BRENT SPENCE BRIDGE PROJECT

EVALUATION OF TOLL ALTERNATIVES

MAY 2014

3-STAGE PROCESS

There are many policy decisions that impact the revenue and traffic on a toll system. The goal of the modeling process is to identify the toll rates and parameters that best fit the Brent Spence Bridge Corridor. The process will be conducted in three steps:

- Test Peak and Off-Peak Rates
- Conduct Parameter Sensitivity Tests
- Run Combined Toll Alternatives

The model will incorporate several key parameters, including peak and off-peak toll rates, video toll premiums, heavy vehicle rates, and frequent user discounts. The forecasts developed using this process will add depth to those previously developed, which assumed a uniform toll rate throughout the day and did not consider a frequency discount. The previous study found that a $2 toll rate would best suit the Brent Spence Bridge Corridor.

Throughout the process, the modelers will maintain a few assumptions:

- Toll rates are for each one-way trip
- Peak periods are from 6-9 a.m. and 4-7 p.m.
- Frequency discounts are earned by taking 40 one-way trips in a calendar month.
- Only transponder customers can earn the frequency discount.

STAGE 1: TEST PEAK AND OFF-PEAK RATES

Modelers will first evaluate peak and off-peak toll rates. Tests to identify these rates will assume:

- No frequent user discount
- The Video toll premium is 50% of Electronic Toll Collection (ETC) rate
- Medium truck toll rates are 2 times the 2-axle toll rate
- Heavy truck toll rates are 5 times the 2-axle toll rate
- 16-lane design

The model will evaluate a range of peak and off-peak toll rates (peak toll rates have no impact on the off-peak model and vice versa). The following rates will be evaluated:

Peak Toll Rates: $1.00, $1.50, $2.00, $2.50, $3.00

Off-peak Toll Rates: $0.50, $0.75, $1.00, $1.25, $1.50

Modeling efforts will determine the impact of varying the toll rates on revenue and traffic. The aim is to determine the point at which revenue and use of the bridge are balanced. The example from the LSIORB (Louisville-Southern Indiana Ohio River Bridges) project below is an illustration of the sensitivity of traffic and revenue to toll rates:

Impact of Toll Rate on Revenue and Traffic
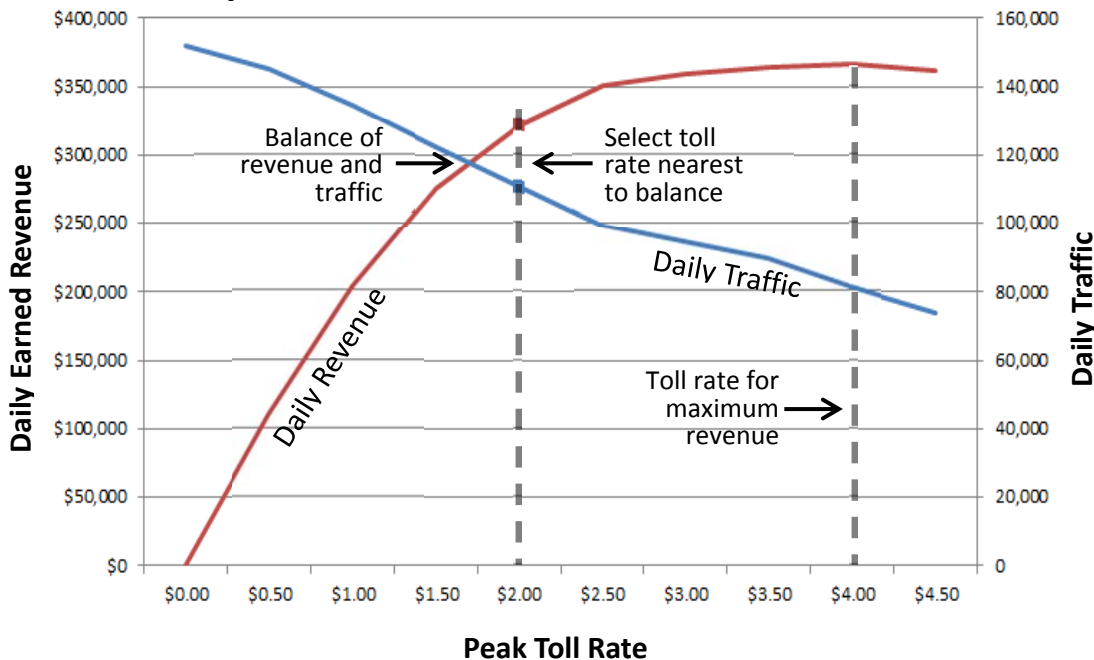
As an additional point for comparison, the toll rate that is forecasted to provide maximum revenue may be found using the same graph. Note that at the point at which the revenue is maximized, traffic using the toll road is much lower than at the point of balance. In the LSIORB example above, this toll rate is about $4.

STAGE 2: CONDUCT PARAMETER SENSITIVITY TESTS

The peak and off-peak rates that were selected after Stage 1 will be the basis of the analysis to refine other model parameters. Multiple scenarios will be included for each parameter.

FREQUENCY DISCOUNT

Frequency discounts are often used by toll agencies to attract commuter customers. On the Brent Spence Bridge Corridor project, this would reduce the burden on local travelers. Only transponder customers would be eligible for the discount, which would reduce the peak toll rate by 50%. The size of the frequent use discount varies across toll facilities with discounts as high as 67% and as little as 10%; a 50% discount was adopted for the LSIORB Project. The model will evaluate scenarios using no discount, a 25% discount, a 50% discount, or the off-peak toll during peak hours as a discount. The eligibility requirement being modeled is 40 one-way trips within a calendar month, and only 2-axle vehicles would be eligible. Frequent user discounts are applied by the toll agency issuing an account credit to the customer. This credit is issued to the transponder account, not a credit or debit card, and may be used to pay for future tolls.

VIDEO TOLL PREMIUM

To address the additional administrative costs and risk for leakage for video toll customers, and to try to incentivize travelers to obtain transponders, a premium is typically charged for customers that do not have a

working (valid) transponder. The magnitude and implementation of video toll premium varies across the industry, and thus multiple scenarios will be assessed:

- 50% of ETC toll: This scenario is the base condition, used in Stage 1. The video toll rate will be increased by 50% of the transponder customer rate for each classification of vehicle.
- 50% of 2-axle ETC toll: The video toll rate will be increased by 50% of the 2-axle transponder customer rate. This differs from the method above as higher axle customers will only be charged the same premium as a 2-axle customer.
- 100% of 2-axle ETC toll: The video toll rate will be increased by 100% of the 2-axle transponder customer rate. This is the video toll premium policy that was adopted for the LSIORB Project.

The difference in concept between the 2 types of premiums is whether the fee is meant to be proportional to the toll amount or varies more per vehicle. The second two options would limit premium that a heavy vehicle would pay. It should be noted that higher premiums increase the percentage of earned revenue (the revenue that a toll agency would achieve if 100% of customers paid) that comes from video toll customers. While this will increase the collected revenue, it also increases the percentage of revenue leakage because of the inherent risks of collecting video transactions. Assuming the same percentage of video transactions are collected in each scenario, the value of the video transaction revenue with a higher differential toll will directly affect the calculation of overall revenue leakage (**Collected Revenue** divided by **Earned Revenue** equals percentage of revenue leakage). It should also be noted that the revenue estimates do not include any collected late fees or administrative fees, which will increase the amount of total collected revenue.

HEAVY VEHICLE RATES

Due to increased wear on pavement and structures, toll agencies typically charge higher tolls for heavy vehicles. Two different methods for vehicle classification will be considered in the models.

- Test 1: This scenario is the base condition, used in Stage 1. Medium Trucks (2 or 3-axles) and Heavy Trucks (4-axles or more) are assessed toll rates that are 2 and 5 times the 2-axle auto toll rate. This is the heavy truck toll rate policy currently envisioned for the LSIORB Project.
- Test 2: N-1 Truck Toll Rote Formula: This is a common approach for establishing toll rates for heavy vehicles based upon the number of axles, using the formula below:

$$Heavy\ vehicle\ rate = (2\ axle\ rate) * (Number\ of\ axles - 1)$$

EVALUATING PARAMETER TEST RESULTS

The results of the tests of each parameter will provide insights into the impact on traffic and revenue of adjusting from the Stage 1 assumptions, and allow an informed discussion into which of values of each parameter should be used for the project.

NUMBER OF LANES

The base scenario in Stage 1 considered a 16-lane configuration. The sensitivity testing will also consider a 14-lane configuration.

STAGE 3: RUN COMBINED TOLL ALTERNATIVES

Using the toll rates selected in Stage 1 and the parameters determined in Stage 2, the model will be run with the combined attributes. The results of this model will be used as a basis for recommendation for the tolling policies considered.

BRENT SPENCE BRIDGE CORRIDOR
Moving the Economy, Creating Jobs

Evaluation of Toll Alternatives Suggested 3-Stage Process

1 Test Peak and Off-Peak Rates

- Test Peak rates: $1.00, $1.50, $2.00, $2.50, & $3.00
- Test Off-Peak rates (50% of peak rate): $0.50, $0.75, $1.00, $1.25, & $1.50
- For tests:
  - ❖ No frequent use discount
  - ❖ Video toll premium = 50% of ETC toll
  - ❖ Medium trucks = 2-axle
  - ❖ Heavy trucks = 5-axle
  - ❖ 16 lane BSB design

Impact of Toll Rate on Revenue and Traffic

2 Conduct Parameter Sensitivity Tests

- Select Peak and Off-Peak rates that balance revenue and use
- Frequency Discount of 50% of peak 2-axle toll
- Video Toll Premium:
  - ❖ 50% of 2-axle ETC toll
  - ❖ 100% of 2-axle ETC toll
- Heavy Vehicle Rates:
  - ❖ Test 1:
    - • Medium = 2-axle
    - • Heavy = 5-axle
  - ❖ Test 2: "N-1" truck toll rate formula: The truck toll rate is the 2-axle toll rate times the number of axles, minus one.
    Heavy vehicle rate = 2-axle rate * (# of axles - 1)
- Test with 14-lane design

3 Run Combined Toll Alternatives

- Use results from Stages 1 & 2 to select combined attributes
- Run alternative and use as basis for recommendation

Notes:
- Toll rates per one-way trip
- Peak periods: 6-9AM & 4-7 PM
- Frequency discount eligibility assumes 40 one-way trips per month and is only good for transponder customers
- While raising the video toll premium increases total revenue, it also increases lost revenue due to leakage, as video tolling has a higher leakage rate than ETC
- Stage 2 – each items is tested on the agreed upon Stage 1 scenario.

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