

Non-Interstate Road Closure Operations Manual

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Minnesota Department of Transportation



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Table of Contents

BACKGROUND	3
INTERSTATE GATE EVALUATION & RECOMMENDED NEXT STEPS	4
PROCESS	5
INTERIM – TOOLS FOR CLOSURE ON MEDIUM PRIORITY INTERREGIONAL CORRIDORS (IRCS)	5
PHASE I	6
PHASE II.....	7
INTERIM AND PHASE I GOALS	8
PHASE II GOALS	8
DEFINITIONS AND CRITERIA FOR ROAD CLOSURES	8
ROLES & RESPONSIBILITIES - ANNUAL PRE-SNOW SEASON PREPARATION	10
SUB AREA SUPERVISOR	10
AREA MAINTENANCE ENGINEER	10
ROLES & RESPONSIBILITIES FOR ROAD CLOSURE PREPARATION	11
ROLES & RESPONSIBILITIES FOR CLOSING THE ROADS	12
SUB AREA SUPERVISOR	12
ROLES & RESPONSIBILITIES FOR MONITORING THE ROAD CLOSURE	14
CRITERIA FOR OPENING THE ROAD	15
ROLES & RESPONSIBILITIES FOR OPENING THE ROAD	15
ROLES & RESPONSIBILITIES FOR POST-STORM EVALUATION	17
APPENDIX A	19
APPENDIX B	21
APPENDIX C	22
APPENDIX D	24

BACKGROUND

The Minnesota Department of Transportation's (Mn/DOT) primary snow and ice control service is to keep roadways open safely. There comes a time when travel is no longer safe on roadways and it becomes necessary to officially close the roads. The conditions leading to closure are usually associated with severe winter blizzards, white outs, large snowdrifts, and accidents. On average, windswept open areas of the Minnesota roadway system are closed a couple of times per season.

Typically, closures occur during periods of zero visibility, wind velocity greater than 35 miles per hour, and wind chills of -30 to -70 degrees F. Mn/DOT plow drivers need to haul and place barricades to close a road. Two to three employees are needed for this effort—performed during dangerous weather conditions. These conditions not only endanger employees' lives or make them vulnerable to an increased risk of injury, but also detain them from plowing their routes. This process is time consuming, labor-intensive, and often ineffective at deterring drivers from driving around barricades. Therefore, the more manual barricades that need to be erected during storms, the higher the potential for endangering employees' and motorists' safety.

Minnesota Statute (M.S.) 160.27, Subdivision 5 (14) makes it a misdemeanor for anyone to “drive over, through, or around any barricade, fence, or obstruction erected for the purpose of preventing traffic from passing over a portion of a highway closed to public travel or to remove, deface, or damage any such barricade, fence, or obstruction.” Besides the misdemeanor penalty, the 1998 Minnesota Legislature added M.S. 160, subdivision 8 that requires Mn/DOT to notify the public that the road will close. The statute makes that the “person civilly liable for rescue costs” if the individual “fails to obey the direction, or instruction of authorized personnel at the location of the closed highway, or ... drives over, through, or around a barricade ... erected to prevent traffic from passing over a portion of a highway closed to public travel.” This civil liability cannot exceed \$10,000.

Mn/DOT Policy Position Statement No. 83-2 defines some of the conditions for closing a road. Mn/DOT Policy Guideline No. 83-2-G-1 lays out the roles and responsibilities involved when closing a road. Extreme weather conditions during the winter of 1997-1998 dramatized the need for a permanent solution to the problem. In 1996, District 4 (Detroit Lakes/Morris) got approval from Mn/DOT management to install gates on I-94. They were installed in the spring of 1997. Mn/DOT management reached an agreement with the Minnesota Department of Public Safety State Patrol to place permanent closure gates along I-90 from the Minnesota-South Dakota border to I-35 in District 6 and District 7, and along I-94 in District 4. Then, Mn/DOT installed permanent gates along the roadway during the 1997-1998 fall and winter seasons.

In response to the Interstate effort, a determination was made that a plan should be put into place for Minnesota Non-Interstate Roads for winter storm road closures. A committee was assigned to define the similarities and differences between interstate and non-interstate needs regarding closure. The committee was representative of Minnesota Districts 2 (Bemidji/Crookston), 3 (Baxter/St. Cloud), 4 (Detroit Lakes/Morris), 6 (Rochester/Owatonna), 7 (Mankato/Windom), and 8 (Willmar). In addition, representatives from State Patrol, Mn/DOT Traffic Engineering, and Management Analysis completed the team.

The charge of the team was to develop a Non-Interstate Road Closure Manual that was similar in format and content to the manual in place for interstate closings—defining areas, types of closure, and individual/area responsibilities/roles. In addition to the manual, a map was created with desired road closures on non-interstate roads as a visual and long-range planning tool.

INTERSTATE GATE EVALUATION & RECOMMENDED NEXT STEPS

Gates were first used on Interstate 94 during the winter of 1997-1998 in District 4 (Detroit Lakes/Morris) from Fergus Falls to Moorhead-Fargo. In 1997 a decision was made to expand the gate network on the Interstate System in the Mankato/Winom and Owatonna district areas. These gates were installed in 1998; tested and used in the winter of 1998-1999. Mn/DOT had a cumulative total of 65 gates by 1998. In 1999, an evaluation of the Interstate Gate System was prepared for the Mn/DOT Office of Advanced Transportation Systems by BRW, Inc.

Key Findings

- gates provide a clear and indisputable notice that the road is closed and travel is prohibited
 - the Non-Interstate Task Force discussed the importance of having road closure signing consistency so the motoring public will see the same picture regardless of geographic district/area
- savings attribute to a reduction in delays by both passenger vehicles and heavy trucks
- reduction in accidents (public safety issue and cost saving issue)
- time savings in road clearing to bare pavement—no stranded vehicles to interfere with plowing operations (reduction in overtime pay)
- barricades (common method of closure) are difficult to put in place, require a 2-3 person crew, have historically resulted in injuries, and once in place, often blow over
- deploying gates has led to a systematic and well-coordinated plan for closing and reopening roads
- gate system provides the truckers with a documented explanation for delays in travel (verification of closure waives late delivery fees)

Applicable Recommended Next Steps for Non-Interstate Closings

- establish statewide standards for best practices of road closing operations—agreement upon standards that serve as guidance for future gate and warning sign deployment
- prioritize road closure deployment—the Non-Interstate team chose to categorize roadways according to the *Better Connections for Minnesota's Future: Interregional Corridor Study* pamphlet which designates the State's Regional Trade Centers and the Interregional Corridor System
 - based on historic road closures, the desired type of barricade was recommended
- develop an operations manual that outlines the steps to be taken for closures and identifies specific responsibilities

PROCESS

The team reviewed copies of the *I-90 Gate Closure Manual* and identified the components of the manual that are applicable in non-interstate conditions. Many responsibilities outlined in this manual remain relevant in regard to non-interstate closures. One of the main differences is the level of enforcement necessary—the interstate gates are monitored by law enforcement personnel whereas the local non-interstate closures have many more access points and would not be as easily controlled. Validity of the closure and penalty of closure violation remain in effect. On non-interstate roads, law enforcement must witness the vehicle drive past the closure. Regardless of enforcement, clear notification of unsafe conditions will help safety and possibly save lives.

Using the State of Minnesota Highway Map and the *Better Connections for Minnesota's Future: Interregional Corridor Study* pamphlet (designates the State's Regional Trade Centers and the Interregional Corridor System), the historical and desired road closures were drawn onto the map. The closures were then divided into four major categories:

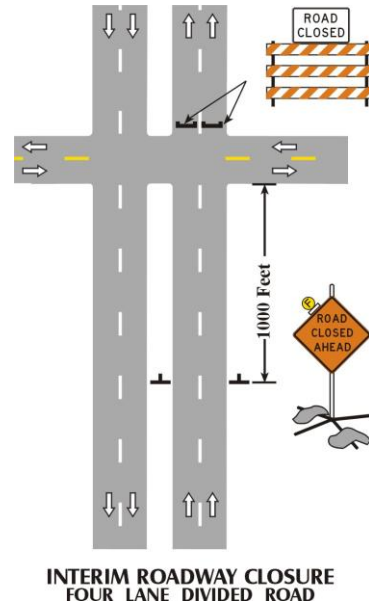
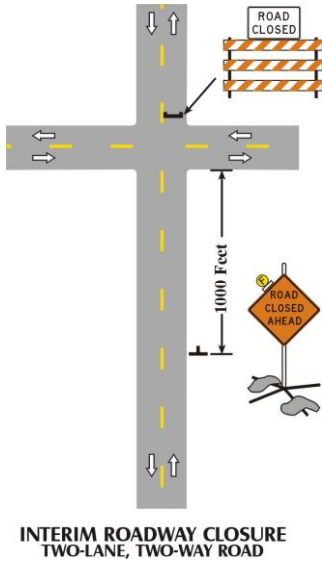
- historical closures on High Priority Interregional Corridors (IRCs)
- historical closures on Medium Priority IRCs
- historical closures **not** on Medium or High Priority IRCs
- non-historical, yet desired closures

The current statutes, policies, and procedures in place (See Appendices A-C) related to road closures remain in effect and are pertinent in regard to the non-interstate system. In addition the definitions and descriptions outlined in the Background and the Definitions & Criteria sections of this document are the same for non-interstate as interstate. No policy of law changes are recommended.

Members then identified the **desired** method of closure for a particular segment(s) of road based on experience, traffic volumes, availability of shelter/resources to stranded motorists in local communities, and the type of conditions typically experience on the segment. The task force realizes that the system needs to be implemented in stages. The first stage will be the immediate or interim stage. The portion including permanent equipment installation would be Phase I. Phase II would automate the gates and advanced warning signs put in place. For statewide consistency, the following types of closures should be used:

Interim – Tools for Closure on Medium Priority Interregional Corridors (IRCs)

- **Type 3 and Type 1 Barricades** – sign to be equipped with black on white rectangular regulatory sign stating “ROAD CLOSED”. This would be accompanied by an advance warning sign of black on orange diamond sign (1000 feet in advance) stating, “ROAD CLOSED AHEAD”. Signs to be secured with sandbags. Generally, Type 3 Barricades would be used on higher volume and higher speed roads—areas where better visibility is necessary. The Type 1 (sawhorse barricade) are for use as the supervisor deems sufficient for low volume, low speed sections.
- See diagrams on following page:

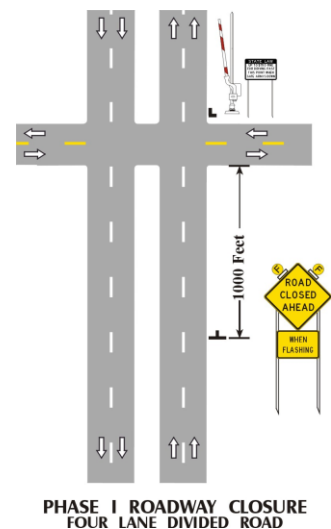


Phase I

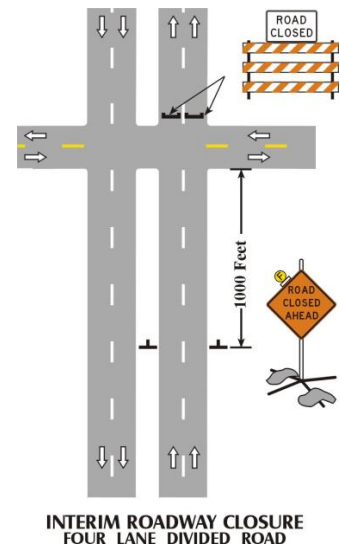
- Static Sign with Flasher** – yellow diamond road sign with black border and lettering to read “ROAD CLOSED AHEAD” accompanied by a rectangular sign beneath stating “WHEN FLASHING”. This sign would also include flashing yellow lights that can be activated during road closing incidents. This sign is to be used in conjunction with the following “gated roadway” scenario. On the map (separate document), this type of sign is identified by a blue teardrop-shaped icon. The symbol indicates the direction of the closure. (If there would need to be closure in all directions, the symbol would appear as a star.)



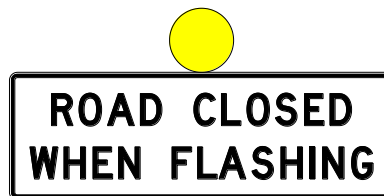
- Gated Roadway** – this would include a gate closure mechanism similar to those currently used on the Interstate. The set up would include a gate arm that swings across the roadway preventing motorists from entering. A regulatory black and white sign stating, “STATE LAW: UP TO \$700 FINE FOR DRIVING PAST THIS POINT WHEN GATE ARM IS DOWN” would be mounted on or near the gate. The gate is to be preceded (1000 feet) by an advanced “Static Sign with Flasher” sign as described above. On the “Desired Road Closure Map” (separate document) the gated roadways are identified with a symbol that looks like this:



- **Barricaded Road** - typically 3 crossbar signs in orange and white accompanied by black on orange “ROAD CLOSED” sign and flasher(s)—to be preceded (1000 feet) by an advance “Static Sign with Flasher” sign. The diagram shows the interim set up...the difference on the Phase I set up is that the orange “Road Closed Ahead” sign would be replaced with a black on yellow “Road Closed Ahead – When Flashing” sign as seen in the above diagram.



- **Regulatory Sign** – when no barricades or gates will be used, there will be some locations that will implement a regulatory sign for closure. This is a rectangular black and white sign stating, “ROAD CLOSED WHEN FLASHING”, a single yellow flashing light will be mounted on the top of the sign.



- **Changeable Message Signs (CMS)** - may be used in conjunction with other types of closures to advise of closure or recommend best options for traveler accommodations. The CMSs are indicated by a pink rectangle on the map (separate document). Please see Appendix D for *Policy Guidelines for Changeable Message Sign (CMS) Use*.

Phase II

Evaluate the Interim and Phase I stages. Determine appropriate sites and components for automation (remote activation of gates and/or flashers via radio and computerized network). This automation will need to follow after Mn/DOT’s development and installation of a microwave-based network for communications.

INTERIM AND PHASE I GOALS

- consistent, clear closures statewide—the need to stay off closed roads should be clear to the public regardless of the type of closure used
- develop rapport with road users to take closings seriously and honor them—know/trust that Mn/DOT is not overreacting
- consequences of violating a road closure must be clear to traveling public—communicated through appropriate signing, education public service announcements (PSA), and other marketing tools

PHASE II GOALS

- coordinated network of automated closures to ensure safety to motoring public and Mn/DOT/municipal employees responsible for road closings and snow removal—eliminate the need for barricades that would need to be erected during a storm
 - interim: for safety reasons (difficulty & danger of assembling Type 3 Barricades), would like to see less cumbersome barricades used
 - barricade would need to include “ROAD CLOSED” sign and flasher(s)
- integrate gate/barricade/advanced warning system with other intelligent transportation systems
- uniformity by road classification of Interregional Corridors and Regional Trade Centers

DEFINITIONS AND CRITERIA FOR ROAD CLOSURES

Mn/DOT Policy Position Statement No. 83-2 distinguishes between road closures and barricaded roads. A road is declared **closed** by word through the news media or other informational source. A road is declared closed and **barricaded** when there are few access points or short sections of roadway where local access to the highway can be reasonably controlled through physical restrictions.

Conditions leading to road closures include severe winter storms and natural disasters. The severity, projected duration, geographic coverage, the quality of information and judgment of the key responsible parties determine the level and the type of response to the disaster or storm.

Conditions to Consider:

- Visibility
- Snow depth
- High wind forecasts
- Blowing snow
- Snowdrifts
- Slick roads
- Rapidly falling temperatures

Maintenance managers should seek to strike a balance between closing a road too soon or too late during storm situations. The goal is to ensure safe travel—however, early and unnecessary closings should be weighed against late closures that could delay reopening the road because of vehicles stuck in snow. Ideal closures are anticipated by reading approaching storm conditions; announced early enough to allow travelers to seek shelter; and allow a final sweep of the closed segments when yet possible to prevent stranded motorists.

With the road closure system in place, it is possible that certain segments and/or directions of travel may be closed or opened, independent of other adjacent areas. For instance, there may be a situation

where a roadway is closed in one direction, yet not the other due to the accommodations available to the motoring public for stopping in a particular community. Or, one direction of a road way may be closed to allow clearing while the other direction remains open.

Scenarios

Possible scenarios that could warrant closing roadways may include:

- Winter whiteout conditions that include zero visibility and blizzard conditions (wind velocity of 35 miles per hour or greater).
- Strong and long-lasting blizzard conditions that not only cause truck rigs to become stuck in snow, but also create the situation where plows cannot keep the roads passable.

ROLES & RESPONSIBILITIES - ANNUAL PRE-SNOW SEASON PREPARATION

Snowplow Drivers

1. By October 15, check gate, sign, and barricade equipment for readiness:
 - batteries
 - gate mechanisms and locks
 - lights/flashers
 - associated signs

Sub Area Supervisor

1. By October 15, ensure the field system is in place and operational:
 - signs
 - gates
 - changeable message signs

Superintendent

1. If necessary, provide financial resources to ensure system readiness, receive assurance that the field system is operational.
2. Notify Area Maintenance Engineer of status of operations

Office Manager

1. By October 15, ensure that all communications systems are in place and functional. These systems include:
 - radio communications
 - broadcast FAX
 - changeable message signs software and computer hardware
 - public inquiry answering machine
 - Mn/CARS
2. Ensure all dispatchers receive training to operate these systems
 - Broadcast FAX
 - Mn/CARS operations
 - response to field needs for assistance
 - answering machines
 - changeable message signs
 - radio communications
3. Establish procedures and train dispatchers so appropriate road closing information is filed for future reference.
4. Establish procedures to track financial information related to unnecessary rescue operations and to ensure appropriate billing.

Dispatcher

1. Refresh system operations skills to operate the systems listed in #2 for Office Manager

Area Maintenance Engineer

1. By October 15, assure all systems are ready and operational for the winter season.
2. Ensure all post-storm evaluations are considered and systems and procedures are revised, as necessary.

ROLES & RESPONSIBILITIES FOR ROAD CLOSURE PREPARATION

Snowplow drivers:

1. Observe local road and weather conditions and advise Sub Area Supervisor as changes occur.
2. Inform Dispatch Center of method of closing, times of closing, and when the road is again available for travel.

Maintenance Superintendent:

1. Manage the closure and opening of the road closing operations.
2. Communicate with the area Public Affairs Coordinator (PAC) regarding weather and road conditions.

Mn/DOT Area Maintenance Engineer (AME):

1. Notify and discuss the anticipated closure or barricading with the District State Patrol Captain, adjacent Mn/DOT Area Maintenance Engineers, and other designated parties.
2. Make the decision whether or not to close the road.

Mn/DOT Public Affairs Coordinator (PAC):

1. Provide changes in road and travel condition information to the appropriate media.

District State Patrol:

1. Discuss with the Mn/DOT Area Maintenance Engineer the conditions that require closing the highway.
2. Notify local law enforcement personnel and patrol districts in adjacent areas, if necessary.

Mn/DOT Emergency Operations Director:

1. Notify other state agencies and offices of road conditions.

Information Sources

- AME or Superintendent
- Transportation Specialists & Supervisors
- National Weather Service
- Road Weather Information System
- Law enforcement
- Mn/CARS

Information Dissemination

- area broadcast FAX provides information to media, such as local radio and television stations, newspapers, state patrol and departments of transportation in affected and adjacent maintenance areas

ROLES & RESPONSIBILITIES FOR CLOSING THE ROADS

Note: The Mn/DOT Policy Guidelines for Closure of State Highways: Severe Winter Storms or Natural Disaster Responsibilities (Highways No 83-2-G-1) are found in the Appendix B.

Snowplow Drivers

1. Monitor and report road and weather conditions in sufficient detail to the Dispatch Center to determine the need to close the highway.
2. Provide advice to Sub Area Supervisor on the need to close the highway.
3. Follow specific incident directions from the sub area supervisor to display advanced signing implement the appropriate closure.
4. Report the closure and time to the Dispatch Center.

Sub Area Supervisor

1. Monitor weather forecasts and roadway condition reports from field staff to assess the need to close the highway.
2. Recommend to the Superintendent or the Area Maintenance Engineer the need to close the highway.
3. Follow specific incident directions from the Superintendent and direct the closure operation.

Superintendent

1. Monitor weather forecasts and analyze road and weather condition reports from field staff, supervisors, adjacent area superintendents.
2. Recommend and assist the Area Maintenance Engineer with the closure decision and closure plan.
3. Direct and communicate the closure plan to the Sub Area Supervisors.

Dispatch Center

1. Monitor and record roadway and weather conditions. Request assistance, if necessary.
2. Keep Superintendent informed of road and weather conditions.
3. Report periodic road and weather condition updates to the Mn/CARS System in the Traffic Engineering Office.
4. Report periodic road and weather condition updates to the answering machine.
5. Record closures and times of closure.
6. Place the appropriate messages on the changeable message signs (when applicable).

Area Maintenance Engineer

1. Confer with the appropriate State Patrol Captain and the Superintendent and agree on which method of road closure is appropriate.
2. Decide which roads are to be closed, and coordinate with adjacent maintenance areas.
3. Work with the Public Affairs Coordinator to disseminate the appropriate communications.
4. Inform the Transportation District Engineer of the decision to close the road(s).

State Patrol & Law Enforcement Personnel

1. State Patrol should inform appropriate law enforcement personnel of the road and weather conditions that could lead to closing.
2. Assemble information from the troopers & law enforcement personnel regarding road and weather information.
3. Discuss and recommend the closure with the Area Maintenance Engineer in terms of the duration and places for closing.
4. Communicate safety needs with the local authorities.

Mn/DOT Public Affairs Coordinator

1. Provide timely and pertinent weather and travel condition information to the appropriate media via a broadcast FAX anytime significant changes occur.

ROLES & RESPONSIBILITIES FOR MONITORING THE ROAD CLOSURE

Snowplow Drivers

1. Discuss monitoring efforts with the Sub Area Supervisor.

Sub Area Supervisor

1. Monitor the road and weather conditions of the sub area and plan for opening the road.

Superintendent

1. Monitor the regional road and weather conditions and plan for reopening the road.
2. Stay in communication with other adjacent Area Superintendents.

Dispatch Center

1. Monitor and update the system information as changes in road and weather conditions occur.

Area Maintenance Engineer

1. Assist the Superintendent, as needed.

Mn/DOT Public Affairs Coordinator

1. Provide timely and pertinent weather and travel condition information to the appropriate media.

State Patrol & Law Enforcement

1. Enforce violations.
2. Provide the lead on rescue attempts.
3. Enforce the new rescue law (See details in Appendix A – M.S. 160.27, Subdivisions 5 & 8) that provides “a person is liable to a state agency or political subdivision for costs incurred for the purpose of rescuing the person, any passenger, or the vehicle.” Civil liability cannot exceed \$10,000.
 - Exceptions: An individual who is known to reside in the area where the road closure occurs. The person is aware of any risks of travel to his or her residence.
 - Those monitoring the road closures may allow exceptions to pass the closure when assured of travel destination possibilities. The license number of the vehicles allowed to pass should be recorded and retained for future reference, if necessary.
4. Request Mn/DOT’s assistance with rescue efforts, when needed.

CRITERIA FOR OPENING THE ROAD

To reopen the road, these conditions must be met:

- One lane of a two-lane roadway must be cleared for traffic and special traffic control measures must be in place, according to the Minnesota Field Manual for Temporary Traffic Control Layouts (Latest Version).
- All stalled vehicles are removed from the traveled roadway (i.e., through lanes). Vehicles that are not blocking through traffic, but are stalled in ditches or along shoulders, shall not be the cause of holding up reopening the road to through traffic.
- Visibility is adequate and predicted to remain so for an extended period of time.
- The guide for the road segment to be considered clear and open to travel without the use of special traffic control measures:
 - **4 Lane Highway** – (non-interstate) – road segment to be cleared from fog line to fog line and traffic can travel side by side in two lanes
 - **2 Lane Highway** – road segment to be cleared for 2 way traffic—able to meet and pass one another
 - **Media** – when the road segments are not able to be cleared to the levels stated, media may be used to allow vehicles onto the roadway with conditions clarified

ROLES & RESPONSIBILITIES FOR OPENING THE ROAD

Snowplow Drivers

1. Monitor and report road and weather conditions to the dispatch center to determine if and when roads should be opened.
2. Provide information to Sub Area Supervisor on the conditions of the segments that would help to determine the possibility of opening the road.
3. If requested, open road—removing barricades or deactivating signs and gates.
4. Report the time of road opening to the Dispatch Center.

Sub Area Supervisor

1. Monitor and report the sub area road and weather conditions to the Dispatch Center.
2. Advise the Superintendent on the possibility of opening segments of the roadway in the sub area.
3. Follow specific incident directions from the Superintendent and direct the opening operations in the sub area.
4. Ensure and guide the proper reporting of road openings and times to the Dispatch Center.

Superintendent – based on monitoring and advice from the field:

1. Decide on the time for opening the road
2. Direct the opening plan
3. Ensure the appropriate communication to the media through the Public Affairs Coordinator.
4. Communicate with superintendents in adjacent regions and advise appropriate maintenance staff.
5. Consult with law enforcement to ensure agreement that road(s) should be reopened.

Dispatch Center

1. Report on MnCARS and the answering machine the periodic road and weather conditions the times and segments of roadway that will open.
2. Record the appropriate road closing and opening times from the field staff.
3. Place the appropriate messages on the changeable message signs.

Area Maintenance Engineer - assist the Superintendent, as needed.

Law Enforcement Personnel

1. Provide field information on the condition of the roadway segments that law enforcement authority observes. This helps determine the possibility of opening the roads
2. Assemble information from the local authorities and discuss with the Superintendent and Area Maintenance Engineer.
3. Continue to communicate with the local authorities with regard to road conditions.

Mn/DOT Public Affairs Coordinator

1. Provide timely and pertinent weather and travel condition information to the appropriate media via a broadcast FAX.

ROLES & RESPONSIBILITIES FOR POST-STORM EVALUATION

Snowplow Driver

1. Check the equipment for readiness.
2. Participate in post-storm debriefing with supervisor.

Sub Area Supervisor

1. Guide the equipment readiness checks of the snowplow drivers.
2. Conduct and participate in post-storm debriefing sessions.

Superintendent

1. Analyze post-storm debriefing information.
2. Ensure appropriate adjustments are made.

Dispatch Center - Dispatchers

1. Participate in post-storm debriefing with Office Manager.
2. Check communication equipment for readiness.

Office Manager

1. Guide the communication equipment readiness checks.
2. Conduct and participate in post-storm debriefing with dispatchers.
3. Report the results of the debriefing to the Maintenance Superintendent.

Area Maintenance Engineer

1. Assist the Maintenance Superintendent, as needed.
2. Where necessary, lead any effort to revise systems and procedures indicated by the post-storm evaluations.
3. Coordinate changes with all stakeholders.

State Patrol

1. Provide information on improving the process to the Area Maintenance Engineer and Maintenance Superintendent on the results of the debriefing with the county sheriffs and patrol officers.

APPENDIX

Appendix A

Minnesota Statutes 1997, Table of Chapters

Table of contents for Chapter 160

160.16 Warning signs and detour signs.

Subdivision 3. **Barricades.** The road authorities may also provide, by contract or otherwise, for the erection of barricades, fences or other obstructions so as to prevent traffic from entering any impassable section of road or a section closed to public travel.

HIST: 1959 c 500 art 1 s 16; 1986 c 444

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160.27 Particular uses of right-of-way; misdemeanors.

Subdivision 5. **Misdemeanors.** Except for the actions of the road authorities, their agents, employees, contractors, and utilities in carrying out their duties imposed by law or contract, and except as herein provided, it shall be unlawful to:

- (1) obstruct any highway or deposit snow or ice thereon;
- (2) plow or perform any other detrimental operation within the road right-of-way except in the preparation of the land for planting permanent vegetative cover or as authorized under section 160.232;
- (3) erect a fence on the right-of-way of a trunk highway, county state-aid highway, county highway or town road, except to erect a lane fence to the ends of a livestock pass;
- (4) erect or reconstruct driveway headwalls in or on the right-of-way of a highway or road, except as may be allowed by permit from the road authority imposing reasonable regulations as are necessary to prevent interference with the construction, maintenance, and safe use of the highway or road and its appurtenances;
- (5) dig any holes in any highway; except to locate markers placed to identify sectional corner positions and private boundary corners;
- (6) remove any earth, gravel or rock from any highway;
- (7) obstruct any ditch draining any highway or drain any noisome materials into any ditch;
- (8) place or maintain any building or structure within the limits of any highway;
- (9) place or maintain any advertisement within the limits of any highway;
- (10) paint, print, place, or affix any advertisement or any object within the limits of any highway;
- (11) deface, mar, damage, or tamper with any structure, work, material, equipment, tools, signs, markers, signals, paving, guardrails, drains, or any other highway appurtenance on or along any highway;
- (12) remove, injure, displace, or destroy right-of-way markers, or reference or witness monuments, or markers placed to preserve section or quarter section corners;
- (13) improperly place or fail to place warning signs and detour signs as provided by law;
- (14) drive over, through, or around any barricade, fence, or obstruction erected for the purpose of preventing traffic from passing over a portion of a highway closed to public travel or to remove, deface, or damage any such barricade,

fence, or obstruction.

Any violation of this subdivision is a misdemeanor.

Subdivision 8. Trunk Highway Closure; Authority, Notice, Civil Penalty.

a) The commissioner may restrict the use of, or close any state trunk highway for the protection and safety of the public or for the protection of the highway from damage during and after storms if there is danger of the road becoming impassable or if visibility is so limited that safe travel is unlikely.

b) To notify the public that a trunk highway is closed or its use restricted, the commissioner shall give notice by one or more of the following methods:

- (1) erect suitable barriers or obstructions on the highway;
- (2) post warning or notices of the closing or restricting of a trunk highway;
- (3) place signs to warn, detour, direct, or otherwise control traffic on the highway; or
- (4) place personnel to warn, detour, direct, or otherwise control traffic on the highway.

c) A person is civilly liable for rescue costs if the person

(1) fails to obey the direction or instruction of authorized personnel at the location of the closed highway, or

(2) drives over, through, or around a barricade, fence, or obstruction erected to prevent traffic from passing over a portion of a highway closed to public travel. "Civilly liable for rescue costs" means that the person is liable to a state agency or political subdivision for costs incurred for the purpose of rescuing the person, any passengers, or the vehicle. Civil liability may be imposed under this subdivision in addition to the misdemeanor penalty imposed under subdivision 5. However, civil liability must not exceed \$10,000. A fine paid by a defendant in a misdemeanor action that arose from the same violation may not be applied toward payment of the civil liability imposed under this subdivision.

d) A state agency or political subdivision that incurs costs as described in paragraph c) may bring an action to recover the civil liability and related legal, administrative, and court costs. A civil action may be commenced as is any civil action. (1998 Minnesota Session Law)

Appendix B



Mn/DOT POLICY POSITION STATEMENT

Date: September 7, 1983

Reference: Highway No. 83-2
Closure of State Highways
Severe Winter Storms or
Natural Disasters

Position Statement:

Every effort within the limits of available resources should be made to keep the highways open to traffic at all times.

Safety for the motorists and Mn/DOT employees are primary considerations of Mn/DOT.

Should weather deteriorate to a condition that requires closing the highway to all vehicular travel or should a natural disaster occur which makes the roadway impassable this policy sets forth the general method to follow.

Background:

DEFINITIONS:

Road "Closed": A road declared closed by word only through the news media or other informational sources. Because of the numerous access points to the roadway, it is deemed impractical to barricade all access to it.

Road "Barricaded": A road declared closed and barricaded to physically prevent travel. This would generally occur on freeways because of the minimal number of access points or on short sections of roadway where the local access to the highway can be reasonably controlled.

It is the responsibility of Mn/DOT Area Maintenance Engineer with the concurrence of the District Engineer to determine when a road should be closed or barricaded.

If there is immediate danger of the road becoming impassable or if visibility is so limited that safe travel is impossible, the Area Maintenance Engineer should declare the road "closed".

If conditions are such that the Area Maintenance Engineer deems it advisable and advantageous to physically prohibit travel, he shall effect closing of the road by placing appropriate barricades and/or traffic control devices and shall declare the road "barricaded". Prior to barricading a road, the Area Maintenance Engineer and State Patrol Commander will confer and agree on the necessity of this action. When the Area Maintenance Engineer and Commander agree that the motorist will need verbal instructions at the barricade, they will attempt to arrange for qualified personnel to provide these instructions.

The State Patrol has the authority to halt traffic and implement temporary road closures in matters relating to public safety; for example, to allow for emergency services following a major accident or series of accidents.

R. P. Braun, Commissioner

Any questions regarding this position statement should be directed to:

Lawrence F. McNamara, Assistant Commissioner - Operations
Room 413 Transportation Building, Telephone (651) 296-3008

Appendix C

Mn/DOT POLICY GUIDELINE

Date: September 7, 1983



Reference: Highway No. 83-2-G-1
Closure of State Highways
Severe Winter Storms or
Natural Disasters
Responsibilities

Guideline:

Communication is the key factor when a road becomes closed or it is decided to close the road. Information must flow between the departments involved with highway operations; public safety, road users, etc. Included are Highway Patrol Officers, Mn/DOT Area Maintenance Officers, Mn/DOT District Officers, Central Office - Mn/DOT and State Patrol, road user agencies and news media. At times, it may involve adjacent states, municipalities, counties and agencies such as the State Division of Emergency Services and Mn/DOT of Communications.

The following responsibilities are assigned to implement the above policy.

1. The following are the responsibilities of Mn/DOT Area Maintenance Engineers:
 - a. Notify and discuss the closure or barricading with the District Engineer.
 - b. Notify and discuss the closure or barricading with District State Patrol Commander.
 - c. Notify adjacent Mn/DOT Maintenance Areas, counties and municipalities through which the route passes.
 - d. Notify Mn/DOT Central Office Maintenance Emergency Operations Section.
 - e. Insure that local news media have been contacted.
2. The following are the responsibilities of the District State Patrol Commander:
 - a. Notify the Mn/DOT Area Maintenance Engineer of conditions that would require the closure of a highway.
 - b. Resolve requests from patrol officers to a close highway with the Mn/DOT Area Maintenance Engineer or Mn/DOT District Engineer.
 - c. Notify their field forces and central office.
 - d. Notify adjacent Patrol Districts.
 - e. Assist in notifying motorists.
3. The following are the responsibilities of Mn/DOT Central Office of Maintenance Emergency Operations Manager:
 - a. Notify the Department of Transportation of any adjacent State that will be directly affected.
 - b. Notify any other State agencies or offices that need the information.
 - c. Coordinate with the State Patrol and Office of Public Information on getting the information to motorists and the public. Incorporate the information in State Road Condition Reports.
4. The State Patrol Central Office shall:
 - a. Contact the Mn/DOT Central Office of Maintenance if it is necessary to resolve District level disagreements on decisions-to-close.
 - b. Notify and coordinate with the Police Agencies of any adjacent affected States.
 - c. Notify affected State Patrol Districts not having the information.
 - d. Assist in getting the information to motorists and the public.

For Interstate routes and other major through routes, the re-opening of a route without warning may have as much impact on the adjacent State or District as the closure itself. It could permit a large number of vehicles to enter an area not yet prepared to accept them. Communications and actions by District and Central Offices of Mn/DOT and the State Patrol when considering a decision to re-open an Interstate or other major route should be handled in a manner similar to that used when considering a decision to close a route.

Position Statement Reference:

Issued under Mn/DOT Policy Position Statement highways No. 83-2.

Background:

Currently, each Maintenance Area has its own policy on closing roads during severe winter storms or natural disasters. The policy and procedures above have been developed to provide statewide uniformity. The policy and procedures were approved by the Maintenance Standards Advisory Committee with the assistance of the State Patrol, Minnesota Department of Public Safety.

R.J. McDonald, Deputy Commissioner

Any questions regarding this position statement should be directed to:

Lawrence F. McNamara, Assistant Commissioner - Operations
Room 413 Transportation Building, Telephone (651) 296-3008

Appendix D

Policy for Changeable Message Sign (CMS Use)

Introduction

The Changeable Message Sign (CMS) system is part of Mn/DOT's Traffic Management System. The primary component is a device that is designed to display words, numbers or symbols which can be changed on command either remotely or on-site. The purpose of the CMS is to communicate real-time roadway or traffic information to travelers, as conditions warrant, so they may react to those conditions in a safe and timely manner.

While this statement appears simple, the application of CMS to fulfill this purpose and achieve effective communication is a significantly complex task due to the variety of situations in which these devices are used. The CMS applications include:

- Emergency response and incident management
- Traffic management
- Road maintenance and construction activities
- Environmental conditions
- Traveler information

Currently, there are four types of CMS used in Minnesota:

- Permanent overhead
- Permanent roadside
- Portable trailer mounted
- Portable vehicle mounted

The permanent signs are controlled by Metro Freeway Operations (MFO), Metro Maintenance Dispatch (MMD) and the Transportation Operation Communication Centers (TOCCs). The portable mounted signs (trailer and vehicle) are typically operated by Mn/DOT maintenance and/or construction staff. However, the portable trailer mounted signs may also be controlled by the above noted TOCC's

CMS have demonstrated influence on traffic behavior and should be used at each appropriate opportunity. In order to obtain and maintain correct and consistent deployments, the following procedures must be learned and observed by all operators.

Coordinating Organizations

Mn/DOT Office of Traffic Engineering, Mn/DOT Metro Freeway Operations, Mn/DOT Metro Division and District Offices (traffic, dispatch, maintenance, construction), MSP Metro and TOCC's, and adjacent states for the purpose of maintaining compatible CMS equipment and operating practices. The Office of Traffic Engineering will maintain stewardship for this policy.

Definitions

Changeable Message Signs (CMS): Changeable message signs or CMS are electrical or electromechanical signs on which messages can be changed remotely through hard wire or wireless communications. Other names for changeable message signs are "variable message signs" (VMS) or "dynamic messages signs" (DMS). New national standards often refer to DMS.

CMS can be located over freeways, beside roadways, on trailers or on vehicles. CMS may display a variety of either pre-programmed or free text messages. Devices such as flashing arrow boards and advanced warning flashers at signalized intersections are not considered CMS since they have the ability to convey only one preset message. CMS types are as follows:

- **Type A:** One-line signs
- **Type B:** Two-line signs
- **Type C:** Three-line signs

Traffic Management Center (TMC): The Traffic Management Center (TMC) is a facility operated by Mn/DOT's Metro Division Office of Freeway Operations (MFO). The TMC provides traffic and incident management and traveler information for highways in the Twin Cities area. Plans are currently being implemented to combine traffic management functions of the TMC with dispatching functions of Metro Division Office of Maintenance operations and dispatching functions of the Minnesota State Patrol. The new center will be located at Metro Division's Water's Edge building in Roseville, Minnesota.

Transportation Operation and Communication Centers (TOCC's): The TOCC's are staffed and operated by the Department of Public Safety - State Patrol 24-hrs/day, 7-days/week providing dispatch and information management services for the State Patrol, Mn/DOT and DNR Enforcement. The Centers are located at nine sites throughout Greater Minnesota. They provide emergency response and incident management, enforcement support, traffic monitoring and management, as well as collection and distribution of traveler and transit information locally and statewide. The TOCC's will be located in Duluth, Virginia, Detroit Lakes, Thief River Falls, Brainerd, St. Cloud, Marshall, Mankato and Rochester. Centers currently exist in Duluth, Virginia and Rochester.

Warrant Criteria and Purpose for Displaying Messages on CMS

Purpose for CMS: The purpose of a CMS is to provide real-time traffic advisory and route guidance information to road users. The specific information conveyed on a CMS may relate to traffic management, incident management or environmental conditions. These signs are used to provide this type of information as much in advance of a condition or situation as is reasonable to give road users a chance to react and take action that they deem appropriate for their needs. CMS effectiveness is dependent on providing information that is timely, accurate and reliable.

Appropriate use of CMS will help promote road user confidence. CMS play an important role in highway safety, operations and the improved use of existing facilities. They are high profile devices specifically designed to attract road users' attention and their use for extraneous messages could dilute their effectiveness when they are really needed. When CMS only display appropriate messages, road users will be more likely pay attention to the information.

Permitted Message Types:

- 1) **Advisory or warning messages:** CMS should display messages only when traffic conditions warrant, otherwise, they should remain blank. Metro Division is testing use of CMS travel time and route diversion messages on TH 55 (Olson Highway) between I-94 and I-494. This system is expected to be operational in the fall of 2000. The travel time messages may be displayed even when travel time is normal.
- 2) **Special event messages:** Criteria for usage to manage freeway traffic destined for special

events are contained in the Mn/DOT Traffic Engineering Manual, Chapter 6.

Prohibited Uses and Messages:

- 1) **Regulatory messages:** Regulatory CMS messages are not recognized or standardized in the Federal Manual on Uniform Traffic Control Devices or the FHWA Traffic Control Devices Handbook nor do they have any legal status with respect to any information that they display.
- 2) **Public Service Announcements:** Criteria to manage freeway traffic destined for special events are contained in the Mn/DOT Traffic Engineering Manual, Chapter 6.
- 3) **Repetitive Messages:** CMS should not be used to display the same message day in and day out. If this becomes the case, use of a static sign should be considered.

Applications for Use of CMS

- **Emergency and Incident Management:** Incident management applications include crashes, debris on road, hazardous materials spills, hazard on shoulder or roadside. This category includes incidents caused by random, unpredictable, but frequent occurrences such as crashes, temporary lane blockage and hazardous material spills. Typically, CMS are used to inform road users that an incident has occurred, the incident's location relative to the CMS (e.g. "1 MILE AHEAD") and the impact (e.g. "EXPECT DELAYS" or "LANE CLOSURE"). Changeable message signs should be used only when an incident is visually confirmed by traffic management or incident management staff. Visual confirmation can also be accomplished via remote camera or sensor information being received by the operator.
- **Traffic Management:** Traffic management applications include congestion (which may include travel time information), construction, maintenance, ramp metering, and HOV operations and special events. This category deals with using CMS to manage traffic congestion where demand exceeds capacity for temporary periods. This category includes traffic diversion that may entail passive or active route guidance. Passive route guidance lacks specificity in providing information about alternate routes. With passive route guidance, information is displayed indicating that a condition exists on the present route; it becomes the road users' choice whether they wish to divert and, if so, onto which alternate route. Active route guidance implies giving specific information to road users concerning exact alternate routes to be followed to avoid a particular traffic condition. Active route guidance should not be used unless the recommended alternate route, or detour, is signed as such from end to end and conditions on that route are actively monitored. Traffic management applications also include traffic conditions associated with special and scheduled events, such as construction, temporary road work and routine maintenance (the CMS can be an effective supplement to construction traffic control, but should not be used in lieu of adequate traffic control planning). Criteria for usage of CMS to manage freeway traffic destined for special events are contained in the Mn/DOT Traffic Engineering Manual, Chapter 6.
- **Environmental Conditions (snow, ice, wind, rain, fog, dust, smoke, etc.):** The environmental conditions application is currently limited to displaying advance road closure information during snow storms and frosty, icy or slippery bridges on trunk highways in Greater Minnesota. Additional environmental condition applications for CMS will be considered and adopted in response to traveler information services developed in conjunction with the statewide deployment of TOCC's.

Responsibility for CMS Operations

Since staffing and equipment exist to provide CMS operations at all times, the benefits of the CMS should be delivered to the traveling public 24 hours per day, seven days a week.

Continuous operation will result in increased safety to workers and responders at incident scenes and in work zones as well as to the traveling public.

Time of Day

- **Metro Operations (MFO and MMD)** personnel have responsibility for operations at all times based on the following listing showing the non-holiday weekday schedule. MFO will always have operational responsibility when they are on site at the TMC. On weekends, MFO will have responsibility. When the TMC is not staffed, MMD will have responsibility.

Group Responsible for CMS Deployment	Weekdays	Saturday	Sunday
Metro Maintenance Dispatch	00:00 to 05:59		
Metro Freeway Operators/Information Officers	06:00 to 19:00	10:00 to 18:00	11:00 to 19:00
Metro Maintenance Dispatch	19:00 to 24:00		

- **MSP/DOT - TOCC's** have operational responsibility 24-hours per day, 7-days per week.
- **Mn/DOT Maintenance and Construction Operations** shall coordinate the operation of portable devices with the above noted operational centers.

Incident Verification

Incidents should be verified prior to posting an appropriate message on a CMS. Verification can occur via of visual sightings and reports of Mn/DOT and DPS field personnel, via remote camera, via sensor information being sent directly into the communication centers. In some cases, messages may be requested from local agencies (enforcement, emergency response, maintenance or construction). When verifying information, the operator should ascertain:

- Type of emergency, incident or request
- Location and geographical coverage required
- Projected duration and level of impact of the incident in order to estimate amount of time CMS will be needed. Duration estimates are based on experience and judgement of the CMS operator and field verification personnel.
- A contact person phone or radio call number to verify the message if possible, as well as verifying when to turn the message off.

Posting Messages on the CMS / When to Post Messages

Messages should only be posted when they are applicable. For incidents, accidents, weather and other short-term messages, signs should be activated as soon as possible after the event is verified and deactivated as soon as the event is concluded. For long-term events such as construction and maintenance activities, CMS messages should not be used to replace static signs. They should be used to advise travelers of real-time conditions to the extent possible. Messages should be updated as conditions change. An example of why messages should be changed is described below:

When to turn on a CMS

Opportunities to utilize CMS occur whenever a **verifiable** incident or other **verifiable** non-recurring event affects the **normal** traffic flows for that time of day. Other non-recurring events include special events, maintenance and minor construction lane closures, and non-recurring

traffic queues on mainlines or exit ramps.

- **Incident Management:** The goal of CMS deployment during an incident is to enhance traffic control near an incident scene, to inform motorists about traffic-impacting circumstances, and to advise or direct motorists about actions to take. The life of a typical incident goes through several stages. It is the responsibility of the CMS operator to evaluate the complete CMS deployment for each stage of each incident. Each stage may require changing messages or adding or deleting specific CMS. For example, a typical two car crash has three stages and requires at least three evaluations by the operator:
 - **Stage 1:** The time the crash occurs to the time of first response vehicle arrives.
 - **Stage 2:** The time from the arrival of the remaining response vehicles to the time all vehicles are cleared.
 - **Stage 3:** The time from when all vehicles are cleared to the time the freeway traffic returns to normal operating conditions for that time of day.

- **Construction and Maintenance Activities:** The goal of CMS deployment during construction and maintenance activities is to enhance traffic control around a work zone in order to provide a safer work environment, to inform motorists about traffic-impacting circumstances, and to advise or direct motorists about actions to take. Permanent overhead CMS should only be deployed for short-term projects or for the first three days of a long-term project. The life of a typical work zone goes through several stages. It is the responsibility of the CMS operator to evaluate the complete CMS deployment for each stage of construction or maintenance. Each stage may require changing messages or adding or deleting specific CMS. For example, a typical construction or maintenance project has three stages and requires at least three evaluations by the operator:
 - **Stage 1:** The time from the set up of work zone barriers and lane control to the time of the actual construction/maintenance project.
 - **Stage 2:** The time during the construction/maintenance project to the time of the completion of the project.
 - **Stage 3:** The time from the completion of the construction/maintenance project to the time of take down of the construction barriers and lane control, and traffic has returned to normal conditions for that time of day.

- **Non-recurring Congestion and Special Events:** The goal of CMS deployment during non-recurring congestion and special events is to inform and advise motorists of slow traffic ahead that may create an unsafe situation or cause travel delay for the motorist. Non-recurring congestion may result from a gawker-slowdown or from special event traffic. This type of CMS deployment typically only has one stage. The CMS should be deployed when congestion levels are greater than normal for that time of day, and should be turned-off immediately when the congested conditions start to subside.

Which CMS to Activate

Sign Types: All three types of CMS are applicable and available to TMC and TOCC operators.

- Type C: Fixed overhead or roadside and portable trailer mounted.
- Type B: Fixed roadside and portable trailer or vehicle mounted.
- Type A: Always vehicle mounted.

Activation Strategy: Operators are to determine which signs to activate using the following activation strategy. This strategy consists of defining three rings, each of a different diameter centered on the location of the incident. Each one of the rings has its own emphasis and goal.

- **Ring 1:** Radius of approximately one mile from the incident. CMS located within this radius will display messages that will assist traffic control around the incident. Ring 1 signs must be activated for all incidents affecting normal traffic flow for that time of the day.
- **Ring 2:** Radius of approximately five miles from the incident. CMS located within this radius will provide information to make drivers aware of the overall situation and opportunities to divert. Ring 2 signs must be activated for all incidents affecting normal traffic flow for that time of the day.
- **Ring 3:** Radius of approximately 10 miles from the incident. CMS located within this radius will provide regional alternate route information. Ring 3 signs must be activated for all major incidents, defined as an incident that causes a traffic backup of over 2 miles

Since it is unlikely that all incidents will occur where fixed CMS are installed exactly where they need to be. Operator judgement will be a key to successful implementation of this strategy. . Because of the relatively infrequent spacing of fixed CMS, portable CMS may need to be provided to augment fixed signs for major incidents. The following table provides additional guidance on how to employ the activation strategy

Incident Severity Description	Ring 1 CMS	Ring 2 CMS	Ring 3 CMS
Road Closure	Yes	Yes	Yes
Severe capacity restriction, blocked lane(s), etc., Significant travel delay expected.	Yes	Yes	Yes
Moderate capacity restriction, partial blocked lane, moderate travel delay expected	Yes	Yes	N/A
Minor capacity restriction, blocked shoulder, minor delay to travel expected	Yes	N/A	N/A
No Impact: incident exists but has no impact on travel delay or congestion.	N/A	N/A	N/A

CMS System Priorities

The CMS usage and messages are to follow the following priorities:

- Incident management. The first priority is safety. Therefore, aside from dedicated signs, this priority means that any messages that are directly related to safety are given first priority for display. Notable examples of this type of message are an emergency closure of a tunnel or highway, restrictions for tunnels, advisory speed limits, road and bridge conditions, etc.
- Roadway closures. The second CMS system priority is the display of road or ramp closures, regardless of the reason for the closures (accident, construction, weather conditions, etc.). This information is important because closures directly impact the route a driver would take.
- Traffic management. The third priority is information on traffic impacts associated with recurring or non-recurring congestion. Special events, construction and maintenance activities often generate congested roadways. Examples of traffic management messages are

lane closure advisories, travel time advisories, delay advisories, and routing to special events.

- **Test Messages.** Test messages may be used check sign operation for maintenance and prior to new signs being placed into service.

Other CMS usage and priorities are as follows:

- **Lane Control CMS.** CMS dedicated to supporting lane control signals such as at the Lowry Hill Tunnel and at Mn/ROAD on I-94 must be used for that purpose when lane control is in effect. Some of these signs can display other messages according to the above priorities.
- **Regulatory CMS such as variable speed limits:** This policy guidance does not yet authorize routine use of CMS for variable regulatory speed limits. When that usage becomes standard practice, then variable speed limits would be considered a first priority use.

CMS Message Content

One of the goals of CMS deployment is to use consistent messages in response to the same situations (day-to-day/operator-to-operator). Each of the three lines has a specific purpose and a specific intent. It is the responsibility of each operator to understand the following usage rules for each line; usage rules for LED CMS signs follow the same policy lines as drum type CMS and have additional capabilities. CMS messages and format should be in accordance with recommendations in Appendix 1, Pages 40-42 and 223-233 (ref. FHWA DRAFT Highway Design Handbook for Older Drivers and Pedestrians) and the following:

CMS Type – No. Of Lines and Phases	Line One	Line Two	Line Three
Type C (Three Lines) Single Phase	Problem	Location (or Distance Ahead)	Action or Effect
Type C Dual Phase	Phase 1: Problem and Location (or Distance Ahead) Phase 2: Action or Effect		
Type B (Two Lines) Single Phase	Problem	Location or Location and (if required) Action/Effect	N/A
Type B Dual Phase	Phase 1 – Line 1: Problem; Line 2: Location (Or Distance Ahead) Phase 2 – Line 1 and/or 2: Action or Effect		
Type A (One line) (Highway Helper)	Obtain messages from TMC or other operations staff	N/A	N/A

CMS Message Wording

Abbreviations

- **Line 1:** Abbreviations can be used to avoid using extra words when the abbreviation meaning is clearly understood or implied. For example, “Roadwork” may be abbreviated “RDWK” and “vehicle” abbreviated “VEH”.
- **Line 2:** Abbreviations can be used to avoid using extra words when the meaning is clearly understood or implied. For example, “Roadwork” may be abbreviated “RDWK” and

“vehicle” abbreviated “VEH”.

- **General:** Other acceptable and non-acceptable abbreviations and abbreviations that are acceptable with a prompt are provided in Appendix 1, pages 233-235 of the FHWA DRAFT Highway Design Handbook for Older Drivers and Pedestrians.

Which messages to select

One of the goals of CMS deployment is to use consistent messages in response to the same situations, day to day and operator to operator. Each of the three CMS lines has a specific purpose and a specific intent. It is the responsibility of each CMS operator to understand the following usage rules for each line of the LED variable message signs. Usage rules for the older drum CMS signs follow the same general policy lines as the LED signs and will be noted when appropriate in the following usage rules.

- **Line 1 Usage Rules:** Line one on all signs is used to describe the type of incident or non-recurring situation. The LED CMS signs offer more options than drum signs and should be as specific as possible. The following messages are found on all LED variable message signs.
- **Blank line** – Line 1 should never be left blank on a deployed CMS
- **Crash** – Should be used when a **verifiable** crash is affecting the normal traffic flows for that specific time of the day. The term “crash” is **preferred** to “accident” because the latter term implies that the incident was unavoidable or that a mistake was made. “Crash” refers to any multiple vehicle or single vehicle crash. It also refers to any spinout, jack-knifed truck, or rollover. This message should be used **during** the actual course of the incident only (stages 1 and 2 for an incident as previously described). When the incident clears (stage 3 as previously described), the message should be immediately changed or the sign should be turned off.
- ***Drum Signs** - The term “Accident” will continue to be used on drum signs until their replacement. “Accident” refers to any single vehicle or multiple vehicle crash. It also refers to any spinout, jack-knifed truck, rollover, or vehicle fire.
- **Stalled Vehicle** – Should be used when a **verifiable** stalled vehicle is affecting the normal traffic flows for that specific time of the day or the safety of the motorist, Highway Helper, or other response team is at risk. A “Stalled Vehicle” may be in the driving lane or on a shoulder, and may be alone or accompanied by an assisting vehicle.
- **Congestion** – May be used in the event of **non-recurring** congestion. This message should be used to give information about leftover congestion resulting from an incident that has cleared if the normal traffic flows at that time and place are usually good. (stage 3 as previously described) This message may also be used to give information about congestion resulting from a gawker slowdown caused by an incident that has occurred in the opposite direction of traffic flow. This message must be used conservatively to be effective, and should be turned-off immediately when the congested conditions **start** to subside.
- **Event Congestion** –May be used in the event of non-recurring congestion that is caused by a special event such as a sporting event or convention. Preferred to “Congestion” because it is more specific to the cause of the congestion.
- **Road Closed** – Shall be used when a mainline roadway is closed at some point downstream due to the effect of an incident or a non-recurring situation. The entire roadway must be blocked and impassable to any traffic flows, or must have been closed

to any traffic flows by proper authorities, before the message “Road Closed” can be deployed on a CMS. Road closures may be due to blockages caused by the incident itself, or by a combination of the incident and the incident response vehicles and personnel. Road closures may also be due to construction or non-recurring events such as pavement failures, emergency police activities, or natural disasters. The message “Road Closed” must not be used to manipulate traffic flows away from a roadway that is open to flow, even if that flow is severely restricted.

- **Crash-Road Closed** - Shall be used when a mainline roadway is closed at some point downstream **due to the effect of a crash**. Is preferred to just “Road Closed” because it is more specific. The same usage rules are followed for this message as for the “Road Closed” message.
- **Ramp Closed** – Shall be used when an **exit ramp** is closed at some point downstream due to the effect of an incident or a non-recurring situation. The same usage rules are followed for this message as for the “Road Closed” message.
- **Debris on Road** – Should be used to alert motorists of any **verifiable** debris that is affecting normal traffic flow for that time of day or is a hazard to motorists. This message should be used for any debris that is unaccompanied by a vehicle or is not related to a crash. For example, “Debris on Road” should not be used to refer to a spilled load in the event of a truck rollover. In that type of incident “Crash” is the **preferred** message.
- **Vehicle Fire** – Should be used for a **verifiable** vehicle fire that is affecting normal traffic flow for that time of day or is a hazard to motorists. “Vehicle Fire” is **preferred** to “Crash” or “Stalled Vehicle” because of the visual hazard to motorists caused by smoke.
- ***Drum Signs** – The message “Accident” should be used for this type of situation.
- **Grass Fire** – Should be used for a **verifiable** grass fire that is affecting normal traffic flow for that time of day or is a hazard to motorists.
- **Flash Flooding** – Should be used to alert motorists of any verifiable flooding that might occur on I-35W in south Minneapolis due to heavy rains. See “TMC CMS Response Plan for I-35W Flash Flooding” map for instructions on deploying this message.
- **Roadwork** – Should be used to alert motorists to any **verifiable** roadwork. The term “Roadwork” refers to any short-term maintenance or construction projects that will last less than 3 days. These projects are either stationary or moving, and are either currently active or are actively setup. “Roadwork” may also be used to notify motorists about the impacts of longer-term projects, but only for the first 3 days of those projects.
- **Pavement Buckle** – Should be used to alert motorists of a pavement buckle in the lanes that is affecting the normal traffic flow for that time of day or is a hazard to motorists. This message should be used until maintenance crews arrive at which time the message should be changed to “Roadwork.”

Line 1 Summary Table:

Line 1 - Statewide Standard Messages				
CRASH	STALLED VEHICLE	CONGESTION	EVENT CONGESTION	ROAD CLOSED
CRASH – ROAD CLOSED	RAMP CLOSED	DEBRIS ON ROAD	VEHICLE FIRE	GRASS FIRE
FLASH FLOODING	ROADWORK	PAVEMENT BUCKLE		
Line 1 - Messages Unique to Outstate Situations				
FOG	HIGH WINDS	ICE	SLIPPERY	

Line 2 Usage Rules: Line two message will refer to the location of an incident, or to the location of congestion that is due to an incident or some other non-recurring event. The regular goal of line two is to be as specific as possible. The LED CMS have many choices on this line, and should be used to be quite specific about location. The standard CMS messages are:

- **Blank line** – Line 2 should never be left blank on a deployed CMS.
- **Ahead** – Should be used for any situation that lies immediately downstream of the CMS and is closer than the next upcoming intersection or interchange.
- ***Drum Signs** – “Ahead” may be used for distances greater than the next upcoming intersection or interchange, if there is not a more appropriate “At” message to be deployed.
- **At...** – Should be used to give location information about a situation occurring within camera-view of the location given. The “At” message is the most specific message available on a CMS and therefore is usually the most preferred message available to describe downstream situations. This message could apply to motorists in rings 1, 2 or 3.
- **North of..., South of..., East of..., West of...** – May be used when the situation being signed for lies downstream of the referenced cross-street intersection. An appropriate “At” message, if available, is usually preferred to these messages so that communication of specific location is achieved. If traffic is being routed off the mainline onto the referenced cross street by an official detour, then this message will be the most effective and specific about the situation. When using traffic management strategies to route traffic off the impacted mainline and onto the referenced crossroad, then this message will be the most effective and specific about the situation. This message can apply to situations several miles downstream of the referenced crossroad. This message is commonly used to describe situations to motorists in rings 2 or 3. The downstream distance to the situation that this message can apply to is a function of the impact, severity and projected duration of the situation.
- **On...** – Should be used for situations occurring on referenced interstates or trunk highways that are accessible and downstream of the CMS location. Should also be used for situations occurring on the exit ramps to those facilities. The distance downstream on those reference interstates and trunk highways that this message can apply to is a function of the impact, severity, and projected duration of the situation. The “On” message is most commonly used to describe situations to motorists in ring 3.

Line 2 Summary Table:

▪ Line 2 - Statewide Standard Messages				
AHEAD	AT -----	NORTH OF -----	SOUTH OF -----	EAST OF -----
WEST OF --- ---	ON -----			

Line 3 Usage Rules: Line three is used to inform, advise, or direct motorists as to what their reaction should be to a situation. For the Metro Area, when an incident results in continuous coverage on KBEM radio, the Radio 88.5 FM message should always be displayed on this line.

The application and maintenance of line three is more dynamic than lines one or two. As events change at the scene of an incident or a construction site, line three should be updated as appropriate. As resulting congestion and backups grow, line three may again need to be changed. In some cases, line three should be left blank if no message applies well to the situation and conditions.

- **Blank line** – Should be used when the CMS deployment is for information only, and the situation being signed for is not described well by the messages available on this line.
- **Prepare to Stop** – Should be used for an incident or event that is causing abrupt slowdowns to traffic flows. Traffic flow stoppages should be occurring downstream from a CMS displaying this message. If stoppages reach back upstream to the point of the CMS, discontinue the use of this message, and change to either “Expect Delays”, “Major Delay”, or “On Shoulder” where appropriate.
- **Lane Closed** – Should be used for an incident when a lane is blocked or closed. This message is preferred to “Prepare to Stop” when a lane is blocked or closed because it is more specific. The LED signs can be lane-specific in these situations. Lane-specific closures are preferred in a ring 1 situation where traffic control assistance is needed around an incident. CMS deployed in rings 2 and 3 can be less lane-specific and “Lane Closed” is the preferred message.

Lane Specific Closures

- **Right Lane Closed**
- **Right 2 Lanes Closed**
- **Center Lane Closed**
- **Left 2 Lanes Closed**
- **Left Lane Closed**
- **On ___ Shoulder** – Should be used for an incident that is located on the shoulder and is effecting the normal traffic flow for that time of day or is a hazard to motorists and response vehicles. This message is preferred to “Prepare to Stop” once vehicles at the point of the CMS are already in the backup. This message is preferred in a ring 1 situation in order to insure the safety of those on the scene of the incident or construction.

Shoulder specific messages

- On Right Shoulder
- On Left Shoulder
- On Both Shoulders
- **Expect Delays** – Should be used for an incident that is causing backups that reach to the point of the CMS. This message is preferred to “Prepare to Stop” once vehicles at the point of the CMS are already in the backup. This message is preferred in a ring 2 or 3 situation or when referencing a cross freeway with an “On...” message in line 2.
- **Major Delay** – Should be used for an incident causing more than 2 miles of traffic backup. This message is preferred to “Lane Closed” or “Prepare to Stop” when the appropriate situation occurs. This message should be changed as soon as the traffic backups recede under 2 miles.
- **Use Caution** – Should be used to inform motorists of a hazardous situation where the safety of the motorists, Highway Helper, State Trooper, or Maintenance Worker is at risk. This message should not be over used as to ruin the effectiveness of the message.
- **Use Other Routes** – Should be used for an incident that causes the road to close and continuous radio coverage is not being performed. In the case of such road closure, the

message “Road Closed” should be displayed on line 1. This message may also be used to suggest diversion from a corridor that is experiencing severe congestion and traffic backups of 2 miles or greater, if another parallel freeway route is available and has green or yellow traveling conditions.

- **Follow Detour** – Should be used for a road closure that is due to maintenance or construction. This message should only be used if there is a posted detour signed by the construction crew.
- **Just Cleared** – Should be used for an incident that has recently cleared and traffic has not returned to normal levels for the time of day. This message should be used with the message “Crash” in line 1. The “Just Cleared” message should only be used on signs that are within the backup. For a sign that is located upstream of the backup, the “Congestion, Prepare to Stop” message should be used.
- **Radio 88.5 FM** – Should be used for any situation where TMC is providing live continuous radio broadcasts on KBEM 88.5 FM. This is the top priority message for these situations. Can be switched to during broadcasts that are not continuous, but only for the duration of those broadcasts.

Line 3 Summary Table:

Line 3 - Statewide Standard Messages				
PREPARE TO STOP	LANE CLOSED	RIGHT LANE CLOSED	RIGHT 2 LANES CLOSED	CENTER LANE CLOSED
LEFT LANE CLOSED	LEFT 2 LANES CLOSED	ON RIGHT SHOULDER	ON LEFT SHOULDER	ON BOTH SHOULDERS
EXPECT DELAYS	MAJOR DELAYS	USE CAUTION	USE OTHER ROUTES	FOLLOW DETOUR
JUST CLEARED				
Line 3 – Messages Unique to Metro				
KBEM 88.5 FM				
Line 3 – Messages Unique to Greater Minnesota				
EXIT NEXT LEFT	EXIT NEXT RIGHT	MERGE LEFT	MERGE RIGHT	

Other Messages: Other messages should be reviewed by the Office of Traffic Engineering and Metro Freeway Operations before being used.

Other Wording Rules: Do not flash, scroll or in any way attempt to attract attention with artistic message displays. The CMS are not advertising gimmicks, and it is essential that road users be exposed to the message content for as long as possible. Exceptions to this could be flashing the action statement (e.g. CAUTION) to highlight some special urgency in the situation, or flashing an arrow (in accordance with the Field Manual, Figure VI-9) to depict a lane change.

Unless automated and updated, avoid details that can be measured or are overly precise such as a duration of time (i.e. 15 MINUTE DELAY). Road users will compare the results and fault the system if there is a discrepancy.

Traffic Conditions for CMS Usage

The manner in which the CMS system is used will vary depending on the nature of the associated traffic condition. Various categories of traffic conditions are described below, along with specific information on the appropriate use of the CMS system.

Regulatory and Lane Control - Some CMS are installed specifically to provide long term lane control such as near the entrance to express lanes. These CMS may only be used for that purpose as they are a part of the highway signing and are not reinforced with fixed signing. Other CMS have been installed for the purpose of providing advisory variable speed limits (AVSL) in areas, which have an approved traffic regulation. These must display speed limits as the fixed signing has been removed. Additional space on the AVSL can be used for messages in accordance with the remaining priorities.

Traffic Restrictions - In this context, traffic restrictions refer to the prohibition of vehicles from using a roadway. These restrictions may be planned or unplanned, short or long duration, and specific or general. Requests for traffic restriction messages generally come from Mn/DOT or local agency maintenance offices.

- Road Closures - Restriction request initiated by a maintenance or construction office. CMS can be used for warning of road closures for emergencies or for scheduled maintenance operations or construction activities.
- Bridge and Bridge Deck Warnings - Usually openings for weather conditions or bridge maintenance activities
- Tunnel and Tunnel Entry Point Warning – Usually related to tunnel or road maintenance, and/or incidents or emergencies at the tunnel site.
- Flammable Restrictions - Tunnels or other sites specified by the Office of Traffic Engineering.
- Weight, Height, Width Restrictions - Restriction request initiated by a maintenance or construction office; CMS use only appropriate in emergency situations (e.g. damaged bridge, weather related conditions), or short term use (e.g. construction-related height restriction)

Incidents - The use of the CMS system for incident information requires close monitoring by TOCC and road maintenance personnel. The use of the system for incident information has the greatest potential for increasing or decreasing CMS credibility. If we are accurate and timely with our CMS usage, we increase our credibility, and vice versa.

Disabled Vehicles and Accidents –

- CMS used only when incident is visually confirmed or when requested by coordinating organizations, in this case usually State Patrol or Mn/DOT maintenance.
- Communication with coordinating organizations should be through TOCC Operations.
- Messages are to be removed once the incident is no longer blocking.
- Messages describe the general nature of the situation (e.g. Accident Ahead) and traffic impacts (e.g. Congestion from Hinkley to Pine City)
- Specific alternate routes included only if alternate is part of the emergency planned routing system or approved by Mn/DOT traffic and maintenance staff
- Messages describing severe incident-related traffic conditions may be continued at the discretion of the operator (e.g. Congestion / Hinkley to Pine City / Earlier Accident), however, CMS should not be used to describe recurrent congestion (i.e. normal day to day

backups)

Road and Driving Conditions – CMS should can be used to display road or bridge conditions (e.g. caution slippery roadway, caution slippery bridge) only while conditions exist and maintenance crews are in the process of responding. Once conditions at the specific site match general conditions of the roadway in that area, the CMS should be turned off.

Special Events – Special event related CMS for freeway management should be coordinated prior to the event with the local Mn/DOT Traffic Office. Message information should be limited to description of event-related traffic impacts and their duration.

Construction and Maintenance Information – The CMS system can be an effective supplement to construction traffic control, but should not be used in lieu of adequate traffic control planning and devices. Anticipated CMS use for construction and maintenance should be included in traffic control plans and be scheduled in advance with the local Mn/DOT Traffic or Maintenance Office. The CMS system should be used when construction activities require drivers to perform complex maneuvers, for major impacts on traffic flow, or in cases where traditional signing methods are impractical.

Mn/DOT (construction and maintenance)

CMS system may be used to display information on lane, ramp, or road closures; detours; and advanced notice for high impact closures.

Construction-related CMS use should be coordinated with local Mn/DOT Office.

- Message information limited to the nature of the construction impact and the effect on drivers - Impacts include: Left Lane Closed; Exit 167 Closed, etc.; Driver effects include: Use Caution; Use Alternate Route; Follow Detour (only if signed detour provided); Expect Delays (no specific duration), etc.

Non-Mn/DOT (construction and maintenance)

- CMS use should be coordinated with the Local Mn/DOT Traffic Engineer or designee.
- Establish a method of maintaining communication with outside agency.
- Messages follow same guidelines as above.

Public Service Announcements (PSA's) – Only freeway or transportation related events or services of regional or statewide significance should be considered for PSAs. The CMS system should not be used for PSA's that are not directly related to transportation. PSA's should only be used randomly and sparingly so as to not degrade the warning nature of the sign, otherwise motorists may disregard the CMS thinking there is just another non-emergency message displayed.

Test Messages – It can be necessary to run test messages on a CMS sign in order to assure correct operations or to "burn-in" a new sign. It is vital that test messages not misdirect traffic, so non-message formats or otherwise acceptable PSA's will be used. Acceptable test messages should either state "TEST MESSAGE", display a portion of the alphabet or a sequence of numbers, or non-message test patterns. Moving or scrolling test patterns or messages are not recommended. Other test messages may be used if reviewed and approved by the local Traffic Office.

Documentation of CMS Usage

It is important to document the use CMS. As a minimum, operations staff shall maintain a log of usage.

Procedure for Changing these Guidelines

These guidelines have been, and will continue to be, developed over time under the direction of the Office of Traffic Engineering. Factors such as changing areas of responsibility, new CMS technologies, and philosophies will necessitate revisions to these guidelines. All revisions should be well thought out and discussed with all involved coordinating agencies and departments. As a minimum, these guidelines should be reviewed annually. Suggestions for revisions shall be directed through the Office of Traffic Engineering.

ATTACHMENTS:

CMS matrix and related notes

CMS vendor list ((to be added))

CMS inventory list ((to be added))