

‘Moving Washington’

Capacity, Efficiency, Demand

WSDOT’s three-part strategy to relieve congestion

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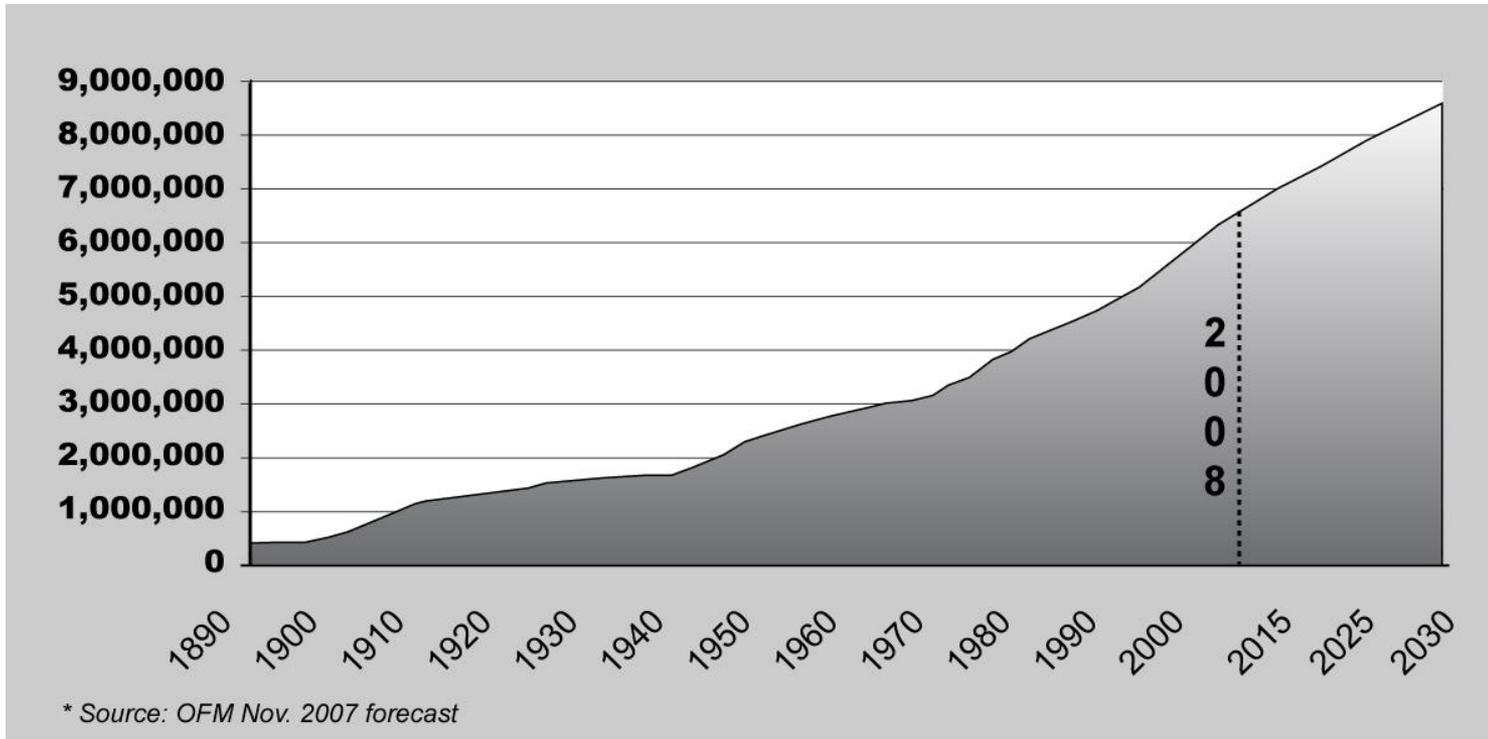
**Washington State
Department of Transportation**

Presentation Overview

- The bigger picture – Moving Washington
- Active Traffic Management
- First Projects

Washington State Population Growth*

Demand is increasing rapidly

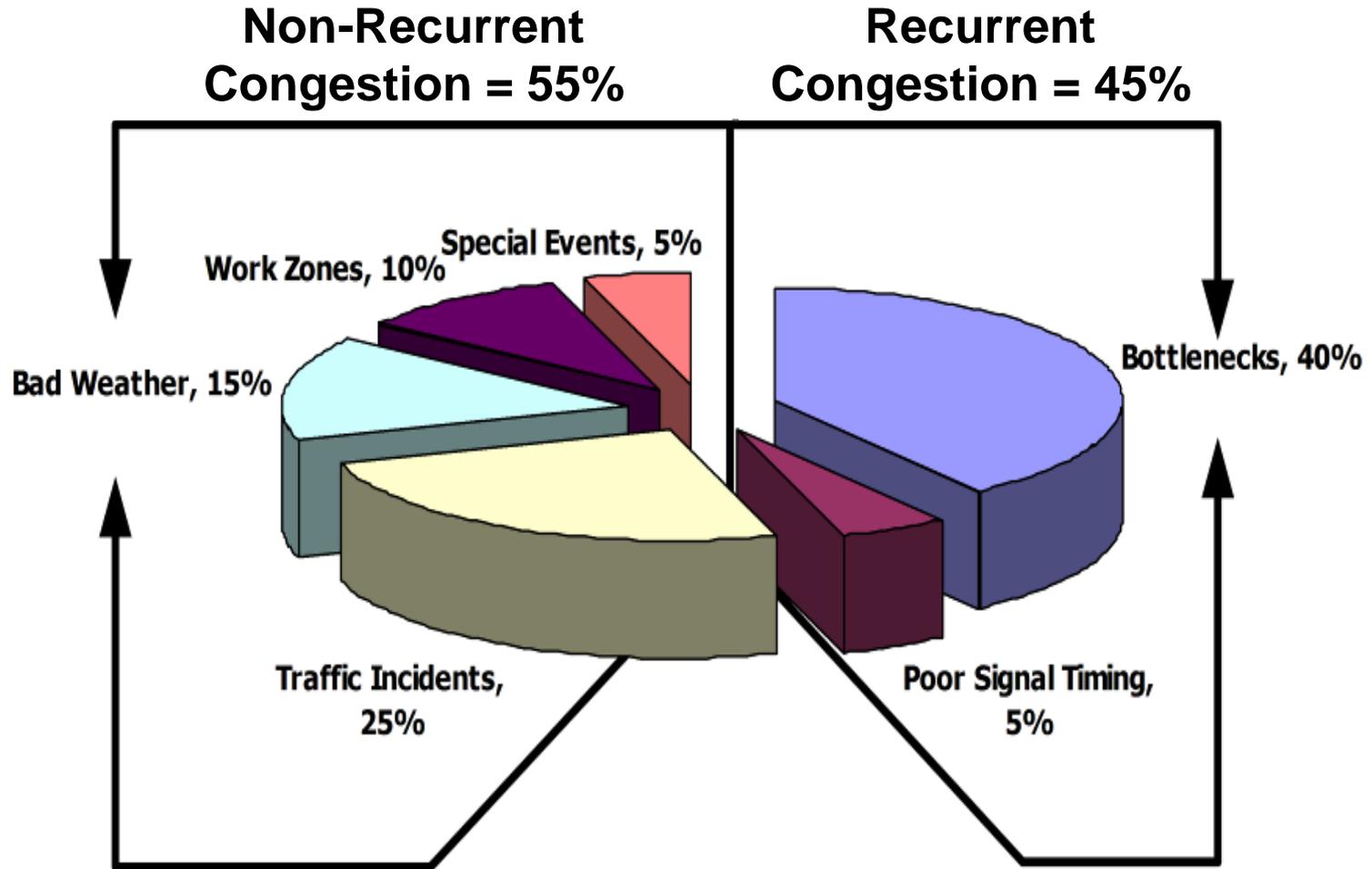


2 million more people
expected by 2030



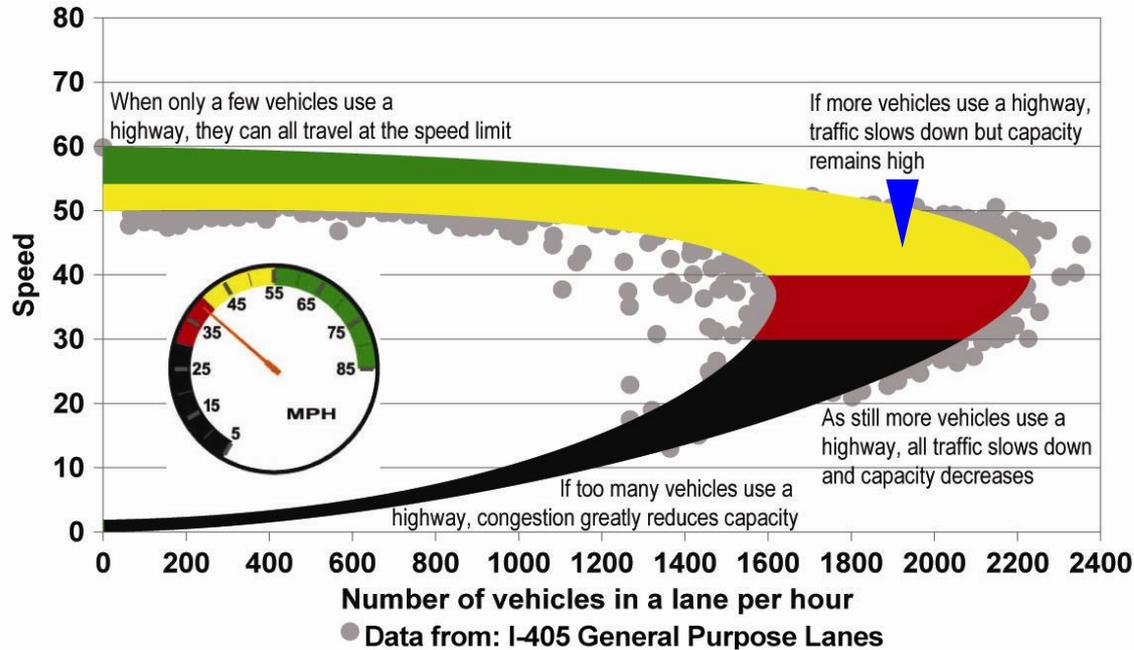
Causes of Congestion

It's more than bottlenecks

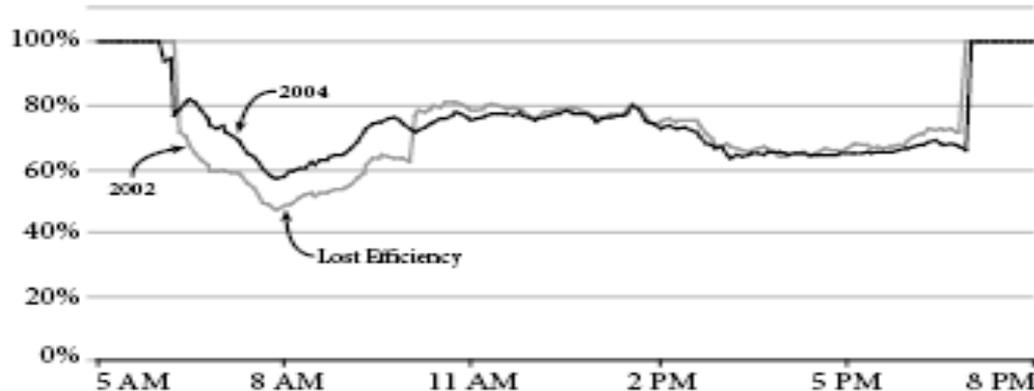


Maximizing Throughput

Making lanes more efficient



I-405 at SR 169 in Renton

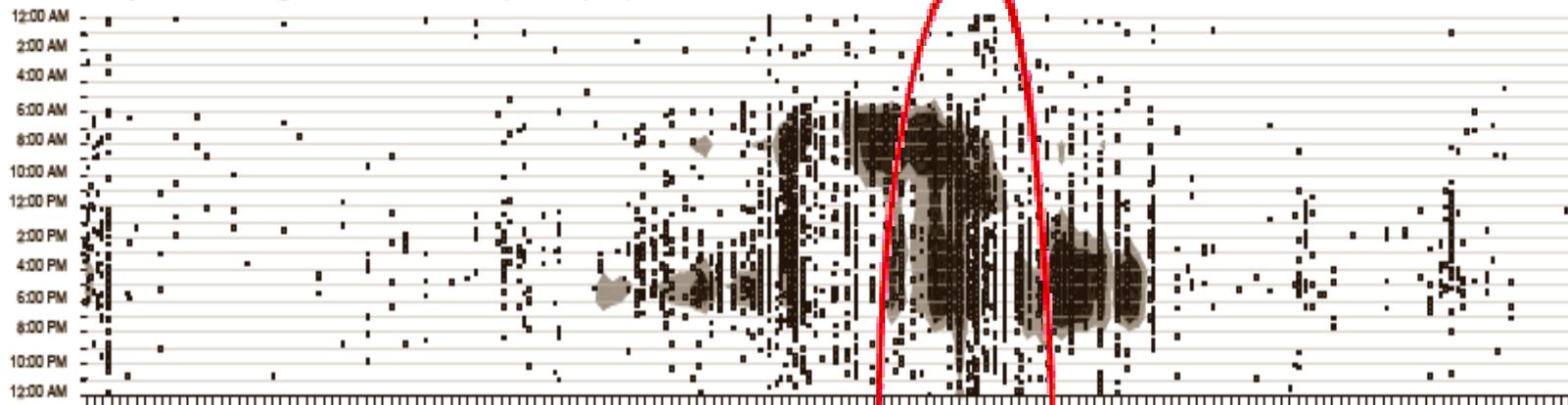


Lost Productivity
 Despite increased demand during rush-hour congestion, fewer vehicles move through each lane.

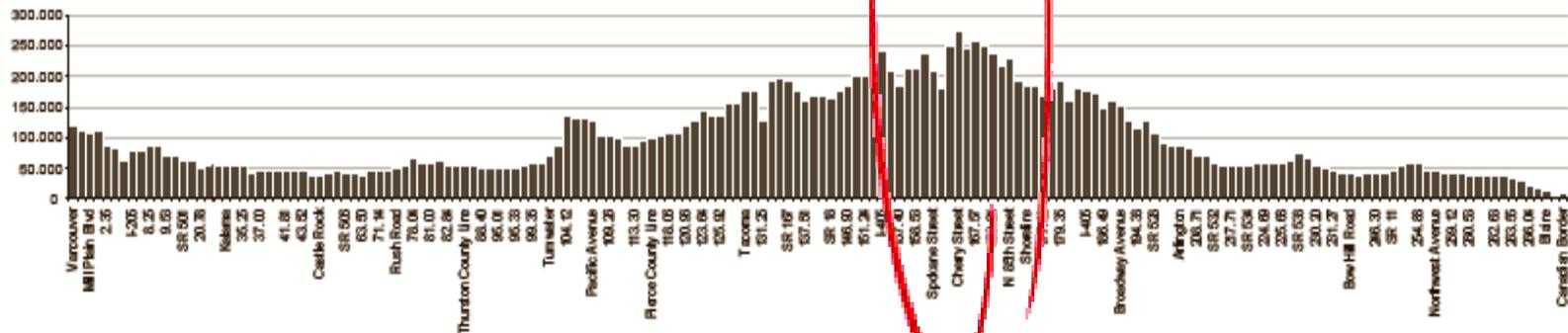
I-5 Collision and Congestion

Northbound Interstate 5: 2005 Rear End Collisions and Congestion Occurances

Collisions (squares) and Congestion (shaded areas) by Time of Day and Location



2005 Annual Average Daily Traffic, Hours of Delay by Milepost (correlates with graph above)



Estimated 2005 General Purpose Lane Performance

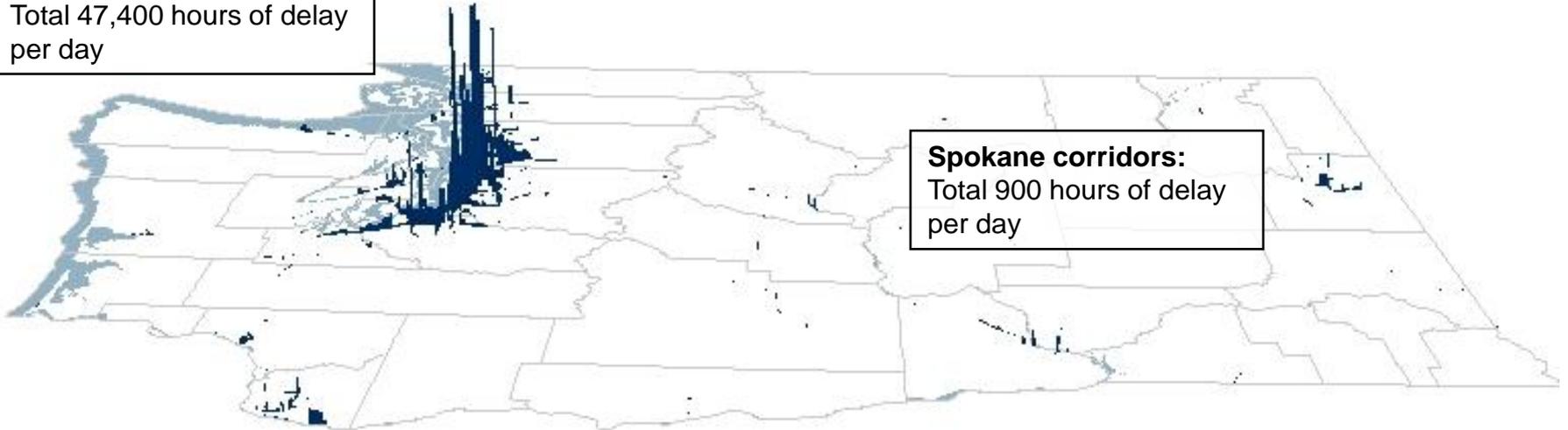
* Federal Law 49 U.S.C. Section 409 prohibits the discovery or admission into evidence of this data in Federal or State Court proceedings or consideration in any action for damages.

There's a lot more to be done...

Highway Congestion

Vehicle Hours of Delay per Day per Mile in Washington State

Puget Sound (King, Pierce, Snohomish):
Total 47,400 hours of delay per day



Spokane corridors:
Total 900 hours of delay per day

Vancouver corridors:
Total 1,300 hours of delay per day

- 370,000 vehicle hours (520,000 person hours) daily delay (2004)
- Chiefly affecting urban areas and especially the Puget Sound region

Moving Washington



✓ Congestion is a priority

Preservation, Safety, Mobility, Reliability and Stewardship are policy goals for Washington State. The success of WSDOT's congestion relief strategy depends on meeting each of the goals.

✓ Delivering on our commitment

WSDOT is delivering crucial transportation projects. With a clear road map for the future, we can meet growing travel demands.

✓ New tools, new challenges

WSDOT is studying transportation innovations around the world and working to implement technologies such as active traffic management to ease congestion today and sustain added capacity into the future.





Adding Capacity Strategically

Building is part of the solution

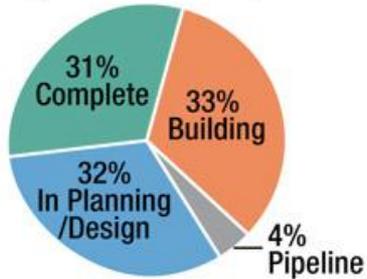
Project Delivery

The Nickel and TPA plans include 392 projects targeting safety, preservation and congestion relief.

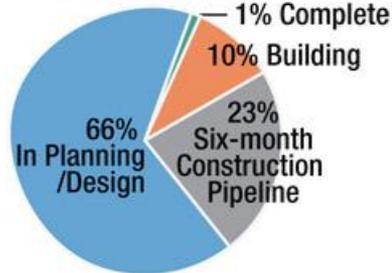


I-5 Everett HOV

2003 Nickel



2005 TPA



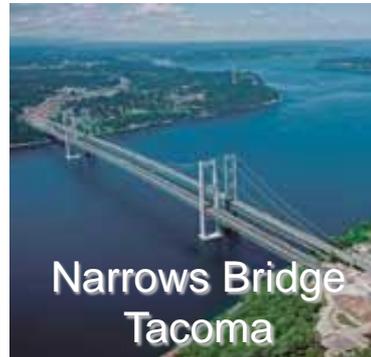
SR 518
Sea-Tac Airport



I-405 Kirkland



US 12
Walla Walla



Narrows Bridge
Tacoma



I-5 Tacoma HOV



US 395
North Spokane



Operating Efficiently

Getting the most out of the infrastructure we have

- **Intelligent Transportation Systems (ITS):**
135 ramp meters, real-time traveler information, 475 traffic cameras, 179 variable message boards, 7 traffic management centers.
- **Incident Response Teams:**
55 trucks responded to 52,877 incidents in 2007. Average clearing time dropped from 33 minutes in 2001 to 16 minutes in 2007.
- **Signal Timing:**
Signal optimization program monitors and adjusts 884 traffic signals to save drivers thousands of hours in yearly traffic delay.
- **High occupancy vehicle (HOV) lanes:**
200 miles of planned 300-mile HOV system complete.
- **High occupancy toll (HOT) lanes:**
Making HOV lanes more efficient.





Managing Demand

Providing people choices

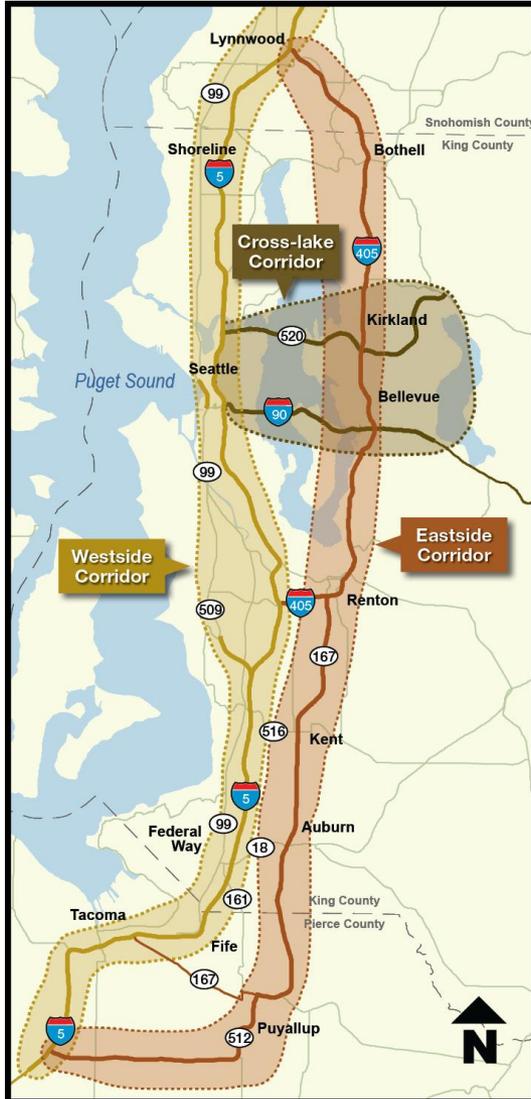
As the urban areas grow, so does demand and corresponding congestion. WSDOT works with multiple modes to manage demand.

- **Commuter Trip Reduction:** More than 1,100 worksites now participate in the program, reducing delay by 19%.
- **Transit options:** bus, light rail, commuter rail, providing 180 million transit trips annually.
- **Vanpools:** The largest vanpool program in the nation has increased 40% since 2003 with more than 2,200 vanpools and nearly 18,000 riders daily.
- **Planning with Cities and Towns:** Careful Land-use actions under the Growth Management Act connect transportation with development.
- **Park and Ride:** 300 lots statewide with more than 43,000 parking stalls
- **Bike lanes and pedestrian access**



Each corridor requires balanced solutions...

Major Corridor Strategies



Central Puget Sound



Spokane



Vancouver

Westside Corridor

Strategically Added Capacity

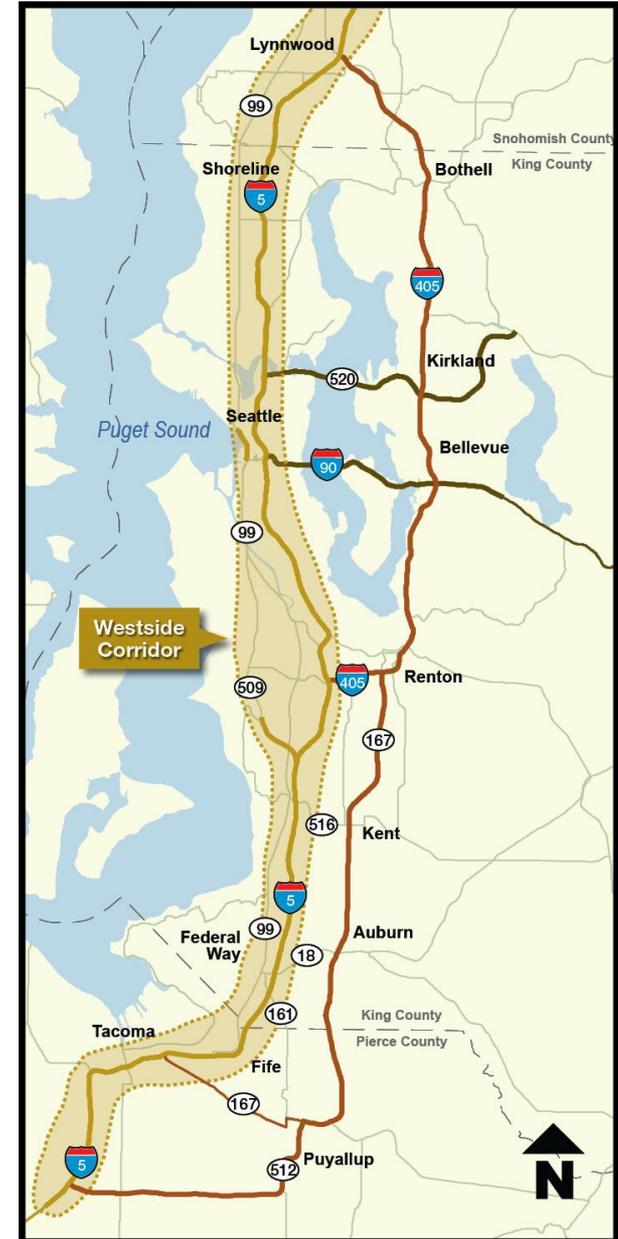
- I-5 HOV Lanes in Everett, Federal Way, Tacoma
- I-5 Shoreline auxiliary lane
- I-5 reconstruction projects
- SR 519 Phase II
- Alaskan Way Viaduct collaboration
- SR 518 third lane from Sea-Tac Airport
- I-5/SR 518/SR 161 interchange improvements

Operate Efficiently

- Ramp Metering / ITS
- Incident Response Teams
- Active Traffic Management

Manage Demand

- Commute Trip Reduction
- Vanpools
- Express Bus
- Sound Transit's Link
- Sound Transit's Sounder



Cross Lake Corridor



Strategically Added Capacity

- SR 520 Bridge Replacement
- I-90 R8A HOV Lane



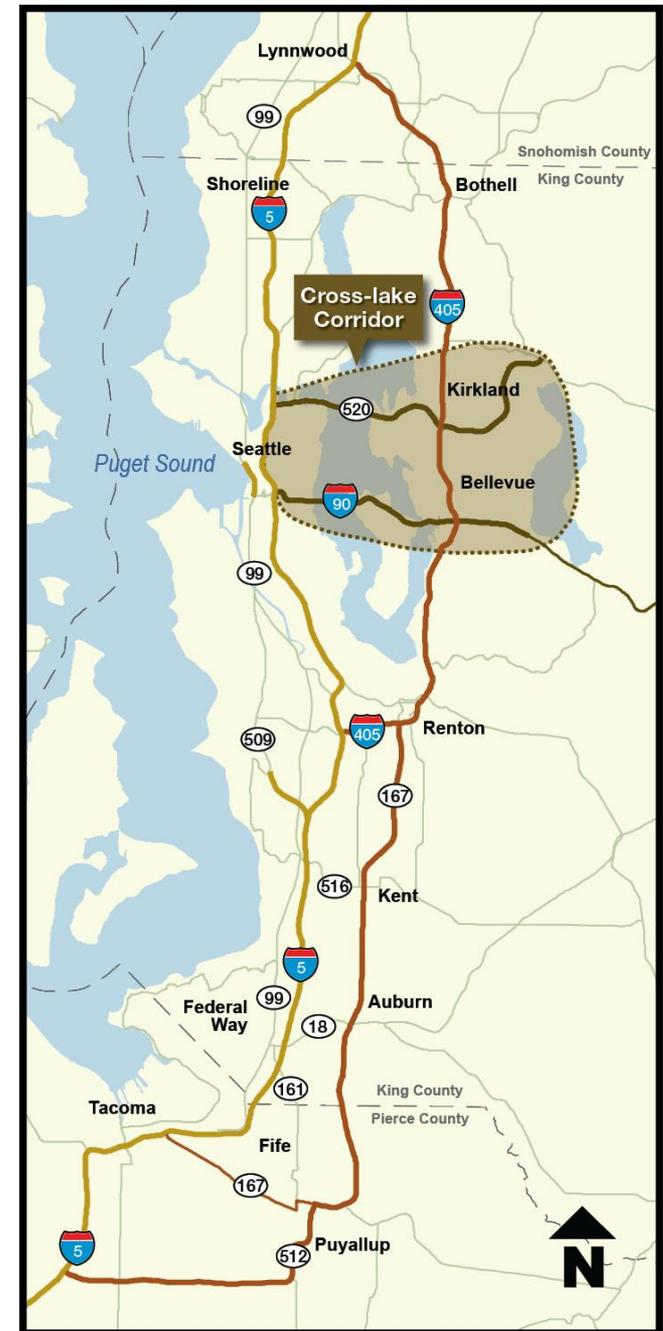
Operate Efficiently

- Ramp Metering / ITS
- Incident Response Teams
- Active Traffic Management



Manage Demand

- Commute Trip Reduction
- Vanpools
- Express Bus/Bus Rapid Transit
- Sound Transit Link station at UW
- Accommodate potential high capacity transit cross-lake
- SR 520 Urban Partnership Agreement - tolling, technology, transit, and telecommuting



Central Puget Sound Active Traffic Management Feasibility Study



**Washington State
Department of Transportation**

Active Traffic Management

New Technologies on the Horizon

- **Build off current ITS**
Active traffic management is the next generation of intelligent transportation system
- **Overhead gantries**
Variable speed limit and lane-control signs over each lane with message signs
- **Speed harmonization**
Maintain flow and reduce collision risk
- **Hard shoulder running**
Shoulders open as a travel lane during peak-hour traffic
- **Emergency refuge pull offs**
Keep traffic moving during stalls and collisions
- **Variable lane control**
Signals divert traffic away from trouble spots and improve emergency vehicle access
- **Travel time signs**
Allow for better reroute decisions by travelers



M42 Birmingham, England

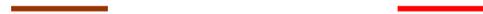


Gantry concept for WSDOT

Feasibility Study Purpose

Evaluation of major transportation corridors for best applications of active traffic management techniques observed in Europe to maximize capacity and increase safety of critical freeway corridors.

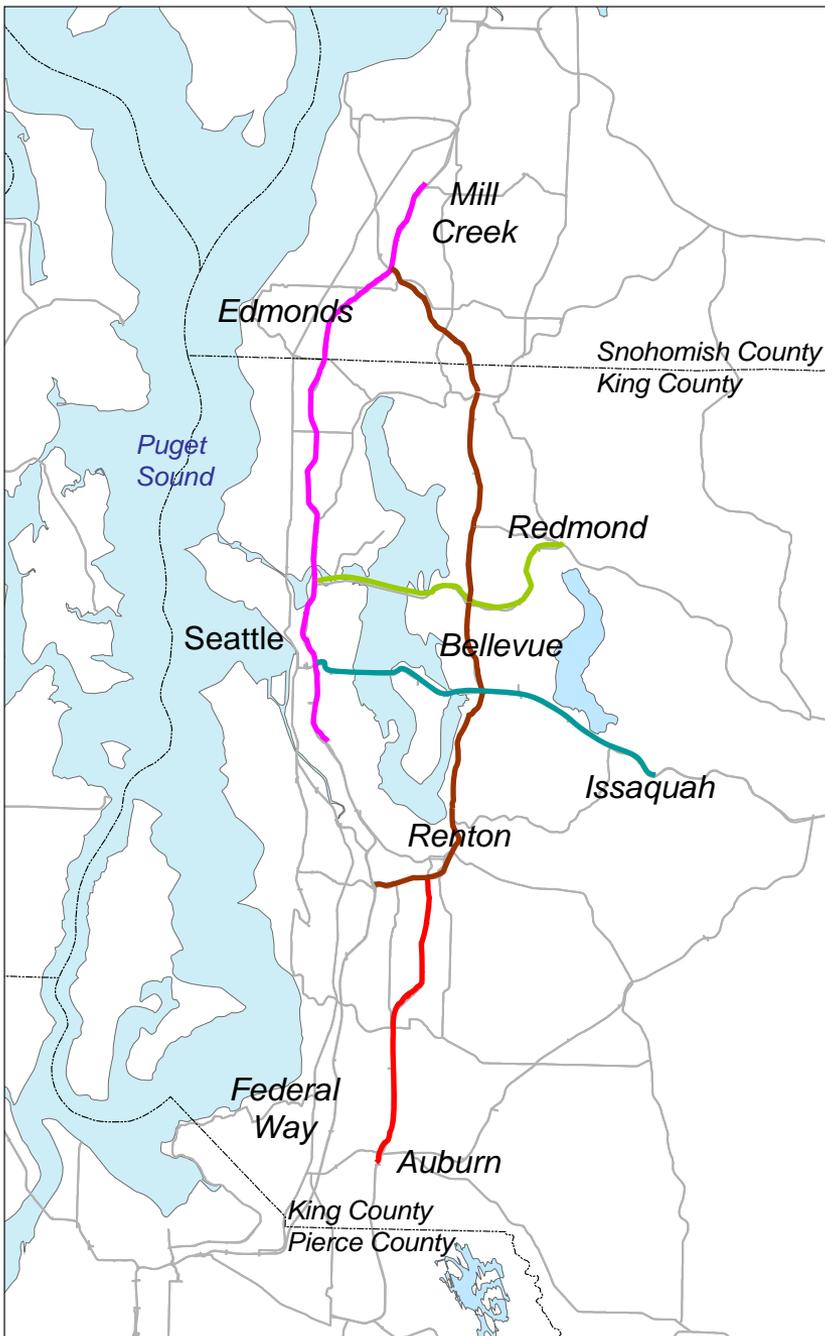
Interstate 405 / State Route 167 Corridor



Interstate 90 / State Route 520 Corridor



Interstate 5 / Alaskan Way Viaduct



Phase 1 - Qualitative Analysis

- Screened major corridors in the Puget Sound region for the application of Active Traffic Management techniques.
- Conducted peer workshop
- All corridors provided a number of opportunities to implement Active Traffic Management techniques
- Recommended I-405 from I-90 interchange to Sea-Tac airport for quantitative analysis.

Phase 2 – Quantitative Analysis

- Modeling and quantitative analysis
- Developed signing/design concepts for Speed Harmonization, Queue Warning, Junction Control, Hard Shoulder Running, Dynamic Re-Routing and Traveler Information
- Developed typical operations scenarios
- Preliminary conceptual cost estimates
- Assessed institutional and policy issues
- Assessed operational issues

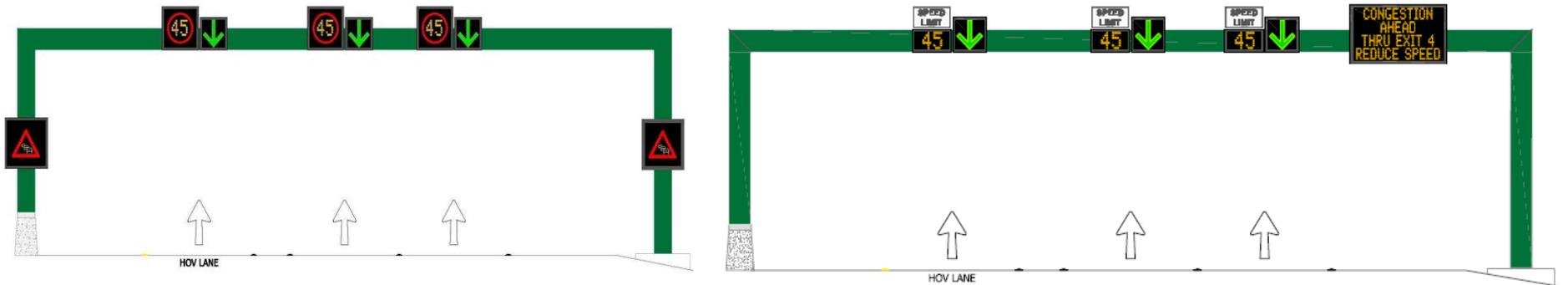
Key Study Findings

- Initial findings are positive, particularly regarding collision reduction.
- Coordinated system of location specific ATM techniques is key.
- Potential for implementation SR 520/I-90 (UPA grant), I-5/SR 99 Alaskan Way Viaduct, I-405
- Need to educate political decision makers, policy makers and the public

Phase 3 - Implementation

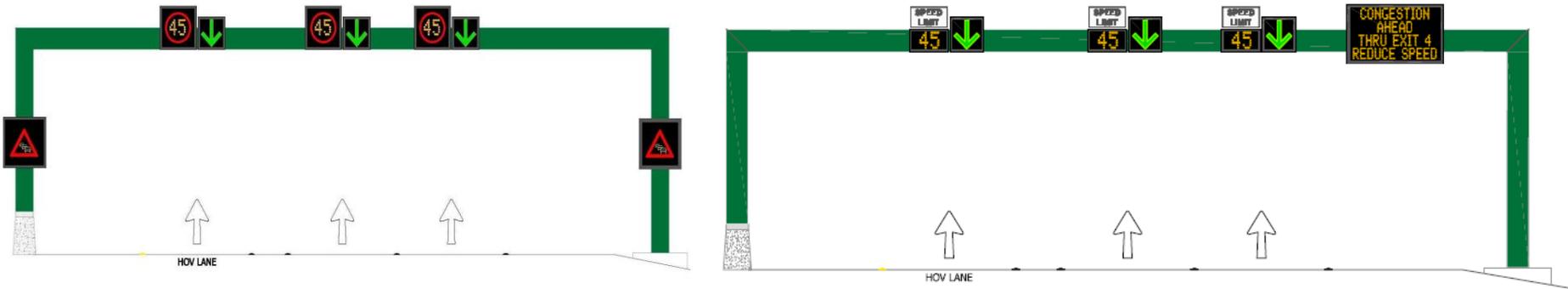
- Develop a Concept of Operations
- Update Regional ITS Architecture to include ATM components
- Incorporate ATM in to State and Regional Plans
- Work with Project Teams to develop conceptual design on I-5, SR 520, I-90, and I-405
- Complete conceptual cost estimates
- Develop implementation plan(s)

Speed Harmonization



Dynamically and automatically reduce the speed limits approaching areas of congestion, collisions, or special events.

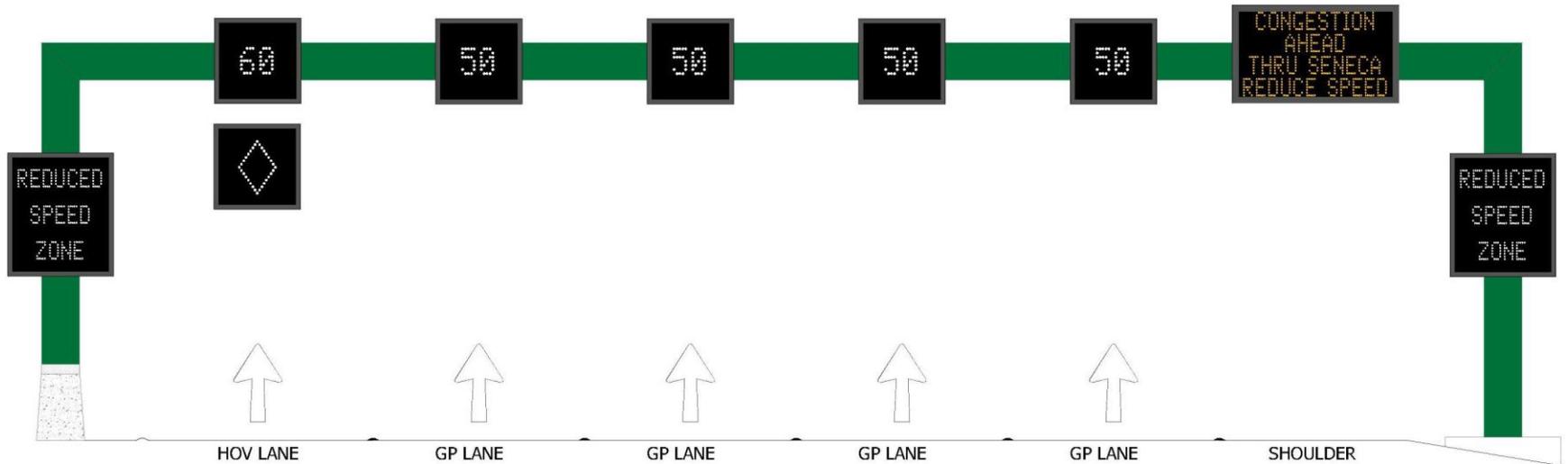
Speed Harmonization



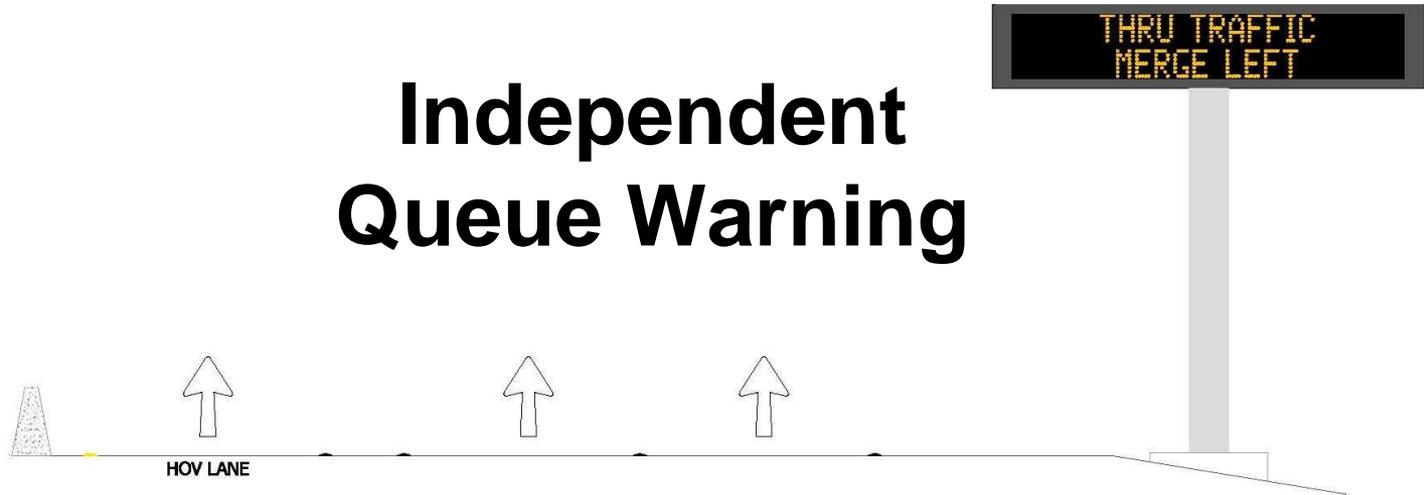
- Potential Savings: \$13 million/year
- Conceptual Planning-Level Cost Estimate:
 - \$12 to \$56 million depending on design concept
 - \$464,000 annual operations and maintenance costs

Concept of Operations

Speed Harmonization System Conceptual Sign Placement & Sizing

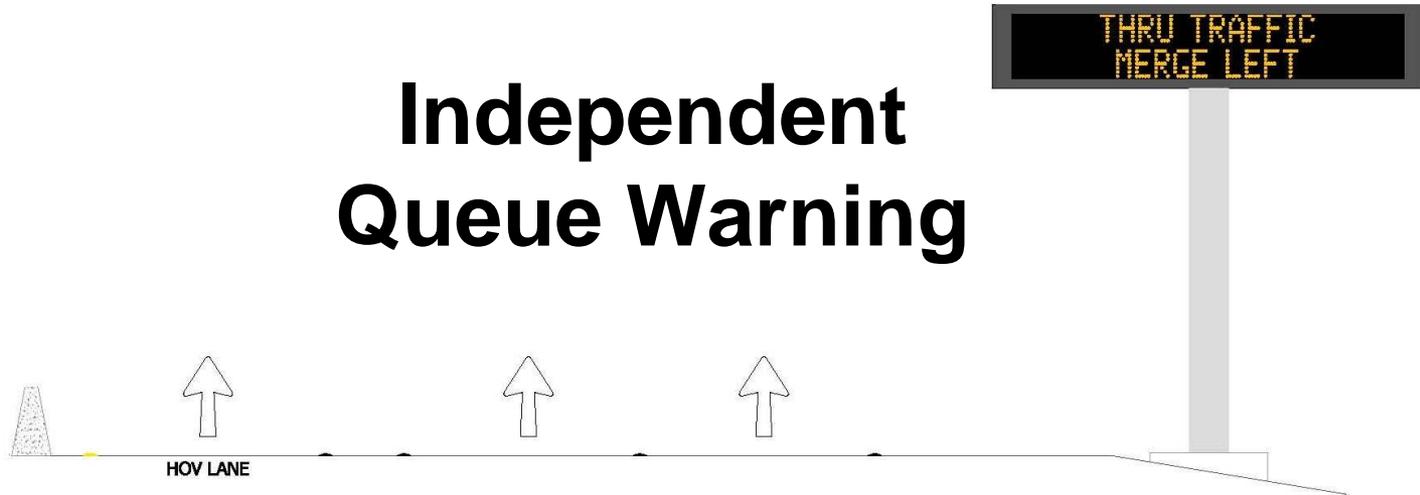


Independent Queue Warning



Warn motorists of downstream queues and direct traffic through alternate lanes.

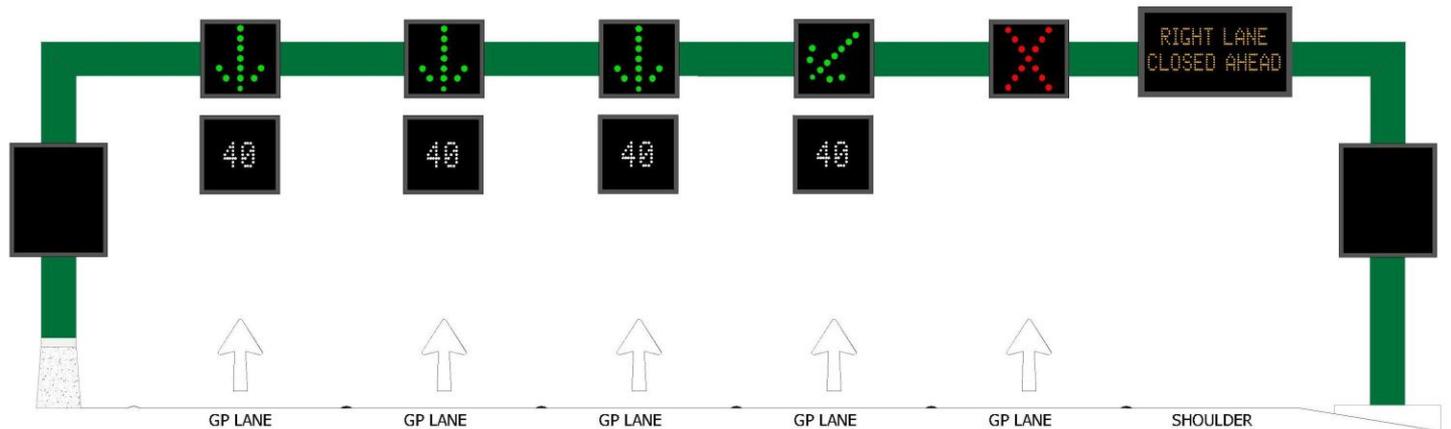
Independent Queue Warning



- 110 hours of reduced delay
- Collision Reduction
 - Primary collisions - 15 to 25 percent (assumed 15)
 - 21 fewer collisions per 3 year period.
- Potential Savings
 - Collision Avoidance = \$392,000/yr
 - Collision Delay = \$8,900/yr
 - Congestion Delay = \$128,000/yr
- Conceptual Planning-Level Cost Estimate:
 - \$0.5 to \$1.5 million depending on design concept
 - annual operations and maintenance costs would be inclusive in speed harmonization estimate if implemented together

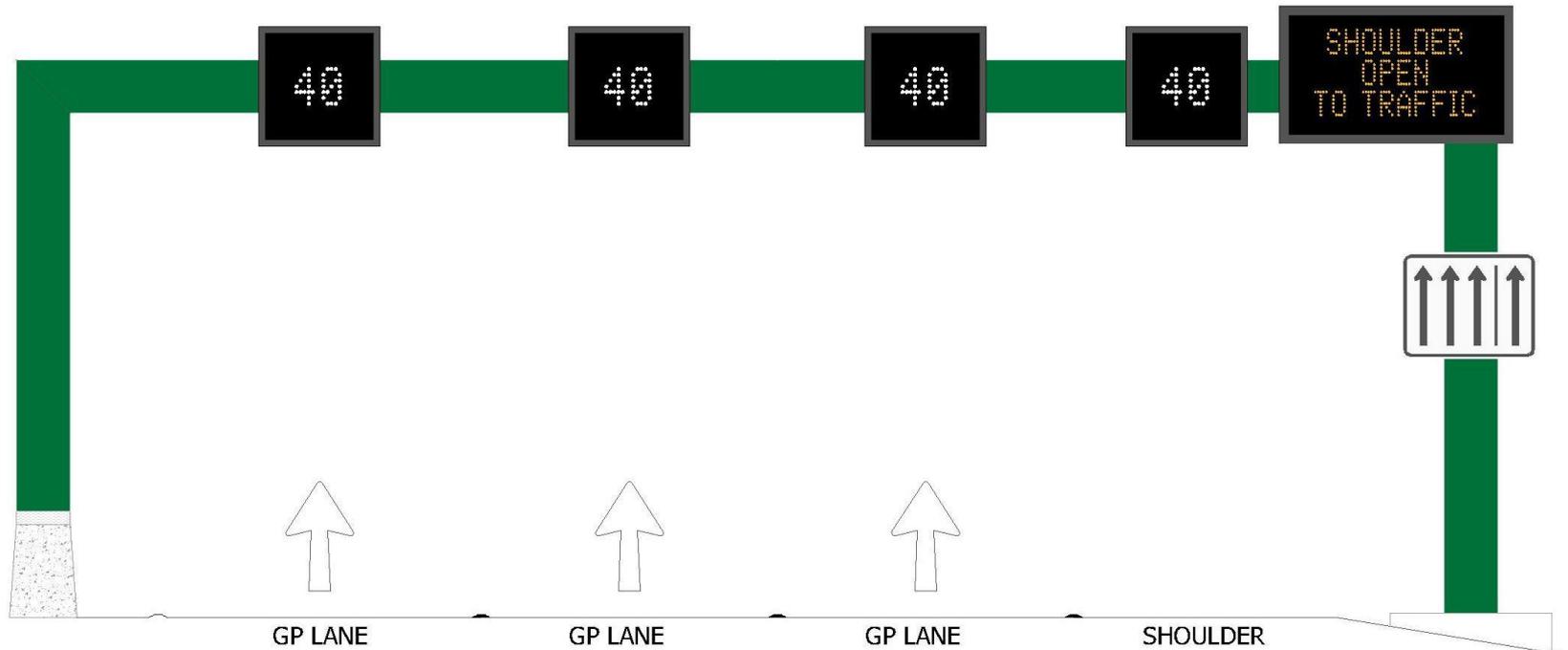
Speed Harmonization

Includes Lane Control and Queue Warning



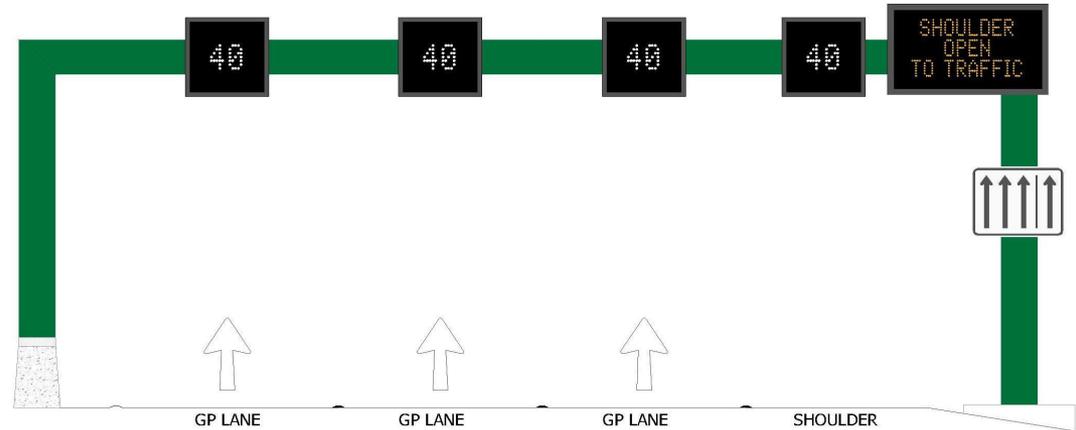
- Dynamically and automatically reduce speed limits approaching areas of congestion, collisions, or special events.
- Warn motorists of downstream queues
- Display which lanes are open, closed, and closed ahead.

Hard Shoulder Running



Use the shoulder as a travel lane during congested periods or to allow traffic to move around an incident.

Hard Shoulder Running

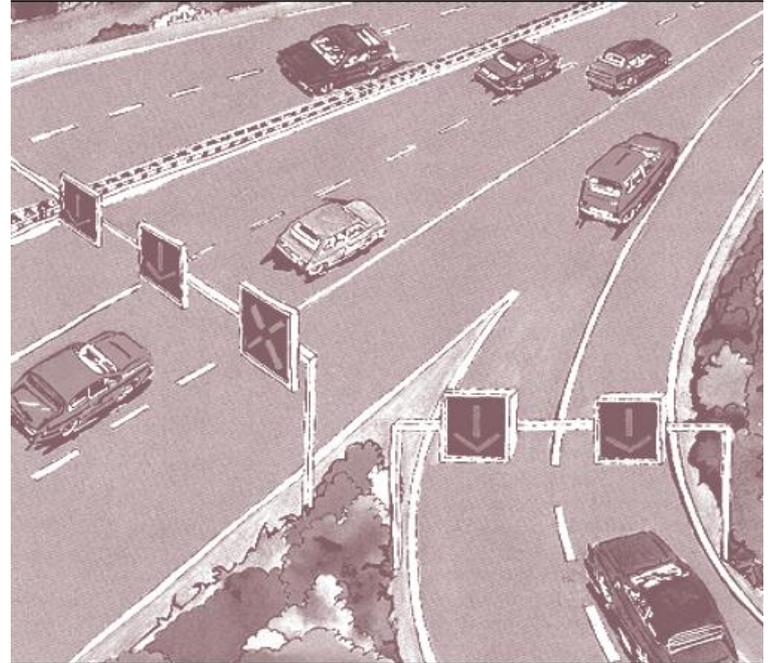


- Location of shoulder running segment must extend beyond roadway bottleneck
- Benefits – clear increase in capacity and decrease in congestion
- Implement as a first phase of a long-term improvement project/strategy
- Preliminary capital cost estimate of \$2.7M per mile
- Operations and maintenance costs will vary by location and implementation with other ATM techniques

Junction Control

Benefits – effectively utilize available roadway capacity and manage traffic flows to reduce congestion.

ATM Feasibility Study –
Developed two different signing/design concepts.



Junction control schematic in Germany, Active Traffic Management: The Next Step in Congestion Management, FHWA, AASHTO, NCHRP, March 2007.

Junction Control

- Collision Reduction – assumed to decrease primary collisions by 15 to 25 percent. Assumed a range of 20 to 25 percent, resulting in the potential for 12 to 15 fewer collisions per 3 year period.
- Potential Savings:
 - Collision Avoidance = \$181,000 to 264,000/yr
- Conceptual Planning-Level Cost Estimate:
 - \$1.5 million

Active Traffic Management Techniques Planned in Seattle

- Speed harmonization with lane control and queue warning
- Dedicated travel time signs
- Hard shoulder running



M 42 Speed Harmonization and hard shoulder lane in England. (UK Highways Agency)

Traveler Information



SCENARIO 4
I-405 CONGESTION
RENTON/FACTORIA CORRIDOR



SCENARIO 2 or 3
I-5 CONGESTION
THROUGH SEATTLE

- WSDOT currently provides travel times via variable message signs
- Additional locations would be beneficial
- Special purpose signs more cost effective
- \$0.7M per location for two sign concept
- \$43,000 in annual operations and maintenance costs



ATM on Interstate 90

ATM technology could help manage projected traffic increases on I-90.

By the end of 2008:

Variable speed limits posted on road-side electronic signs to smooth traffic flow and reduce collisions in the westbound lanes of I-90 from I-5 to I-405.

The Lake Washington Urban Partnership could help bring more advanced ATM technology to the I-90 corridor.

By late 2009:

Gantries display real-time traffic information and variable lane speed over each lane in both directions to further smooth traffic flows, help drivers make better decision in the commute and reduce collisions.



Variable speed gantry in Rotterdam, The Netherlands

The Lake Washington Urban Partnership



- Part of USDOT initiative to reduce congestion in five geographic regions across the country through implementing the “Four T’s”
 - Seattle/King County area
 - San Francisco
 - Minneapolis
 - Miami
 - New York City Los Angeles/Chicago

- The “Four T’s”
 - Tolling
 - Technology and Traffic Management
 - Transit
 - Telecommuting

- WSDOT, PSRC and King County are partnering to implement comprehensive congestion reduction strategies



Bridge to the future

Using the right tools at the right time:

Tolling

- Electronic tolling to help fund replacement SR 520 bridge and corridor improvements.

Technology and Traffic Management

- Toll rates that vary by time of day to manage demand.
- ATM - Variable lane speed and message signs smooth traffic flow and help commuters make better choices.

Transit

- Expanded transit service along the 520 corridor to reduce auto trips and provide toll-free travel options.

Telecommuting

- Continued investment in choices for reducing work commute trips.

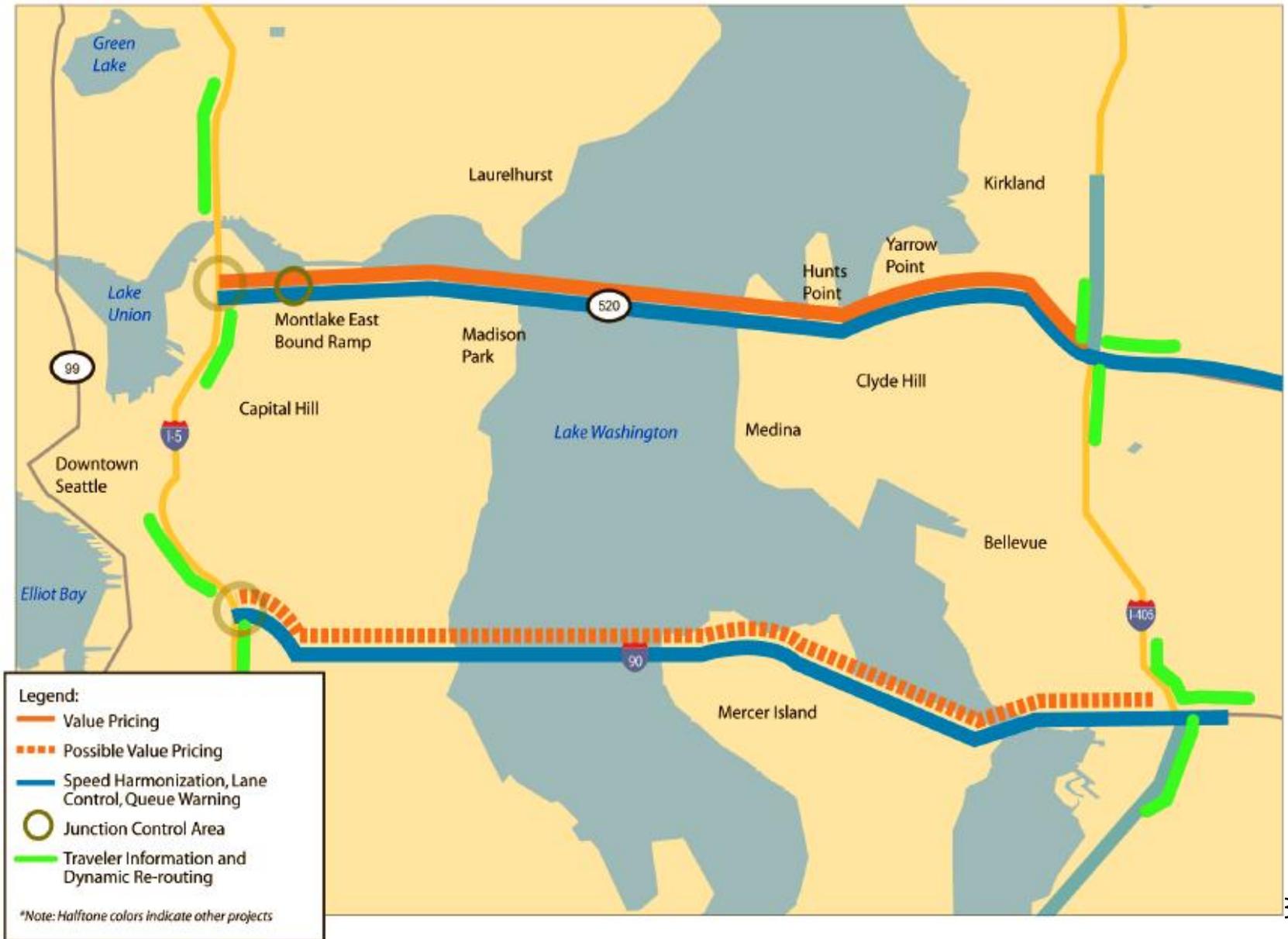


Tolling on SR 520 circa 1972



An artist's rendering of electronic tolling on the SR 520 bridge in 2009

Tolling & Technology Opportunities—

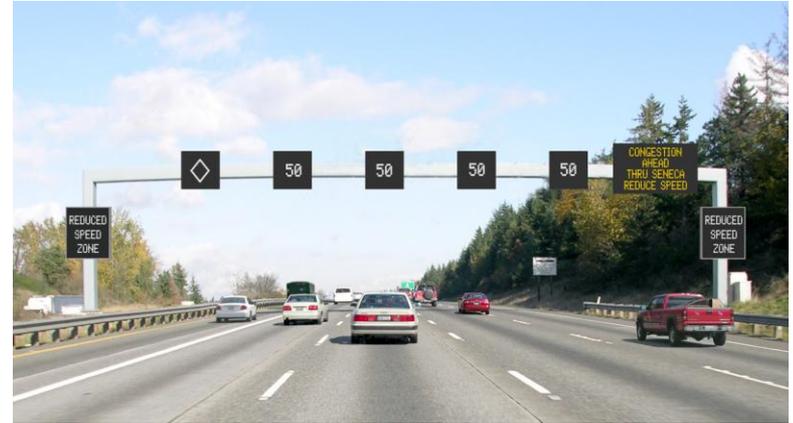




A smarter Interstate 5

ATM can better equip I-5 for anticipated volume increases

- Gantries over the highway display real-time commuter information, such as lane closures, traffic incidents ahead and dynamic rerouting options.
- Variable speed limits displayed over each lane control traffic speed to match changing conditions. Traffic flows more smoothly
- The system could substantially reduce traffic collisions, which currently account for 25% of congestion.



Artist rendering of ATM on I-5



Similar project in Birmingham, England

- **For More Information**

- Additional information on Active Traffic Management can be found in the July 2007, FHWA/AASHTO report titled *Active Traffic Management: The Next Step in Congestion Management*.

- **Local Contacts:**

Craig Stone, P.E.

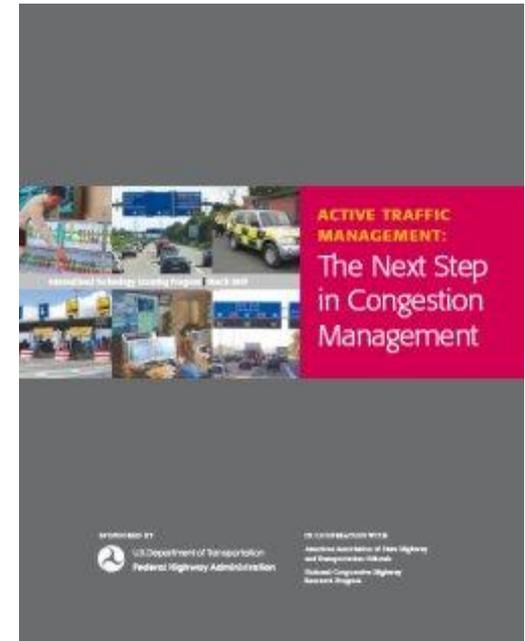
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