

**Pooled Fund Study Project TPF-5(054)**  
**SDDOT Project SD2002 – 18**  
**Development of Maintenance Decision Support System**  
**Phase IV**  
**Sixth QUARTERLY PROGRESS REPORT**  
**April - June, 2007**

**Overview**

The focus of the Phase IV second quarter (2007) was the conclusion of the field activities for the Field Deployment Transition (FDT). Significant activities during this time frame include late season case study activities, GUI enhancements and refinements, and FDT-II wrap-up survey meetings.

Many of the case studies during the 2006-07 winter were conducted in the first quarter of 2007. However, the late winter did present a few case study opportunities that were captured early in quarter II of 2007. The complete list of case studies can be found in Table 1.

Improvements to the MDSS Graphical User Interface (GUI) were performed and incremental new releases of the software were available for use throughout the quarter. The latest version available at the June 11<sup>th</sup>-12<sup>th</sup> MDSS Technical Panel meeting was v3.20.3. This version contained many features that had been asked for during the FDT-II.

Winter wrap-up surveys were set up and conducted during the quarter. These included face-to-face meetings and conference calls meetings. In cases where neither one of these type of meetings were possible, surveys were sent to locations for needed input on the MDSS.

This report will encompass the major tasks that have been accomplished during the second quarter of 2007 while following the outline of the Phase IV Work Plan.

**Implement version 2.0 of the PFS MDSS in state agency offices in individual and multi-state test regions as determined by the Technical Panel and evaluate its performance during 2005-06 winter operational maintenance activities (Task 1)**

Task completed. No additional activities during Q2 2007.

**Identify required additional research necessary to continue the enhancement of MDSS within an operational environment (Task 2)**

Case studies were conducted during this quarter complimented the case studies collected during the first quarter. These case studies were conducted across the PFS-MDSS domain by both Meridian staff and DOT observers. The following table shows the list of the different case studies performed during the previous two quarters. Case studies collected during the second quarter are highlighted in yellow.

Location of the Event	Date	Type of Event	Observers
Columbus, IN	2/13/07	Freezing Rain & Snow	Tony McClellan & Gary Phillips
Yankton, SD	2/24/07	Heavy Snow	Ed Rogers, SDDOT
Red River Valley	3/01/07	Compacted Snow	John Mewes & Ben Hershey
Iowa	3/03/07	Major Ice and Snow	None
Red River Valley	3/15/07	Multi-faceted Snow event	John Mewes & Ben Hershey
Alexandria, MN	4/2/07	Snow event	Daniel Peterson
Kansas	4/13/07	Late Season; Heavy Snow	None
New Hampshire	4/15/07	Late Season; Heavy Snow	None

Table 1: Case studies performed during the first and second quarter of 2007.

A large volume of data was collected from these cases; including MDSS forecast data, photographic and subjective observations, camera imagery, as well as NWS and RWIS observations. The case studies from Kansas and New Hampshire were collected because of the nature of the event. Both cases were from the same storm event that contained very heavy snow for both locations.

### **Prepare for the Field Deployment Transition (FDT) to be conducted during the winter of 2006-07 (Task 3)**

Task completed. No additional activities during Q2 2007.

### **Perform scientific validation of observed weather variables and comparison with input variables to the PFS MDSS (Task 4)**

Processing of the case studies collected during FTD-II had begun. Preliminary analysis of the March 1<sup>st</sup> and 15<sup>th</sup> and April 2<sup>nd</sup>, 13<sup>th</sup>, and 15<sup>th</sup> case studies has been completed. Modifications to the MDSS modeling software to improve results where discrepancies have been noted is underway. This includes modifications to the removal of ‘dry’ snow from roads by traffic through suctioning processes, as well as modifications to the manner in which wind affects the deposition and removal of snowfall on the roadway. The mid-April case studies have very limited field data associated with them. They were stored only because it was noted that in both cases (from the same storm, in two widely separated locations) extremely heavy snow fell that did cause some buildup of snow on MDSS test routes. However, MDSS projected that adequate heat should’ve been available within the air and roadway to keep these routes wet. Preliminary indications are that MDSS’ use of visibility observations to estimate snowfall rates may break down in extremely heavy snowfalls, but more investigation is needed.

### **Perform an assessment of the validity, acceptance, utilization and operational requirements of MDSS within State DOT winter maintenance practices (Task 5)**

The winter wrap-up surveys conducted across the states provide useful feedback the over assessment of how MDSS performs. During this quarter the surveys were conducted and preliminary information has been compiled.

During the February 2007 Technical Panel meeting it was noted by several participating states that the MDSS GUI continued to have performance issues on their agency computers. Unfortunately the cause of performance problems is difficult to diagnose, since computers with seemingly equivalent hardware often exhibit considerably different performance characteristics. One problem that seemed to be consistently reported was a slow startup time. During this quarter Meridian made significant modifications to the GUI infrastructure that will result in more than a 50% reduction in startup time relative to versions presently in use as a result of FDT-II. In an attempt to isolate other potential problems Meridian developed a standardized test procedure that will be used to establish performance metrics for the GUI. Meridian is in the process of establishing 'normal' ranges of performance for most GUI functions. The same test procedure can then be followed on computers exhibiting performance problems in an attempt to isolate perceptions from reality and which aspects of the GUI are most prone to performance troubles.

### **Develop a strategy to transition the MDSS PFS to a broader state DOT audience and full deployment (Task 6)**

The continuing growth of the MDSS was evident during the second quarter as there were several steps taken to move toward a broader audience and full deployment. The addition of the routes during the last quarter of 2006 and first quarter of 2007 tested the capacity of the system in an operational mode. The second quarter also saw the addition of a number of new routes in Indiana, bringing this region to near deployment (Columbia Sub-district).

In addition to the route additions to the system, meetings and conference calls were held to gather information regarding deployment options. Action items were discussed during the first quarter Technical Panel Meeting (February, 2007) and these items were addressed during the second quarter and presented to the Technical Panel at the June 2007 meeting. Several presentations were developed and presented at the meeting in June. Information regarding operational deployment, Intellectual Property (IP) concerns, and operational issues were presented to the Technical Panel. Information regarding estimated cost of the various levels of deployment were also presented to the members in the meeting. Discussions on all these topics were conducted at the meeting, fostering other ideas and comments regarding the information presented.