



CHANGEABLE MESSAGE SIGN MGS 06-04F

1.0 DESCRIPTION. All solar powered changeable message signs, hereinafter referred to as a CMS, shall be designed and manufactured in accordance with this specification.

2.0 MATERIAL. Each CMS shall consist of an all LED (light emitting diode) matrix message board, solar/battery power supply and a user operated interface, as specified, all mounted on a heavy duty, towable trailer.

2.1 Each CMS shall have the following minimum characteristics:

1. Full Matrix - Each CMS shall be the Full Matrix type with the capability of providing one, two, and three lines of changeable characters with minimum heights of 52 inches (1300mm), 28 inches (700mm), and 18 inches (450mm), respectively, and a minimum width of 12 inches (300mm). Full Matrix signs shall be capable of both static and dynamic graphics, and full display sized messages. At the 18-inch (450mm) setting, the sign shall display three lines containing eight changeable characters per line.
2. Character Matrix (Three Line) – Each CMS shall consist of a minimum of three lines containing eight individual changeable characters per line. Each character shall be a minimum of 12 inches wide and 18 inches (450 mm) high.
3. Full matrix CMS and character matrix CMS shall meet the following:
 - (a) The overall sign dimensions shall not be less than 72 inches (1800 mm) high x 126 inches (3150 mm) wide.
 - (b) The CMS shall be legible up to a distance of 650 feet (200 m) for both day and night operations and shall be visible for ½-mile (800 m) with 18 inch (450 mm) characters.
 - (c) When fully raised in the display position, the bottom of the CMS board shall be at least a height of 7 feet (2100 mm) from the ground and the ability to rotate a complete 360 degrees atop the lift mechanism. A sight tube, used to aim the CMS board to on coming traffic, shall be installed on the CMS board or mast. The CMS shall have an electrical-hydraulic lifting mechanism that includes a fully functioning manual lifting and lowering relief mechanism as a back up. The CMS shall have the ability to lock into various viewing angles as determined best for the motorists by the CMS operator.
 - (d) All LED displays and control circuitry shall be operational from -20 F (6 C) to 120 F (50 C). The LED's shall have a rated life of 100,000 hours. The LED's shall be ITE amber in color on a flat black background.
 - (e) The CMS face shall be constructed that if an individual panel fails or is disconnected, all other panels shall continue to display the message. The CMS face shall be constructed that if an individual pixel fails all other pixels shall continue to display the message.
 - (f) 1. The CMS shall have a digital cellular transceiver compatible with the district's current cellular IP (packet data) service provider and be capable of receiving a message from a remote location and forwarding the message to the CMS controller



- to change the displayed message.
2. The CMS shall be constructed with the capability of installing a future digital cellular transceiver.
- (g) The CMS shall have the necessary hardware on board that will allow the message to be changed from the CMS location without connection. A connecting cable a minimum of 5 feet (1.5 meters) long shall be provided to allow for the connection from the sign controller to a notebook computer. For on-sight operation, the CMS shall have a removable waterproof keyboard with display panel. (Note: Notebook computer is secondary control for sign).
 - (h) The sign controller shall provide an event time clock, a minimum storage capacity of 400 messages, a battery-charge status, panel or pixel status, and all other required controls for the operation of the display.
 - (i) The supplier shall provide the Commission the required software and licenses necessary to change the message from a remote location. This software shall be compatible with the district's Windows 2000 Professional, NT, or XP operating systems and be able to issue compatible modem commands. The supplier shall provide technical assistance with the installation and operation of software.
 - (j) The trailer body frame, fenders, control and battery boxes shall be constructed of metal. The trailer welding shall be in accordance with American Welding Society standards. The trailer shall have a 2000-lb (910-kg) swiveling jack located at the four corners. The trailer shall have a hydraulic surge brake system. The trailer shall have a minimum of 15-inch (380 mm) tires. The axle assembly shall have a capacity of 3500-lb (1590-kg). The axles shall have bearing buddies to provide grease to the spindles. Dependent on the request, the trailer tongue shall have either a 2-inch (50-mm) ball with single latch type trailer hitch with double chains or a pintle hitch "lunette eye" connection with double chains. The control box shall have either an interior light or the keyboard display shall be backlit for nighttime lighting.
 - (k) The unit shall be able to withstand a 65-mph (105-kmph) maximum road wind speed. The trailer shall be able to support the fully extended CMS board in an 80-mph (130-kmph) wind load.
 - (l) Each CMS unit shall have a trailer lighting system with a 4-wire flat male molded plug.
 - (m) Batteries provided with the absorbed glass mat (AGM) type; 6 volt deep cycle-sealed-maintenance free battery with a minimum of 220 amp hours, fully charged. The power supply shall use a battery bank sufficient in capacity to operate a full display of characters under normal operating conditions for 30 continuous days when disconnected from the solar panels. The battery bank shall be arranged so the weight is distributed evenly.
 - (n) Solar charging system shall allow for total autonomy of 24/7/365 continuous operation.
 - (o) The solar panels shall be able to rotate 360-degrees independent of the direction of the CMS board. The solar panels shall be able to tilt from 0-degree horizontal to 40-

- degrees vertical.
- (p) The CMS shall have the capability to charge the battery bank from a 120 VAC power source within a 48 to 72 hour time period. The battery charger shall provide a minimum of 55 amperes. The CMS shall have power control circuitry to manage solar charging. The CMS shall also be equipped to accept power from a 120 VAC utility power source. All terminals and connections shall be clearly labeled.
 - (q) All exterior surfaces except the sign face shall be cleaned, primed, and finished with two coats of Highway Safety Orange and the sign interior itself shall be cleaned and finished with one coat of corrosion inhibiting primer and two coats of flat black. The sign face shall be covered with a rigid translucent material to prevent damage to the sign face caused by the environment.

3.0 WARRANTY. New units delivered to the Missouri Department of Transportation must be covered by the manufacturer's standard warranty for a minimum of one year, which includes on-site repair and maintenance (parts, labor, and travel), at no expense to MoDOT.