



Dynamic Message Signs (DMS)

TTI
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Photo: Courtesy of Natalie Villwock-Witte, WTI

Description: Dynamic message signs (DMS), also called variable message signs (VMS) or changeable message signs (CMS), provide short pieces of information to the traveling public. DMS can be portable, semi-permanent, or permanent installations. They can also be used in concert with Highway Advisory Radio (HAR) (see [#TTI1](#)) or Variable Speed Limits (VSL) (see [#TM2](#)).

DMS are effective for alerting motorists to operational, regulatory, warning or guidance announcements at a specific location. The motorists can then respond by adjusting driving behavior, choosing an alternative route, or changing when they travel.

Rural Transportation Critical Needs

- Crash Countermeasures
- Emergency Services
- Operations & Maintenance
- Rural Transit & Mobility
- Surface Transportation & Weather
- Tourism & Travel Information
- Traffic Management

Issues Addressed

- Pre-trip information
- En-route information
- Public data collection
- Public's ability to communicate to transportation agency or emergency services

Strategies Achieved

- Road User
- Road
- Vehicle
- Safety Culture
- Engineering
- Emergency Response
- Enforcement
- Education





Applicability

- The use of portable DMS are relatively inexpensive (both for purchase and rental), and can be especially useful in rural areas because they can be moved to multiple locations. Portable DMS do not require dedicated power and communications on site. Instead, they typically use solar power and either cellular or satellite communications.

Partnerships

- Applications benefit from collaboration among numerous agencies, which may include:
 - Departments of transportation (local, state, federal)
 - Federal land managers

Key Components

- Sign board
- Power and communications

Examples of Implementation

- **Colorado Department of Transportation (CDOT)**

In 2014, CDOT upgraded its [dynamic message signs \(DMS\)](#) in the southwest part of the state. The upgrades include upgrades to the fiber optics.

- **Kansas Department of Transportation (KDOT)**

KDOT, on its KanDrive Roads [page](#), displays all of its closed-circuit television and DMS locations. When there is a message on a DMS, the sign changes from black to yellow.

- **Grand Canyon National Park (Arizona)**

Grand Canyon National Park [employed DMS to promote a park-and-ride lot](#).

- **Advanced Transportation Management (New Hampshire)**

As part of [Advanced Transportation Management](#) along the I-93 corridor, the New Hampshire DOT made use of six DMS.

- **Clark County, Washington and Washington State Department of Transportation (WSDOT) Coordination**

In 2013, WSDOT [coordinated with Clark County, Washington](#) to test allowing Clark County, Washington to take or management of the DMS to “display local road conditions and travel times, safe driving tips and crime trends in the area.”





Implementation Considerations (General)

- The Manual on Uniform Traffic Control Devices (MUTCD) provides extensive, specific guidance on deployment and operations of DMS, including a section on portable DMS applications.
- DMS have become commonplace applications of intelligent transportation systems. Many agencies, including local agencies, have begun to purchase and use them.
- General guidelines for portable DMS include:
 - The signs should be visible from ½ mile under ideal day and night conditions, and
 - Each message should be legible from all lanes at the specified distance and in accordance with the MUTCD.

Implementation Considerations (Pro)

- DMS are relatively easy to maintain.
- They are eye-catching to many travelers.
- They have been in existence for a relatively long period; therefore, lots of lessons learned and guidance already exist.
- Portable DMS can be moved and used for multiple purposes.

Implementation Considerations (Con)

- A limited amount of information can be conveyed to the motorists using this tool.
- There are restrictions on what can be displayed on a DMS.
- The potential exists for “hackers” to control what is displayed on the sign if precautions are not taken into consideration.
- Messages must be monitored and carefully reviewed for clarity and spelling.

Opportunities for Future Expansion

- Entities that are considering a DMS may want to try a pilot installation, as done at Grand Canyon National Park. In addition, if considering the installation of permanent DMS, an agency may want to install them in systematic chunks. Another option is to create a semi-permanent installation by using a portable DMS, but locating it on a concrete pad that has a permanent power source and communications.
- In the future, instead of providing information on a DMS to motorists, the information that previously was disseminated via a DMS would be broadcast through a connected vehicle’s radio.

Useful Tip

A low-cost tip is to use the dynamic message sign to provide safety messages and public service announcements to improve the safety culture in your area. If you need more information on public opinion about these messages or the types of messages to use, [this](#) Federal Highway Administration report may be of interest.





Additional Resources

- *Manual on Uniform Traffic Control Devices*, found here: <https://mutcd.fhwa.dot.gov/htm/2009r1r2/part2/part2l.htm>
- Federal Highway Administration, *Portable Changeable Message Sign Handbook*, found here: <https://www.fhwa.dot.gov/publications/research/infrastructure/pavements/ltp/reports/03066/>
- National Cooperative Highway Research Program *Synthesis 383, Changeable Message Sign Displays During Non-Incident, Non-Roadwork Periods*, found here: <http://www.trb.org/Publications/Blurbs/160447.aspx>

Cost Range

(Cost/financial information, where noted, is based on 2016 dollars (unless otherwise specified). Cost/financial information is estimated, and will vary based on size and scope of project, number of units, etc. In general, capital costs include initial purchase costs of hardware, software, and other required equipment. Maintenance and operations costs include staff time to operate, monitor and maintain systems; data collection; system upgrades; evaluation; etc.)



Capital Costs: The total capital cost for this tool range from low (Less than \$50,000) to higher (above \$250,000) depending on the type (portable, semi-permanent, or permanent) and size of the DMS chosen. For example, at Rocky Mountain National Park, costs associated with deploying portable DMS included short-term installation renting the device, delivering the device, maintenance, and training. Each company that provided quotes had variations based on what was included in the price. The portable DMS quote received from one company had a cost of approximately \$2,500 per month per device, which included delivery, pickup, maintenance, and training. Another company provided a lower price of \$2,100 per month per device, with a \$2,500 delivery fee for every four devices rented¹. However, for the second cost estimate, maintenance and training were not included. Overall, the costs of deploying a pilot system are dependent upon the size of the system. Other examples showed that for a permanent DMS, the costs can range from \$45,400 to \$112,000 and construction costs for the DMS installed in Glenwood Canyon (Colorado) were \$321,000².



Operations Costs: The operations and maintenance cost for this tool are anticipated to be low (Less than \$50,000). For a permanent installation, they may include repairing the electronic components or software upgrades. If renting from a company, it is likely that these costs would be reflected in the rental costs. They also might include the time necessary for a staff member to monitor the accuracy of the tool when deployed

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