Weather Responsive Traffic Management (WRTM) Strategies and TMC Weather Integration

Road Weather Mgmt Stakeholder Meetings
Albuquerque, NM
September 8, 2011
WRTM Program Framework

**WTRM Strategies**
- Develop new strategies
- Refine/improve existing strategies
- Create concept of operations
- Develop eval. procedures

**Performance Evaluation**
- RWM Performance Metrics
- SHRP-2 Reliability Studies

**Social Science/ Human Factors**
- Human Factors Analysis of Road Wx Advisory and Control Information

**Traffic Analysis Tools**
- Empirical Studies on Wx and Traffic
- Microscopic Analysis of Wx and Traffic
- Traffic Estimation and Prediction System (TrEPS)

**Data Collection/ Integration**
- Weather Integration in TMC
- Clarus Initiative
- Baseline Road Weather Info

- WRS
- MODSS
Developments in WRTM Strategies
Project Objectives

• Review state-of-the-practice
• Document and quantify benefits of existing WRTM strategies through an expert panel
• Identify possible improvements
• Develop concept of operations documents
• Develop procedures of evaluating the benefits or value of improved strategies
• Conduct a stakeholder workshop for WRTM

Scheduled for October 6, 7 in Portland Oregon following the TMC Pooled Fund Meeting
State of the Practice

• Eight categories of WRTM strategies were identified and over 20 strategies described.
  – Motorist advisory and alert/warning systems
  – Speed management strategies
  – Vehicle restriction strategies
  – Road restriction strategies
  – Traffic signal control strategies
  – Traffic incident management
  – Personnel/Asset management
  – Agency coordination and integration
State of the Practice (Cont)

• WRTM strategies tend to be localized.
  – Numerous applications exist to deal with certain specific problem locations/road segments
  – Strategies that address regional travel impacts are rare and primarily exist in the motorist advisory arena

• WRTM strategies use observed weather and traffic condition data
  – Very few use forecast data (mainly vehicle/route restrictions)
  – Most strategies respond to deteriorating traffic conditions

• Very few proactive WRTM strategies

• Limited documentation of benefits of the WRTM strategies
Expert Panel for Improved WRTM

• Dave Kinnecom – Utah Department of Transportation (UDOT)
• Brian Fariello – Texas DOT (San Antonio)
• Vince Garcia – Wyoming DOT
• Tina Greenfield Huitt – Iowa DOT
• Gene Donaldson – Delaware DOT
• Jack Stickel – Alaska DOT
• Sheldon Drobot – National Center for Atmospheric Research
• Rob Helt – City of Colorado Springs
• Peter Koonce – City of Portland
Recommended Improvements to WRTM Strategies

- Improved linkages between weather conditions and traffic operational impacts
- Detailed guidance on where and when to use active warning systems
- Improved impact prediction and decision support capabilities
- Enhanced weather information integration at TMCs
- Better techniques and tools to facilitate intra- and inter-agency coordination during weather events
- Improved coordination between transit service providers and traffic management agencies
Concepts of Operations for New or Improved WRTM Strategies

- Based on the state-of-practice review and the recommended improvements from expert panel
  - Weather Responsive Active Traffic Management – including vehicle, facility and route restrictions
  - Weather Responsive Traffic Signal Management
  - Weather Responsive Traveler Information – including both pre-trip and en-route traveler information
  - Seasonal Load Restrictions
  - Intra- and Inter-agency coordination
WRTM Evaluation Framework

**Pathway**

- **WRTM Strategy (Broadly Defined)**
- **Specific Strategy/System Implementation**
- **System Outputs**
- **Expected Benefits/Outcomes**
- **Achievement of National ITS Goals**

**EXAMPLE**

- **Active Warning System**
  - Automated system to warn travelers that ice may be present on a bridge at a specific location and to proceed with caution
    - • Accuracy of warning relative to conditions
    - • Timeliness of warning
      - • initiation
      - • removal
    - • Reduction in vehicle speeds
    - • Reduction in crashes, injuries, and fatalities
    - • Changes in driver perceptions of understandability and usefulness of the warnings
    - • Improved safety
    - • Improved driver satisfaction
TMC Wx Integration Project

• **Objectives:** Help TMC’s evaluate their use of Wx information for operations, identify needs for additional Wx information, and provide optional strategies for integrating that new information into their system

• **Accomplishments:**
  – Prepared a State of the Practice report on TMC Wx Integration
  – Developed a Self-Evaluation and Planning Guide to assist TMCs to identify needs and strategies, and prepare a plan for Wx integration
  – Worked directly with 7 TMCs across the country to conduct their self-evaluation and develop/implement Wx integration plans
Integration Activities with TMCs

• Sacramento, California Regional TMC: Implemented and evaluated the performance of a weather alert notification system

• Kansas City Scout TMC: Integrating weather event forecast information into their Advanced Traffic Management System (ATMS)

• Colorado Springs TMC: Conducting a pilot study on winter weather arterial signal timing in one of their city grids

• Louisiana statewide TMCs: Completed a comprehensive statewide self-evaluation and integration plan across their four TMCs

• Wyoming Statewide TMC: Expanding road weather information sensor coverage and implementing additional variable speed limit notification system in key corridors

• Redding, California TMC: Completed their self-evaluation but resource limitations prevented them from completing an integration plan
Outcomes and Benefits

• Increased awareness of value of Wx information and preparedness to act proactively
• More timely dissemination of road weather information to operators and the traveling public
• Greater Wx information sharing among operators, maintenance, meteorologists, and external agencies
• Improved operational response to emerging Wx conditions
• Enhanced safety, mobility and satisfaction for travelers (both general public and commercial)
• Cost savings due to more efficient and effective operational management of Wx events
Next Steps

• Continue to promote guide and assist TMC’s with self-evaluation
• Support TMC’s with implementing integration strategies
• Quantify and document the benefits of weather integration
Team Composition

• Roemer Alfelor and David Yang, FHWA
• Deepak Gopalakrishna, Battelle
• Kevin Balke, Texas Transportation Institute
• Chris Cluett, Battelle
• Fred Kitchener, McFarland Management