

MICHIGAN  
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION  
FOR  
**LIGHT EMITTING DIODE CHANGEABLE MESSAGE, OPEN-CLOSED SIGN**

SIG:EMS

1 of 4

APPR:CRB:HLO:06-04-24  
FHWA:APPR:06-04-24

**a. Description.** This work consists of one or more of the following work types, at locations shown on the plans:

1. Furnishing and installing a new light emitting diode (LED) type changeable message OPEN/CLOSED sign.
2. Removing an existing OPEN/CLOSED sign.
3. Removing, storing, and reinstalling an existing OPEN/CLOSED sign.

As applicable, this work includes removal or installation of mounting brackets, hardware, fittings, wiring, grounding, conduit, cable, connections, and any associated material required to complete the work.

**b. Materials.** Furnish changeable message OPEN/CLOSED sign in accordance with this special provision. Furnish all hardware, and appurtenant materials in accordance with sections 918 and 921 of the Standard Specifications of Construction and this special provision.

1. Sign Face. Fabricate the sign face and letters as shown on the plans. Form the letters of the message using a single row of LED's to form each message.

Design the sign to alternately display, in one direction only, either an "OPEN" or a "CLOSED" message, in 12-inch white letters. Ensure that each message is clear and legible, for a minimum of 300 feet, within a 20-degree viewing cone centered about the optic axis, in any light condition with no phantom message visible. Ensure the sign face messages appear blank when not activated.

Furnish a face plate that is a minimum 0.080 flat aluminum with the LED light assembly mounted to it. Furnish a 0.125-inch matte clear polycarbonate lens to protect the LED face plate.

2. Electrical. Furnish a LED sign that operates on 120 VAC, 60 hertz (Hz), single phase equipped with power-conditioning circuitry that reduces the input voltage to operate the LEDs at the manufacturer's recommended current.

Attach the LED light assembly to the sign housing in such a manner that it will remain properly in place during normal traffic conditions. Furnish a LED light assembly that has a minimum of 50,000-hour life cycle with no more than 30 percent lumen depreciation. Ensure that all assemblies are burned-in for 24 hours and certified for compliance by the manufacturer. Ensure the manufacturer's name and date of manufacture, along with a quality control tracking

sticker, is mounted on the inside of the LED light assembly.

Ensure each white LED message is formed in strings of three high output LED's. Ensure the "OPEN" legend consumes no more than 20 watts and the "CLOSED" legend consumes no more than 25 watts. Furnish a dimming device with a photo cell for improved nighttime visibility.

Furnish one LED power supply for each message or symbol. Ensure the power supply reduces the incoming 120 VAC to 12 VDC. Furnish LED power supply(s) that are 40 watt minimum and rated by the *UL* for a Class 2 operation, 12 VDC that are Ingress Protection (IP66) rated.

Furnish a bushing, grommet, or rolled edge in sheet metal or conduit openings to protect conductors from abrasion.

Furnish fuse and lightning protection for each LED sign.

3. Wiring. Furnish signs completely wired using color-coded wire. Unless otherwise specified, furnish a minimum seven-strand, 600-volt (V) No.18 AWG soft annealed copper wire, insulated with high heat-resistant nylon coated thermoplastic or neoprene rated for 194 °F (90 °C). Ensure that wiring is clearly marked.

Furnish a 3-pole single throw type disconnect switch mounted so that a mechanical means other than friction prevents it from turning.

Furnish a barrier type terminal strip with spade type lugs for electrical connection of field wires.

4. Functional Requirements. Ensure the sign is capable of continuous operation over a temperature range from -35 °F to +140 °F (-37 °C to +60 °C).

Furnish redundant power supplies so one power supply may completely fail, and the sign will still display a discernable message or symbol. Ensure a failed power supply indicator red LED light illuminates automatically upon failure of the primary power supply. Ensure the failed LED light(s) are visible on the front of the LED face plate.

5. Sign Case. Ensure that doors and other moving components fit properly and move freely. Unless otherwise specified, bolts, hinges, and other hardware must be *AISI Series 300* stainless steel.

A. Housing. Furnish a sign housing meeting the following requirements:

- (1) Overall dimensions: width 102 inches, height 20¾ inches, depth 8 inches;
- (2) Top, bottom and sides fabricated from a minimum 0.080-inch thick extruded aluminum;
- (3) Back fabricated from a minimum 0.063-inch-thick flat aluminum and designed to direct water out of the housing (by way of a slot into the back edge of the extrusion into which the back panel is inserted and welded); and
- (4) Corners and seams continuously welded by the Tungsten Inert Gas (TIG)

process to ensure a weatherproof enclosure.

B. Door. Furnish a fully gasketed and watertight door meeting the following requirements:

- (1) Allows full access to the serviceable components of the sign when opened;
- (2) Fabricated from a minimum 0.125-inch extruded aluminum;
- (3) TIG welded at two adjacent corners with the other two corners screwed together allowing one edge of the door to be removed for installation;
- (4) Fastened to the bottom of the housing by a full-length continuous stainless steel hinge;
- (5) Secured onto a 1 inch wide, 5/32 inch thick, neoprene gasket with a minimum of two 1/4-turn link locks;
- (6) Fitted with a three sided 7 inch visor, 7 inches deep, fabricated from 0.63-inch aluminum to act as a sunshade; and
- (7) Screened vent holes in the door frame to minimize condensation.

C. Painting Requirements. Prior to painting the sign housing and door, clean and pretreat all metal surfaces in accordance with standard industry practice to ensure bonding of the paint. Coat the metal interior of the sign, all internal metal components, the LED face plate, and the inside of the sign visor with flat black.

Furnish certification that the pretreatment requirement has been met, including the method and material used in the pretreatment process, to the Engineer at the time of delivery. Paint the sign case in accordance with subsection 921.07.G of the Standard Specifications for Construction.

6. Packaging and Marking. Permanently and legibly mark the finished sign with the vendor's name, trademark, or other suitable identification. Individually package each sign to prevent damage during transportation to the destination. Legibly mark each package with the description of contents, order number, and vendor's name.

7. Inspection. Inspection will be performed by the Department or its representative. When requested, furnish mill test reports for all aluminum extrusions.

8. Warranty. Furnish materials with a manufacturer's warranty, transferable to the Department or the local agency responsible for the project, that the supplied materials are free from all defects in materials and workmanship. Furnish the warranty and other applicable documents from the manufacturer, and a copy of the invoice showing the date of shipment, to the Engineer prior to acceptance.

**c. Construction.** Complete this work in accordance with sections 818 and 820 of the Standard Specifications for Construction, as shown on the plans and as directed by the Engineer.

1. Installation. When installing new sign, furnish and install the changeable message

sign as shown on the plans. Furnish and install a sign that requires no special tools for routine maintenance. Mount the sign on sign support posts as shown on the plans or as directed by the Engineer. When installing salvaged is specified, install a sign, salvaged on the project, as shown on the plans.

2. Removal. When removal is specified, remove the changeable message sign as shown on the plans. Removal includes the sign, power supply, hardware, fittings, cable, connectors, grounding, and other appurtenances required for a complete removal. Store or dispose of removed material as directed by the Engineer and section 204 of the Standard Specifications for Construction.

3. Salvage. Remove, store, and reinstall removed material as directed by the Engineer and section 204 of the Standard Specifications for Construction. Store salvaged equipment to be re-installed on the project in a protected and clean environment.

**d. Measurement and Payment.** The completed work, as described, will be measured and paid for at the contract unit price using the following pay items:

<b>Pay Item</b>	<b>Pay Unit</b>
Sign, Changeable Message LED, OPEN-CLOSED .....	Each
Sign, Changeable Message LED, OPEN-CLOSED, Rem.....	Each
Sign, Changeable Message LED, OPEN-CLOSED, Salv .....	Each