

**State of Wisconsin/Department of Transportation
RESEARCH PROGRESS REPORT FOR THE QUARTER ENDING: March 31, 2005**

Program: SPR-0010(36) FFY99		Part: II Research and Development	
Project Title: GIS Tool to Measure Performance of Winter Highway Operations	Project ID: 04-01	Sponsor: MRUTC	Approved Starting Date: January 1, 2005
Administrative Contact: Nina McLawhorn		Approved Ending Date: June 30, 2006	
WisDOT Technical Contact: Jason Bittner			
Approved by COR/Steering Committee:			
Project Investigator (agency & contact): UW-Madison, Alan Vonderohe			

Description:

The University of Wisconsin-Madison has been assisting the Wisconsin Department of Transportation (WisDOT) and eight participating Wisconsin counties with research and development on data management aspects of the Wisconsin Winter Maintenance Concept Vehicle Project. The concept vehicles are equipped with differential GPS for location, environmental sensors (e.g., for air and pavement temperature), equipment status sensors (e.g., for blade position), and material spreader rate sensors (e.g., for salt, sand, and anti-ice treatments). These data are telemetered in real-time to a monitoring station and are also recorded on magnetic media on-board the vehicle for later downloading.

One of UW-Madison's primary activities has been development of a geographic information system (GIS) application, referred to as "Wisplow". This application computes winter maintenance operations performance measures by integrating and analyzing environmental, equipment status, and materials usage data coming from the vehicles with spatial databases of roadway centerlines, attributed with patrol sections, route systems, number-of-lanes, and functional class. Manually-entered data, such as storm event types and durations, labor and equipment cost rates, and vehicle equipment configurations are also used in the computation of performance measures. Wisplow outputs include reports and decision management tools (e.g., charts, graphs, and maps) that show values of, and relationships among, computed performance measures. Earlier work indicated significant potential utility of Wisplow for support in winter maintenance decision making.

Objectives of the current project include:

1. Development and implementation of enhancements to Wisplow, including automated resolution of spatial ambiguities when relating vehicle coordinates to roadways, tailoring the user interface and databases for each county in which the system will be installed, and enhancing the system according to selected suggestions received at previously-conducted workshops and through interactions with users.
2. Development and testing of the necessary spatial databases (roadway centerlines maps, patrol sections, attributes, and topology) for selected participating counties.
3. Installation of, and training on, Wisplow and the spatial databases at each of the selected participating County Highway Departments.

Total study budget	Current FFY budget	Expenditures for current quarter	Total Expenditures to date	Percent Complete
\$105,000	\$105,000	\$20,042	\$20,042	25%

Progress This Quarter:

The project team holds regular weekly meetings to determine status and develop short-range plans. Significant progress has been made on solution to the spatial ambiguity problem (fully implemented), prioritization and development of enhancements to Wiscplow, and development of the necessary spatial databases for selected participating counties. Concerning the latter, Columbia, Portage, Kenosha, and Trempealeau Counties have been selected. Trempealeau is a late comer and Manitowoc County (which was on the original list) has withdrawn from the study (by decision of county administrators concerned about future costs). Columbia's database is nearly complete, with only development of topology left to be done. Portage's database is nearly complete, with only identification of patrol sections and development of topology yet to be done. Kenosha's database is partially complete, with centerlines and roadway names in place. Trempealeau's database needs to be developed from scratch by digitizing digital orthophotos. We are in frequent contact with county and WisDOT personnel, asking and answering questions as we proceed. All persons with whom we are working are dedicated and very helpful. System documentation (technical and user) and data documentation (metadata) are underway.

Work Next Quarter:

1. Complete currently-prioritized enhancements to Wiscplow.
2. Complete Columbia and Portage County database development.
3. Continue Kenosha and Trempealeau County database development.
4. Revisit the initially-developed performance measure list and determine if others on that list should be implemented.
5. Thoroughly test Wiscplow against the completed Columbia and Portage County databases and vehicle data.
6. Initiate discussion of arrangements for installation and training at the participating county highway departments.

Circumstances affecting progress/budget:

We are on-time and on-budget, despite there being some unexpected changes during the first quarter. These changes were 1) loss of Manitowoc County after some time and effort had been devoted to their spatial database and 2) bringing Trempealeau County on-board after the loss of Manitowoc.

Gantt Chart:

