



RESEARCH SERVICES SECTION

TECHNICAL SUMMARY

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PROJECT COST:

\$56,802



The mapping tool uses retroreflectivity data collected by Mn/DOT using handheld devices that measure key variables.

Developing and Implementing Enhanced Pavement Marking Management Tools: Phase I—Mapping Tool

What Was the Need?

Pavement markings are an essential component of highway construction and roadway safety. Drivers need to quickly identify where the markings are and what they are telling them. Good pavement markings provide critical elements to guide drivers on correct road paths, supplement road signs to inform and warn drivers, and improve night driving conditions.

The key factor in determining the nighttime visibility of pavement markings is retroreflectivity: their ability to reflect light back to the driver. Retroreflectivity is determined by the type and method of marking (typically paint, epoxy or preformed tape) and how it degrades over time. Tracking this information provides a practical method for maintaining markings, saving money and making roads safer.

The Iowa Department of Transportation had recently completed a statewide implementation of a system to organize its pavement marking data and make it available to field offices and paint crews. Mn/DOT wanted a comparable tool to bring together the separate marking databases maintained by each Mn/DOT district to ensure that decisions regarding pavement marking needs, durability and quality were made consistently, objectively and cost-effectively.

What Was Our Goal?

This project was Phase I of a comprehensive project to better manage Mn/DOT's pavement marking processes and tools, designed to help each Mn/DOT district determine its restriping needs. The objective of Phase I was to create a mapping tool to enable users at many locations to map and query retroreflectivity and marking application production information.

This software needed to quickly and easily provide insight into the quality of pavement markings on the roadway system to enable better-informed maintenance and restriping decisions. The tool needed to employ a platform that required little installation time or technical support.

What Did We Do?

Mn/DOT engaged the Center for Transportation Research and Education at Iowa State University for this project because CTRE had developed Iowa's system. A key task was for CTRE to gain a thorough understanding of Mn/DOT's unique situation and needs. CTRE and Mn/DOT held a series of information-gathering sessions where critical decisions were made, including:

- How to retrieve, sort and analyze data sources needed for display in the mapping tool.
- What data items needed to be included and how to collect them from the available data.
- How to incorporate pavement marking information in the Geographic Information System database used by the mapping tool.
- How to fit the tool into Mn/DOT's system architecture.

These discussions gave CTRE the insight to develop the tool and associated data queries. CTRE provided a report that included an overview and user's manual for the tool, and proposed a recommended course of action for its subsequent refinement.

“The Pavement Marking Management Tool and its initiative is 100 percent in line with Mn/DOT’s Strategic Plan: ‘Mn/DOT will continuously improve service and efficiency in order to give citizens the best value for their tax dollars by encouraging innovation . . . through creative, cost-saving solutions.’”

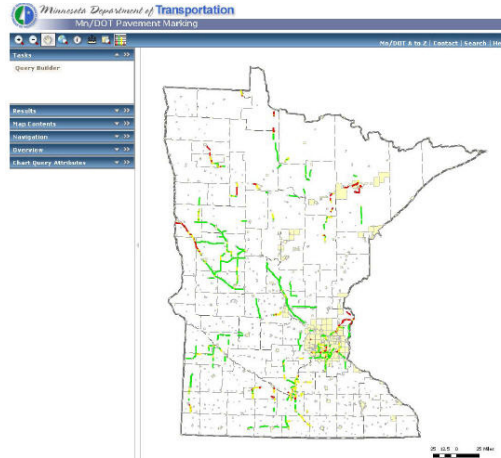
–Sue Groth,
Director, Minnesota
Office of Traffic and
Safety

“Based on our initial conversations with Mn/DOT, we were able to build an easy-to-use tool that presented itself to the user as an extension of the Mn/DOT Web site.”

–Omar Smadi,
Research Scientist,
Center for Transportation
Research and Education
at Iowa State University

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The tool includes a GIS map showing retroreflectivity across Minnesota roadways, which serves as a visual aid for locating problem areas and planning paint marking strategically. Routes with retroreflectivity data are highlighted by color.

What Did We Learn?

This first phase of the Pavement Marking Management Tool project showed that the previous way of tracking which roads needed pavement marking attention was outdated and could be greatly improved. It also became apparent in the course of this study that pavement marking data needed to be made available not only to central planning locations, but also to district offices and paint-marking teams.

The simplicity and organization of the software validated Mn/DOT’s decision to pursue its implementation. It can be accessed via any Web browser, requires no software installation or maintenance by users, populates the database behind the scenes, and provides retroreflectivity values that can streamline planning and improve decision-making for maintenance of pavement markings throughout Minnesota.

What’s Next?

The Pavement Marking Management Tool will provide a significant resource to Mn/DOT staff in developing short- and long-term pavement marking plans by offering a tool to research and monitor the performance of its pavement markings, while also determining that performance relative to the cost of that type of marking. To realize the benefits of this tool, Mn/DOT needs to take additional steps, including:

- Providing additional district training and demonstration.
- Establishing standard Oracle data tables.
- Developing retroreflectivity data flow requirements at both central and district offices; for example, to support automated entry of Global Positioning System data from Mn/DOT’s paint strippers and from retroreflectivity vans. Mn/DOT should also explore using tools such as GPS-enabled PCs or handhelds to automate data entry in the field from the department’s many types of striping equipment.
- Incorporating paint data from both Central Office and Contract Striping, which will give staff the ability to match marking performance with installation information.

Ultimately, CTRE and the Mn/DOT Central Office Pavement Marking Engineer will provide training on the tool to Mn/DOT personnel in each of the eight districts.

This Technical Summary pertains to Report 2008-37, “Developing and Implementing Enhanced Pavement Marking Management Tools for the Minnesota Department of Transportation: Phase I—Mapping Tool,” published September 2008. The full report can be accessed at <http://www.lrrb.org/PDF/200837.pdf>.