Guidelines for Changeable Message Sign (CMS) Use

1.0 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.

2.0 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.

3.0 Definitions

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3.1 **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

3.2 **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.

3.3 **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.

4.0 Warrant Criteria and Purpose for Displaying Messages on CMS

4.1 **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.

4.2 Permitted Message Types:

4.2.1 **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.

4.2.2 **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.

4.3 Prohibited Uses and Messages:

4.3.1 **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.

4.3.2 **Public Service Announcements**: Criteria to manage freeway traffic destined for special events are contained in the Mn/DOT Traffic Engineering Manual, Chapter 6.

4.3.3 **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.

4.4 Applications for Use of CMS

4.4.1 **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.

4.4.2 **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.

4.4.3 **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.

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5.0 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.

5.1 Time of Day

5.1.1 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. Since the following table reflects current assignments. Since these assignments may change from time to time, check with Metro Freeway Operations or Metro Maintenance Dispatch for current assignments.

Group Responsible for CMS Deployment	Weekdays	Saturday	Sunday
Metro Maintenance Dispatch	00:00 to 05:29	00:00 to 09:59	00:00 to 10:49
Metro Freeway Operators/Information Officers	05:30 to 20:30	10:00 to 18:00	11:00 to 19:00
Metro Maintenance Dispatch	20:31 to 24:00	18:01 to 24:00	19:01 to 24:00

5.1.2 **MSP/DOT - TOCC's** have operational responsibility 24-hours per day, 7-days per week.

5.1.3 **Mn/DOT Maintenance and Construction Operations** shall coordinate the operation of portable devices with the above noted operational centers.

5.2 **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.

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?? A contact person phone or radio call number to verify the message if possible, as well as verifying when to turn the message off.

6.0 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:

6.1 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.

6.1.1 **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.

6.1.2 **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.

6.1.3 **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.

7.0 Which CMS to Activate

7.1 **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.

7.2 **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 a CMS use-warranting event. Events warranting use of CMS's include incidents, roadwork or special events. See Section 4 – Warrant Criteria and Purpose for Displaying Messages on CMS – for additional information on what messages may and may not be posted to CMS's. Each ring has a specific emphasis and goal.

    ?? **Ring 1**: <u>Radius of approximately one mile from CMS warranting event</u>. CMS located within this radius will display messages that will assist traffic control around the event. Ring 1 signs must be activated for all events affecting normal traffic flow for that time of the day.

    ?? **Ring 2**: <u>Radius of approximately five miles from the warranting event</u>. 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**: <u>Radius of approximately 10 miles from the warranting event</u>. CMS located within this radius will provide regional alternate route information. Ring 3 signs must be activated for all major events, defined as an event that causes a traffic backup of over 2 miles, and road closures. When road closures are required due to weather events, it may be appropriate to activate CMS's well in advance of Ring 3 so that road side services such as restaurants and motels at the point of the road closure are not overwhelmed.

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Since it is unlikely that all incidents will occur where fixed CMS are installed exactly were 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 events. The following table provides additional guidance on how to employ the activation strategy

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

8.0 CMS System Priorities

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

8.1 **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.

8.2   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.

8.3 **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.

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

8.5 **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.

8.6 **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.

9.0 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		

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CMS Type – No. Of Lines and Phases	Line One	Line Two	Line Three
Type A (One line) (Highway Helper)	Obtain messages from TMC or other operations staff	N/A	N/A

10.0 CMS Message Wording

10.1 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.

10.2 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.

10.2.1 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.

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***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 <u>not</u> 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. For additional clarification on use of CMS for roadwork see Section 4.3.3 "Repetitive Messages" and Section 6.1.2 "Construction and Maintenance Activities"

?? **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	

10.2.2 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.

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>   ***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 ------			

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10.2.3 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 in 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				

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KBEM 88.5 FM				
Line 3 – Messages Unique to Greater Minnesota				
EXIT NEXT LEFT	EXIT NEXT RIGHT	MERGE LEFT	MERGE RIGHT	

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

10.4 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

11.0 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.

11.1 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.

11.2 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.

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?? <u>Bridge and Bridge Deck Warnings</u> - Usually openings for weather conditions or bridge maintenance activities

?? <u>Tunnel and Tunnel Entry Point Warning</u> – Usually related to tunnel or road maintenance, and/or incidents or emergencies at the tunnel site.

?? <u>Flammable Restrictions</u> - Tunnels or other sites specified by the Office of Traffic Engineering.

?? <u>Weight, Height, Width Restrictions</u> - 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)

11.3 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.

11.4 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)

11.5 Road and Driving Conditions – CMS should 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.

11.6 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.

11.7 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.

11.8 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.

11.9 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.

11.10 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.

11.11 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.

12.0 Documentation of CMS Usage

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

13.0 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:

1) CMS matrix and related notes
2) CMS vendor list ((to be added))