2015 Winter Maintenance Peer Exchange
Bloomington, MN
September 21-25, 2015

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FHWA Office of Operations
Road Weather Management Team
Introduction to the RWMP

• Goal:
  Improve mobility and safety by alleviating the impacts of weather on the surface transportation system

• Mission:
  “Anytime, Anywhere Road Weather Information”

Utilizes current and predicted information about weather’s effect on roads to build decision support tools and aid road users and operators to make safe and effective decisions

- When to treat/pre-treat roads for snow & ice control
- When/how to post effective traveler advisories (fog, floods, rain, snow, ice, etc.)
Weather vs. Road Weather

Weather
• The state of the atmosphere with respect to wind, temperature, cloudiness, moisture, pressure, etc.
• How will it affect me?
  - Clothing, umbrellas, emergency preparedness, etc.
• How do I get it?
  - Meteorologists, NWS, Internet, etc.

Road Weather
• The state of the roadways with respect to wind, temp., precipitation type, pavement & subsurface temp., pavement conditions, visibility, etc.
• How will it affect me?
  - Closed roads, reduced speeds, travel restrictions, tire friction loss, etc.
• How do I get it?
  - TBD???
Statistics
RWMP Meetings

• Recently held the annual RWMP Stakeholder Meeting (August 25, 2015)
  - Virtual format
  - Over 100 attendees nation-wide

• Regional Roundtable Meetings
  - Will be announcing dates soon

• 2016 RWMP Annual Stakeholder Meeting
  - In-person
  - Late Spring 2016
Increased Data Sources

Connected Vehicles

Crowdsourced
Pathfinder Project

Goal:

• Develop Guidance for Improving Collaboration Between State DOTs and the Weather Enterprise

This project is about building collaborative relationships between State DOTs and the Weather Enterprise to improve weather messages to the public:

- Better public decision-support
- *Weather* forecasts translated to transportation impact messages
- Data sharing and collaboration over the messages
- Consistent messaging from all public sources
Integrated Mobile Observations (IMO)

Objectives:
- Better understand how to capture, communicate, and process data from the vehicle’s internal codes and external road weather sensors placed on the vehicle
- Identify uses for and incorporation of the data in new and established applications
- Assess the impact and results of utilizing the data in applications

Outcomes:
- Used to enhance decision making by traffic operators, maintenance managers, and travelers
Pikalert® Vehicle Data Translator (VDT)

- Software that creates highly detailed weather and road condition output (e.g., “nowcasts” and forecasts) based on:
  - Inputs of vehicle-based measurements (i.e., vehicle actions, road conditions, and the surrounding atmosphere)
  - Other, more traditional weather data sources
- Matches quality-checked data to specific roadway segments
**Enhanced Maintenance Decision Support System (EMDSS)**

- Produces road weather forecasts and treatment recommendations to aid maintenance managers and other personnel in key decisions of treatment type, timing, rates, and locations.

- EMDSS builds on traditional MDSS by incorporating VDT output, giving high resolution forecasts that make use of mobile data.

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**Road Conditions**

- **A**
  - Avg. Air Temp: 31°F
  - Dewpoint: 29°F
  - Pavement Temp: 29.6°F
  - Precip: Mixed
  - Condition: Slush
  - Visibility: LOW

- **B**
  - Avg. Air Temp: 30°F
  - Dewpoint: 29°F
  - Pavement Temp: 27.3°F
  - Precip: Snow
  - Condition: ICE
  - Visibility: Moderate

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Motorist Advisory and Warning (MAW) System

- Displays road weather alerts and forecasts of hazards to provide traveler information to decision makers from DOT personnel to the traveling public
- Uses RWH output and a road weather forecast to provide alerts
- A web-based display can be used for decisions before traveling, a phone application provides information on the road
Road Weather Performance Measurement (RW-PM) Tool

Demonstrate prototype RW-PM tool that provides for:

• Integration of traffic mobility, road weather maintenance and motorist advisory analysis and information

• Continuous near real-time data processing, including
  - Continuous updating of traffic control, RdWx maintenance and motorist advisory recommendations as RdWx conditions evolve throughout weather events
Integrated Modeling for Road Weather Condition Prediction

• Provide the foundational systems engineering documentation (ConOps & Detailed Systems Requirements) to create a tool that:
  - Incorporates real-time and/or archived data and results from an ensemble of forecast and probabilistic models (e.g. - road weather, traffic, work zones, incidents, etc.) and
  - Fuses them in order to predict the current and future overall road/travel conditions for travelers, transportation operators, and maintenance providers.

• Tool to be used for tactical (right now) and strategic (in the near future) planning
Integrated Modeling for Road Weather Condition Prediction

Accomplishments

• Developed review of road weather and traffic condition models for potential integrations
• Developed operational concepts for integrated predictions of road conditions
• Engage stakeholders

Next Steps

• Develop system architecture and design for integrated road condition prediction
• Build and test the IMRCP
• Deploy and evaluate the IMRCP with stakeholders
The Weather Data Environment (WxDE)

- Provides timely and accurate road weather data for traveler information and for enhancing road maintenance activities
- Integrated, real-time weather condition data aggregated from fixed sources and connected vehicles
  - 49 state, local and institutional contributors
  - Vehicle Data Translation (VDT) is included
- Quality controlled and assured
- Real-time on-line and by subscription for current operations
- Archived data download for research
- Predictive forecasts for roadway conditions (coming soon)

The Weather Data Environment (WxDE)

Accomplished to Date

• Integrated with the VDT
• Archived weather data from 2009 to present
• Federated with the Research Data Exchange
• Provides available data for road segments
• Enhanced security

Planned Enhancements

• Broader road segment coverage
• RWIS monitoring service
• Standardized reporting/subscription interface
• Enhanced Web map interface
• Enhanced archive storage/retrieval
Weather-Responsive Traffic Management (WRTM)

Strategies

• Motorist advisory and alert/warning systems
• Speed management strategies
• Vehicle restriction strategies
• Road restriction strategies
• Traffic signal control strategies
Connected Vehicle (CV) Pilot Program

Goals:
• Improve Safety
  - 80% ↓ in crashes
• Improve Efficiency
  - Save 4.8 Billion hrs.
• Improve Environment
  - Reduce Emissions

New York City:
• V2V technology in 10,000 city-owned vehicles
• V2I technology throughout Midtown Manhattan

Tampa, FL:
• CV technology to solve peak rush hour congestion
• Equipping pedestrian smartphones
• Measuring environmental benefits

Wyoming:
• Focused on safe and efficient movement of freight
• V2V and V2I technology to collect information and disseminate to vehicles not equipped with the new technology
Vehicle Automation and Road Weather

• Poor sensor performance for automated vehicles under degraded environmental conditions
  - Snow, fog, dust, direct sunlight, etc.

• Looking Ahead
  - Road weather information critical for operating condition assessment
  - Potential for new opportunities for real-time road surface condition information collection
  - Potential reduction in certain weather-related crash types as sensors/technologies improve
RWMP Team

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