Washington State Transportation Commission

SR 99 Traffic and Revenue Analysis

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Steve Abendschein, Senior Planner, Stantec

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Building a New SR 99 Corridor
Traffic Patterns Change with the SR 99 Tunnel

- Full access at tunnel portals to northbound and southbound SR 99 and ramps to downtown city streets.
- Removal of viaduct’s Columbia and Seneca ramps.
- Removal of viaduct’s Elliott and Western ramps.
Advisory Committee on Tolling and Traffic Management

• The committee's scope was established via:
  – Federal Highway Administration-issued Record of Decision.
  – Seattle Department of Transportation and WSDOT Memorandum of Agreement.
  – City of Seattle's resolution 31323.

• The committee made advisory recommendations in 2014 on strategies for:
  – Minimizing traffic diversion from the tunnel due to tolling.
  – Tolling the SR 99 tunnel.
  – Mitigating traffic diversion effects on city streets and I-5.
History of SR 99 Toll Traffic and Revenue Studies

• Several toll feasibility studies conducted over 2002-10
  – ESSB 5768 passed in 2009 session identified a deep bored tunnel as preferred option, analyzed with tolls in 2010
  – Modeling tools don’t adequately capture travel times/delays associated with alternative routes to a tolled tunnel within the downtown street grid

• Advisory Committee on Tolling & Traffic Management (ACTT) 2011-14
  – City of Seattle and WSDOT collaborate on a more in-depth analysis of tolling
  – Dynamic Traffic Assignment (DTA) model was developed to better simulate the performance of alternative routes to the tolled tunnel
  – 9 toll scenarios analyzed as part of the ACTT study
  – Recommended toll rate that meets financial obligation while minimizing diversion

• Investment Grade T&R Study 2015-17
  – 5 preliminary scenarios analyzed in 2015 to frame discussion
  – Data collection and model refinement / calibration in 2016
  – 3 investment-grade scenarios, including one based on ACTT recommendation
SR 99 Tolling Process

- Legislature requires $200 million from tolling
- ACTT Planning-Level Study
- Investment-Grade Traffic & Revenue Analysis
  - Bonds Sold
- April 2017: Collaboration with Partner Agencies
  - WSTC Rate-Setting Process
    - Additional Analysis
    - Public Outreach
  - WSTC Establishes Rates
    - Tunnel opens
    - Tolling begins
Stantec’s International Traffic and Revenue Practice

- Completed over 140 Investment Grade T&R Studies for 35 different clients
- Over $43B in bond sales
- Over $20B in bond sales since 2009 (post-recession)
- Experienced with TIFIA, rating agencies, and investor community
- Managing Leader for Stantec’s T&R Group
- Project Manager for all west coast clients
## Model Assumptions Comparison

### SR 99 IGS vs. ACTT

<table>
<thead>
<tr>
<th>Input</th>
<th>ACTT Study</th>
<th>IG T&amp;R Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Based on count data from</td>
<td>2010</td>
<td>2015</td>
</tr>
<tr>
<td>Zonal Structure</td>
<td>PSRC 1k Model with Seattle zonal</td>
<td>PSRC 4k Model</td>
</tr>
<tr>
<td></td>
<td>enhancements</td>
<td></td>
</tr>
<tr>
<td>SED Forecasts</td>
<td>PSRC 2006 Forecast with PB adjustments for recession</td>
<td>BERK 2015 Forecast</td>
</tr>
<tr>
<td>Value of Time (VoT – 2015 $)</td>
<td>Average: $18.80</td>
<td>Average: $20.05</td>
</tr>
<tr>
<td>Range of VoT</td>
<td>High: $29.14</td>
<td>High: $24.03</td>
</tr>
<tr>
<td></td>
<td>Low: $14.80</td>
<td>Low: $15.90</td>
</tr>
<tr>
<td>VoT Stratification</td>
<td>6 vehicle classes</td>
<td>12 vehicle classes</td>
</tr>
<tr>
<td></td>
<td>(software limit)</td>
<td>(software limit)</td>
</tr>
<tr>
<td>Modeling of PBM Toll Increment</td>
<td>Not modeled; Only GTG rate modeled</td>
<td>Modeled explicitly as separate toll rate</td>
</tr>
<tr>
<td>Toll Diversion Process</td>
<td>Generalized cost function (toll as time penalty) by vehicle class</td>
<td>Binary LOGIT(toll choice) function by trip purpose and occupancy</td>
</tr>
<tr>
<td>Bias Constants</td>
<td>None</td>
<td>Toll and Electronic Toll Collection (ETC)</td>
</tr>
<tr>
<td>DTA Model Software Version</td>
<td>Dynameq 2.6</td>
<td>Dynameq 4.0</td>
</tr>
</tbody>
</table>
Study Area
Investment Grade Traffic and Revenue | Key Inputs

Comprehensive data collection

- Traffic counts, including turning movements at intersections and volumes on arterials, plus analysis of historical count data
- Speed measurements using travel time runs and corridor speeds
- Trip origins and destinations from regional surveys and corridor level “big data” sources (Airsage, Streetlight)

Socio-economic forecasts (population, households, and employment)

- Independent forecasts prepared by Berk
- Focus on 14 core districts serving as SR 99 catchment area
- Socio-economic forecasts are higher than those used for the ACTT study

Future highway and transit network conditions

- Includes closure of 3rd Ave transit tunnel to buses
Two-tiered modeling structure

- PSRC Regional Model → Dynamic Traffic Assignment (DTA) model
- Trip tables, modal splits, and trip characteristics extracted from the regional model and incorporated into the DTA model

DTA model simulates realistic congestion conditions and driver response to tolling

- The IG work employs a more complex, toll choice component in the DTA model than previous ACTT work
- Results in higher driver sensitivity to tolls

Model was calibrated for screen-line volumes, time of day patterns, speeds, and trip ends (origins/destinations)
Investment Grade T&R Study | Key Assumptions

- Forecast start date of 3/1/2019, with following ramp up assumed:
- Forecast period: FY 2019-59
- Truck shares and average toll multipliers (relative to 2-axle auto toll):
- No HOV exemptions
- Pay By Mail toll increment of $2.00 (non-escalating)
- Pay By Plate fee of $0.25 (non-escalating)
- No toll escalation (except in maximum revenue Scenario IG-2)
- 96 routine maintenance closures per year on nights and weekends
- Values of time are based on values from existing area toll facilities

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Ramp-Up Assumption</th>
<th>Forecast Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019 (4 months)</td>
<td>75%</td>
<td>25%</td>
</tr>
<tr>
<td>2020</td>
<td>80%</td>
<td>20%</td>
</tr>
<tr>
<td>2021</td>
<td>97%</td>
<td>3%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vehicle Class</th>
<th>Toll-Free Share of Traffic</th>
<th>Average Axle Count</th>
<th>Toll Multiplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autos / Small Trucks</td>
<td>93%</td>
<td>2.00</td>
<td>1.00x</td>
</tr>
<tr>
<td>Medium Trucks</td>
<td>3%</td>
<td>2.11</td>
<td>1.06x</td>
</tr>
<tr>
<td>Large Trucks</td>
<td>4%</td>
<td>4.17</td>
<td>2.09x</td>
</tr>
</tbody>
</table>
# Toll Scenario Assumptions

<table>
<thead>
<tr>
<th>Toll Scenario</th>
<th>Toll Rate Schedules*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scenario IG-0</strong></td>
<td></td>
</tr>
<tr>
<td>(Financial Plan)</td>
<td>Minimum $1.00 11 PM-5 AM Nights &amp; All Day on Weekends</td>
</tr>
<tr>
<td></td>
<td>Off-Peak $1.50 5-6 AM, 9 AM-3 PM, &amp; 6-11 PM Weekdays</td>
</tr>
<tr>
<td></td>
<td>AM Peak $1.75 6-9 AM Weekdays</td>
</tr>
<tr>
<td></td>
<td>PM Peak $2.50 3-6 PM Weekdays</td>
</tr>
<tr>
<td><strong>Scenario IG-1</strong></td>
<td></td>
</tr>
<tr>
<td>(Low Diversion)</td>
<td>Minimum $1.00 11 PM-5 AM Nights &amp; All Day on Weekends</td>
</tr>
<tr>
<td></td>
<td>Off-Peak $1.00 5-6 AM, 9 AM-3 PM, &amp; 6-11 PM Weekdays</td>
</tr>
<tr>
<td></td>
<td>AM Peak $1.25 6-9 AM Weekdays</td>
</tr>
<tr>
<td></td>
<td>PM Peak $1.25 3-6 PM Weekdays</td>
</tr>
</tbody>
</table>

* Pay By Mail toll rates are $2.00 higher; Scenario IG-2 toll rates for FY 2019 are rounded to the nearest nickel.

Note: All three scenarios assume that buses are no longer allowed to use the 3rd Ave tunnel and that the Alaskan Way viaduct has been removed and the surface Alaskan Way is open with all improvements completed.
SR 99 and Alaskan Way Daily Volumes at Pike and Union

*Results show that toll rates between $1 and $1.25 do not raise the $200 million in revenue required by the Legislature.
SR 99 and Alaskan Way Daily Volumes at University and Seneca
FY 2020 – SR 99 Volumes (Daily)

Northbound

- Existing Configuration: 38,800
- Toll-Free: 49,500
- IG-0: 24,800
- IG-1: 27,300

Southbound

- Existing Configuration: 33,400
- Toll-Free: 47,800
- IG-0: 27,000
- IG-1: 29,000

*Existing Configuration Volumes between Pike and Union
FY 2020 – SR 99 Volumes (AM)

Northbound

Southbound

*Existing Configuration Volumes between Pike and Union
FY 2020 – SR 99 Volumes (MD)

Northbound

*Existing Configuration Volumes between Pike and Union

Southbound
FY 2020 – SR 99 Volumes (PM)

*Existing Configuration Volumes between Pike and Union
FY 2020 – SR 99 Volumes (EV)

Northbound

*Existing Configuration Volumes between Pike and Union

Southbound
FY 2020 – SR 99 Volumes (NT)

Northbound

*Existing Configuration Volumes between Pike and Union

Southbound
FY 2020 Weekday Traffic Profiles
## Tunnel Volume by Vehicle Class

### FY 2020

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Total (24-hour) Daily Volume</th>
<th>Vehicle Classification Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Auto / Small Truck</td>
</tr>
<tr>
<td>IG-0</td>
<td>51,800</td>
<td>49,000</td>
</tr>
<tr>
<td>IG-1</td>
<td>56,200</td>
<td>53,000</td>
</tr>
</tbody>
</table>

### FY 2040

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Total (24-hour) Daily Volume</th>
<th>Vehicle Classification Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Auto / Small Truck</td>
</tr>
<tr>
<td>IG-0</td>
<td>67,300</td>
<td>63,100</td>
</tr>
<tr>
<td>IG-1</td>
<td>70,000</td>
<td>65,600</td>
</tr>
</tbody>
</table>
# DTA Network Summary

## FY 2020

<table>
<thead>
<tr>
<th>AM</th>
<th>MD/PM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Toll-Free</strong></td>
<td><strong>IG-0</strong></td>
</tr>
<tr>
<td>Total VMT (miles)</td>
<td>1,270,362</td>
</tr>
<tr>
<td>Total VHT (hours)</td>
<td>41,873</td>
</tr>
<tr>
<td>Average Speed</td>
<td>30.3</td>
</tr>
<tr>
<td>Average Trip Length (miles)</td>
<td>3.66</td>
</tr>
</tbody>
</table>

## FY 2040

<table>
<thead>
<tr>
<th>AM</th>
<th>MD/PM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Toll-Free</strong></td>
<td><strong>IG-0</strong></td>
</tr>
<tr>
<td>Total VMT (miles)</td>
<td>1,340,385</td>
</tr>
<tr>
<td>Total VHT (hours)</td>
<td>51,375</td>
</tr>
<tr>
<td>Average Speed</td>
<td>26.1</td>
</tr>
<tr>
<td>Average Trip Length (miles)</td>
<td>3.61</td>
</tr>
</tbody>
</table>
GTG and PBM Transactions

GTG Transactions

PBM Transactions
Total Transactions

Note: Assumes tolling starts 3/1/2019
GTG and PBM Revenue

GTG Revenue

PBM Revenue
Total Gross Potential Revenue

Note: Assumes tolling starts 3/1/2019
Gross Toll Revenue Potential Forecast Comparison
SR 99 Tunnel Scenarios IG-0, IG-1 & ACTT 7

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Scenario IG-0</th>
<th>Scenario IG-1</th>
<th>ACTT Scenario 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM Peak Period</td>
<td>$1.25</td>
<td>$1.25</td>
<td>$1.75</td>
</tr>
<tr>
<td>Midday / Evenings</td>
<td>$1.00</td>
<td>$1.00</td>
<td>$1.50</td>
</tr>
<tr>
<td>PM Peak Period</td>
<td>$1.25</td>
<td>$1.25</td>
<td>$2.50</td>
</tr>
<tr>
<td>Nights / Weekends</td>
<td>$1.00</td>
<td>$1.00</td>
<td>$1.00</td>
</tr>
</tbody>
</table>

Note: ACTT Scenario 7 includes 1.3% annual toll escalation.

Fiscal Year

$ millions
Initial review by Office of State Treasurer

- **Scenario IG-0**: Referred to as the “Financial Plan – Toll rates selected to target the $200 million funding goal”, and

- **Scenario IG-1**: Referred to as the “Low Diversion – lower toll rates favored by the ACTT”

- **Conclusion:**
  - “This preliminary analysis suggests that projected revenues in Scenario IG-0 more than meet the financial goals described above. Projected revenues in Scenario IG-1 fall materially short of these financial goals.”
Next Steps

- Continue work with partner agencies
- Begin stakeholder and community outreach
- Rate setting to occur in late 2017 / 2018, pending Commission direction
Contact

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Learn more:
• Alaskan Way Viaduct Replacement Program Schedule – http://www.wsdot.wa.gov/Projects/Viaduct/Schedule
• Follow Bertha – www.wsdot.wa.gov/Projects/Viaduct/About/FollowBertha
• Watch Bertha’s breakthrough – https://www.youtube.com/watch?v=sLum1jxW1ls