Assessing Risk in Priced Managed Lane Projects

A Case Study: Eastside Corridor Independent Toll & Revenue Study

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presented by

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Main Takeaways

- Priced Managed Lanes are an increasingly popular approach to expanding capacity
- Demonstrated ability to manage traffic
- But reliable revenue streams are more challenging
- Traffic and revenue forecasting needs to recognize risks
  - » This is even more critical for priced managed lanes

Priced Managed Lane Forecasting Challenges

- Traffic growth or "demand"
  - » Magnified in managed lanes because of nonlinear relationships between traffic volume, speed and price
- Interaction between design, operations, toll setting, revenue and how drivers respond
- Transponder ownership
- "Ramp-Up" period
- Translating "typical" or "average" weekday model conditions to annual revenue

Moody's and other rating agencies have expressed big concerns with priced managed lanes*

- Toll rates are typically higher than for toll roads
- Free alternatives are easily accessible and decision to use tolled lanes will be more volatile than for traditional toll roads
- A small diversion of traffic onto tolled lanes frees up capacity on non-tolled alternative, thus decreasing the attractiveness of the tolled lane
- Value of Time for users varies throughout day
- Forecast models are generally more complex than for traditional toll roads; Pricing is designed to meet a speed and congestion threshold, not revenue maximization.
- Management of dynamic pricing and violations tracking is complex

* Managed lanes are HOT! Unique risks and benefits versus traditional tolling, Moody's Investor Service, May 9, 2013

Eastside Corridor Case Study

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Legislature Directed an Independent Study

The transportation commission shall retain appropriate independent experts and conduct a traffic and revenue analysis for the development of a 40-mile continuous express toll lane system that includes State Route number 167 and Interstate 405. The analysis must include a review of the following variables within the express toll lane system

- **Vehicles with two or more occupants are exempt from payment**
- **Vehicles with three or more occupants are exempt from payment**
- **A variable fee**
- **A flat rate fee**

I-405 Eastside Corridor Express Toll Lanes
What we were asked to analyze

» Four variations of discounts/exemptions:

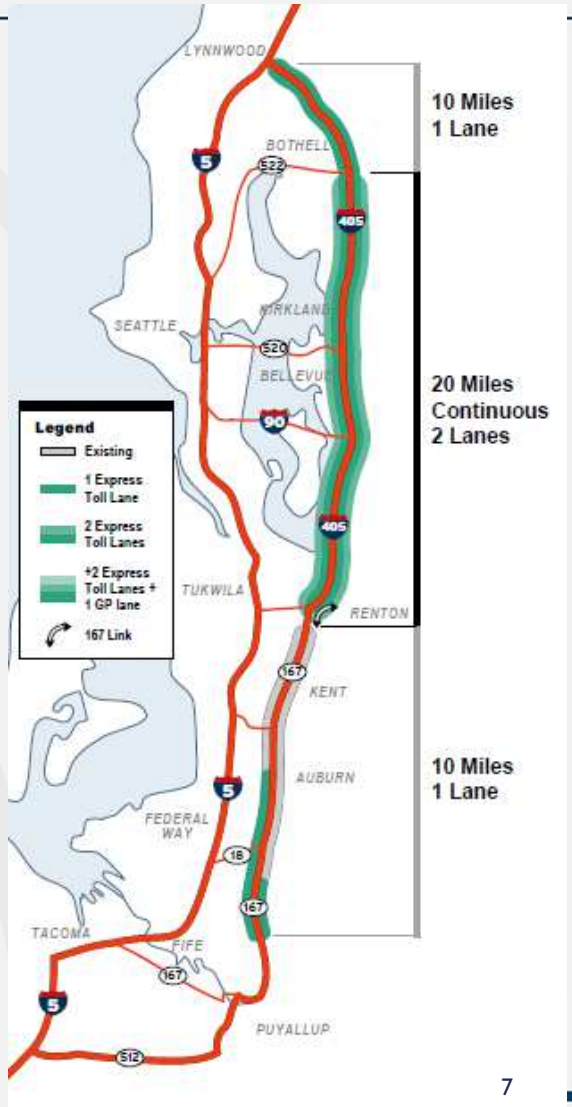
- HOV 2+ travels free
- HOV 3+ travels free
- HOV 3+ exempt during peak periods and HOV 2+ exempt during off-peak periods
- All HOV discount of $1.00 in 2014 (sensitivity test only)

» Toll setting

- Dynamic pricing (based on actual traffic conditions)
- Variable pricing (posted rates based on historical conditions)
- Flat pricing (price is the same all day)

» Operational Objective

- Maintain 45 mph in Managed Lanes 90% of the time



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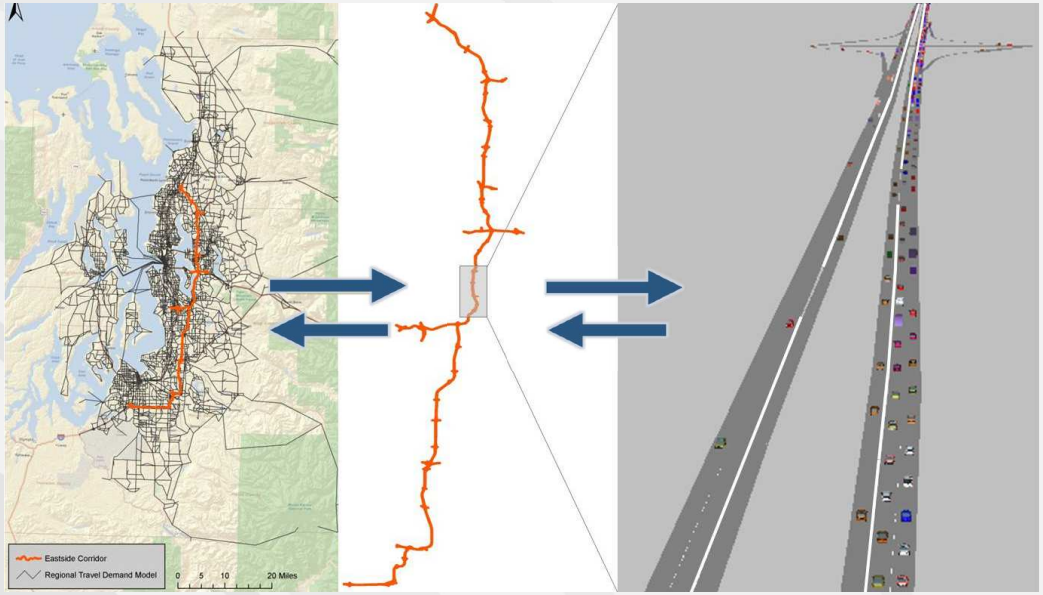
Analytical Overview

Traffic demand; today and tomorrow

Estimate share that would use lanes for free (HOV) and pay

Operational outcomes

Risks



Regional Travel Demands

- PSRC Model
  - ✓2010, 2014, 2018, 2030, 2040

Corridor Travel Demands

- Iterative Process between Demand Model and Operational Model

Choice of Corridor Drivers to Pay to Use Express Toll Lanes

- The portion of the express lane that would pay a toll under different priced conditions

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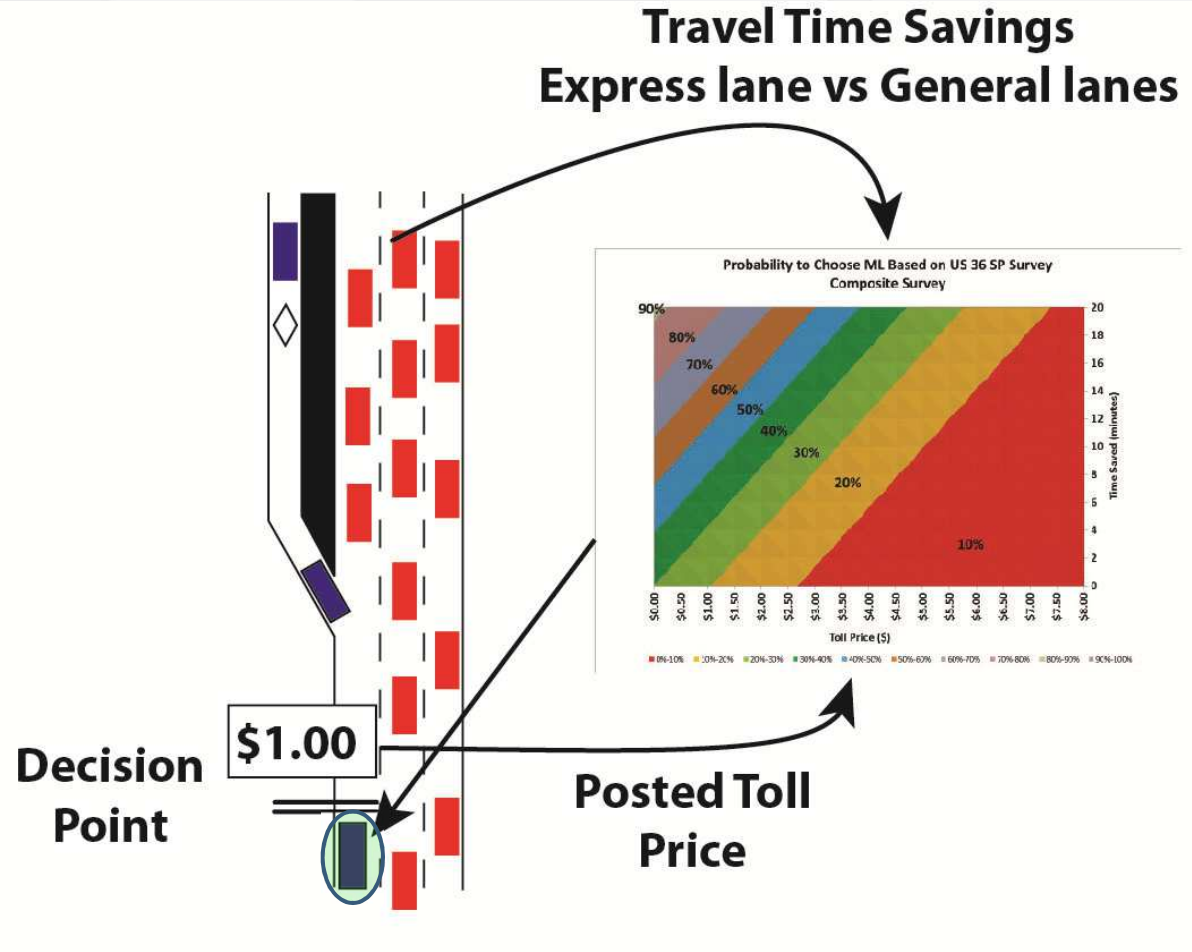
Priced Managed Lane Choice Modeling



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Risk Factors

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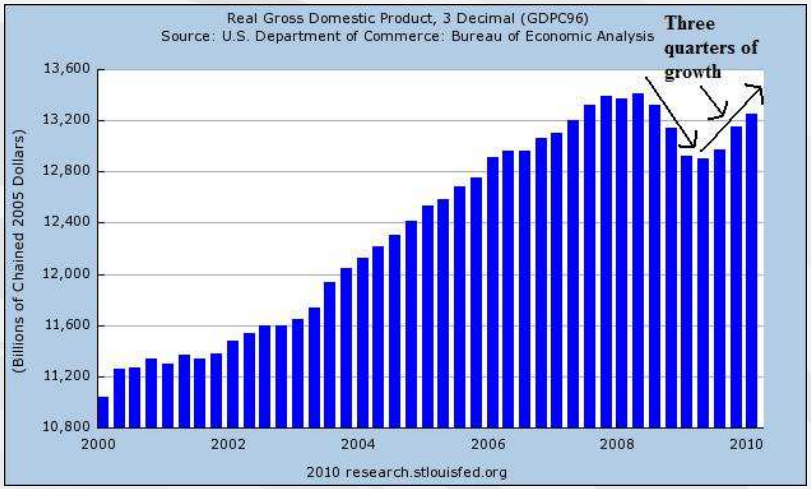
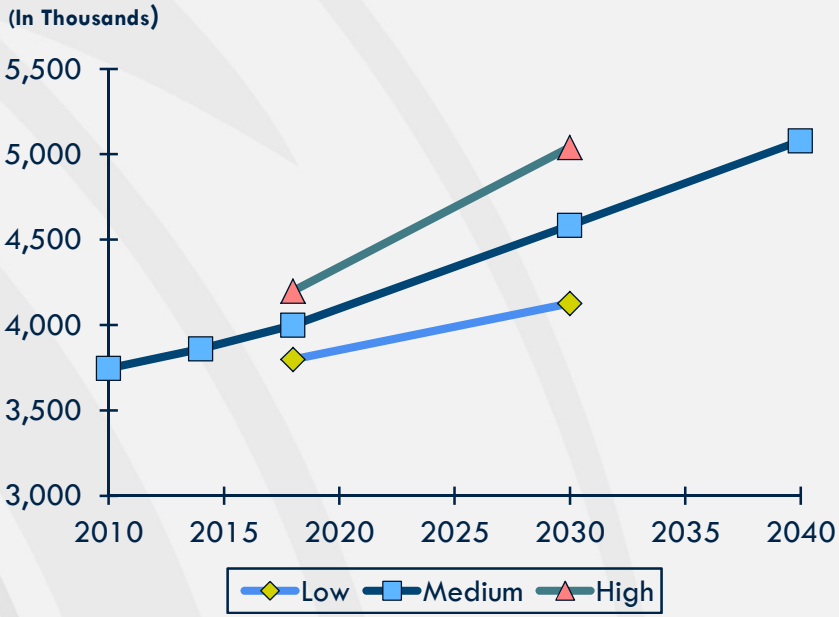
Traffic growth





- Corridor traffic growth is uncertain
- Influenced by numerous factors, including socioeconomic growth

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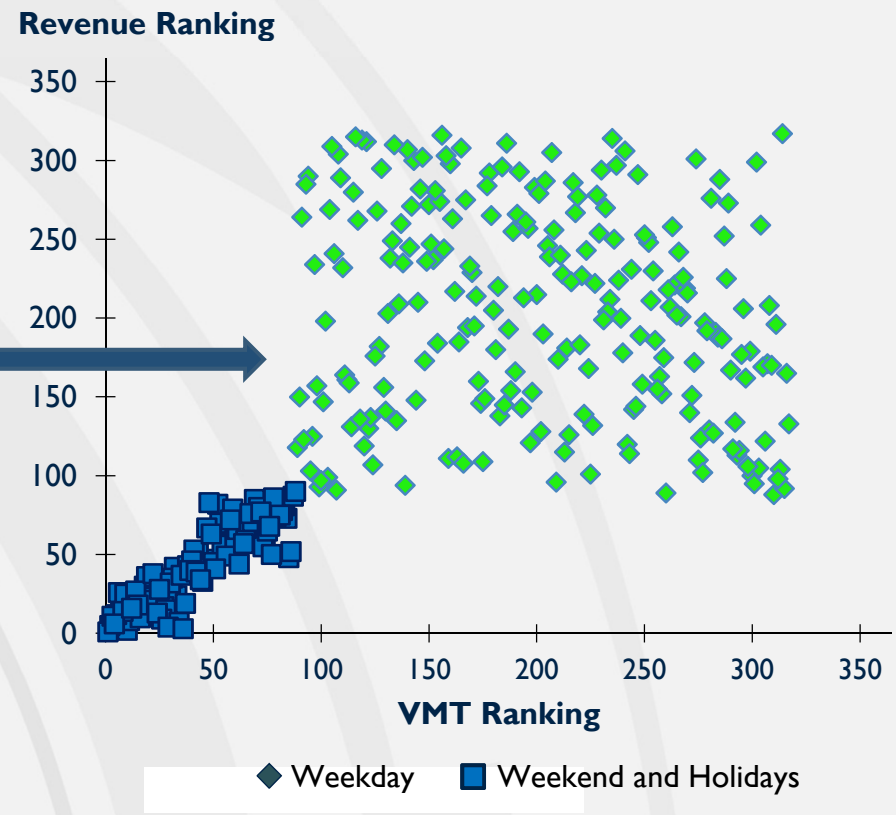
Does Traffic Typical Day = Revenue Typical Day

- Relationship of Typical Day to Annual Revenue on existing SR 167 in 2010
  - » Reasonable to expect that the rank of traffic volume would be similar to the rank of revenue on a given day
    - But it's not
  - » Adds uncertainty to calculating annual revenue from a typical day of traffic



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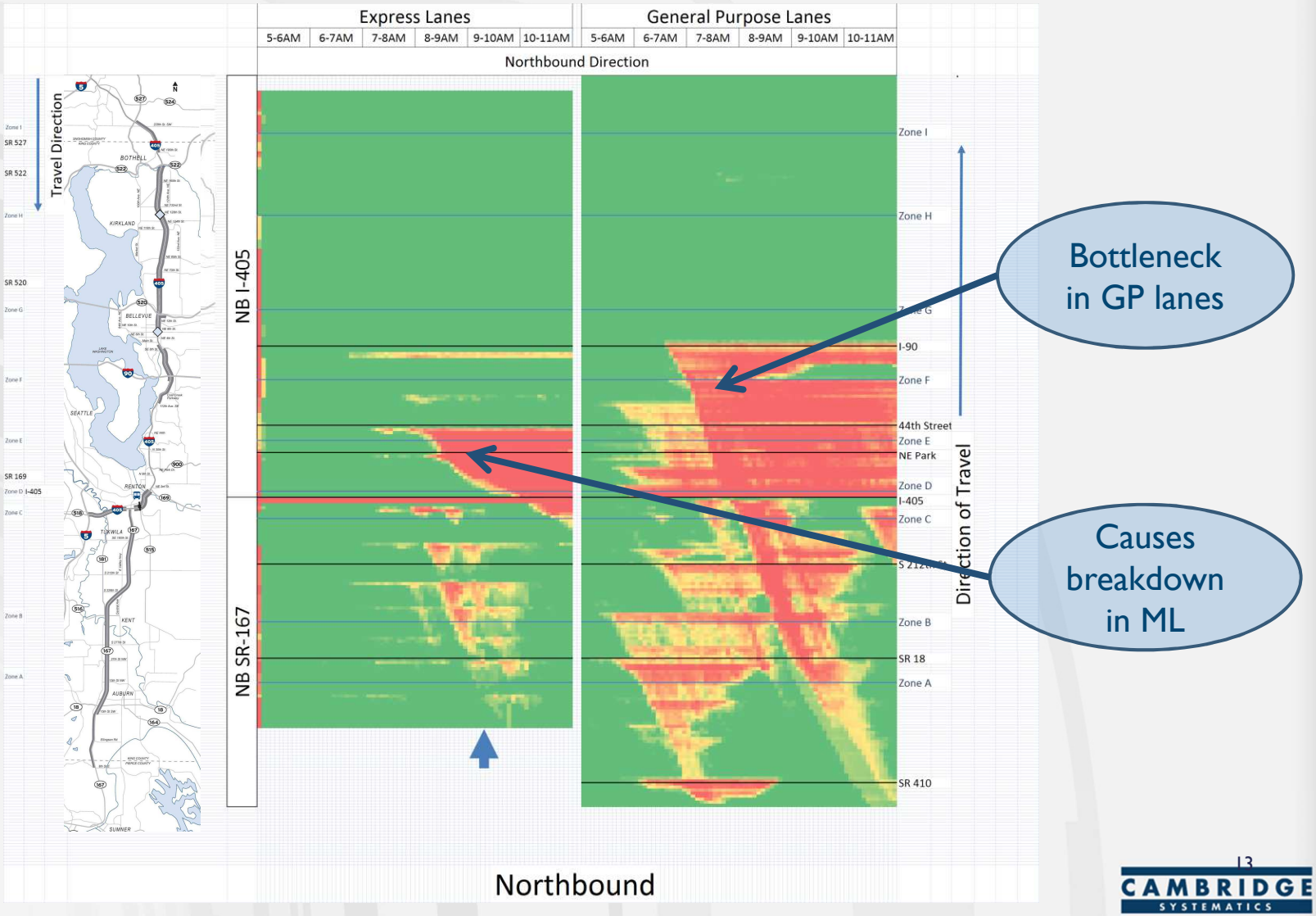
Design of the Facility

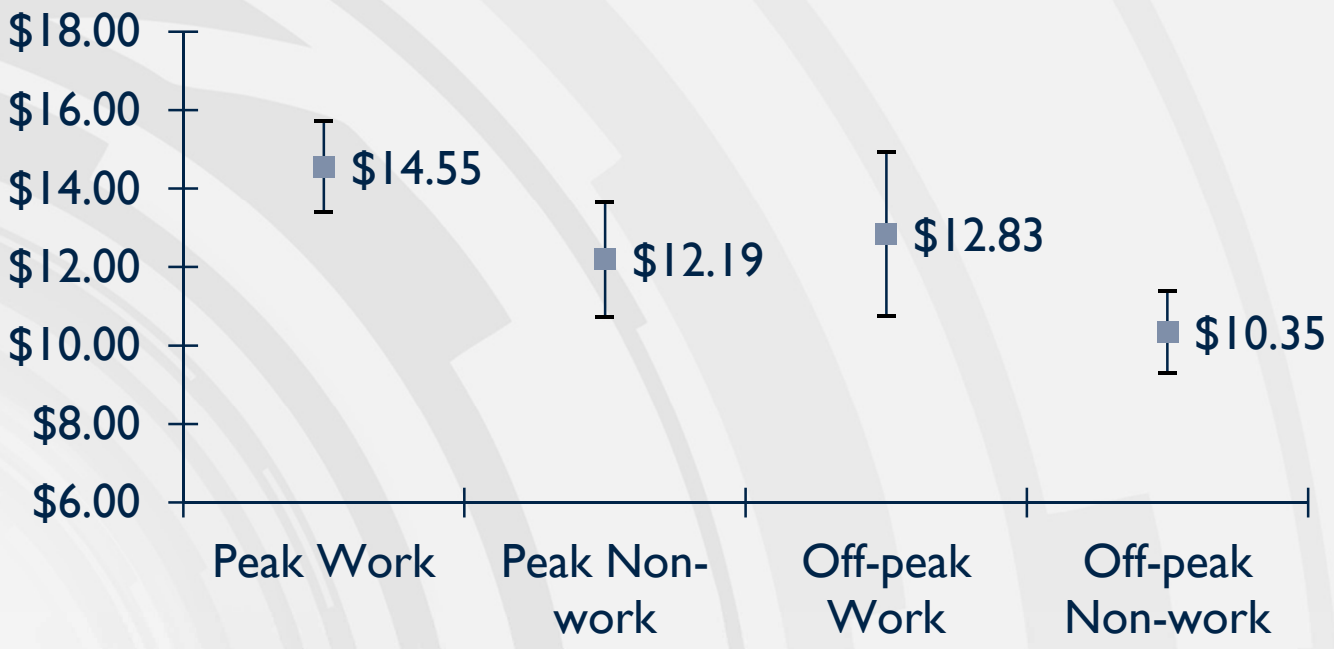


Transponder Ownership Levels Affect Revenue

- Assuming high %'s will over estimate revenue
- Initial phase of Eastside Corridor (SR 167) did not promote
  - » Only 14% of corridor drivers had transponders
  - » Revenues were significantly lower than projected

Values of Time

- Values of time vary by time of day and trip purpose
- Overall average = $13.09/hour



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Quantifying Risk

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Risk Analysis

Develop Probability Distributions

- Transponder Penetration (2014 and 2018)
- Traffic growth (2030)
- Willingness to pay
- Annualization of daily revenue

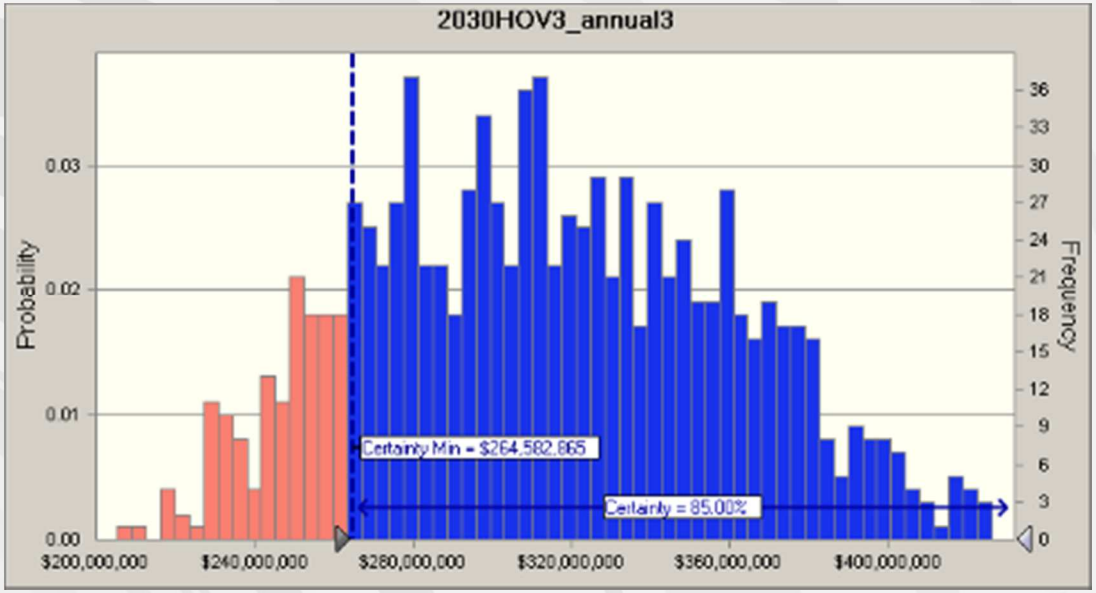
Run Scenarios

- 85 scenarios
- Permutations of high, medium, low of transponder penetration, growth and willingness to pay

Apply spreadsheet model

- Apply Monte Carlo Simulation to test 5,000 variants
- Apply to 2014, 2018 and 2030, and to 40 year revenue streams

Distribution of Revenue Outcomes



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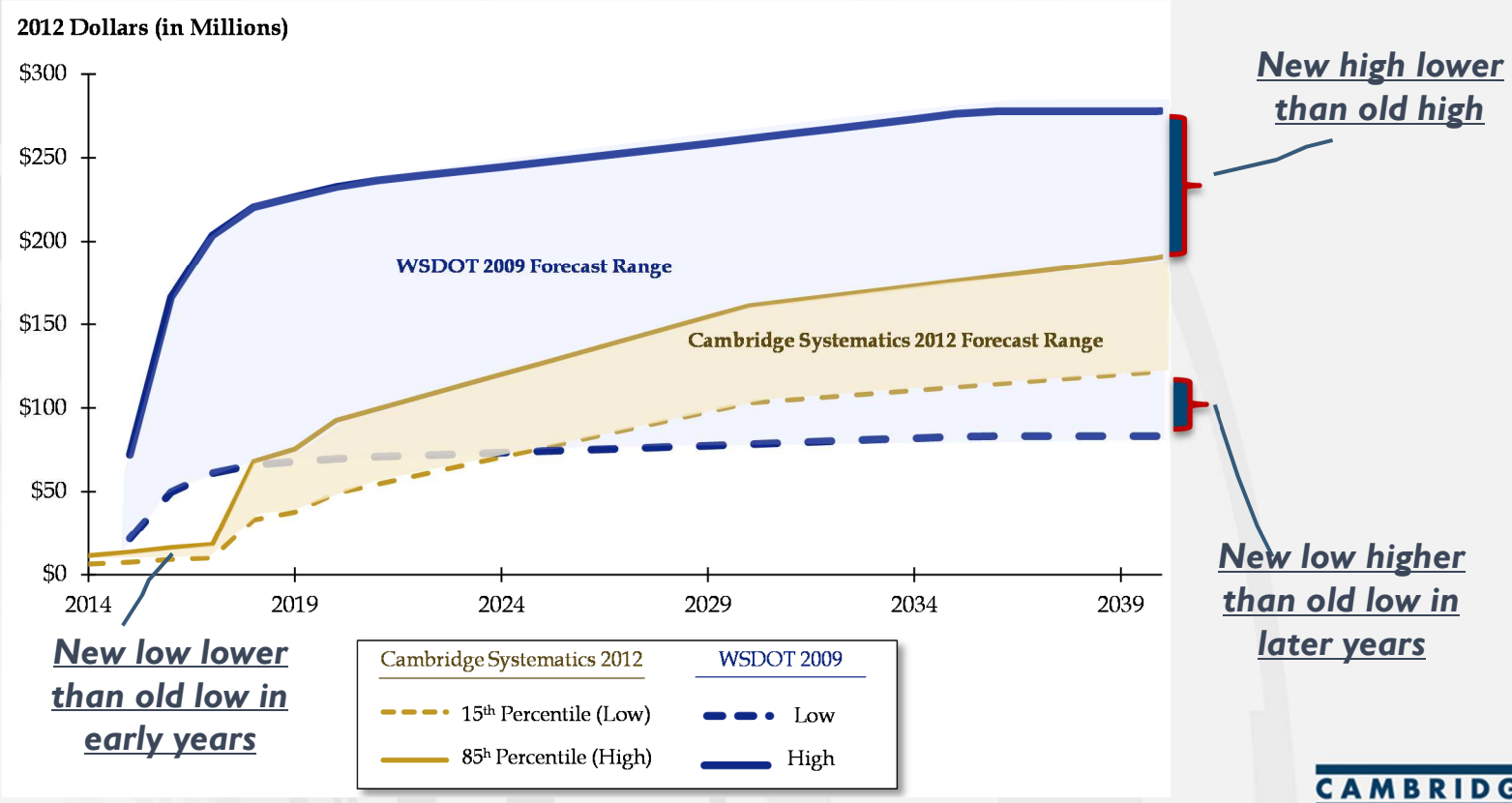
Comparison of Gross Revenue Forecasts WSDOT 2009 and CS 2012

- **New forecast has a narrower range than prior forecast**



Summary

- Do not underestimate the uncertainties
  - » Forecasting for revenue takes on an extra dimension than forecasting design-year traffic for a non-priced facility
- Don't ignore the cost and delivery side of the equation
  - » Decisions made in the planning phase can influence revenue and cost outcomes in unexpected ways
- Relying on priced managed lanes revenue for financing is a heavy lift
  - » "Excess revenue" is not likely
- Transparency about risks from the beginning is vital

End

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