Assessing Risk in Priced Managed Lane Projects

A Case Study: Eastside Corridor Independent Toll & Revenue Study

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Cambridge Systematics, Inc.

John Lewis

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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
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
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
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

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
Priced Managed Lane Choice Modeling

Travel Time Savings
Express lane vs General lanes

Decision Point $1.00 Posted Toll Price

Probability to Choose ML Based on US 36 SP Survey Composite Survey
Risk Factors
Traffic growth

- Corridor traffic growth is uncertain
- Influenced by numerous factors, including socioeconomic growth
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
Design of the Facility

### Bottleneck in GP lanes

Causes breakdown in ML
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
Quantifying Risk
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

![Graph showing distribution of revenue outcomes. The x-axis represents revenue amounts ranging from $200,000,000 to $400,000,000, and the y-axis represents probability. The graph includes a shaded area indicating a certainty of 85.00% with the minimum certainty at $264,582,865.]
Comparison of Gross Revenue Forecasts
WSDOT 2009 and CS 2012

- New forecast has a narrower range than prior forecast

- New high lower than old high
- New low lower than old low in early years
- New low higher than old low in later years
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

For Additional information please contact:

- John Lewis  jlewis@camsys.com
- Jeffrey Buxbaum  jbuxbaum@camsys.com
- Jaimison Sloboden  jsloboden@camsys.com