



## RESEARCH SERVICES

OFFICE OF POLICY ANALYSIS,  
RESEARCH & INNOVATION

## TECHNICAL SUMMARY

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### Principal Investigator

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### PROJECT COST:

\$96,032



Portable changeable message signs are useful for temporary conditions, such as road construction, maintenance, work zone applications, special events and incident management.

# Putting Research into Practice: Creating a Manual of Practice for Changeable Message Signs

## What Was the Need?

To provide motorists with up-to-date information about traffic, weather and roadway conditions, MnDOT and other transportation agencies use changeable message signs (CMS). These signs may be permanent, installed in the right of way or on overpasses and sign structures; or they may be portable, placed where they are required only temporarily, such as at maintenance and construction sites.

However, to effectively inform drivers and help traffic flow, CMS messages need to be clear and easy to read. Improper messaging can cause drivers to become confused or to slow down in an attempt to comprehend signs, reducing safety and increasing congestion.

In the past, MnDOT's guidance for CMS has been spread among disparate sources, and there has been no central resource for CMS information. A new effort was needed to combine these sources into a single manual and to develop accompanying training modules.

## What Was Our Goal?

The goals of this project were to develop an updated CMS Manual of Practice about proper messaging for permanent and portable CMS across the state, and to develop presentation and training materials for communicating this guidance to a broad spectrum of MnDOT employees.

## What Did We Implement?

This implementation project is based on CMS information derived from a [2000 MnDOT technical document](#); existing Federal Highway Administration (FHWA) standards; Manual on Uniform Traffic Control Devices requirements; the MnDOT 2012 Field Manual; best practices identified from 12 other state departments of transportation (DOTs); and feedback from key stakeholders in the Minnesota Department of Public Safety, Greater Minnesota MnDOT districts, cities, counties, local agencies and private vendors.

## How Did We Do It?

Researchers began by conducting a literature review of CMS practices currently used or being considered by other state DOTs. They also consulted FHWA guidance and work by the Traffic Management Center pooled fund study. Researchers found numerous areas covered in guidelines from other states and agencies that were not previously covered in MnDOT guidelines, including which CMS messages were prohibited. These documents were also instructive in their format, which allowed easier access to relevant topics than MnDOT's previous guidance and used graphics and pictures to effectively convey information in a simple and readable way.

Researchers then interviewed MnDOT and external stakeholders for their key operational needs, including staff at Minnesota transportation management and commu-

*The CMS Manual of Practice developed in this project combines a previously disparate set of sources for CMS guidance into a single document and along with accompanying training modules will help to improve the operation and effectiveness of MnDOT's CMS system.*

*“This manual will help increase the clarity and consistency of CMS messages in Minnesota, decreasing driver confusion and so improving traffic flow and safety.”*

—Jesse Larson,  
Assistant Freeway  
Operations Engineer,  
Regional Transportation  
Management Center,  
MnDOT Metro District

*“With this project, MnDOT has developed one of the few comprehensive changeable message sign manuals available in the country.”*

—Alan Rindels,  
Research Development  
Engineer, MnDOT  
Research Services

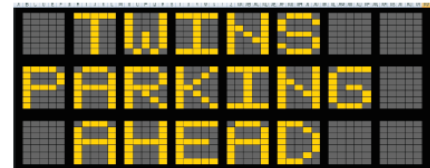
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### Acceptable



### Prohibited



MnDOT prohibits the use of CMS to display advertisements referencing specific names, services, and political party candidates or campaigns. It also prohibits public service announcements not related to the display of traffic safety information.

nications centers across the state; MnDOT construction, maintenance and safety personnel; the Minnesota State Patrol; the cities of Bloomington and Minneapolis; Hennepin County; Metro Transit/Metropolitan Council; and contractors and vendors. In general, both internal and external stakeholders had been unaware that MnDOT has a current set of CMS guidelines.

Using literature search and interview results along with input from the MnDOT technical advisory panel, researchers developed learning objectives and instructional strategies for the development of the CMS manual and online training modules. Then they conducted a beta test of the manual and Web training modules with MnDOT and external stakeholders.

### What Was the Impact?

The 2012 CMS Manual of Practice is written in accordance with the latest human factors research to provide easily accessible information about:

- Agency CMS and portable CMS operations throughout Minnesota.
- Message guidelines, including content, length, message unit and load, format and splitting.
- Message priority requirements for traffic incident management purposes.
- Acceptable standard practice abbreviations for CMS message sets.
- Single- and dual-phased CMS message set requirements and conformance to federal and state regulations.
- A complete CMS and portable CMS message set library and field guide library, and a quick reference sheet for portable CMS.

Beta testers found the manual and accompanying interactive [training modules](#) to be very clear and effective. Modules show users how to create CMS messages and include questions that require users to apply knowledge gained from the prepared coursework to specific situations and events, allowing supervisors to determine whether operators have fully comprehended the contents of the manual.

### What's Next?

The manual created in this effort is a living document that will be reviewed and updated annually by district engineers within MnDOT's Office of Traffic, Safety & Technology. With a single source of consistent CMS information, MnDOT will be able to improve the operation and effectiveness of its CMS system.

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*This Technical Summary pertains to Report 2012-32, “Changeable Message Sign (CMS) Manual of Practice,” published November 2012. The full report can be accessed at <http://www.lrrb.org/PDF/201232.pdf>.*