

**Pooled Fund Study Project TPF-5(054)**  
**SDDOT Project SD2002 – 18**  
**Development of Maintenance Decision Support System**  
**Phase V**  
**Second Quarter Progress Report**  
**April – June, 2009**

**Overview**

The foci of Phase V second quarter (Q2) 2009 were the wrap-up of 2008/2009 winter operations for the fourteen member states and continued research and development efforts. Operation efforts came to a close during Q2, although many states continued to experience some winter weather during the months of April and May. No additional training was conducted, but forecasting and customer support were provided during Q2.

Development activities continued during the quarter including enhancements to user display capabilities. This includes modifications to the panning/zooming functions of the MDSS GUI and the integration of Winter Maintenance Response Index (WMRI) functionality into the MDSS system. Internal changes were also made to accommodate the large number of saved storms in each state. The changes made in Q2 will be available to users during Q3.

The MDSS deployment guide was presented to the Technical Panel during the late May meeting. This document included input from states that provided information back on a questionnaire sent during Q1.

**Progress by Task**

Specific accomplishments on the explicit tasks of the Phase V work plan during the second quarter of 2009 follow.

**TASK 13: Provide weather forecast support, MDSS configuration support, live MDSS operations, and necessary training for continuing deployment field trials in the participating highway agencies throughout the 2007-2008 and 2008-2009 winter seasons.**

MDSS operations continued in all 14 states until winter operations had concluded on all MDSS routes. Winter weather continued well into Q2 in many areas, allowing users the opportunity to continue to use MDSS in their winter operations. The late winter also allowed states to assess their MDSS deployments and begin making plans for next winter.

There were additional requests to save storms from the PFS member states during the quarter. Steps were taken to ensure all storms that needed to be saved were captured, including taking some storms offline until additional resources were available to host these storms for all to view. Discussions between Meridian and the states were conducted to ensure critical storms for training or other immediate uses were not moved offline. There were substantial internal changes made to ensure that beginning in Q3, all saved storms will be always be accessible by all users (although limits on the number of storms that can be saved for an agency still apply).

At the conclusion of the 2008-2009 winter season the PFS MDSS had a total of 912 maintenance routes. **Table 1** shows the breakdown of the number of routes per state. **Figure 1** also shows the geographic distribution of routes across the U.S.

Table 1: Breakdown of routes per state following the 2008-2009 winter season

Breakdown of Number of Routes by State			
State	# of Routes	State	# of Routes
California	6	Nebraska	101
Colorado	110	New Hampshire	7
Indiana	156	New York	17
Iowa	64	North Dakota	77
Kansas	18	South Dakota	80
Kentucky	5	Virginia	9
Minnesota	194	Wyoming	68

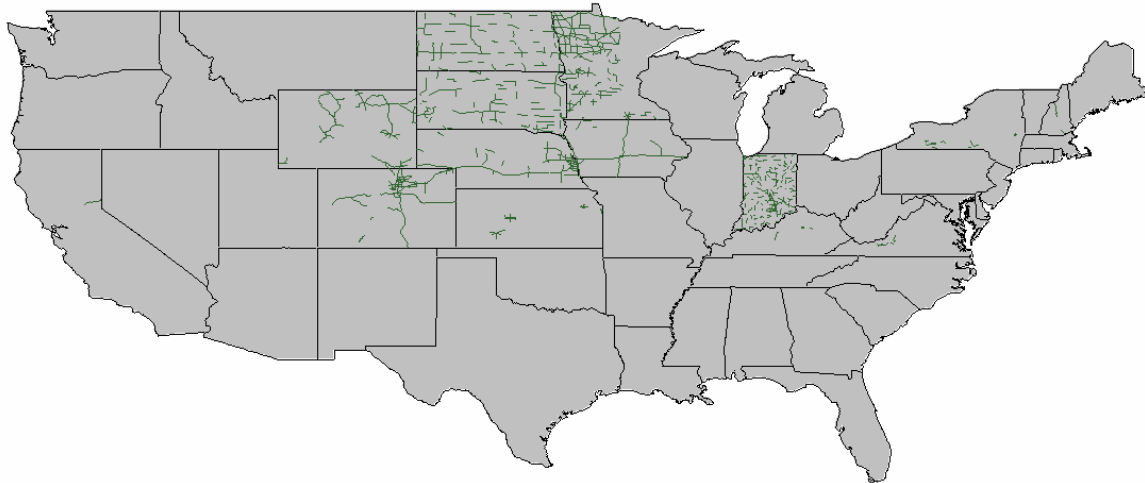


Figure 1: Distribution of routes geographically across the 14 states with MDSS routes.

**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.**

Enhanced in-vehicle MDSS software developed during previous quarters (associated with subtask 14.2) has been largely implemented and is available for use as of the end of Q2 2009. In addition, Meridian has 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. From the standpoint of managing and utilizing this information, the development of capabilities for generating reports geared toward management personnel in agencies using MDSS have been a focus of Q2. Many of the envisaged reports focus on facilitating both individual and combined managerial analysis of MDC/AVL and MDSS information.

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

Efforts to improve the capability and performance of MDSS continue on an ongoing basis. Subtasks 15.1, 15.2, 15.4, 15.5, 15.7, and 15.8 were all completed in previous quarters. Subtask 15.6 is presently being addressed through the inclusion of capabilities for generating management-oriented reports via the MDSS GUI. Other enhancements and adjustments to MDSS' modules, falling under Subtask 15.10, have also been completed during Q2. These include the development of new navigation functions for the MDSS GUI Map View as well as a capability for permitting graph reordering in the MDSS Route View. Another major effort during Q2 has been to move MDSS' storm playback capabilities to a separate server. The disk space requirements of this capability were quickly exceeding available capacity on the operational MDSS web server. Further, these requirements were also creating a situation where rapid recovery from a server crash was going to be impossible because of the extensive file system checks that would be required. As such, a considerable effort was put into moving the playback capability to an MDSS 'storm server', and modifying the MDSS GUI so as to make requests to the appropriate server depending upon whether the user is in live or playback mode.

**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.**

Support of the MDSS cost/benefit study was completed during Q4 of 2008. However, research into the potential for application of MDSS as a tool for generating a Winter Maintenance Response Index (WMRI) has continued during 2009. Efforts during the quarter focused on building a capability for generating management-oriented reports into the MDSS GUI. Since the format and content of these reports is expected to vary across member agencies, effective implementation of this capability required the ability for the MDSS GUI (which runs as a standard Windows executable installed on agency computers) to access and run additional code that is pulled on-the-fly from the MDSS server. The advantages of this approach are twofold. First, it permits code that is specific to a particular agency to be kept separate from the standardized MDSS GUI distribution. Second, it permits changes to agency-specific management report menus and content without requiring software reinstallation. Initial reports that have been generated under this new capability focus primarily on the visualization and analysis of data coming out of the MDSS WMRI simulation system as well as out of agency MDC/AVL systems

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

Three documents regarding MDSS procurement specification were finalized during Q1. Also during Q1 it was determined that a PFS MDSS Deployment Guide document was needed to help upper management understand the concept of MDSS and also to provide documentation of experiences and lessons learned from testing and deployment across the project states. A questionnaire was circulated during Q1 to gather insight on deployment issues, route selection and distribution, training, AVL/MDC, human factors, and other deployment issues. The results were compiled, and a PFS MDSS Deployment Guide was developed during Q2 and presented to the Technical Panel in late May. The Technical Panel reviewed the document and provided

comments and suggestions during the end of Q2. It was agreed that two documents were needed to fulfill the two initial needs: (1) A short, 2-page document for high-level management to become familiarized with the project concept and its benefits, and (2) a thorough deployment guide for project managers tasked with the operational deployment of MDSS. The document presented to the Technical Panel fulfilled the second need well, and it will be published early in Q3. The short 2-page document will be developed and presented to the group during Q3.

**TASK 18: Prepare a final report summarizing methodology, findings in performance, conclusions and recommendations.**

No activities have been performed for this task during Q2. 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 as the project winds down.

**TASK 19: 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 Q2.