USE OF RWIS DATA TO SUPPORT ITS OPERATIONS IN WYOMING

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Wyoming Department of Transportation, ITS Program
Mountain-Plains Consortium
Use of RWIS Data to Support ITS Operations in Wyoming

Three current projects for WYDOT

- ITS System to Reduce High Wind Truck Crashes near Bordeaux
- Variable Speed Limit System for I-80 Elk Mountain Corridor
- Developing System for Consistent Messaging on I-80 Dynamic Message Signs
ITS System to Reduce High Wind Truck Crashes near Bordeaux

- The Problem
- Study Benefits
- Work Plan
  - Phases 1 - 3
The Problem

I-25
ADT 5,700
25% Trucks
The Problem

Max Wind Speed
Bordeaux, WY
(1994-2001)
The Problem

Legend
Overturning Truck Crashes

- 5
- 6
- 7
- 8
- 14
- 18
- 20

Legend:
- Cities
- Highways
- Interstates
- Weather Stations

<table>
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<tr>
<th>MP</th>
<th># of Crashes</th>
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<td>54.17</td>
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<td>70.31</td>
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<td>70.55</td>
<td>7</td>
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<td>70.64</td>
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1994-2003
Study Benefits

- WIM on I-25 North of Cheyenne Shows only 9% are Operating Un- or Lightly-Loaded
  - Relatively few vehicles (~100 per day) on corridor are “at risk”
- Closures of I-25 have Economic Impacts Due to Delay of Freight Vehicles
  - 1-hour ~$18,000
  - 8-hour ~$150,00
  - 24-hour ~$500,000
- Avg. Cost of Crash = $83,000
High Wind Warning System

- Use RWIS Wind Data Thresholds to Implement a 3-Tiered Warning System (Warning, Severe Warning, Closure)
- Use DMS, Beacon Signs, & CB Wizard to broadcast warnings
- Consider Implementation of Weight-Based Warnings and/or Partial Closures
High Wind Warning System has Following Potential Benefits

- Reduced # of Road Closures
- Reduced Duration of Road Closures
- Reduced Crashes
- Improved Peace-of-Mind for Travelers
- Easier Operation for WYDOT
Work Plan

- **Phase 1:** July 2007 - June 2009
  - Implementing Technology
    - Installed: Updated RWIS, Speed Sensors, Additional Cameras, DVR
    - Under Design: DMS, Lighting, CB Wizard Alert System, Beacon Warning Signs

- **Phase 2:** May 2008 – July 2009
  - Measuring Baseline Conditions
  - Verify Risk Equations for Overturning and Sliding High Wind Crashes
  - Implementation of High Wind Warning System
  - Communication with Stakeholders
Work Plan

- **Phase 3: August 2009 – July 2010**
  - Monitoring System with High Wind Warning System
    - Crash Records
    - Speed Data
    - Postcard Surveys
  - Interviews with Stakeholders
  - Recommendation for Further Enhancements to System

- **Long Term**
  - Crash Record Monitoring for 3+ Years
VSL System for I-80 Elk Mountain Corridor

- The Problem
- Study Benefits
- Work Plan
  - Phases 1 & 2
The Problem

I-80
ADT 11,380
55% Trucks
The Problem

1996 to 1998

1999 to 2000

2001 to 2004

Legend

- 0.000 - 0.386
- 0.386 - 0.795
- 0.795 - 1.320
- 1.320 - 2.680
- 2.680 - 6.240

Crash Rates were calculated from Average Annual Daily Traffic (AADT), section length, and crash event data obtained from the state of Wyoming.

Crash Rates are crashes per million vehicle miles traveled.
The Problem

- “Driving too fast for conditions” common crash factor
  - Difficult to enforce and often cited only after crash has occurred
- Conditions on Elk Mountain Corridor Challenging
  - Severity of the conditions often underestimated or difficult to observe
  - Many drivers not familiar with conditions
Previous Studies Found that VSL Systems Lower Average Speeds and Lower Variability in Speeds

Can be Easier to Enforce than the “too fast for conditions” judgment call
Many current VSL Systems Utilize Overhead DMS Signs

Proposed System will Utilize Side-Mounted Signs (two at each location)
Proposed VSL

- Decision-Support System to Provide Guidelines for Setting Speed Limits
  - RWIS Data
    - Wind Speeds, Wind Gust Speeds, Surface and Subsurface Conditions, Visibility
  - Speed Data
    - Average Speeds, Variation in Speeds, Speeds by Vehicle Classification
- Protocol for Sharing and Storing Information on Speed Limit Changes for Enforcement Personnel
Study Benefits

- Expected Quantifiable Benefits
  - Fewer crashes
  - Reductions in frequency and duration of road closures

- Expected Non-Quantifiable Benefits
  - Improved ease of operations
  - Easier to enforce
  - Improved peace-of-mind for travelers
Work Plan

- Phase I: September 2007 – November 2008
  - Determine Baseline Operating Conditions
  - Purchase, Install, and Test VSL Signs
  - Develop Decision-Support System
  - Coordination with Highway Patrol

- Phase 2: December 2008 – February 2010
  - Implementation of System
  - Monitoring of System
  - Determination of System Effectiveness

- Long Term
  - Long Term Monitoring of Crash History on Corridor
Developing System for Consistent Messaging on I-80’s Dynamic Message Signs

- The Problem
- Study Benefits
- Work Plan
  - Phases 1 - 2
The Problem
Expected Quantifiable Benefits
- Fewer crashes
- Reductions in frequency and duration of road closures

Expected Non-Quantifiable Benefits
- Improved ease of operations
- Improved peace-of-mind for travelers
- Greater trust in the messages, which should lead to increased compliance with warnings
Phase 1: August 2007 – July 2008
- Document existing procedures and analyze consistency of messaging
- Survey road users to determine satisfaction with existing system and to identify areas for improvement

Phase 2: August 2008 – July 2009
- Statistical modeling of RWIS, speed, and DMS data to determine effectiveness of messaging
- Develop a decision-support system for determining messages based on real-time RWIS, speed, and condition reports
Use of RWIS Data to Support ITS Operations in Wyoming

Similarities between the projects

- Using RWIS data, along with other real-time data sources, to improve the operation of ITS technology
  - Develop operational thresholds from statistical analyses
- Aimed at improving the safety as well as increased efficiency through reduced frequency and duration of road closures
Questions?