

# EXPECTED IMPLEMENTATION JANUARY 2016

## 700 HIGHWAY SIGNING. (REV 6-11-15) (FA 6-19-15) (1-16)

SUBARTICLE 700-1.1 is deleted and the following substituted:

**700-1.1 Description:** Furnish and erect roadway signs at the locations, and in accordance with the details, shown in the Plans.

The Department designates ground traffic signs as signs erected on the shoulders, slopes, or medians, but not extending over the traveled roadway, and may further classify these signs as single post or multi-column.

The Department designates signs erected partially or completely over the traveled roadway or mounted on bridges as overhead traffic signs, and may further classify these signs as overhead cantilever or span traffic signs.

Meet the requirements of Section 603.

SUBARTICLE 700-3.2.1.1 is deleted and the following substituted:

**700-3.2.1.1 General:** Signs must not exceed 9 feet in length or be larger than 18.0 square feet in area, and must not weigh more than 144 pounds. Provide an internally illuminated sign assembly listed to the requirements of UL48. Light emitting diode (LED) retrofit kits must be listed on the APL.

SUBARTICLE 700-3.2.1.2 is deleted and the following substituted:

**700-3.2.1.2 Housing:** Ensure that the sign housing is constructed of continuous 5052 or 6063-T5 aluminum. All housing, corners, and door seams must be continuously welded. All exterior surfaces of the assembly must be powder-coat painted in accordance with Military Standard MIL-PRF-24712A or AAMA-2603-02. Finish must meet the requirements of ASTM D3359, ASTM D3363, and ASTM D522. Sign housings with any interior airspace must consist of a box type enclosure and separate hinged door assembly. The sign housing must include provisions to prevent water from entering the sign housing. Drain holes in the sign larger than 0.125 inch must be covered by a screen.

Signs must have removable sign faces. The sign assembly must have one face unless specified otherwise in the Plans. The sign face must be secured by a method that holds the sign face securely in place. Slide-in grooves are allowed to secure the sign face if the sign is edge lit.

The sign face must be a translucent lens constructed of 0.125 inch thick high impact strength polycarbonate or acrylic meeting UL48. Letters must be as detailed in the Contract Documents. Background must be translucent retroreflective sheeting coated with a transparent, pressure-sensitive adhesive film. Color must meet the criteria as detailed in Sections 994. Retroreflective sheeting must meet the requirements of Section 994, and be listed on the APL.

If a door opens upward, it shall have a bracket on each side to secure the door in the open position during maintenance. Doors shall be permanently and

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continuously sealed with a foam gasket listed to UL157 to prevent the entry of water into the sign housing. Each door must be secured from opening by a minimum of two stainless steel rotary action draw latches.

The sign assembly must be designed and constructed to withstand 150 mph wind loads meeting the requirements of the Department's Structures Manual.

SUBARTICLE 700-3.2.2.1 is deleted and the following substituted:

**700-3.2.2.1 General:** Ensure highlighted signs meet the design and functional requirements specified in this Section and Section 2A of the MUTCD. Use LEDs to highlight the sign's shape, color, or message.

Stop, Do Not Enter, Yield, and Wrong Way signs that are highlighted with LEDs must use red LEDs. All other signs must use LEDs which resemble the color of the sign background color.

SUBARTICLE 700-3.2.5 is deleted and the following substituted:

**700-3.2.5 Electrical Requirements:** Electrical wiring must meet NEC requirements for the light source provided. All wiring must be copper wire. All internal electrical wiring must be tight and secure. Ensure the sign includes an accessible electrical power service entrance compartment (internal or external) for connection of field wiring. External compartments must be weather-tight. All power supplies and ballasts must be Federal Communications Commission (FCC) approved.

Ensure electrical connections are protected against corrosion. All signs must have provisions for an integrated photocell.

SUBARTICLE 700-3.2.7 is deleted and the following substituted:

**700-3.2.7 Acceptance of Internally Illuminated Signs:** Certify that signs and clamp-on cantilever arms provided meet the criteria in this Section.

SUBARTICLE 700-4.1 is deleted and the following substituted:

**700-4.1 General:** Dynamic Message Signs (DMS) must meet the requirements of NEMA TS4-2005. DMS are classified by the type of sign display and the type of mechanical construction. Provide monochrome, tri-color, or full-color signs as shown in the Contract. Use only equipment and components that meet the requirements of these minimum specifications and are listed on the APL. DMS LED retrofit kits must be listed on the APL.

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SUBARTICLE 700-4.2.7 is deleted and the following substituted:

**700-4.2.7 Sign Housing Photosensors:** Ensure the sign meets the requirements of NEMA TS 4-2005, Section 8.8. Ensure that the sensors provide accurate ambient light condition information to the sign controller for automatic light intensity adjustment. Ensure that the automatic adjustment of the LED driving waveform duty cycle occurs in small enough increments that the sign's brightness changes smoothly, with no perceivable brightness change between adjacent levels. Ensure that stray headlights shining on the photoelectric sensor at night do not cause LED brightness changes.

Ensure that the brightness and color of each pixel is uniform over the sign's entire face within a 30 degree viewing angle in all lighting conditions.

SUBARTICLE 700-4.10 is deleted and the following substituted:

**700-4.10 TMC Communication Specification for all DMS:** Ensure that the sign controller is addressable by the TMC through the Ethernet communications network using software that complies with the NTCIP 1101 base standard (formerly the NEMA TS 3.2-1996 Standard), including all amendments as published at the time of contract letting, the NTCIP Simple Transportation Management Framework, and conforms to Compliance Level 1. Ensure that the software implements all mandatory objects in the supplemental requirement SR-700-4.1.1, Dynamic Message Sign NTCIP Requirements, as published on the Department's State Traffic Engineering and Operations Office web site at the time of contract letting. Ensure that the sign complies with the NTCIP 1102v01.15, 2101v01.19, 2103v02.07, 2201v01.15, 2202v01.05, and 2301v02.19 Standards. Ensure that the sign complies with NTCIP 1103v02.17, Section 3.

Ensure that the controller's internal time clock can be configured to synchronize to a time server using the network time protocol (NTP). NTP synchronization frequency must be user-configurable and permit polling intervals from once per minute to once per week in one-minute increments. The controller must allow the user to define the NTP server by internet protocol (IP) address.

Provide communications line circuits that are point-to-point or multipoint, and that provide full duplex asynchronous data transmissions at the rate shown in the contract documents or directed by the Engineer.

Assign each sign controller a unique address.

SUBARTICLE 700-4.21 is deleted and the following substituted:

**700-4.21 Operational Testing:** After the system testing is successfully completed; conduct one continuous 72 hour, full-operating test prior to conducting the 30 day acceptance test. The Engineer will approve the type of tests to be conducted. Include in the tests all control, monitoring, and communications functions of the field equipment by the master equipment.

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SUBARTICLE 700-4.22 is deleted and the following substituted:

**700-4.22 Acceptance Testing:** Conduct a 30 day acceptance test after the successful completion of the approved 72 hour operational test. During the 30 day test period, limit downtime due to mechanical, electrical, or other malfunctions to a maximum total of five calendar days. If the equipment fails to operate for a total of five or more calendar days, testing will be restarted. The Engineer may select to pause and extend the 30 day test period by the number of days lost by failure and repair time in lieu of restarting the full 30 day test. The Engineer will furnish the Contractor with a letter of approval and completion stating the first and last day of the 30 day test period.

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