Synergies Among Congestion Pricing, Active Transportation and Demand Management (ATDM), and Other Market-Based Strategies

- **Audio:**
  - Via Computer - No action needed
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- **Presentations by:**
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  - Bob Sheehan, USDOT ITS Joint Program Office, robert.sheehan@dot.gov
  - Brian Kary, Minnesota Department of Transportation, brian.kary@state.mn.us
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- **Audience Q&A** – addressed after each presentation, please type your questions into the chat area on the right side of the screen

- **Closed captioning is available at:**
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- **Recordings and Materials from Previous Webinars:**
  - http://www.fhwa.dot.gov/ipd/revenue/road_pricing/resources/webinars/congestion_pricing_2011.htm

Synergies Among Congestion Pricing, ATDM, and Other Market-Based Strategies

Angela Jacobs
FHWA Value Pricing Program
February 24, 2015

U.S. Department of Transportation
Federal Highway Administration

Synergies Among Congestion Pricing, ATDM, and Other Market-Based Strategies

- Through technological advances, we have witnessed an evolution in innovative solutions designed to alleviate congestion
- Priced Managed Lane corridors have utilized dynamic pricing as a congestion reduction strategy
- UPA/CRD programs encouraged the use of combined strategies with the “4 Ts”
- ICM and ATDM strategies further optimize congestion management efforts
- Webinar presenters will focus on the synergies among these complementary strategies

Active Demand Management - Definition

Complement to:

- Active Traffic Management
- Active Parking Management

FHWA:

Active Demand Management (ADM) uses information and technology to dynamically manage demand, which could include *redistributing* travel to less congested times of day or routes, or *reducing* overall vehicle trips by influencing a mode choice.

Active Demand Management - Strategies

- Dynamically managed lanes (occupancy, price. etc.)
- Shared use mobility (e.g., carshare, bikeshare)
- Dynamic ridesharing (carpooling and vanpooling)
- Dynamic routing
- Dynamic transit capacity assignment
- On-demand transit, dynamic fare reduction
- Transit connection protection
- Predictive traveler information

Synergies Among Congestion Pricing, ATDM, and Other Market-Based Strategies

- Robert Sheehan, USDOT ITS Joint Program Office – Integrated Corridor Management
- Brian Kary, Minnesota DOT – ATDM and Congestion Pricing in Minnesota
- Tyler Patterson, Washington State DOT – A Case Study of SR 167 HOT Lanes Access Changes

Integrated Corridor Management

Bob Sheehan

ITS Multimodal Research Program Manager,
ITS Joint Program Office

U.S. DOT

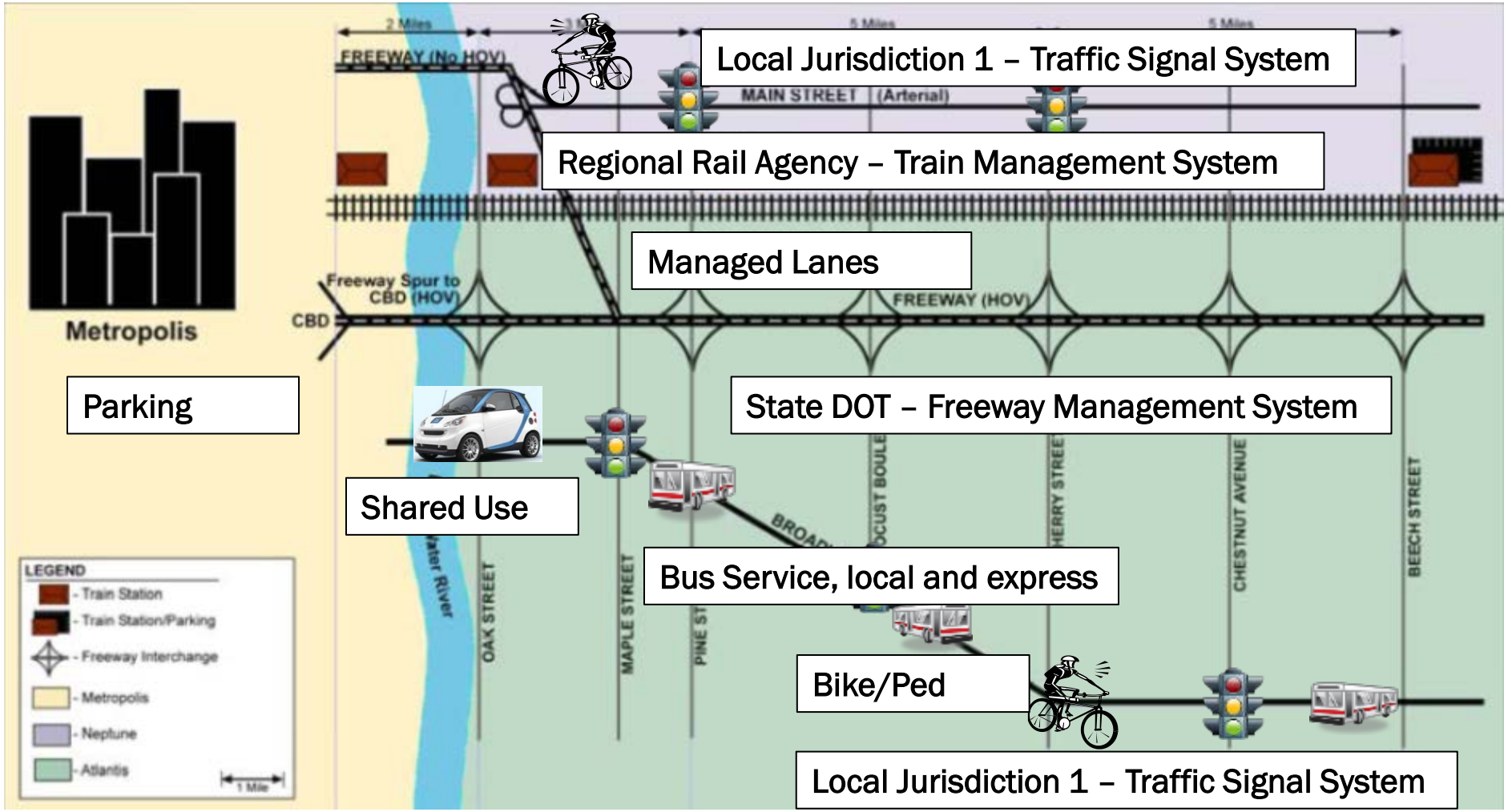
The Reality: Operations Today

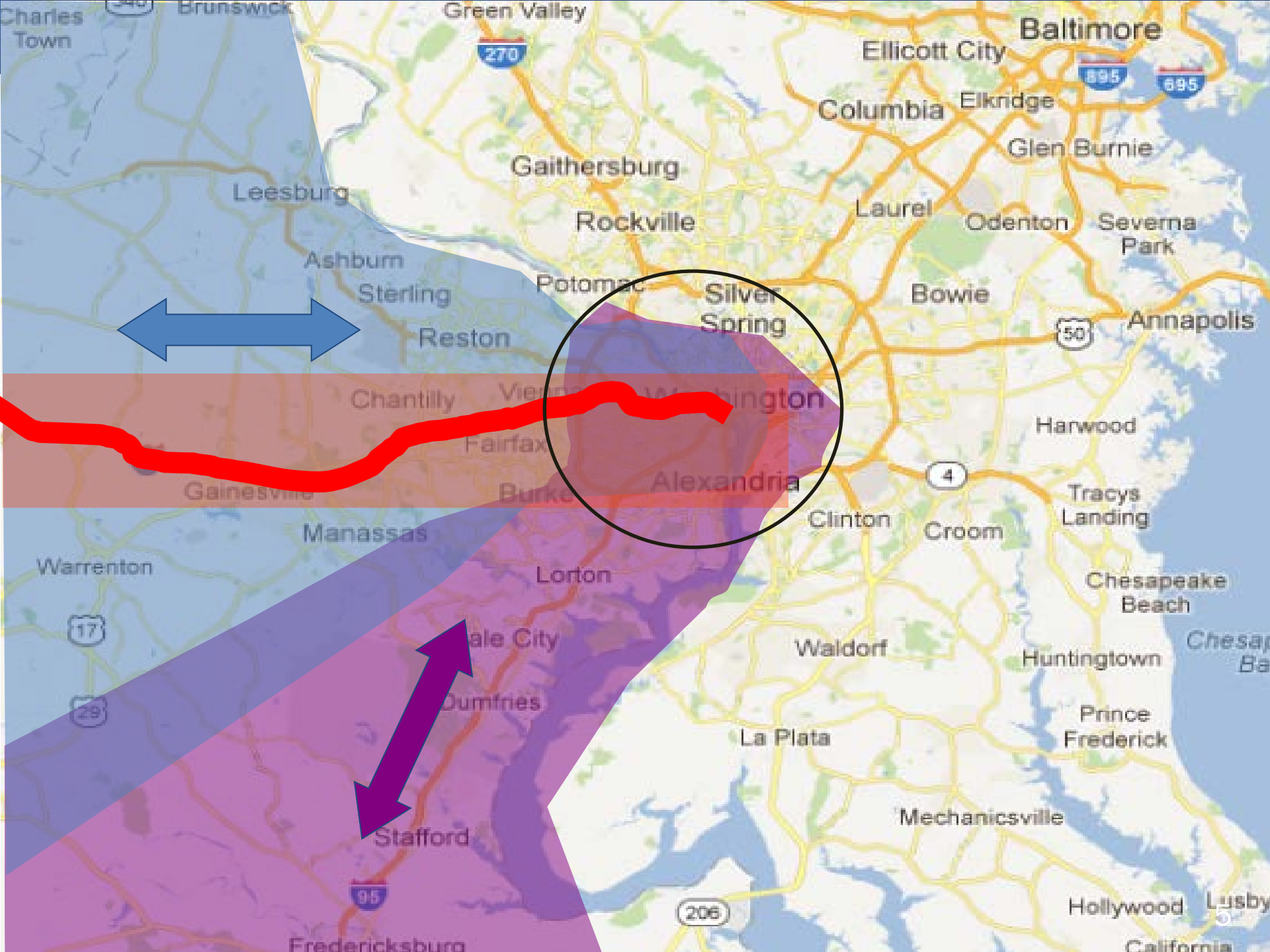
- Surface transportation systems are made up of several independent networks
  - Freeways, bus/rail transit, arterials, etc.
- Most efforts to reduce congestion have focused on optimization of individual networks
  - Agency/facility/mode – specific ITS systems & strategies
- Minimal cross-network management in response to increased demand / reduction in demand

ICM Vision

- An opportunity exists to realize significant improvements in the efficient movement of people and goods through integrated and proactive management of major multimodal transportation corridors.

Generic Corridor




Charles Town
Brunswick
Green Valley
270
Baltimore
Ellicott City
895
695
Columbia
Elkridge
Glen Burnie
Gaithersburg
Leesburg
Rockville
Laurel
Odenton
Severna Park
Ashburn
Sterling
Potomac
Silver Spring
Bowie
Annapolis
50
Reston
Chantilly
Fairfax
Alexandria
Harwood
4
Tracys Landing
Clinton
Croom
Manassas
Warrenton
Lorton
Chesapeake Beach
17
Waldorf
Huntingtown
29
Prince Frederick
La Plata
Mechanicsville
Stafford
95
206
Hollywood
Fredericksburg

Integration

Institutional Integration

Coordination to collaboration between various agencies and jurisdictions that transcends institutional boundaries.

Operational Integration

Multi-agency and cross-network operational strategies to manage the total capacity and demand of the corridor.

Technical Integration

Sharing and distribution of information, and system operations and control functions to support the immediate analysis and response.

ICM Operational Approaches

A. Information Sharing / Distribution
B. Improve Operational Efficiency at Network Junctions
C. Accommodate (Passive) / Promote (Active) Cross Network Route and Modal Shifts
D. Modify Capacity, Short Term – Demand Relationship Within Corridor
E. Modify Capacity, Long Term – Demand Relationship Within Corridor

Approach D: Manage Capacity-Demand Relationship Within Corridor in “Real-time”/Short-Term

1. Capacity Oriented
   - i. Lane use control (reversible lanes / contra-flow).
   - ii. Convert regular lanes to “transit-only” or “emergency-only.”
   - iii. Add transit capacity by adjusting headways and # of vehicles.
   - iv. Add transit capacity by adding temporary new service
   - v. Add capacity at parking lots (temporary lots)..
   - vi. Increase roadway capacity by opening HOV/ HOT lanes/ shoulders.
   - vii. Modify HOV restrictions
   - viii. Restrict ramp access (metering rates, closures).
   - ix. Convert regular lanes to “truck-only.”
   - x. Coordinate scheduled maintenance and construction

Approach D: Manage Capacity-Demand Relationship Within Corridor in "Real-time"/Short-Term

2. Demand Oriented
   - i. Variable speed limits (based on Demand, Time of Day, construction, weather conditions).
   - **ii. Modify toll / HOT pricing.**
   - **iii. Modify transit fares to encourage ridership.**
   - **iv. Modify parking fees.**
   - v. Variable truck restrictions (lane, speed, network, time of day).
   - vi. Restrict / Reroute Commercial Traffic
   - **vii. Incentives**

KEY: Implemented at a corridor-level, multi-jurisdictional, multi-modal fashion

Stakeholders

Who's here today?

Who's missing?

- Roadway Agencies
- Planning Organizations
- Private Sector
- Transit Agencies
- Activity Centers
- Fleet Operations
- Public Safety
- Other agency departments
- **Traveler**

ICM and Pricing

- Pricing to influence demand
- Incentives to influence demand
- Options
  - Modify toll / HOT pricing.
  - Modify transit fares to encourage ridership.
  - Modify parking fees.
  - Incentives

Opportunities for integration

- As part of an integrated approach, travelers would be given more complete information regarding their decision to pay for use of a managed lane vs. other options
- These lanes could enhance the capabilities of ICM strategies by providing options that are already programmed and signed by regional agencies.

Challenges to Integration

- Agencies implementing managed lanes using congestion pricing typically have a primary objective of providing a “congestion-free” option for travelers who are willing to pay.
- Operators seek to provide a driving experience that **customers** perceive to be more valuable than the toll paid.
- Ensuring travel time reliability is an important element in providing the managed lane driver with this experience, especially when compared to uncertain travel times in general purpose lanes.

Challenges to Integration, cont.

- Pricing is a powerful tool to influence demand
- The decision to alter pricing for a **corridor objective** cannot be taken lightly.
- Example: Priced facility with considerable transit service; Objective of the corridor is based on PMT and Person Delay; Major incident on general purpose lanes!!; Managed lanes will be priced to maintain maximum flow (assuming no cap);

  What about the corridor objective? Should the restriction on the managed lanes be lifted? How does that affect the managed lane customer? How does that affect transit reliability and captured riders? Choice riders?

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Learn More

- Sign up for the ICM newsletter – anna.l.giragosian@leidos.com

- Visit the ICM website and bookmark the Knowledgebase - http://www.its.dot.gov/icms/

ATDM and Congestion Pricing in Minnesota

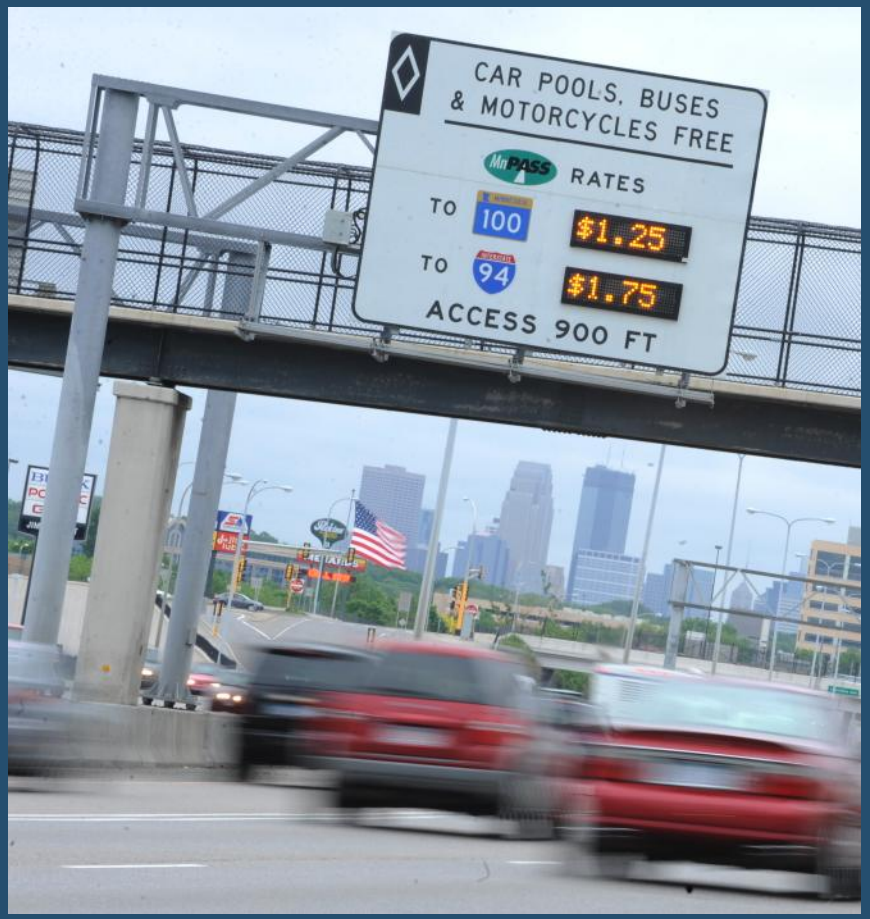
Brian Kary
Minnesota Department of Transportation

Regional Transportation Management Center

- Shared Operations Center
  - MnDOT Traffic Operations
  - MnDOT Maintenance Dispatch
  - State Patrol Dispatch
- 400 miles of freeway management system
  - Cameras
  - Changeable Message Signs
  - Freeway Service Patrol
  - Adaptive Ramp Metering

MnPASS System

- High Occupancy Toll Lanes
- Provide for faster, safer and more reliable travel options
- Travel benefits for transit, carpoolers, motorcycles and MnPASS customers
- Dynamic Pricing



I-35W: The 21ST Century Highway

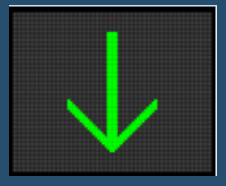
- Expanded MnPASS System
- Smart Lanes
- Priced Dynamic Shoulder Lane
- Bus Rapid Transit and Stations
- Integrated Park and Rides
- Low cost/high benefit capacity

I-35W Smart Lanes

- Intelligent Lane Control Signals (ILCS) located every ½ mile over every lane.
- A total of 297 ILCS.
  - 187 ILCS on I-35W
  - 110 ILCS on I-94
- ILCS are a 4ft x 5ft full color matrix signs.
- Use of the ILCS is for incident management , variable speeds and priced dynamic shoulder lane.

ILCS Sign Options

Blank – default



Green – Lane Open

Flashing Yellow – Caution

Red X – Closed

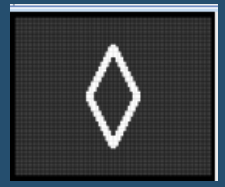
Lane Closed Ahead

Merge Left

Merge Right

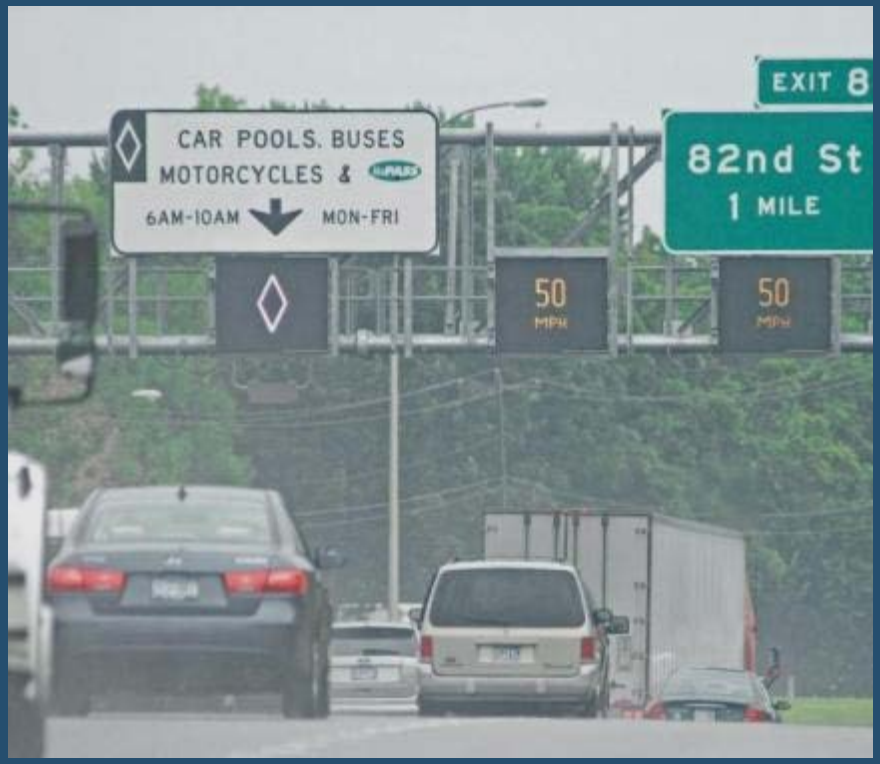
Merge Both

Speed Limit



White Diamond

Variable Speed Limits



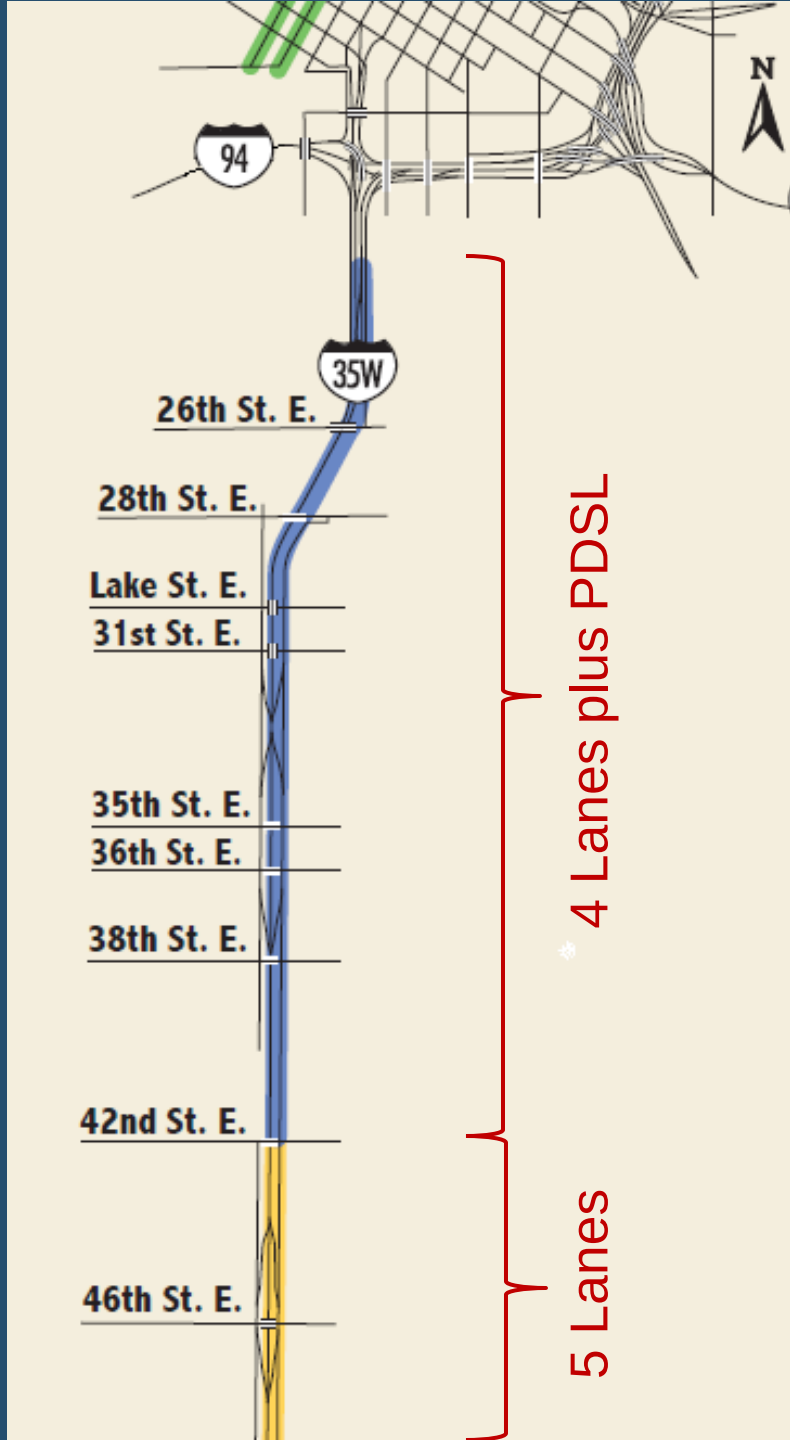
- Advisory Only
- Detection measures traffic speeds downstream
- Speeds are posted up to 1 ½ miles upstream

I-35W Early Results

- Lane Control Messages
  - Human factors study and surveys has shown understanding of ILCS messages
  - Message compliance still an issue
- Variable Speed Limits
  - Minimal improvements to mobility
  - Improvements in speed differential approaching congestion
  - Reduced shockwaves
  - Too early for crash data results but preliminary results are not showing improvements

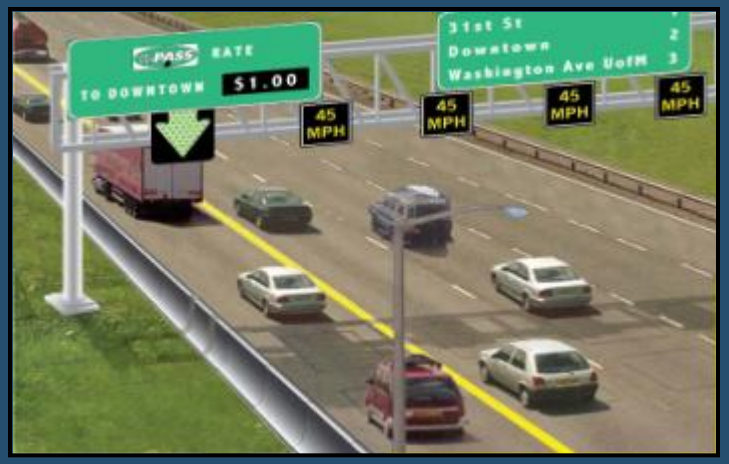
Priced Dynamic Shoulder Lane (PDSL)

- 3 Mile Segment on NB 35W
- Maintains existing 4 lanes with an added PDSL Lane
- Effectively extends the MnPASS lane to downtown Minneapolis using existing road space
- Total Cost = $17 M



I-35W PDSL Operations

- Monday – Friday
  - 6:00 AM to 7:00 PM
  - Expanded Mid-day hours due to high violation rates
- Can be open on weekends or evenings for special events, weather or incidents.
  - Regular Saturday hours from 11:00 AM to 7:00 PM



Operations Challenges

- ILCS requires more precision to deploy than overhead CMS.
  - Distance to incident is closer
  - Lane specific
  - Need precise location of incident
  - Requires more operator actions
    - Multiple ILCS to deploy for a single incident
    - Every changing incident scene

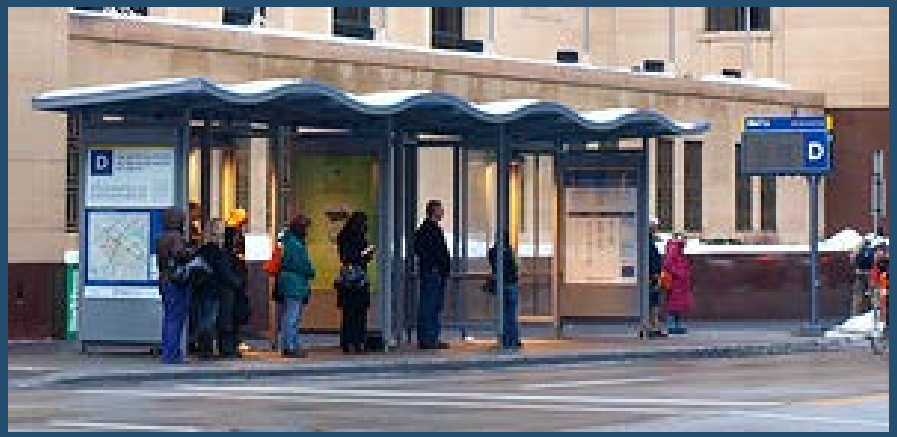
- Requires highly skilled and detail oriented staff

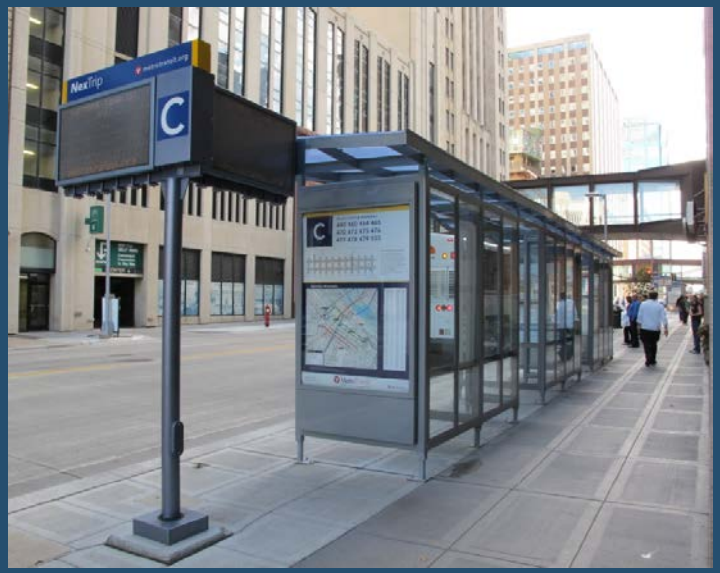
Maintenance Staffing

- MnPASS Revenues on I-35W paid for one FTE to maintain ILCS.
  - No additional funding for I-94
- Maintenance Agreements for ILCS
  - I-35W - approximately $280,000 a year
  - I-94 - approximately $200,000 a year
- Utilities Costs
  - I-35W - approximately $60,000 a year
  - I-94 – approximately $40,000 a year

Metropolitan Council

Regional Benefit: Marquette & Second Avenues





Metropolitan Council

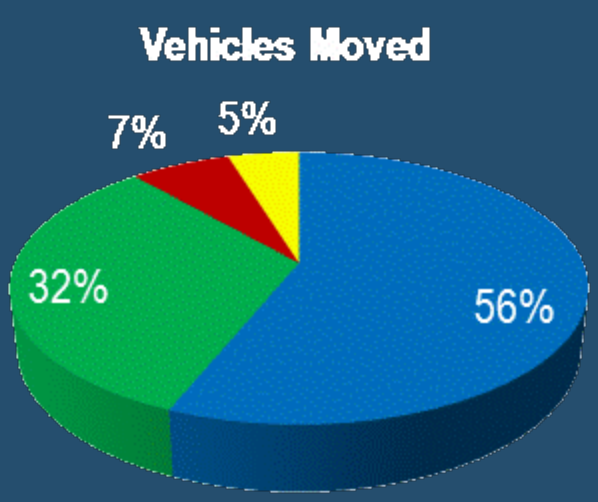
Park & Ride and Bus Fleet Expansion

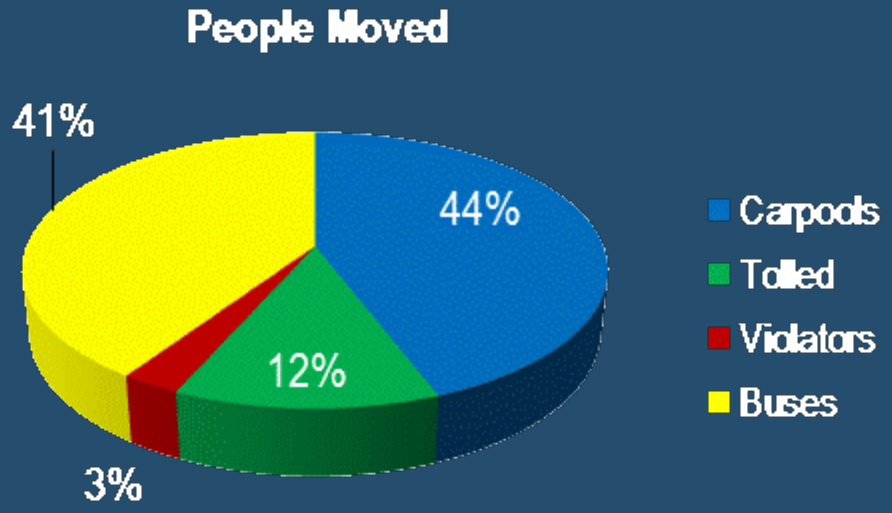
Metropolitan Council

Innovative Transit Technology

MnPASS Use & Performance

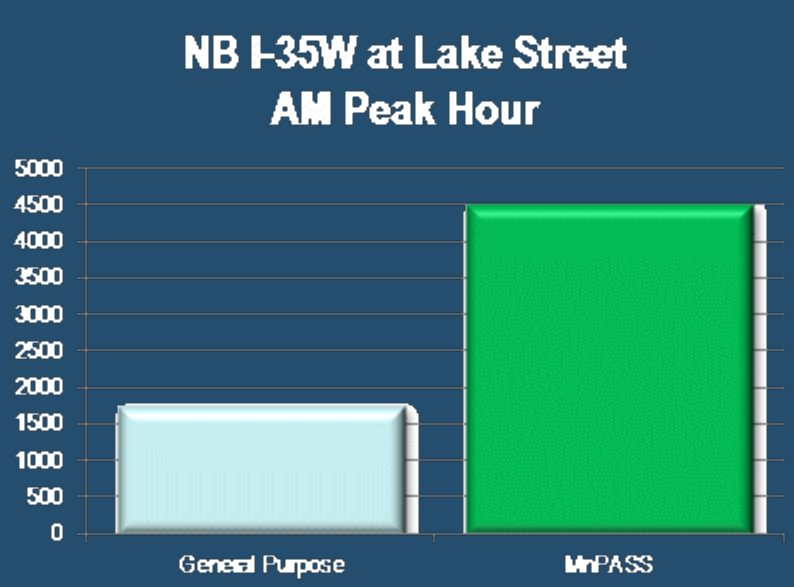
- The majority of people using MnPASS are carpooling or riding transit
- Single occupant MnPASS customers make up 32% of the total vehicles in the lane, but are only 12% of the total people in the lane

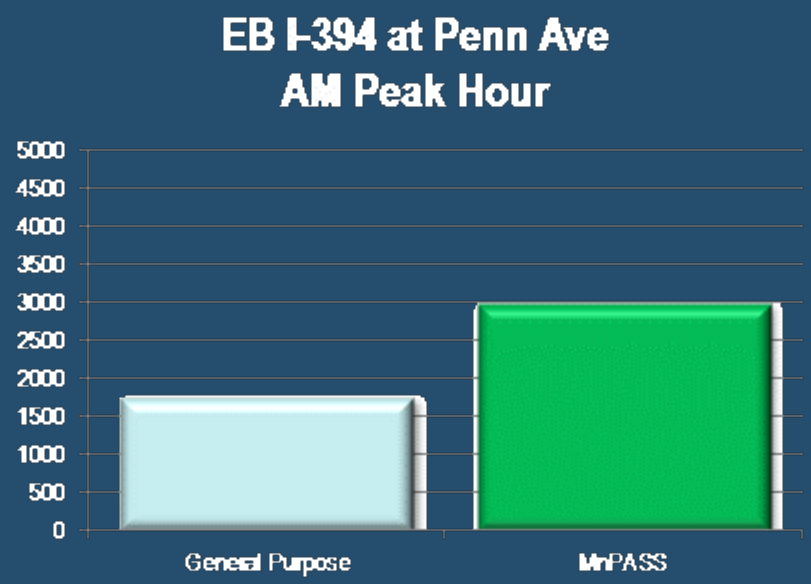




MnPASS Use & Performance

- A MnPASS lane can move twice as many people as a single general purpose lane during congestion



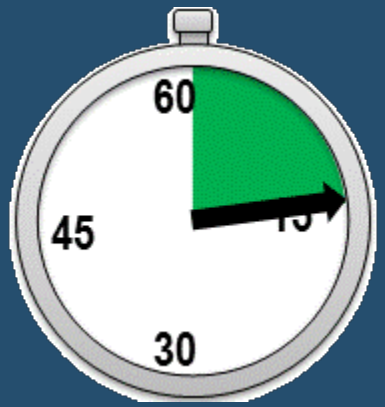


MnPASS Reliability & Time Savings

- General purpose lanes are prone to congestion and are therefore unpredictable, which requires more time when planning a trip
- MnPASS lanes can be relied on to provide a predictable trip time
- A commuter on NB I-35W traveling from Lakeville to downtown Minneapolis must plan for a 28 minute commute, while a MnPASS commuter only needs to plan for 14 minutes

General Purpose Lane Time

MnPass Lane Time



MnPASS Use & Performance

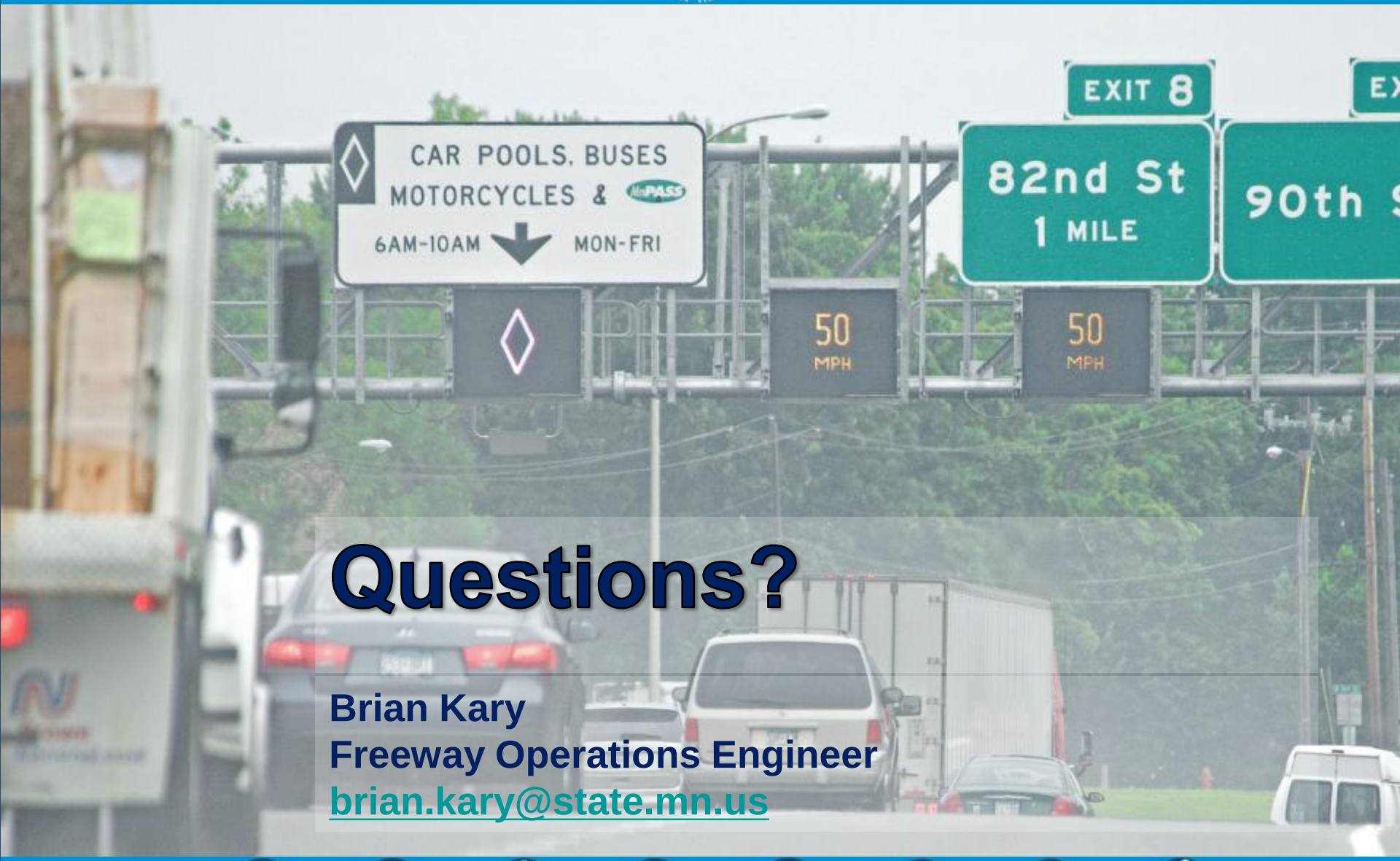
Transit Improvement

- I-35W Express Bus Service since 2009
  - Efficiency and reliability of service has greatly improved
  - Metro Transit service increased 11%
  - Metro Transit Ridership up 55%

- I-394 Express Bus Service since 2009
  - Efficiency and reliability of service has greatly improved
  - Metro Transit service increased 6%
  - Metro Transit Ridership up 24%

Future of ATM in MnDOT

- MnPASS
  - I-35E Opening in 2015/2016
  - Other corridors being studied
- Dynamic Shoulders
  - Nothing planned, but still in the toolbox
- I-35W ATM
  - Some remove as part of future construction projects
  - Replace with more frequent DMS rather than ILCS
  - PDSL will be a permanent lane



Questions?

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Congestion Pricing and ATDM

A Case Study of SR 167 HOT Lanes - Access Changes

Tyler Patterson
Toll Operations Engineer

Leidos Webinar
February 24, 2015

Washington State Department of Transportation

SR 167 HOT lanes overview

Why HOT lanes on SR 167?

- Highly congested route
- Under-used HOV lanes at 2+
- Provide drivers a choice

- Opened May 3, 2008
- Tolls adjust automatically to keep HOT lane traffic flowing at 45 mph or faster
- Going on 7 years of a 4 year pilot

SR 167 HOT lane features May 2008-August 2014

- Free to buses, 2+ carpools and motorcycles
- Solo drivers pay a single toll to travel any distance on 10-mile route
- *Good To Go!* pass required for non-HOV
- Single HOT lane in each direction
- Electronic signs indicate toll rate before each entry point
- 10 access points
- Access Changes – HOT lane separated from general purpose lanes by single line, then double line, now single line again. Double lines are illegal to cross

Pre-HOT lanes:

SR 167 had two general purpose lanes and one HOV lane.

HOT lanes: *HOV lanes were converted to a single HOT lane in each direction.*

SR 167 HOT lanes meeting goals

HOT Lanes are meeting objectives

Objectives	Goal Met?	Accomplishments
Free Flow Traffic	√	• HOT lanes Speeds >45mph • Travel Times more reliable
Reduced Congestion	√	• Daily tolled volumes up • Corridor transit volumes up
Improved Safety	√	• Average collision rate • Incident response time down
Demonstrated Ability to Finance Improvements	√	• HOT lanes generating revenue since April 2011
Equitable Use of Facility	√	• Annual surveys show both low and high income drivers use HOT lanes

Listening to customers

"Our members have indicated that the number one complaint they have received for the SR 167 HOT Lane Pilot Program is the access control restrictions." - PSRC

Puget Sound Regional Council
PSRC

SOUNDTRANSIT

"Too many drivers violating the double white line crossing restrictions without any apparent penalties. Creates a real safety hazard." – survey respondent

"We have seen already that dedicated access points can make it difficult for transit to use if not located appropriately…a continuous access treatment would remove this uncertainty for transit." – Sound Transit

Improving SR 167 HOT lane access

$520,000 Federal Value Pricing Program grant to demonstrate more-open access on the SR 167 corridor.

Funding included:

- Restriping and signage changes
- Public information and outreach
- Evaluating new access

Project goals

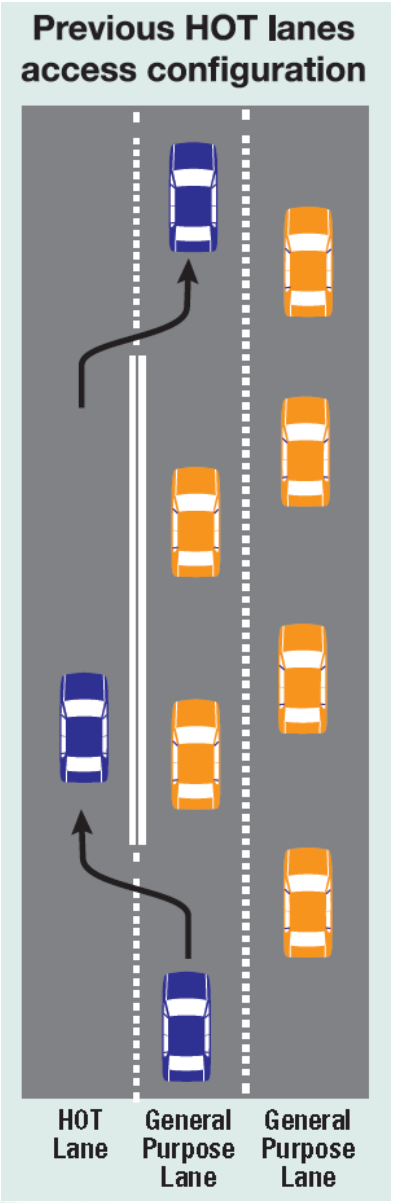
- Improve access for HOT lanes drivers
- Evaluate effects on revenue
- Understand customer responses, attitudes and concerns
- Determine if the new HOT lane access works

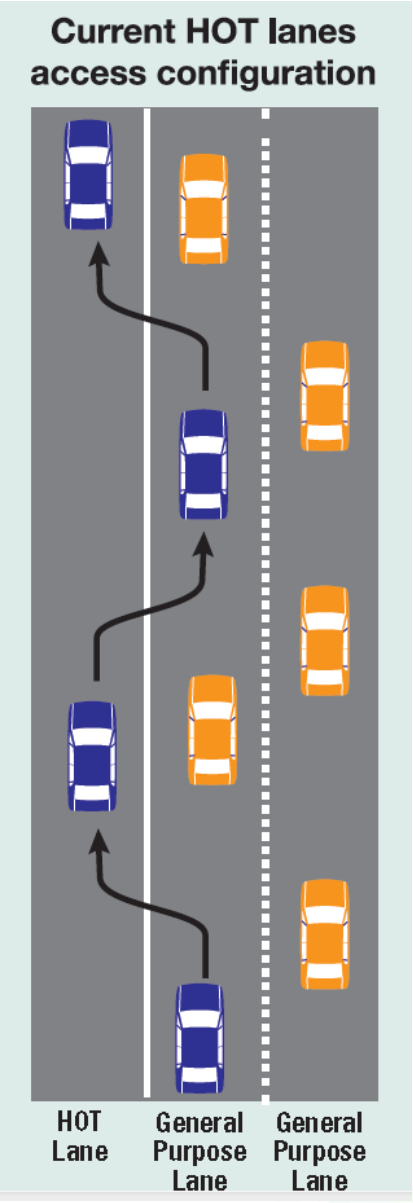
Striping changes

- Accomplished via a design-bid-build project
- Project duration three weeks

Work Activities

- Remove second white stripe to create one continuous solid stripe separating the HOT toll and general purpose lanes.
- Left double white stripe at the start and the end of the HOT lane

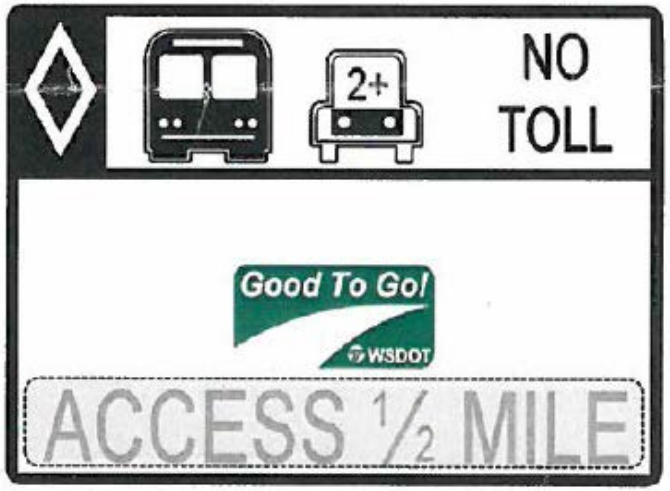




Signing Changes

Work Activities

- Signing removals and changes

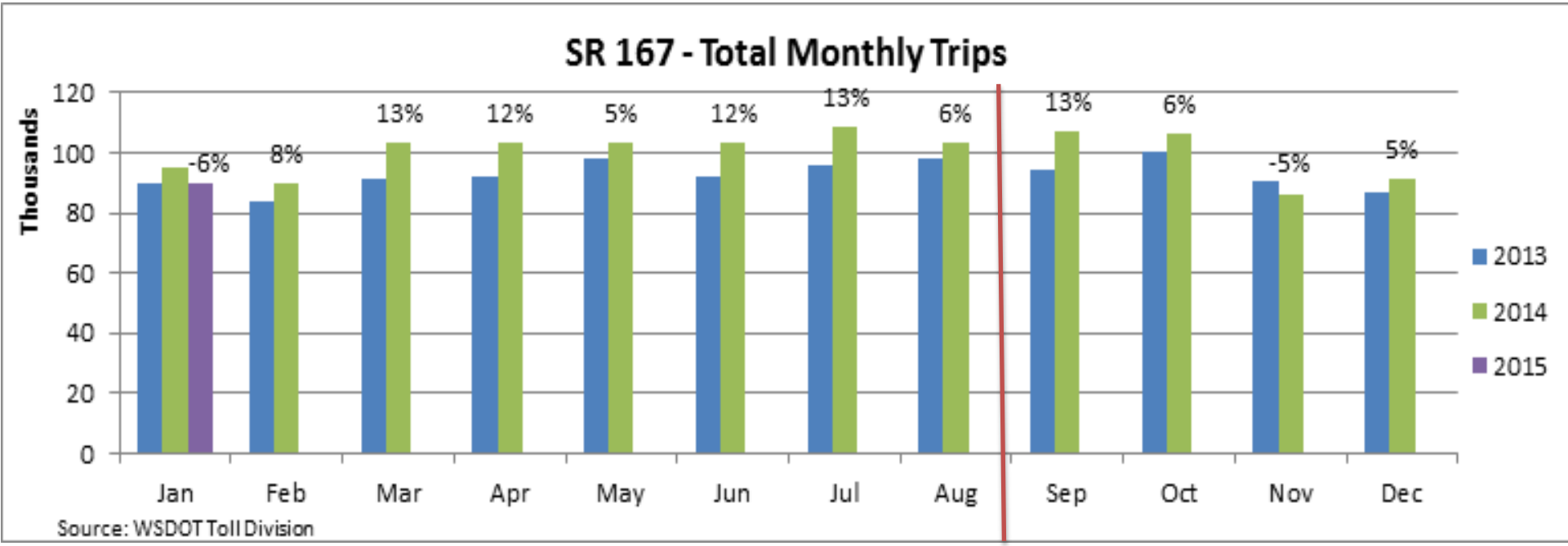


Install Plaque on Existing Access Signs (8 signs). Plaque will say PASSES ONLY.

Illegal To Cross Double White Line Sign - to be removed (41 signs).

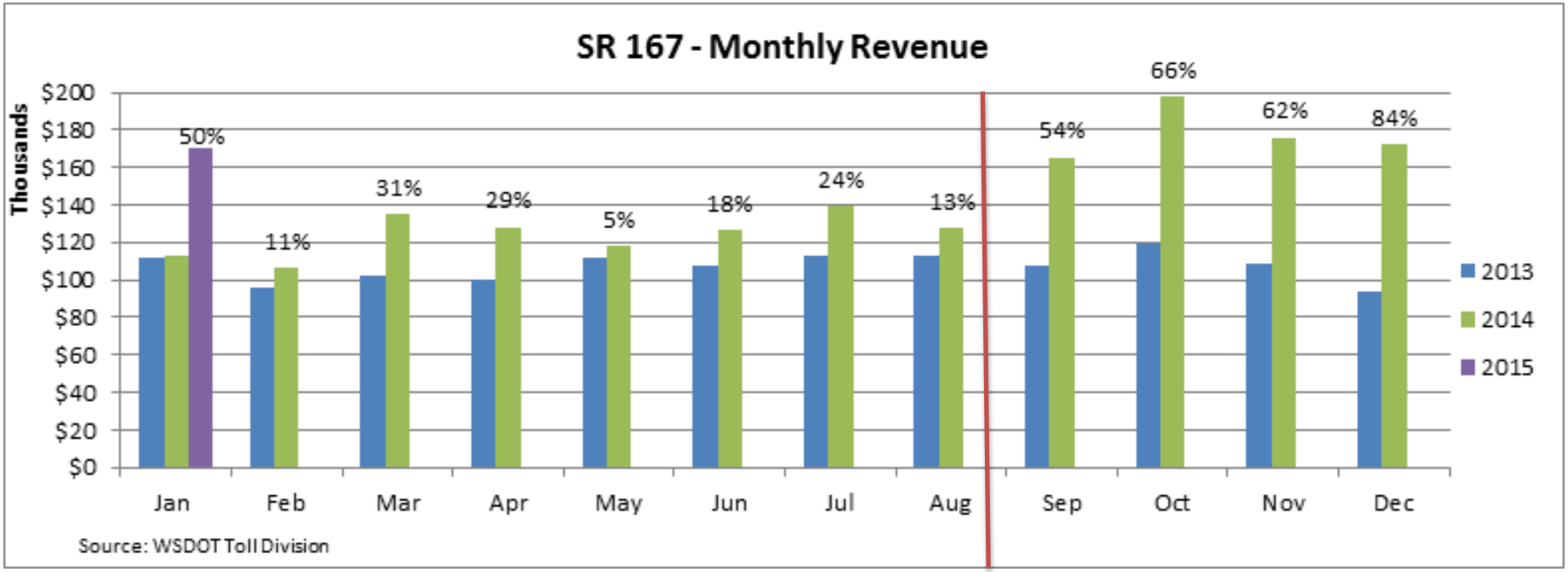
Next Exit Signs - to be removed (8 signs).

Impact on transactions

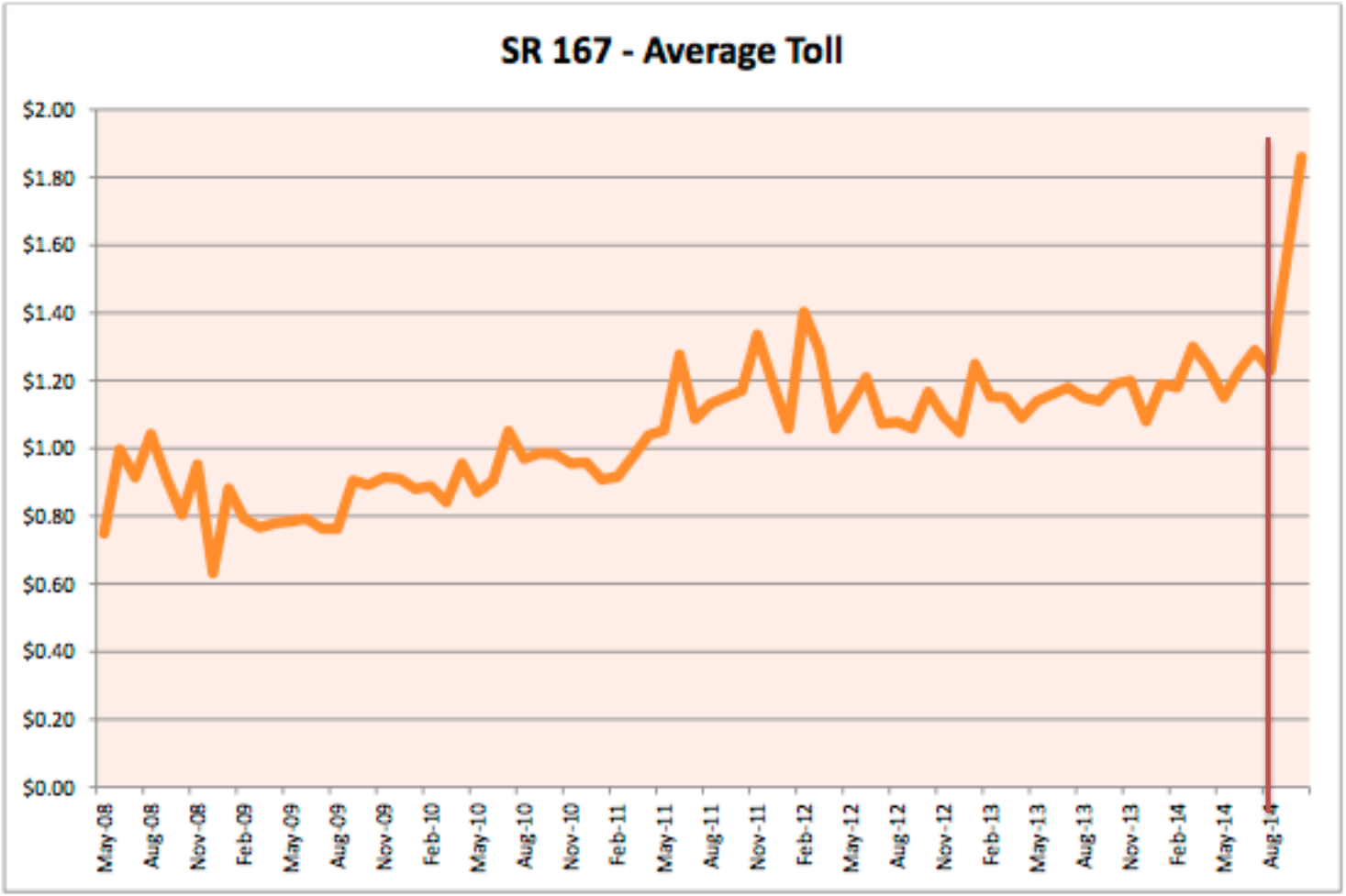


Toll revenue is up

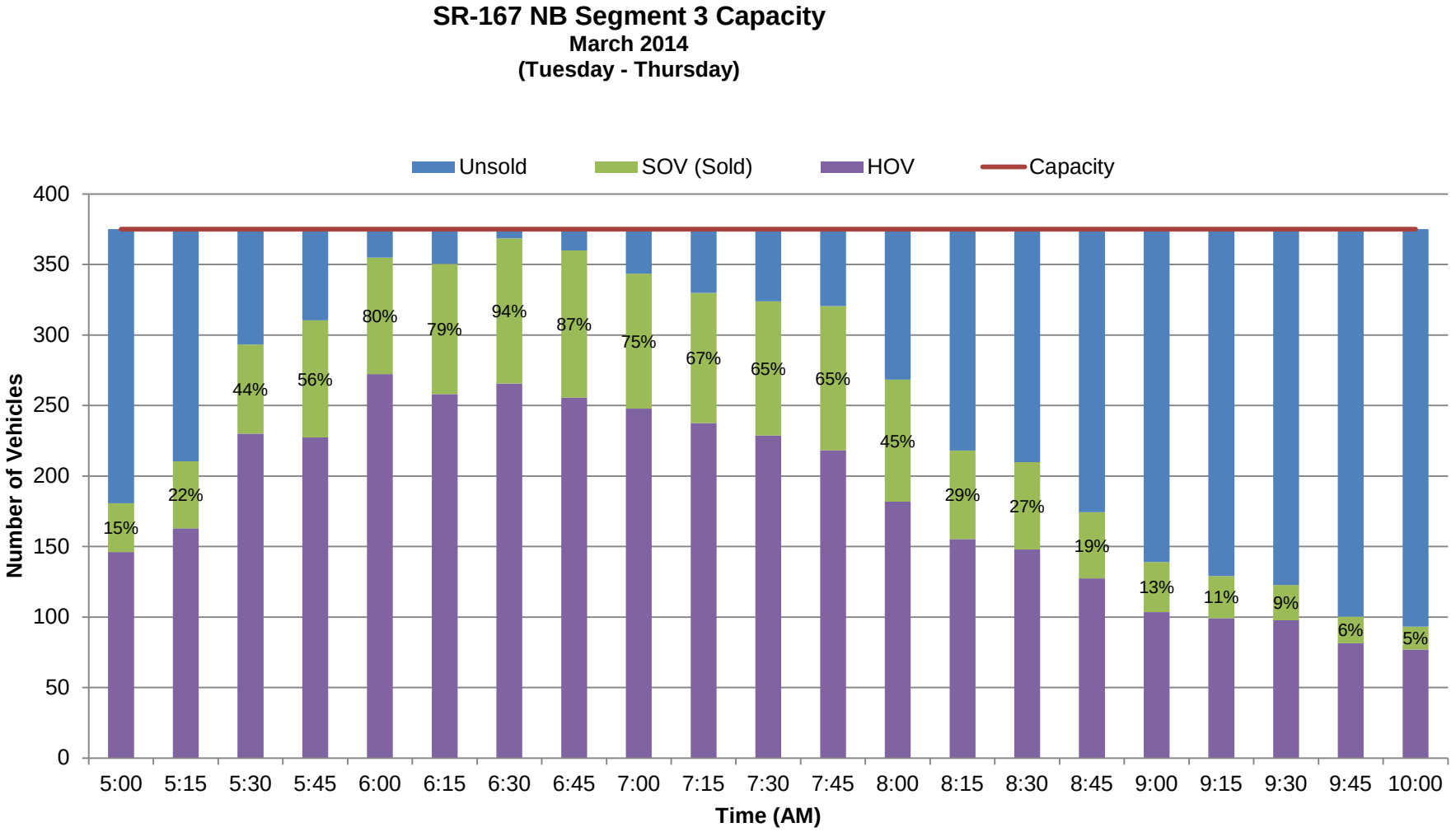
The increase is substantial, and based on both increased price and volume



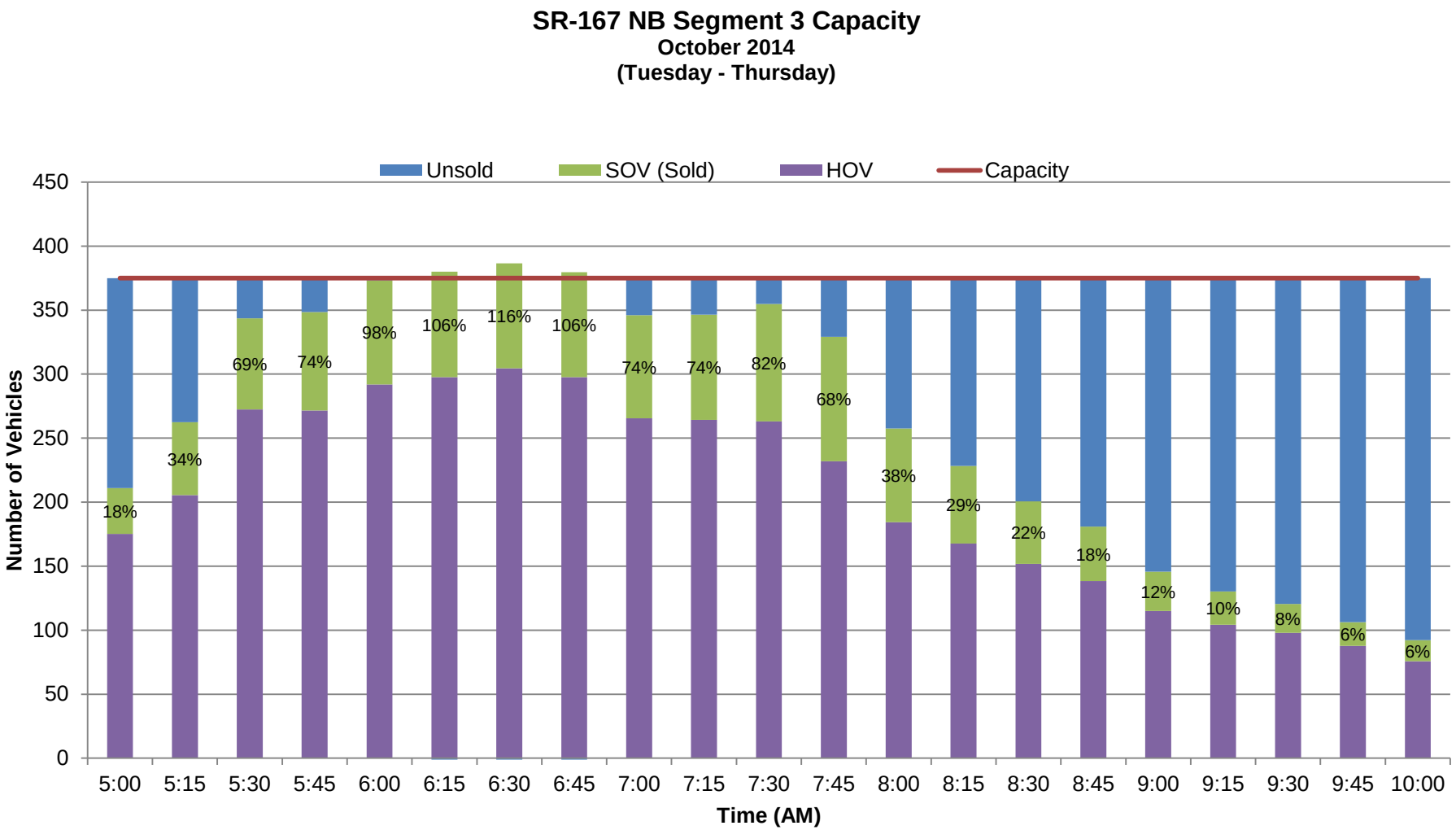
Price per paid trip has increased



Capacity Use – Limited Access



Capacity Use – Open Access



December 2014 customer email survey

- Sent to 44,000 customers; nearly 4,000 responded
- More convenient: 82 percent agree
- Easier to use: 80 percent agree
- More useful: 77 percent agree
- Prefer new access: 67 percent
- Safer: 42 percent agree

Washington State Transportation Center (TRAC) before and after evaluation

Evaluation focuses on:

- revenue collections
- toll evasion
- safety
- reliability and speed of the express toll facility
- reliability and speed of the general purpose lanes
- customer attitudes
- transit operations

Initial SR 167 Continuous Access Results

WSDOT's Initial Results

Traffic

- Increased volumes in HOT lanes (both paying and non-paying)
  - consistent growth in transactions
  - HOVs are largest increase
- Slightly decreased speeds in HOT and GP lanes

Revenue

- Increased toll revenue
  - 50% in September 2014
- Increased toll rate
  - More frequent high prices
  - $9 maximum toll reached more often

Customers

- Increased customer satisfaction
- Increased complaints about price (not performance)
- Decreased complaints about violators

Safety

- No dramatic change

Next Steps

- University of Washington Study completed (Summer 2015)
- Continue to monitor and adjust the pricing algorithm
- May add striping back to specific locations (Like at the toll points)
- Extend the system southbound through major bottleneck (2017)

Questions?

Tyler Patterson

Toll Operations Engineer

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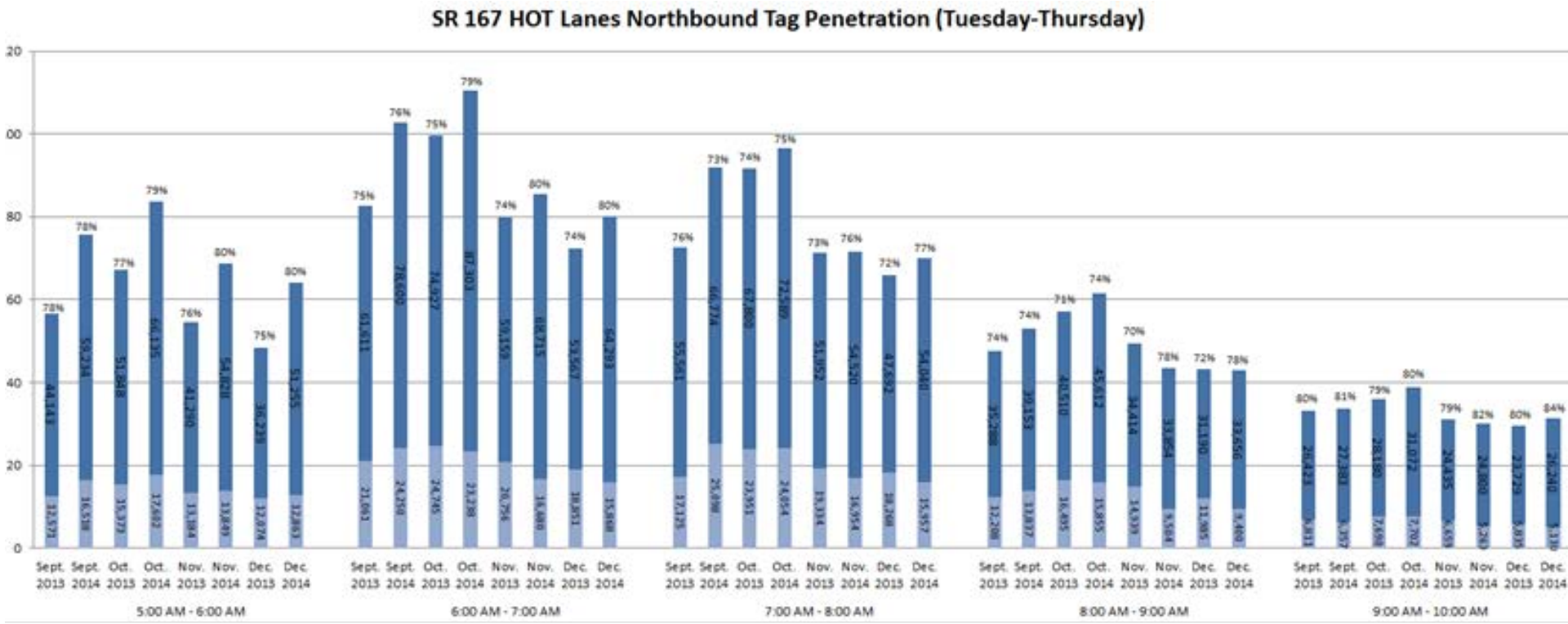
Alternative performance evaluation tools



Alternative performance evaluation tools