

Pooled Fund Study Project TPF-5(054)
SDDOT Project SD2002 – 18
Development of Maintenance Decision Support System
Phase VI
First Quarter Progress Report
January – March, 2011

Overview

Phase VI first quarter (Q1) 2011 continued winter operations in all states involved with the PFS, including full customer support, forecasting support (where necessary), and route adjustments as noted. Most locations completed training with their MDSS users during 2010 Q4, but some locations still requested some training during Q1. During training sessions in Q4 there were requests from many users for a reference guide to provide an overview of each module within the system. The reference guide was completed and distributed to users during Q1.

MDSS research and development also continued during Q1. From direction received at the Q4 Technical Panel meeting, a major research focus of Q1 has been the assessment of recommendations. Enhancements were made to the MDSS GUI to collect information from the field to support case studies regarding the assessment of recommendations. Numerous other enhancements to the GUI were also developed and/or released during Q1, as detailed below. Version 7.10 of the MDSS GUI was the latest version available as of the end of Q1.

Progress by Task

Specific accomplishments on the explicit tasks of the Phase VI work plan during the first quarter of 2011 follow.

TASK 14: Refine and evaluate techniques for acquiring, managing, using, and reporting information from mobile data collection equipment mounted in winter maintenance vehicles and for providing information to maintenance operators via the same equipment.

Meridian continued to work with a number of PFS member agencies to incorporate new data feeds and to resolve issues reported from the field relating to the provision of MDSS information back into maintenance vehicles. During Q1 this included the interpretation of VDT data (e.g., weather and road condition) from PreCise for deployments in Wyoming and Kansas, as well as the addition of PreCise data feeds for several counties in Wisconsin (Menominee, La Crosse, and Fond du Lac). Data feeds from Interfleet, for the Kentucky Transportation Cabinet, and Zoom Info Systems, for Adams and Green Lake counties in Wisconsin, were also initiated. From the standpoint of managing and utilizing this information, the development of capabilities for generating reports that leverage the MDC/AVL information has continued to be a focus during Q1. Specifically,

Meridian has completed the design process and a significant amount of the development work for a database intended to house the MDC/AVL and corresponding MDSS and weather data in a manner that makes it more readily accessible for report generation and MDSS/MMS/ATIS integration, and has released an initial suite of tools for generating reports based upon this and similar information. Evaluation of data from these initially-released reports has led to the discovery and rectification of several longstanding issues in MDSS' MDC/AVL data processing and interpretation.

TASK 15.: Refine and evaluate the capability and performance of MDSS software components, including surface condition prediction models and graphical user interface.

Task 15 efforts during Q1 have included refinement of code relating to proxy servers, the tool for assessment of recommendations, and the "METAlerts" interface, as well as a near complete rewrite and enhancement of the "Route View" within the MDSS GUI. This rewrite will finally provide a client-side tie-in to MDSS' capability for modeling conditions on segment 'tiles'. Tiles are considered to be generic subareas within an MDSS segment that are expected to exhibit a relatively uniform response to weather conditions. Examples of applications of tiles may be to model bridge decks within an MDSS segment separately from roads, or to model sheltered areas separately from open areas. The new and improved Route View will also provide a 'heads-up' display that will feature other new information not previously available to MDSS users, including cross-sectional profiles of moisture, vertical profiles of roadbed temperature, and indications of deicer and abrasive residual amounts. As is typical for a winter quarter given the expanding winter deployments, an extensive amount of time was consumed with debugging user-reported problems, especially related to new features of the MDSS GUI and new computing environments that are encountered in expanding deployments. The server-side infrastructure of the MDSS system was improved in Q1 through the initial testing of routing of MDSS' traffic through the AT&T Content Delivery Network (CDN). Use of the CDN is expected to reduce bottlenecks, and potentially communications costs, via offsite caching of MDSS' data. The development of an assessment tool for MDSS recommendations continued for Q1. The interface for user assessment of recommendations was modified to allow users to accept, accept conditionally, and decline recommendations and then give more detail for a declined recommendation. An issue arose when users tried to evaluate recommendations for more than one segment on a route. Further investigation will be needed to resolve this but will be conducted in Q2. Over 150 assessments of recommendations were made this quarter from eight participating states. Several case studies were made of assessments and a few of these studies were presented at the early spring tech panel meeting. Further review of the assessments will be conducted in Q2 and Q3 of this year. The study will be continued next season.

TASK 16: Recommend, develop, and evaluate methods for enhancing highway agencies' management through interfaces between MDSS and other management systems, analysis of winter maintenance practices, and extension of MDSS techniques to non-winter applications.

Work toward improving the management reports toolset in the MDSS GUI has continued during the quarter (task 16.1). Efforts during Q1 have focused heavily on continued assessment and refinement of a new tool for wintertime precipitation analysis. This tool, the development of which was initiated under the Clarus project, shows considerable promise for improving MDSS' ability to support management-oriented performance analysis where an accounting for variable weather conditions is required. While still undergoing refinements, this tool is now serving as MDSS' primary resource for observed precipitation information.

Work on the agency integration task (16.3) during Q1 has focused primarily upon integration of MDSS with maintenance management systems (MMS). Meridian has been directed to initially focus on the development of tools for generating reports of the nature required by MMS systems. Toward this end, Meridian has completed design of an SQL database schema appropriate for storing MDSS and MDC/AVL data in a manner that is more amenable to the generation of MMS-oriented reports. Refinement of this schema, as well as development of software for interfacing with this database, has been a primary focus of Q1. This includes the software required to populate, maintain, and query the database, and software oriented toward the development of specific reports. Some preliminary types of reports have been made available to MDSS users during the 2010/11 winter season, but are only available for a limited timeframe after real-time pending transition of these tools to the SQL database.

No significant progress has been made in the task of improving integration between MDSS and ATIS systems. The SDDOT was nominated as the testbed for exploring these applications, and that effort is presently on hold pending SDDOT's transition to a new road condition reporting system.

TASK 17: Develop a model MDSS procurement specification suitable for use by public highway agencies.

No changes were made to the procurement specifications during Q1.

TASK 18: Provide weather forecast support, MDSS Configuration support, live MDS operations, and necessary training for continuing limited deployment field trials in the participating highway agencies.

The start of Q1 continued full operations throughout the PFS states. Operational costs were reconfirmed during Q1 and all states' costs were finalized. Some states looking for insight to next winter season's costs request cost estimates for possible operations. These estimates were provided to those states.

Similar to winter operations in past season, route configuration and adjustments were made throughout Q1. These route reconfiguration changes included updates to maintenance practice information, chemical adjustments per agency changes, and adjust routes to match agency changes. Along with configuration changes, the development of a reference guide was provided to users during Q1. The purpose of this document was to highlight key points with each module within the system. With this premise in mind, the

document was developed so each page addresses a different module and thus can stand alone and does not rely on other pages within the document. This reference guide does not replace the MDSS GUI manual but provides an additional resources requested by the users in the field.

During Q4 there was a lot of onsite training conducted across all MDSS states. Training was not the focal point during Q1 but some locations still had on site training. **Error! Reference source not found.** shows the list of states, dates, locations and trainers that were present at the training conducted during Q1. States that are denoted with a “*” represent those agencies that are not billing their operations via the MDSS PFS contract. The training in CO and MD were initial MDSS training for the winter season while the other training was follow-up training for advanced users.

<i>State</i>	<i>Location</i>	<i>Date</i>	<i>Trainer(s)</i>
<i>IN*</i>	Warsaw & Seymour	1/18-1/19	Ben Hershey
<i>WI*</i>	Wausau & Madison	1/20-1/21	Ben Hershey & Tony McClellan
<i>W*Y</i>	Douglas/Casper, Sheridan, Sundance, Gillette	1/24-1/27	Gordon Bell
<i>CO*</i>	Durango & Grand Junction	2/1 & 2/3	Ben Hershey & Gordon Bell
<i>MD</i>	Hampton Roads	2/9	Tony McClellan
<i>WY</i>	Casper	3/3	Ben Hershey & Gordon Bell
<i>CO*</i>	Denver	3/21	Gordon Bell

Table 1: Training schedule during Q1.

TASK 19: Prepare a report summarizing methodology, findings in performance, conclusions and recommendations.

No activities have been performed for this task during Q1. A Major Report on the study to date was created during the Q1 2008 and will eventually serve as the basis for the Final Report.

TASK 20: Make an executive presentation to the project’s technical panel and provide electronic copies of the presentation material to participating states.

No activities have been performed for this task during Q1.