Testing and Evaluation of Guidelines for Disseminating Road Weather Information

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WRTM Program

Framework for the WRTM Program

- Safety, Mobility, and Performance Evaluation
- WRTM Strategies
  - Advisory Control Treatment
  - Behavioral/Human Factors Analysis
  - Traffic Analysis, Modeling, and Prediction
- Traffic and Weather Data Collection and Integration
Human Factors Analysis for Road Weather Information

- Identify traveler requirements for Road Wx information
- Review and evaluate existing Road Wx messages and dissemination methods
- Recommend strategies for improving Road Wx information content and dissemination
Phase 1 Accomplishments

1. Identified and Evaluated Existing Messages and Dissemination Strategies

2. Incorporated Information into a Road Wx Message database

3. Developed Preliminary Guidelines for Disseminating Road Wx Information

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Existing Messages and Dissemination Strategies

• *Weather Messages*: Weather advisory and control messages on precipitation, visibility, wind and extreme weather events such as thunderstorms, hurricanes, tornadoes, floods, etc.

• *Dissemination Strategies:*  
  - Kiosks  
  - Variable/Dynamic Message Signs  
  - 511/Highway Advisory Radio  
  - Websites  
  - Cellular Phones  
  - In-Vehicle Navigation Systems  
  - Other information portals
# Road Weather Message Database

**Source**

## Weather Event Messages

<table>
<thead>
<tr>
<th>Winter Conditions</th>
<th>Convective Weather</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blizzard conditions</td>
<td>Severe thunderstorms</td>
</tr>
<tr>
<td>Sleet or freezing rain</td>
<td>High winds</td>
</tr>
<tr>
<td>Freezing drizzle</td>
<td>Hail</td>
</tr>
<tr>
<td>Flurries or light snow</td>
<td>Hurricanes</td>
</tr>
<tr>
<td>Blowing snow</td>
<td>Tornadoes</td>
</tr>
<tr>
<td>Moderate to heavy snow</td>
<td>Other</td>
</tr>
<tr>
<td>Extreme cold</td>
<td>Extreme heat</td>
</tr>
<tr>
<td>Bridge or road frost</td>
<td>Blowing sand or dust</td>
</tr>
<tr>
<td>Low roadway traction</td>
<td>Smoke, mist, fog, or haze</td>
</tr>
</tbody>
</table>

## Dissemination Method

- TV
- Local AM/FM radio
- Satellite radio
- HAAR
- 511
- Portable electronic device

## Message Modality

- Visual Component
- Auditory Component

## Message Type

- Advisory
- Control

## Content

**Suggested DMS Messages for:**

**LIMITED VISIBILITY CONDITIONS**

**Warning Messages**

<table>
<thead>
<tr>
<th>Roadway Name</th>
<th>Roadway Name</th>
<th>Roadway Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dense Fog</td>
<td>Dense Fog</td>
<td>Roadway Name</td>
</tr>
<tr>
<td>Use Caution</td>
<td>Reduce Speed</td>
<td>Blowing Sand</td>
</tr>
</tbody>
</table>

**Speed Advisory Messages**

<table>
<thead>
<tr>
<th>Roadway Name</th>
<th>Roadway Name</th>
<th>Roadway Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dense Fog</td>
<td>Dense Smoke</td>
<td>Blowing Sand</td>
</tr>
<tr>
<td>Advise XX MPH</td>
<td>Advise XX MPH</td>
<td></td>
</tr>
</tbody>
</table>

**End of Queue Warning (Two Panel Message)**

<table>
<thead>
<tr>
<th>Panel 1</th>
<th>Panel 2</th>
<th>Panel 1</th>
<th>Panel 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roadway Name</td>
<td>Watch For</td>
<td>Roadway Name</td>
<td>Watch For</td>
</tr>
<tr>
<td>Dense Fog</td>
<td>Stopped</td>
<td>Dense Fog</td>
<td>Stopped</td>
</tr>
<tr>
<td>Ahead</td>
<td>Vehicles</td>
<td>Next X Miles</td>
<td>Vehicles</td>
</tr>
</tbody>
</table>

**Truck Lane Restriction (Two Panel Message)**

<table>
<thead>
<tr>
<th>Panel 1</th>
<th>Panel 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roadway Name</td>
<td>Trucks</td>
</tr>
<tr>
<td>Dense Fog</td>
<td>Right Lane</td>
</tr>
<tr>
<td>Ahead</td>
<td>Only</td>
</tr>
</tbody>
</table>

**Roadway Closed**

**Roadway Name** Closed

**Exit at Voss**

**Diversion Message (Two Panel Message)**

<table>
<thead>
<tr>
<th>Panel 1</th>
<th>Panel 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roadway Name</td>
<td>Use</td>
</tr>
<tr>
<td>Closed</td>
<td>Other</td>
</tr>
</tbody>
</table>

**PONDING OR FLASH FLOODING CONDITIONS**

<table>
<thead>
<tr>
<th>Main Lanes Passable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water on Road</td>
</tr>
</tbody>
</table>
Preliminary Design Guidelines

Weather Events → Traveler Decisions → Dissemination Methods → Guidelines

What are the Key Mobility impacts? What are the Traveler Decisions to be made? What are the appropriate Dissemination Methods?

**For Example:**
- reduced traction
- congestion
- poor visibility
- road closures

**For Example:**
- expect & plan for delays
- use alternative route
- change travel modes
- drive with greater caution
- change their driving behavior
- make safety-related preparations
- cancel their trip

**For Example:**
- DMS
- HAR
- 511
- In-vehicle devices
- Cell phones
- Kiosks
- Websites
Preliminary Design Guidelines

- 30 guidelines and 4 tutorials for road weather advisory and control information for:
  - Message content, length, and structure
  - Design of fonts, colors, icons, and alerts
  - Display of map, weather, and traffic information
  - How to communicate timeframe, urgency, likelihood

- Specific guidelines are provided for the range of dissemination methods (DMS, HAR, 511, etc.) associated with road weather information.

- The guidelines are organized around traveler information needs and driving decisions.
Preliminary Design Guidelines

Section Title: General topic area that is addressed by the guideline

Introduction: Brief definition of the scope of the guideline

Figure, Table, or Graphic: Visual representation or example of the information presented in the guideline

Key References: List of references used to write the design guideline

Guideline Title: Contains the guideline number, specific topic addressed by the guideline, and the applicable Dissemination Method types

Design Guideline: Message design guidance, always presented in a blue box

Discussion: Further explanation and rationale for the design guideline

Page Number
Phase 2 - Testing and Evaluation of Design Guidelines

1. Develop and implement a plan to test and evaluate the design guidelines.
   • On-line survey/questionnaire
     http://www.surveymonkey.com/s/X72ZSZ5
   • On-site testing/evaluation

2. Revise the guidelines based on the survey/test results and recommendations from operators and travelers.

3. Implement a set of outreach activities in order to attract, engage, and involve the user community.
Criteria for On-Site Testing/Evaluation

1. Geographical/weather variation
2. Transportation network coverage
3. Dissemination methods
4. Types of messages
5. Willingness to evaluate or improve existing dissemination methods
6. Agency responsible for posting messages
## Testing/Evaluation Sites

<table>
<thead>
<tr>
<th>Agency</th>
<th>Operational Network Coverage</th>
<th>Weather Events</th>
<th>Dissemination Methods for Weather</th>
<th>Road Wx Messages</th>
<th>Responsible for Posting Messages</th>
<th>Approach to Messages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kansas City Scout, MO</td>
<td>Urban freeway; bi-state</td>
<td>Snow, ice, flooding, wind</td>
<td>DMS, 511, website</td>
<td></td>
<td>TMC operators</td>
<td>Approved message sets</td>
</tr>
<tr>
<td>Wyoming Statewide TMC</td>
<td>Rural freeway and arterials</td>
<td>Snow, ice, wind</td>
<td>DMS, VSL, 511, website, HAR, “511 notify” that pushes weather messages to subscribers</td>
<td>Closures; variable speed limit control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colorado Springs, CO TMC</td>
<td>Urban arterials</td>
<td>Snow, ice</td>
<td></td>
<td>Traffic signal control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CDOT, Colorado</td>
<td>Freeways</td>
<td>Snow, ice, other</td>
<td>VMS, VSL</td>
<td>Op Program Mgr; Supervisor</td>
<td>Both preset and ad hoc messaging</td>
<td></td>
</tr>
<tr>
<td>WA State DOT and NW Regional TMC</td>
<td>Urban freeways and arterials</td>
<td>Snow, ice, heavy rain, flooding, wind, fog</td>
<td>DMS/VMS, website, 511, HAR</td>
<td>TMC supervisors, operations staff, regional and state-wide</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>----------------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>Maryland CHART</td>
<td>Urban freeways and arterials</td>
<td>Snow, ice, heavy rain,</td>
<td>DMS, HAR, 511 recently activated</td>
<td>Closures, advisories, icy conditions, anti-icing</td>
<td>Operations staff</td>
<td>Standardized set. SOP already for winter events</td>
</tr>
<tr>
<td>Indiana DOT</td>
<td>Urban freeways on IN side of Chicago area</td>
<td>Focus on road conditions, winter weather effects</td>
<td>DMS; a CARS state, just getting into 511</td>
<td>Advanced warning of lake snow effects</td>
<td>Dispatchers; “super users” can create custom messages</td>
<td>Both fixed message sets and ad hoc messaging</td>
</tr>
<tr>
<td>Meridian</td>
<td>Manages statewide 511 systems (for GA, KS, NE, SD, ND, MT, WY, and NV.)</td>
<td>Full range (emphasis on winter weather conditions)</td>
<td>511 phone and websites</td>
<td>Wide range</td>
<td>Varies by states</td>
<td>Varies by state</td>
</tr>
<tr>
<td>Castle Rock, Inc.</td>
<td>CARS system</td>
<td>Covers 12 states and several other entities</td>
<td>Focus on 511</td>
<td>Wide range</td>
<td>Varies by state; CRC guidance</td>
<td>Varies by state</td>
</tr>
</tbody>
</table>
Traveler Evaluation Methods

1. Focus Groups
2. Comment Forms
3. Intercept Surveys
4. Social Media