

Toll Modeling Analysis for the SR 520 Bridge Replacement and HOV Project

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Presentation Overview

- Project Background
- Project Alternatives
- Modeling Procedures
- Summary of Findings

Project Background



- **History**
 - Bridge opened in 1963 as a tolled facility
 - Toll removed in 1979
- **Study Area**
 - Seven mile corridor from I-5 to I-405

Project Background

- **Goal** Improve mobility for people and goods across Lake Washington in a manner that is safe, reliable, and cost effective
- **Project Status** WSDOT is currently preparing a DEIS

Project Background

- **Traffic Volumes** ~ 110,000 daily vehicles trips on an average weekday



Project Background

- Alternative Routes



I-90 and SR 522



Project Alternatives

Using the EMME/2 Puget Sound Regional Council Model the following alternatives were analyzed:

- **1998 Base Year**
 - SR 520 - 2 GP / direction
 - Model was refined, updated and validated
- **2030 No Build**
 - SR 520 - 2 GP / direction
 - Included planned improvements only

Project Alternatives

- **2030 4-Lane**
 - SR 520 - 2 GP / direction
 - Non carpool are tolled
 - Transit and HOV are toll free
- **2030 6-Lane**
 - SR 520 - 2 GP / direction and 1 HOV / direction
 - Non carpool are tolled
 - Transit and HOV are toll free
- **2030 8-Lane**
 - SR 520 - 3 GP / direction and 1 HOV / direction
 - Non carpool are tolled
 - Transit and HOV are toll free
 - Additional capacity on I-5

Modeling Procedures

Base Model

- Existing 4-step PSRC model
- VDFs and GC assignment procedure from the new PSRC model
- Performed mini-validation analysis for study corridor

Modeling Procedures

Mini Validation

- Updated network attributes:
 - Coding Refinement (capacity, FFS, number of lanes, turning movements, etc)
 - Transit Service Level
- Transit and auto vehicle volumes within 10% of actual volumes for cross-lake

Comparison of Daily Vehicle Volumes

| | 1998 Base Year Estimated | WSDOT 2000 Observed | Ratio Estimated/Observed |
|---------------|-------------------------------------|--------------------------------|-------------------------------------|
| SR 520 Bridge | 113,000 | 116,000 | 0.97 |
| I-90 Bridge | 161,000 | 150,000 | 1.07 |

Modeling Procedures

General Procedure

Two-step process:

- Established trip distribution using a full model run without tolls
- Used resulting trip distribution to perform mode choice and assignments inclusive of tolls and feedback

Modeling Procedures

Different WSDOT study provided key inputs

- Value of Time (VOT) in 1990 dollars
 - Used survey data
 - Performed statistical mode choice estimate analysis
- Toll Rates in 1990 dollars
 - Special modeling analysis performed to establish toll rates

Modeling Procedures

| <i>Model Input</i> | <i>Value Expressed in Dollars of Year:</i> | | | |
|--------------------------------|--|---------------|---------------|---------------|
| | <i>1990</i> | <i>1998</i> | <i>Today</i> | <i>2030</i> |
| 2030 PM Peak Period Toll Rate | \$ 2.50 | \$3.05 | \$ 3.35 | \$ 6.50 |
| 2030 Off-Peak Toll Rate | \$ 1.35 | \$1.65 | \$1.80 | \$3.50 |
| 2030 Peak Period Value of Time | \$ 10.80 / hr | \$ 13.20 / hr | \$ 14.43 / hr | \$ 28.17 / hr |
| 2030 Off-Peak Value of Time | \$ 9.10 / hr | \$ 11.20 / hr | \$ 12.21 / hr | \$ 23.85 / hr |

Modeling Procedures

Generalized Cost Assignment

- Toll Rates
 - Peaks = 250 cents
 - Off Peak = 135 cents
- VOT
 - Peak factor = $(1/10.8) \times 60/100 = 0.0555$ min/cents
 - Off-peak factor = $(1/9.1) \times 60/100 = 0.0659$ min/cents

Modeling Procedures

Production of “Pure” Travel Times

- GC based times include toll time costs
- Used GC based link volumes to calculate “pure” travel times

Modeling Procedures

Mode Choice Model Inputs

- “Pure” travel time:
 - *3+ HOVs*
 - *Transit*
- “Pure” travel time + Toll Time Cost:
 - *Non-HOVs using GP lanes*

Model Results

- Systemwide mode share
- PM peak and daily cross-lake screenline
- Detailed traffic data for micro simulation analysis

Conclusions

- Special studies required for estimates of VOT and toll rates
- New VDFs and GC procedures were useful for more accurate forecasts
- Results assisted to evaluate alternatives effectively