

**Pooled Fund Study Project TPF-5(054)**  
**SDDOT Project SD2002 – 18**  
**Maintenance Decision Support System – Phase II**  
**QUARTERLY PROGRESS REPORT**  
**January – March, 2004**  
**April 19, 2004**

Much of the effort during the first quarter of 2004 was expended on the implementation of the Limited Deployment – Tactical Integration (LDTI) field test. This test was the culmination of the background research efforts done during Phase I of the Pooled Fund Study (PFS) and demonstrated the approach of the MDSS PFS design. The specific accomplishments within the Phase II Plan completed during this quarter include the following listed within the structure of the Phase II Plan.

**Expand knowledge base on maintenance needs to support MDSS (Task 3)**

Meridian continued to expand the knowledge base needed to guide and support the development of the decision support program. The LDTI training sessions became an important extension of the information gathering process started in the Interview sessions in Phase I. One of the key components of the LDTI test was the collection of field information by route.

To implement the collection and display component of the LDTI, it was necessary to confirm detailed information about the test routes, the assignment of equipment and personnel, the route itinerary, and unique characteristics of each route. The specifics gathered illustrated that the complexity of the decision support system, due to local considerations, was even more extensive than previously defined in Phase I. The new information gathered from the 10 training sessions was added to the Needs Requirements document. In addition, Meridian added a number of articles and support documents to the broader MDSS library used to document and support the MDSS program.

**Assess state's ability to process, collect, and report maintenance information (Task 4)**

The primary work under Task 4 during the quarter was a determination of a processing scheme that was acceptable to the IT departments in all the five states. This was an absolute requirement for the final design of the LDTI and future implementation of an operational MDSS support program. Meridian developed contacts within each of the IT departments and determined acceptable technical solutions. The analysis indicated that a web-based interface supported at Meridian headquarters was the best solution for the LDTI test. Part of the test graphical user interface was built around a Java-based solution that appears to meet the processing requirements within the member states.

The transfer of maintenance information from the field to the central processing facility was one of the key features of the LDTI. Meridian investigated the resources available in the member states to communicate data, finding each state having a slightly different communications infrastructure. The interest was to develop, if possible, a common communication process that could utilize these existing communications infrastructures. Two solutions were tested during the LDTI test: 1) a web entry page for data communicated via normal DOT communications from mobile field equipment to the local maintenance facility, and 2) phone communication using Interactive Voice Recognition (IVR) technology. Meridian held several meetings with vendors specializing in mobile data collection to explore the existing capabilities for logging field data and transferring this data to a processing center. The key

components of these discussions are methodologies to efficiently collect measured and observed data in the field, the data logging techniques and features, and mechanisms to expeditiously transfer data from the mobile platform (vehicle) into a communication network.

#### **Limited deployment – tactical integration prototype development (Task 7)**

The software development effort was partially dependent upon the processing configurations permissible within the IT Departments of the member states. Once a satisfactory solution was determined, Meridian proceeded to develop and test the LDTI software internally. The biggest challenge was to create the graphical user interface that fit the IT requirements. A secondary challenge was a clear definition of maintenance routes. Meridian initially envisioned routes as a stretch of highway maintained in one contiguous out and back maintenance operation. Once it became apparent that DOT maintenance routes are much more complex than this, the data collection and decision support mechanisms had to be restructured.

#### **Limited deployment – tactical integration test plan (Task 8)**

Preparation for the LDTI test required integration of background experience, the knowledge gained from research efforts done under Phase I, and the necessary logistics to make the test work. The Functional Prototype (FP) test, performed by the Federal Highway Administration in Iowa, provided considerable insight into the test process. Meridian reviewed the reports done by the National Labs and then spent a day with the participants in Ames and Des Moines, Iowa, discussing their experiences and their perceived pros and cons of the testing methods. Since the LDTI test covered areas within five states, Meridian made contacts within each of the states to define the specific routes for the test, the configuration of the routes, the personnel that would participate in the tests, and contact information for the participants. Meridian encapsulated this information into a draft Test Plan that was distributed to the Technical Panel the first week of March. During the subsequent training sessions, the route structures and personnel information were clarified further and confirmed for the tests.

#### **Limited deployment – tactical integration operational test (Task 9)**

The LDTI field test was defined as operational on March 10<sup>th</sup> although it had been available for testing for over a week prior to that. Meridian commenced training on March 8 in Indiana and completed the tenth and final training session in Fergus Falls, MN on March 19. The training sessions were designed to provide an overview of the LDTI test program and explain the mechanics of entering field information into the LDTI decision support system. The sessions also provided guidance on how to see the influence of field entered data and how to visually assess the impact of their actual or proposed maintenance actions on pavement conditions. The training sessions lasted from 2.5 hours to over 4 hours, depending upon the depth of the discussions. Based upon these discussions, subsequent phone conversations, and recommendations from DOT participants, Meridian made several adjustments to the graphical user interface to make the interface more user-friendly and correct minor inconsistencies in the road condition processing technique. Test participants found the interface acceptable but made numerous suggestions to make the interaction with the system more efficient for them. Meridian did one follow-up visit in Iowa to review procedures and assess user acceptance. Additional trips were planned; however, after the conclusion of the training sessions there was limited weather activity and the visits did not materialize. All states had an opportunity to do some minimal testing before winter ended. Indiana and Iowa had the best situations for the test and both have provided considerable input.