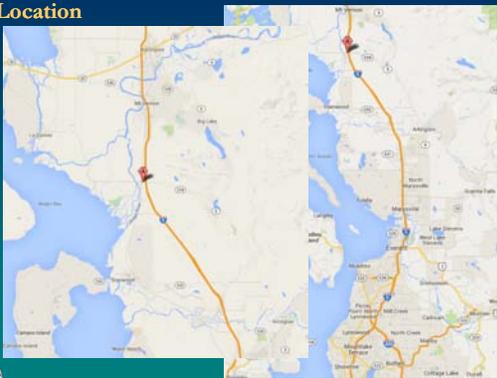
Jennifer Swanson
 Project Manager

 Given Kutz
 Traffic Engineering Technician IV
 Presenter


 Skagit County Public Works Engineering Division

44

Location




45

Location History - 1937




46

Location History - 1969




47

Location History - 1998




48

Construction

Construction began October 7, 2013

55

Construction

Installation of PUD's Waterline

56

Winter Shutdown

Construction was suspended on November 20, 2013

Aerial Photo December 2013

57

Resume Construction

Construction resumed May 5, 2014

Aerial Photo June 2014

58

Placing curbs & truck aprons.

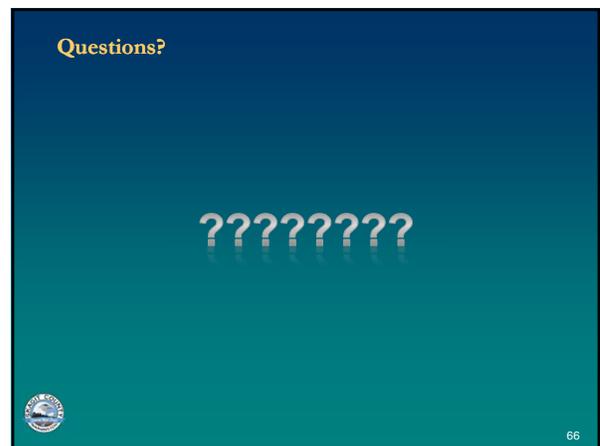
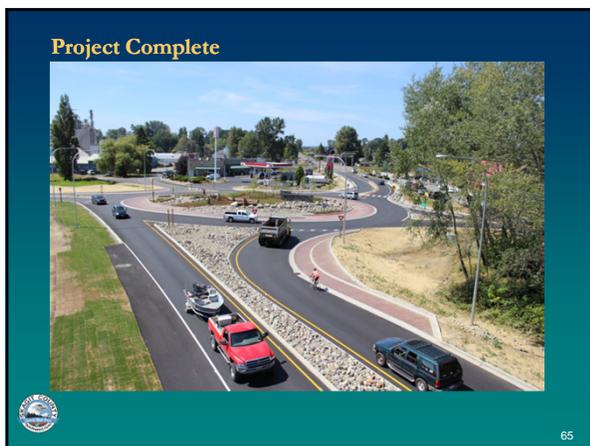
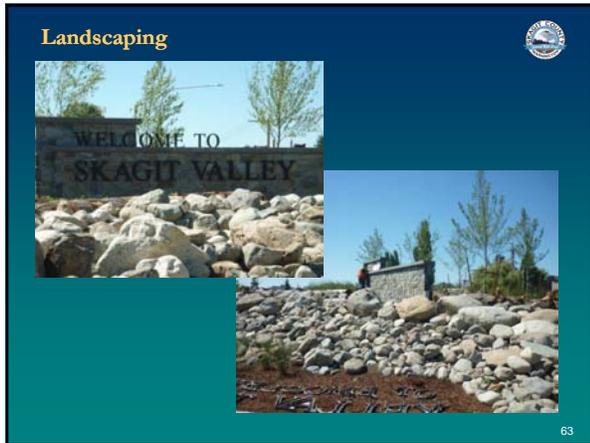
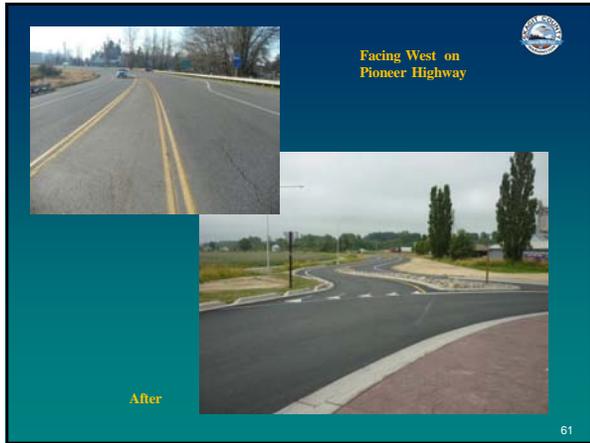
59

Pioneer Hwy-Facing East

Before

After

60



Big Data to Transportation Decisions: How Can Transportation Agencies and Users Contribute and Benefit?

Yinhai Wang
PacTrans STAR Lab
University of Washington
Email: yinhai@uw.edu Tel: 1-206-616-2696
For the Meeting of Urban Traffic Engineers Council
Nov. 12, 2014



Background

What causes congestion and how to mitigate it?
How much fuel and time wasted?
How much extra pollution caused by traffic jam?



Image source: <http://stock.gettyimages.com/stock-images/Charles/Photographs/2009/6/18/1245347143341/Traffic-jam-400.jpg>

Background

How to monitor health condition of transportation infrastructure?

Which infrastructure piece is the most critical for the roadway network?



Picture source: http://en.wikipedia.org/wiki/I-35W_Mississippi_River_bridge

Other Sample Key Questions

- How to quantify the benefit from a transportation investment?
- How to measure vehicle miles of travel/vehicle hours of travel?
- Where to place electric vehicle charge stations and how to predict an EV's range?
- What is the impact of a road construction project on travel?
- How to estimate traffic emissions at a given location and time?
- What is the impact of toll on users of different income levels?
- Where do pedestrians go and how to improve their safety?
- How to improve transit services without adding new resources?
- How does congestion form up and how to mitigate it?
- Where do trucks go and how to guide them to the best routes?
- ...

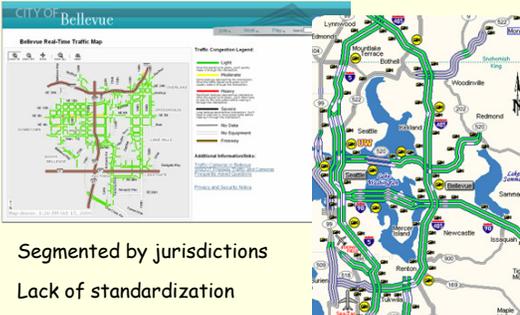
Data Hurdles

To answer critical transportation questions and make informed decisions, we need

Data! Data! Data?



Data Hurdles



Segmented by jurisdictions
Lack of standardization

Age of Big Data

Traffic Sensors



+



↓

Transportation Big Data!

PacTrans STAR Lab Research on Big Data and E-Science

73

Age of Big Data



Image sources: <http://connectedvehicle.challengepost.com/submissions/2012-drive-the-roadway-to-intelligent-transportation>

PacTrans STAR Lab Research on Big Data and E-Science

74

Challenges to Transportation Professionals

- Extract Values from Big Data Streams
 - High volume and high velocity
 - High variety and high variability
 - Methods and tools to take values out
- Manage Big Data
 - Spatial and temporal features
 - Storage and query efficiencies
 - Privacy protection
- Understand and Use Big Data
 - Problems with classical transportation theory
 - Weak data training in transportation curriculum
 - Isolated to systematic view

PacTrans STAR Lab Research on Big Data and E-Science

75

Research Needs

Proposed actions to address the gaps:

- Actively pull what we need from the existing data resources
- Build our own stream of big data
- Design a standard mechanism for connecting transportation related datasets
- Develop e-science transportation methods to take advantage of the spatial and temporal datasets to support transportation analysis and decision making
- Build big data analytics tools to facilitate usage of big data
- Develop new courses in transportation curriculum to make our students/working professionals ready for the big data era

PacTrans STAR Lab Research on Big Data and E-Science

76

Research Needs

What is e-science?

- Computationally intensive science that is carried out in highly distributed network environments
- Application of computer technology to the undertaking of modern scientific investigation

E-science of transportation:

- Computationally intensive science for scientific investigations in transportation issues using immense data sets

PacTrans STAR Lab Research on Big Data and E-Science

77

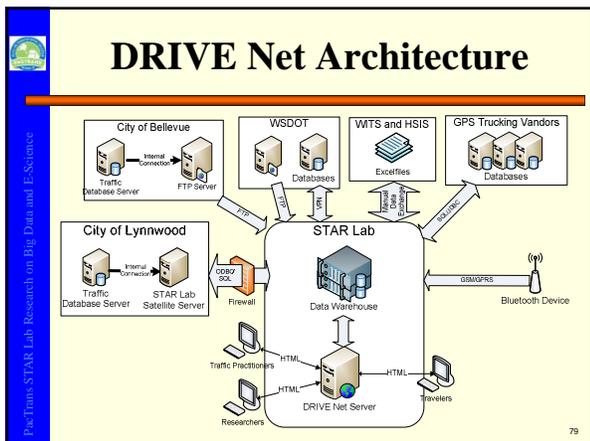
Research Examples

Digital Roadway Interactive Visualization and Evaluation Network (DRIVE Net) currently being developed at the Smart Transportation Applications and Research Laboratory (STAR Lab) of the University of Washington.

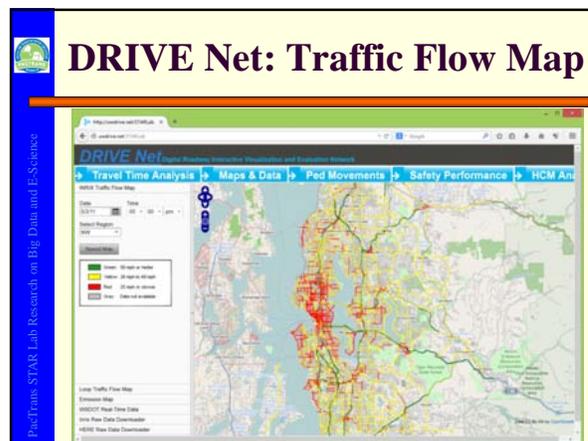
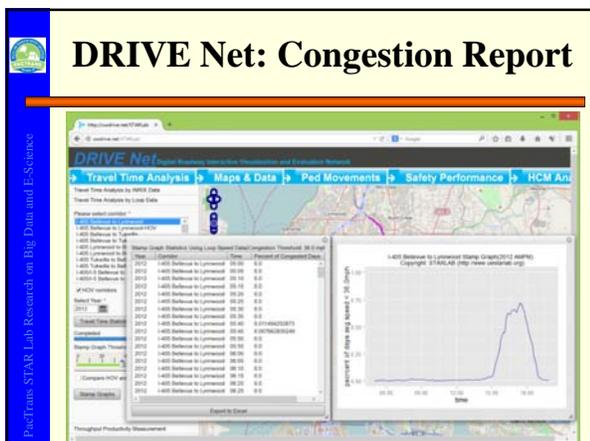
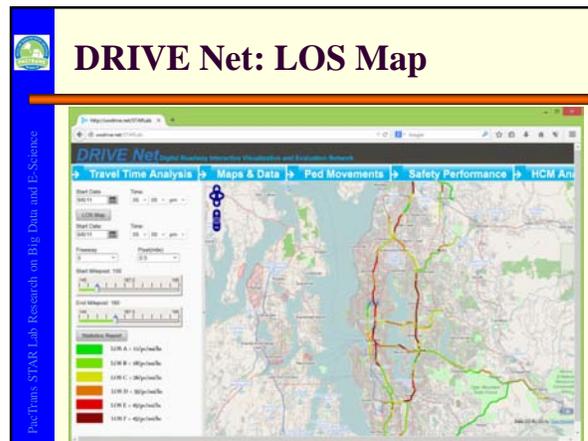
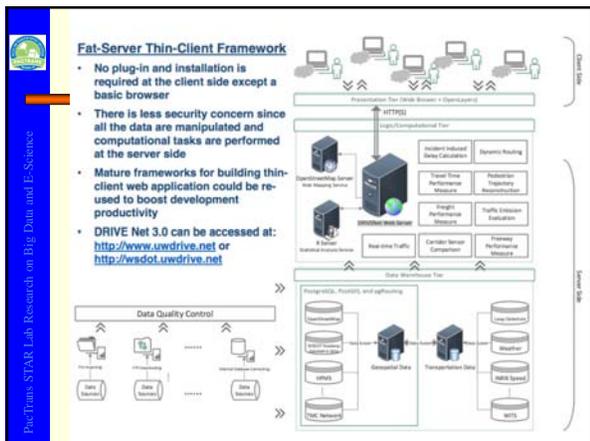
- DRIVE Net is a system for the data sharing, visualization, modeling, and analysis
 - Web-based system for e-Science investigations
 - Real-time traffic visualization
 - Data sharing platform
 - Statistical Modeling
 - Vehicle emissions quantification
 - Mobile Sensing
 - Freeway Performance Measurement

PacTrans STAR Lab Research on Big Data and E-Science

78



- ## DRIVE Net Data Sources
- Online Data Sources
 - WSDOT 20-second loop data
 - INRIX Data
 - GPS Truck Data
 - Bluetooth Data
 - FHWA HERE Data
 - Geospatial Data
 - DOT shape files
 - OpenStreetMap Geographic Data
 - Offline Data
 - WITS (Washington Incident Tracking System) and Weather Data
 - More Data to Come
 - HPMS Volumes
 - Ferry Terminal Conditions
 - Bicycle Data



Your Participations Needed!

- Contribute Ideas
 - How DRIVE Net may help address your problem?
 - What functions are missing in the current system?
- Contribute Data
 - Be part of our regional transportation system
 - Collaborate on data capture and data mining
- Contribute Research and Intern Opportunities
 - Let us know your practice and needs
 - Let us learn from you and help future practice

PacTrans STAR Lab Research on Big Data and E-Science

91

Thanks for your attention!

- Acknowledgment

This project is partly funded by Washington State Department of Transportation (WSDOT) and PacTrans. We appreciate their funding support!





PacTrans STAR Lab Research on Big Data and E-Science

92

Seattle's Shared Transportation Options



Urban Traffic Engineers Council / Institute of Transportation Engineers
Kiersten Grove
November 12, 2014



94

SDOT's mission and vision

Mission: delivering a first-rate transportation system for Seattle.



Vision: a vibrant Seattle with connected people, places, and products.

94

Presentation overview

- What is shared transportation?
- What's in Seattle?
- Opportunities for local governments
- Emerging issues & considerations

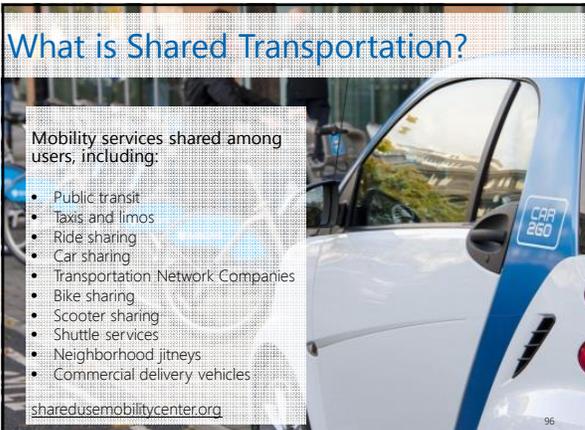
95

What is Shared Transportation?

Mobility services shared among users, including:

- Public transit
- Taxis and limos
- Ride sharing
- Car sharing
- Transportation Network Companies
- Bike sharing
- Scooter sharing
- Shuttle services
- Neighborhood jitneys
- Commercial delivery vehicles

sharedusemobilitycenter.org



96

Car sharing

- Traditional – Zipcar
- Point-to-point/One-way – car2go, Drive Now
- Peer-to-peer – Getaround
- All include:
 - Membership
 - Per use/time charge
 - Flexible use of on and off street parking



Taxis & Flat Rate Vehicles

- On-street hails, call, or apps
- City regulates the number & fares
- Apps – Curb, Flywheel, Yellow Cab, and even Ubertaxi




Transportation Network Companies

- Uber, Lyft, Sidecar
- App-based services to request rides
- Flexible pricing
- Variety of vehicle types
- New shared ride models – UberPool & Lyft Line




Bike share

- Traditional – [Pronto Cycle Share](#)
 - Non-profit Puget Sound Bike Share
 - Launched October 13
 - 50 stations, 500 bikes
 - Serving Downtown, Capitol Hill, South Lake Union, and the University District
 - [How does it work?](#)
 -  Spotcycle App
- Peer-to-peer – Spinlister



What shared transportation brings to Seattle

- More options
- Opportunity for car light and car free living
- Market competition and better service
- Last/first mile connectivity
- Time and geographic flexibility
- Safety

Emerging issues & considerations

- Equitable access
- Curb use & pricing
- Consumer protection – insurance, safety
- Regulated industries & new technologies
- Effects on travel behaviors

Questions?

kiersten.grove@seattle.gov | (206) 684-4653

www.seattle.gov/transportation




Shared Transportation in Tacoma

Kristina Walker, Downtown On the Go
Josh Diekmann, City of Tacoma

UTEC/ITE-WA | Nov. 12, 2014




What's here?







Downtown Tacoma



Where do we share?

- Downtown Tacoma:
 - 30,000 employees
 - 5,000+ students
 - 77 percent drive alone rate
- Universities
 - UW Tacoma
 - Pacific Lutheran University
 - University of Puget Sound



DOWNTOWN
On the go!

How did it happen?

- On-street permits (City of Tacoma)
- Pre-cars outreach
- Marketing and outreach
 - Partnership with County/CMAQ Grant
 - Partnership with Zipcar
 - Local Business



DOWNTOWN
On the go!

Using the Zipcars



DOWNTOWN
On the go!

Marketing



DOWNTOWN
On the go!

Lessons learned

- Need early adopters
- Need business buy-in
- Need residential density



DOWNTOWN
On the go!

Contact us

- **Kristina Walker**
Downtown On the Go
kristinaw@tacomachamber.org
253-682-1739
downtownonwego.org
- **Josh Diekmann**
City of Tacoma
jdiekmann@ci.tacoma.wa.us
253-591-5756



2014 Corridor Capacity Report

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

Sreenath Gangula, P.E., PTOE
Washington State Department of Transportation



Joint Urban Traffic Engineers Council / ITE Washington State Section
Wednesday, November 12, 2014

Washington State Department of Transportation

Purpose of the report

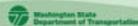
The 2014 *Corridor Capacity Report* (CCR) was created

- ▶ To help inform WSDOT policy makers, planners and engineers as they examine the multimodal capacity opportunities for state highways
- ▶ To support WSDOT's Practical Solutions and performance-based planning initiatives
- ▶ To apprise the Legislature, stakeholders, educational and research institutions, the media, and the public about highway system conditions and how we can work together to reduce congestion



11 5

Why is this important?

11 6

Our journey: Systems performance measurement




11 7

This year's report includes:

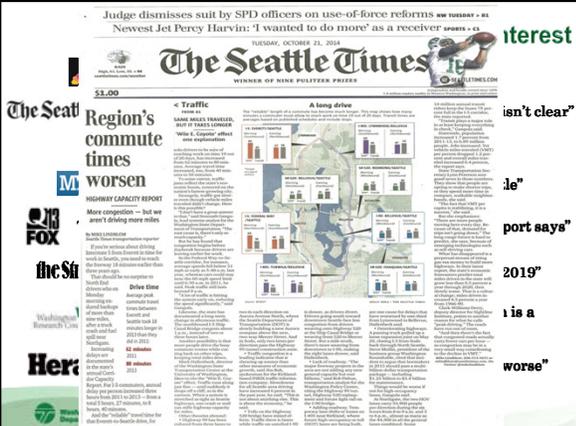


...in partnership with Metropolitan Planning Organizations (MPOs), Transit agencies
 Ben-Franklin Council of Governments; C-Tran; Community Transit; Intercity Transit; King County Metro; Puget Sound Regional Council; Southwest Regional Transportation Council; Sound Transit; Spokane Regional Planning Council; Spokane Transit; Thurston Regional Planning Council; University of Washington

Interactive PDFs for the 2014 Corridor Capacity Report, the Appendix and WSDOT's Handbook for Corridor Capacity Evaluation can be accessed online at: <http://www.wsdot.wa.gov/Accessibility/CorridorCapacity2014.pdf>



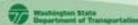
11 8



12 9

Our approach: Performance Journalism

- **Good Stories**– Use narrative reporting to make it real and tell the story – one of the most difficult tasks for many.
- **Good Writing**– Use a reader-friendly approach.
- **Good Data and Rigorous Systems Analysis**– Unyielding pursuit for data integrity and quality analysis.
- **Good Graphics and Visualization**– Every graph tells a story, every graph asks a question.
- **Good Format/Presentation**– The report should entice the reader to engage with the material, allow a quick grasp of the message, and not distract from the content.
- **Quality Control**– It's your credibility.
- **Good Timing**– Lead, don't follow.



12 9

Tools used for data analysis

12
1

2014 CCR Report outline

- Executive summary
- Statewide indicators
- Regional indicators
- Corridor level indicators
- Marine highways
- Project level indicators

Today's presentation outline

- Executive summary stats
- Statewide & Regional indicators
- Corridor level indicators (one example)
- What other analysis do we do?
- Next steps

12
2

The big picture: Dashboard

2014 Corridor Capacity Report Dashboard of Indicators

	2009	2010	2011	2012	2013	Difference '11 vs. '13
Demographic and economic indicators						
State population (thousands)	6,672	6,725	6,768	6,818	6,882	1.7%
Gasoline price per gallon (annual average) ¹	\$2.80	\$3.22	\$3.85	\$3.90	\$3.64	-5.5%
Washington total employment (thousands of workers) ²	2,863	2,837	2,873	2,922	2,990	4.1%
Taxable retail sales (billions of dollars) ¹	\$109.5	\$107.7	\$107.4	\$110.7	\$117.2	9.1%
Multimodal performance measures						
Drive alone commuting rate ³	72.1%	73.0%	73.3%	72.2%	72.7%	-0.6%
Carpooling commuting rate ³	11.2%	10.5%	10.2%	10.7%	10.1%	-0.1%
Bicycling and walking commuting rate ³	4.3%	4.4%	4.2%	4.5%	4.3%	0.1%
Public transit commuting rate ³	5.9%	5.5%	5.6%	5.6%	6.3%	0.7%
Transit ridership ⁴ (in millions)	129.9	189.8	195.1	218.1	--	--
WSDOT Ferries ridership ⁴ (in millions)	22.5	22.6	22.3	22.2	22.5	0.9%
Statewide congestion indicators						
Greenhouse gas emissions						
Million metric tons of carbon dioxide equivalents (CO ₂ e) ⁵	95.0	96.1	--	--	--	--
Transportation as percent of emissions from all sources statewide ⁵	44.8%	43.9%	--	--	--	--

12
3

The big picture: Executive Summary

Congestion on the rise, but still below pre-recession levels

- 2009 was the least congested year statewide since the most recent recession in 2008
- Statewide congestion increased 1.5% reflecting economic indicators such as retail sales, employment, population etc.
- Statewide VMT saw slight increase while per capita miles traveled decreased
- Regional indicators: the Puget Sound and Spokane areas saw no change in delay for 2011 and 2013 while the Tri-cities and Vancouver areas saw reductions in delay
- Commute corridors exhibit delay in varying magnitude. For example, I-5, I-405, I-90 and SR 167 in the Puget Sound area saw increased delay while SR 520 saw a decrease

12
4

Statewide: Vehicle Miles Traveled

Record high statewide vehicle miles traveled in 2013
1993 through 2013; VMT in billions

Annual VMT for all public roadways increased 0.4% between 2011 and 2013.
Annual VMT on state highways only increased 0.6% between 2011 and 2013.
Annual VMT for state highways only decreased 1.2% between 2011 and 2013.

In 2013, annual vehicle miles traveled (VMT) per person at second lowest level since 1968
1993 through 2013

Annual VMT per person on all roadways decreased 1.2% between 2011 and 2013.
Annual VMT per person for all public roadways decreased 1.1% between 2011 and 2013.
Annual VMT per person on state highways only decreased 1.1% between 2011 and 2013.
Annual VMT per person for state highways only decreased 1.1% between 2011 and 2013.

Year (population)	State highways	All public roads	State highways	All public roads
2009 (6,672)	31,446	56,481	4,718	8,462
2010 (6,725)	31,764	57,191	4,724	8,505
2011 (6,768)	31,495	56,995	4,648	8,417
2012 (6,818)	31,214	56,607	4,578	8,303
2013 (6,882)	31,648	57,211	4,595	8,313
Δ 2013 vs. 2011	0.193	0.246	-0.0	-0.04
% Δ 2013 vs. 2011	0.6%	0.8%	-1.1%	-1.2%

12
5

Statewide and regional indicators: Delay

Hours of delay per person remains steady statewide
2009 through 2013; Annual delay in hours:minutes

Urban areas	2009	2010	2011	2012	2013	% Δ 2011 vs. 2013
Puget Sound ¹ (King, Snohomish and Pierce counties)	7:26	8:19	8:23	8:03	8:23	0.0%
Spokane County	0:05	0:12	0:08	0:09	0:08	0.0%
Tri-Cities ² (Benton and Franklin counties)	0:21	0:36	0:35	0:32	0:12	-65.7%
Vancouver (Clark Co.)	0:38	0:22	0:23	0:22	0:17	-26.1%
Statewide	4:12	4:42	4:43	4:31	4:42	-0.4%

Estimated annual travel delay and cost of delay on state highways by urban area
2009 through 2012; Delay in hours; Cost of delay in millions in 2013 dollars

Urban area	2009	2010	2011 ¹	2012	2013	% Δ 2011 vs. 2013
Puget Sound (King, Snohomish and Pierce counties)	27,256,023	30,750,000	31,995,000	30,170,000	31,737,500	1.8%
Spokane (Spokane County)	39,000	97,500	66,000	77,000	70,000	7.7%
Tri-Cities (Benton and Franklin counties)	180,750	155,000	155,000	141,000	55,000	-64.5%
Vancouver (Clark County)	272,500	167,500	167,500	160,000	130,000	-22.4%
Other areas	450,727	485,000	417,500	351,500	457,500	9.6%
Statewide annual	28,085,000	31,645,000	31,970,000	30,900,000	32,450,000	1.5%
Annual cost of delay	\$742	\$837	\$845	\$817	\$858	1.5%

12
6

Statewide: Economic indicators

- Employment continued upward trend
- Taxable retail sales hit five year high in 2013
- Gas prices decreased 5.5% between 2011 and 2013
- Driving age population grew faster than overall state population

Indicator	2011	2013	%Δ	Trend
Driving age population (16 years and over, in millions)	5.37	5.48	2.0%	↑
Employment (millions of workers)	2.87	2.99	4.1%	↑
Unemployment rate	9.2%	7.0%	-2.2%	↓
Taxable retail sales ¹ (billions of dollars)	\$107.4	\$117.2	9.1%	↑
Gasoline price per gallon ² (dollars)	\$3.85	\$3.64	-5.5%	↓
Passenger vehicle registrations (millions)	4.34	4.44	2.2%	↑

Data source: Washington State Office of Financial Management, Washington State Employment Security Department, Washington Economic and Business Research Council, Washington State Department of Revenue, and U.S. Energy Information Administration. Note: 1. Adjusted for inflation and reported in 2013 dollars.

Corridor level: what's included

WSDOT collects real-time traffic data for 84 commute routes in urban areas throughout the state:

- Central Puget Sound area (52 routes) has 6,800 loop detectors along 235 centerline miles (1300 lane miles)
- South Puget Sound area (20 routes) has 128 data sensors along 77 centerline miles (270 lane miles)
- Vancouver area (8 routes) uses probe data to complement loop data
- Spokane area (4 routes) uses loop detector data from PeMS
- Tri-Cities area (in progress)

Other areas use data from a combination of data collection technologies such as probe data, Bluetooth, Wavetronix, Automated License Plate Reader to name a few...

Corridor level: Key takeaways

WSDOT analyzed 84 urban commute corridors on state highways that span 720 miles (excluding ferry routes): In 2013, these corridors had:

- 165 miles of **routinely congested segments**, resulting in 63 hours of congestion daily.
- 1,506 **transit** vehicles in service during peak periods; 570 had more than 90% utilization daily.
- 102,400 peak period **transit riders** along the commute corridors each weekday, helping **avoid** 1.03 million miles of solo vehicle travel and 873,000 pounds of **greenhouse gas** emissions daily.
- 162,000 **ferry vessel** sailings with an on-time performance of 95.6% and an annual ridership of 22.5 million.

Corridor Example: I-5

Annual banner metrics

- Miles traveled
- Delay
- GHG emissions

Daily measures

- Travel times
- Person throughput between SOV and HOV lanes
- Routinely congested segments
- Transit ridership, capacity and utilization
- Park and ride lot location, capacity and utilization

A glimpse of a year on the corridor

Annual person miles traveled 2011 vs. 2013: 2,472 vs. 2,472 (0.0% change)

Annual vehicle delay 2011 vs. 2013: 1,919 vs. 3,010 (57% increase)

Annual emissions 2011 vs. 2013: 2,068 vs. 2,018 (2.4% decrease)

Delay increases not evenly distributed along corridor

CHAR I-5

The birth of "Spiral Visualization"

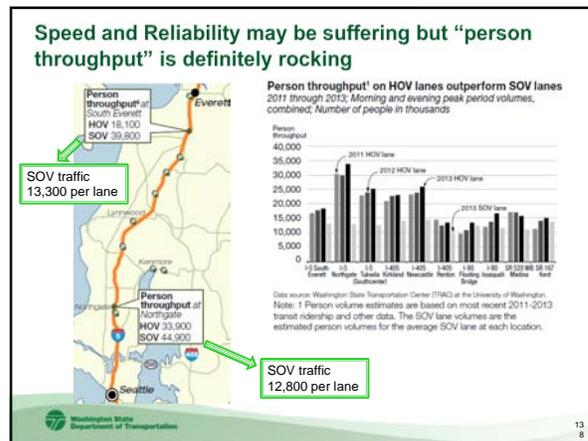
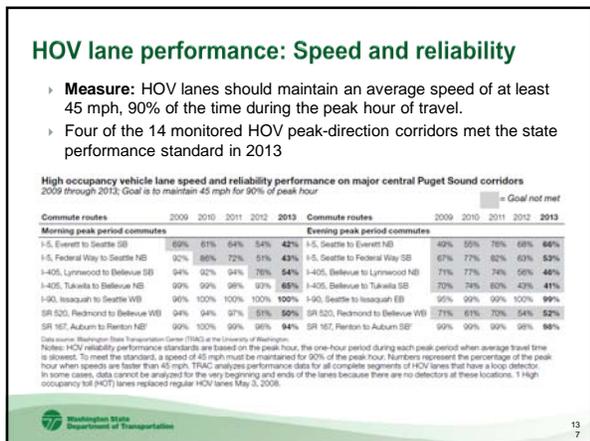
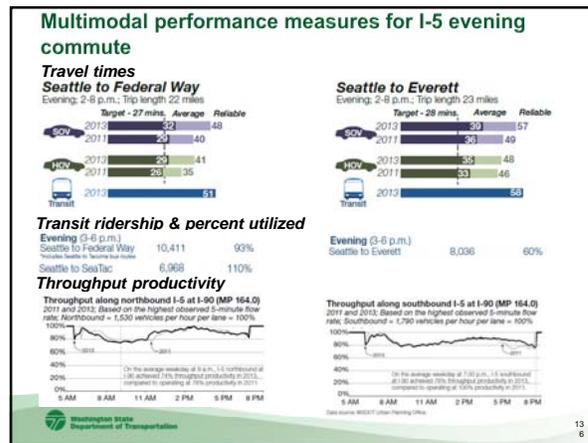
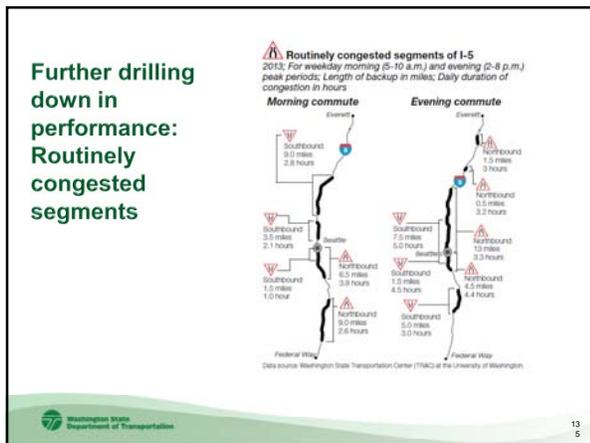
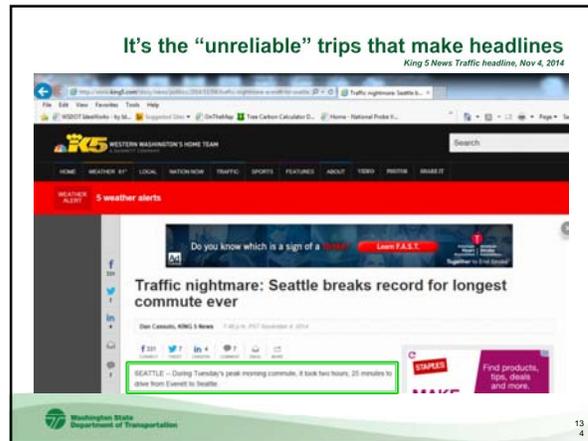
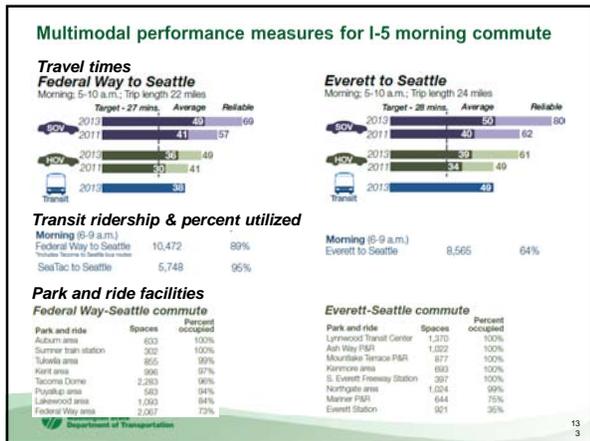
How to read a spiral graph

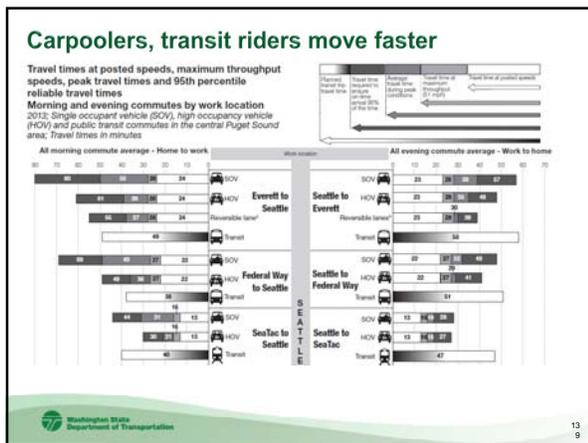
When and where was the most intense delay as measured by vehicle hours of delay? How does delay differ by direction of travel? What corridors experienced the most noticeable delay?

I-5 between Federal Way and Everett

Between 7 a.m. and 10 a.m., there was intense delay around the Seattle area. Evening delay peaked between 3:30 p.m. and 6:15 p.m. and was widespread along the entire northbound I-5 corridor.

Delay on I-5 southbound was more widespread during the morning but more pronounced during the evening commute. The most intense delay was southbound from Northgate to Seattle in the evening and lasted for about 3 hours.





- ### What other analysis do we do?
- › Marine highways
 - Ridership
 - Trip reliability
 - Fuel usage
 - Capacity/utilization
 - On-time performance
 - › Before and After project analysis
 - I-5 Active Traffic Management
 - SR 167 HOT lane evaluation
 - Capacity expansion project analysis
 - › Incident Response analysis
 - › Future federal and state reporting requirements
 - Moving Ahead for Progress in the 21st Century (MAP-21)
 - Results Washington
- Washington State Department of Transportation
- 14
9

- ### Next steps...
- › Expand partnerships
 - › Incorporating the data and analysis from the report as a tool for Practical Solutions training
 - › Develop interactive online tools for wider use of system performance data and measures
 - › Expand analysis to include Accessibility measures
 - › Expand analysis to National Highway System as defined in MAP-21
- ...many more ideas—but limited resources
- Washington State Department of Transportation
- 14
1

- ### We need your input
- › How can we make it better?
 - › How do we get it to the right people?
 - › What other applications should we think about?
 - › How can we expand partnerships?
- Washington State Department of Transportation
- 14
2

Resources

- WSDOT's Congestion Website: <http://www.wsdot.wa.gov/Accountability/Congestion/>
- WSDOT's Accountability Website: <http://www.wsdot.wa.gov/accountability/>
- Real Time Travel Times Website: <http://www.wsdot.wa.gov/traffic/seattle/traveltimes/>
- Plan Your Commute—95% Reliable Travel Times Website: <http://www.wsdot.wa.gov/traffic/seattle/95percentile.aspx/>
- WSDOT's quarterly performance report: the Gray Notebook <http://www.wsdot.wa.gov/Accountability/GrayNotebook/notebooksNB.htm>
- Performance Measurement at WSDOT, four page folio http://www.wsdot.wa.gov/NR/rdonlyres/91088378-E709-40EF-AE42-AE80BC44A91C/0/TRB_Performance_Folio.pdf
- WSDOT's Strategic Plan: <http://www.wsdot.wa.gov/Secretary/ResultsWSDOT.htm>
- Performance Journalism: http://www.wsdot.wa.gov/NR/rdonlyres/F0DE7328-BA3D-45A0-95DB-641A4CE32D78/0/2008_TRB_Performance_Journalism.pdf
- Making the Case for Funding: The WSDOT Experience (2008, Transportation Research Record) http://www.wsdot.wa.gov/NR/rdonlyres/ESD34838-6662-4464-B4BA-1E858BB07100/0/2007_TRB_Making_Case_Funding.pdf
- Maximizing Highway System Capacity: Measuring and Communicating System Performance in an Evolving Field—(2008, Transportation Research Forum) http://www.wsdot.wa.gov/NR/rdonlyres/5FF329ED-A940-4F8A-A738-6894DBE838D0/Maximizing_Highway_Capacity_PM_Finalvsr.pdf
- Moving Washington Website: <http://www.wsdot.wa.gov/movingwashington/>

Contact Info: Sreenath Gangula, P.E., PTOE
Lead Systems Analyst
Washington State Department of Transportation
Office of Strategic Assessment and Performance Analysis
360-705-6888 GangulaS@wsdot.wa.gov

Washington State Department of Transportation

14
3

Questions?

Washington State Department of Transportation

14
4

Thank you and
Goodbye



Next meeting:
March 2015 in Tumwater

145