SHRP 2 L38
Pilot Testing of SHRP 2 Reliability
Data and Analytical Products

Washington State Department of Transportation
and
University of Washington STAR Lab

March 13, 2013
Agenda

- Introduction
- General Approach
- Proposed Scope of Work
  - L02
  - L05
  - L07
  - L08
  - C11
- Task Timeline
Introduction

- **Data**
  - L02: Establishing Monitoring Programs for Travel Time Reliability

- **Analysis**
  - L07: Evaluation of Costs and Effectiveness of Highway Design Features to Improve Travel Time Reliability
  - L08: Incorporation of Nonrecurrent Congestion Factors into Highway Capacity Manual Methods
  - C11: Development of Improved Economic Analysis Tools

- **Project Prioritization**
  - L05: Incorporating Reliability Performance Measures into the Transportation Planning and Programming Process
General Approach

**MOVING WASHINGTON INITIATIVE**

- Provides test sites in evaluating the analytical tools
- Offers large-scale decision making and project prioritization
- Incorporates the products into business and decision-making process
General Approach

Technical Report/Guidebook Test (Model Test)
- Experimental Design
  - Test Objectives
  - Testbed Design
  - Testing Period
  - Data Collection Plan
  - Testing Method
- Data Collection
  - Testbed Installation
  - Data Collection
- Testing
  - Assumptions
  - Different Sites
  - Historical Data
- Compare

Excel Based Tool Test (Application Test)
- Validation
  - Theory
  - Algorithm
  - Calculation
- Interface
  - Friendly
  - Necessary Guidance
  - Help Documents
  - Default Setup
  - Layout
- Transferability
  - Various Scopes

Analysis and Feedback
- Result Analysis
- Conclusions
- Feedback/Potential Refinements
Travel Time Reliability Monitoring System (TTRMS)

- Major components: data manager, computational engine, and report generator
- Assist agency in understanding the reliability performance of its systems and monitor how its reliability improves over time
Proposed Approach

- Identify data sources
  - Infrastructure-based data
  - Vehicle-based data
  - Non-recurring event data
- Compute/measure route travel time
- Characterize the reliability of a given system
- Identify sources of congestion and unreliability
- Understand the impact of the sources of unreliability
Actions to Take

- Our assumption is to apply our data to the TTRMS procedure
- Use DRIVENET as platform for the data management and analysis system
- Amount of data (at least three-month of I-5 data)
- Report effectiveness, usability, and reliability of the tool
DRIVENet E-Science Platform

DRIVENet: Digital Roadway Interactive Visualization and Evaluation Network

- INRIX Data Analysis
- Freeway Traffic
- Travel Time Analysis
- Incident Induced Delay
- Freight Data Analysis
- Emission Data Analysis
- Mobile Device Routing
- WSDOT Real-Time Data

The real-time information below is provided by the Washington State Department of Transportation (WSDOT):

- [ ] Freeway Alerts
- [ ] Freeway Cameras
- [x] Freeway Travel Time
- [ ] Mountain Pass Conditions
- [ ] Border Crossings

Seattle-SeaTac (5:00 PM)
Downtown Seattle to SeaTac
From 1-5 @ University St in Seattle To 1-5 @ S 188th St in SeaTac'
Current Travel Time: 14
Average Travel Time: 15
Last Updated At: 2/17/2013 10:40:00 AM
Things to Test

- **TTRMS**
  - Experiment with the techniques to generate route-level travel time from segment-level travel time
  - Experiment with travel times and volumes to identify the association of facility travel time reliability with volumes and other relevant factors
  - Compare with published reports such as the GRAY NOTEBOOK and the annual congestion report, for product validation and potentially fine-tune the methods
Spreadsheet-based tool based on the design guide

- Measure the operational effectiveness and the economic benefits of design treatments for a freeway segment
- Benefit-and-cost comparison for non-recurrent congestion treatments
Proposed Approach

- Test site: I-5 JBLM
  - Major incidents
  - Work zones
  - Large spikes in demand
- Reconstruct I-5 JBLM to add high-occupancy vehicle and general capacity travel lanes
- Rebuild interchanges
- Construct the Cross Base Highway
Things to Test

- Estimate the potential improvement of a variety of design treatments

- Input:
  - Geometric data
  - Demand volumes
  - Crash and incident
  - Treatment
Things to Test

- **Output:**
  - Travel Time Index (TTI) curve for existing condition
  - Predictive TTI for the treated condition
  - Use customized treatment tab to evaluate proposed treatments

- **Report effectiveness and usability of the tool**
SHRP 2 L08 - Product

- Spreadsheet-based tool
  - FREEVAL and STREETVAL Computational Engines
  - Evaluate the travel time reliability under the impact of a variety of non-recurrent congestion sources
Actions to Take

- Apply FREEVAL to I-5 JBLM and STREETVAL to SR-522
- Test the tools’ usability and effectiveness
- Test the methods and guidance on incorporating travel time reliability into capacity estimates and performance measurements
Things to Test

- **Input:**
  - Time Period
  - Demand
  - Geometric data
  - Signal timing plan
  - Non-recurrent congestion source

- **Output:**
  - HCM performance measure
  - Impacts of variability on facility performance over long term (one year)
SHRP 2 C11 - Product

- Spreadsheet-based tool
  - A sketch planning tool to evaluate benefit-and-cost for multiple highway investments
  - Predict economic impacts generated by a specific project
- Output:
  - Mean Travel Time Index (TTI) to measure all types of variations, incident induced delay, and recurring delay
Potential Output Comparison

- WSDOT freight performance measures based on GPS data
  - Locate roadway bottleneck
  - Use GPS data to quantify roadway reliability

- Measure economic impact of (un)reliability
  - Add truck GPS data to improve WSDOT cost-and-benefit analysis
  - Forecast reliability
  - Explore the value of roadway reliability for trucking
Actions to Take

- Usability feedback of the tool
- Compare with the ongoing projects for corridor performance measures and cost-benefit analysis
SHRP 2 L05 - Product

- A framework for incorporating reliability into the planning and programming process
  - Provide five steps for incorporating reliability into planning and programming in order to generate support for funding to improve reliability
Actions to Take

- Apply the procedure to Moving Washington projects
- Perform reliability analysis for regional network (similar to SHRP 2 L02)
- Compare with WSDOT published reports such as Gray Notebook
- Perform benefit-and-cost analysis on reliability to identify needs and further prioritize candidate projects
- Interview or survey experts to evaluate the quality of results
## Task Timeline

<table>
<thead>
<tr>
<th>ID</th>
<th>Task Name</th>
<th>Start</th>
<th>Finish</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Task 1: Attend a One-Day Briefing</td>
<td>25/02/2013</td>
<td>29/03/2013</td>
<td>Q1</td>
<td>Q2</td>
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<td>2</td>
<td>Task 2: Prepare a Revised Research Plan</td>
<td>25/02/2013</td>
<td>30/04/2013</td>
<td>Q3</td>
<td>Q4</td>
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<td>3</td>
<td>Task 3: Compile and Integrate Data for the Test</td>
<td>01/05/2013</td>
<td>31/07/2013</td>
<td>Q1</td>
<td>Q2</td>
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<td>4</td>
<td>Task 4: Analyze Reliability and Improvement Strategies</td>
<td>03/06/2013</td>
<td>02/10/2013</td>
<td>Q1</td>
<td>Q2</td>
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<tr>
<td>5</td>
<td>Task 5: Prepare an Interim Report</td>
<td>02/09/2013</td>
<td>17/10/2013</td>
<td>Q1</td>
<td>Q2</td>
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<tr>
<td>6</td>
<td>Task 6: Apply Analytical Results for Decision Making</td>
<td>16/10/2013</td>
<td>13/12/2013</td>
<td>Q1</td>
<td>Q2</td>
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<td>Task 7: Evaluate the Reliability Products</td>
<td>02/12/2013</td>
<td>03/03/2014</td>
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<td>Q2</td>
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<td>03/02/2014</td>
<td>15/04/2014</td>
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<td>Q2</td>
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<td>30/04/2014</td>
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Thanks!

Questions?