MDSS Development and Deployment: Accomplishments of the Maintenance Decision Support System

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Pooled Fund Study (PFS)

Maintenance Decision Support System
PFS MDSS: Historical Review

- Roots lie in STWDSR (late 1990s)
  - FHWA-led activity to scope interest and needs for road weather decision support
- 2001: Concept of a multi-state MDSS
  - Discussions begin between Mn, ND, SD, & Meridian to form an alternative to the FP MDSS
- 2002: June release of a SDDOT Research Project Statement to form a Pooled Fund Study MDSS
  - Participants: In, Mn, ND, SD
  - Expectation of a 2-year project
  - Meridian to serve as contractor
Initial PFS Planning

- Sept. 19, 2002
  - Identified Issues to Guide MDSS Development
- November 2002
  - Award of contract to Meridian to begin MDSS effort
  - 3-yr effort
PFS MDSS Guidelines

• Integrate:
  – Maintenance practices & policies
  – Available maintenance resources
  – Previously reported maintenance treatments
  – Road conditions and predictions
  – Weather conditions and forecasts

• To Yield:
  – Recommended maintenance actions that are continually updated
Concept of Operations

• Weather creates a “dynamic” layer on the road surface
• The intent of Maintenance is to modify and/or remove this layer in the most effective and efficient manner
• Bottom line is to improve safety and mobility
Pooled Fund MDSS: Project Timeline (Simplified)

2002
- Assess DOT Needs, Readiness

2003
- Evaluate Functional Prototype

2004
- Develop MDSS Software

2005
- 6-State Limited Deployment
- Refine MDSS Software
- Validation Studies

2006
- 8-State Field Trials
- 10-State Field Trials

2007
- Extensive Deployment
- 13-State Field Trials
- B/C Analysis

2008
- Full Deploy
PFS MDSS Growth

- **Joined 2002 (Charter Members)**
- **Joined 2002**
- **Joined 2004**
- **Joined 2005**
- **Joined 2006**
- **Joined 2007**

As of September 27, 2007
MDSS Map Display

1. Geographic background
2. MDSS Routes – road condition shown
3. Weather backgrounds – radar shown
4. RWIS data – road condition shown
5. METAR observation – present weather shown
MDSS Alert System

- Weather alerts
- Road condition alerts
- Blowing snow alerts
- National Weather Service watches and warnings

PFS MDSS Accomplishments
MDSS incorporates camera images as a support resource.

PFS MDSS Accomplishments
PFS MDSS map is a link to more detailed pavement and weather info.
Users may display:

- RWIS histories (shown here)
- NWS METAR observations
- MDSS route conditions and forecasts

Users may:

- Choose tabular or graphic formats
- Configure table to user’s desired parameters
- Set time step for display
PFS MDSS integrates maintenance actions reported from manual and automated sources:

- Maintenance actions
- Road conditions
- Weather conditions
- Pavement temperatures
**PFS MDSS** generates maintenance recommendations showing:

- Road temperature
- Road condition
- Percent ice
- **Maintenance actions**
- Depth of ice
- Depth of liquid
- Depth of snow

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PFS MDSS Graphic Route Display
Forecasted Weather Conditions
Freezing Rain / Sleet Probability

Rain Probability

Snow Probability

PFS MDSS Graphic Route Display
Forecasted Precipitation & Road Conditions
Maintenance Recommendations and Forecasted Road Conditions

- Liquid Depth
- Snow Depth
- Maintenance Actions
- Pavement Temp
- Freeze Point Temp
- Dew Point
- % Ice
In-Vehicle MDC/AVL MDSS

Two way data flow maximizes value of MDC/AVL systems
MDSS Transition to Deployment

- Deployed (with separate maintenance agreement)
- Deployed (with PFS enhancement and maintenance Support)
- No PFS MDSS Activity
- Pre-Deployment Preparation
- Field Trials
- Assessment and Exploration

Time

Research

Operations

Continuing Research Efforts
Summary of Achievements

• GIS display of weather, pavement, & route conditions
• Display of vehicle location and treatment history
• Display of video imagery
• Enhancement of alert system
• Support for site specific pavement condition modeling
• Integration of actual treatment activity into pavement condition model
• Integration of ‘traffic actions’ into pavement condition model
• Incorporation of standard maintenance practices where MDC/AVL data is not available
• Introduction of innovative treatment recommendations based on performance and cost considerations
• Creation of in-vehicle display of weather conditions and route recommendations
MDSS Development and Deployment: Accomplishments of the Maintenance Decision Support System

For More Information:
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