



Florida Department of Transportation

RICK SCOTT
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

JIM BOXOLD
SECRETARY

December 28, 2015

Khoa Nguyen
Director, Office of Technical Services
Federal Highway Administration
3500 Financial Plaza, Suite 400
Tallahassee, Florida 32312

Re: State Specifications Office
Section **700**
Proposed Specification: **7000105 Highway Signing.**

Dear Mr. Nguyen:

We are submitting, for your approval, two copies of the above referenced Supplemental Specification.

The changes are proposed by Amy Tootle of the State Construction Office to require all construction-related documentation to be submitted by electronic means for consistency with the State Construction Office e-Construction initiative.

Please review and transmit your comments, if any, within two weeks. Comments should be sent via email to daniel.scheer@dot.state.fl.us.

If you have any questions relating to this specification change, please call me at 414-4130.

Sincerely,

Signature on file

Daniel Scheer, P.E.
State Specifications Engineer

DS/dt

Attachment

cc: Florida Transportation Builders' Assoc.
State Construction Engineer

HIGHWAY SIGNING.**(REV ~~10-29-15~~ 12-28-15)**

SUBARTICLE 700-1.5 is deleted and the following substituted:

700-1.5 Acceptance of Signs:

700-1.5.1 Sign Inspection: ~~Submit~~Provide certification that the sign assembly meets the material and installation requirements of the Contract Documents. The Engineer will inspect the signs upon delivery to the storage or project site and again at the final construction inspection. Repair and replace signs deemed unacceptable by the Engineer at no expense to the Department.

SUBARTICLE 700-2.2.4 is deleted and the following substituted:

700-2.2.4 Erection of Signs and Sign Supports: Do not erect overhead sign supports until the concrete strength in the support footing is at least 2,500 psi. Determine concrete strength from tests on a minimum of two test cylinders sampled and tested in accordance with ASTM C31 and ASTM C39 and verifying test results have been submitted ~~provided~~ to the Engineer.

Erect the signs and sign structures in accordance with the details shown in the Plans. The Contractor may fabricate the structural steel sign trusses in sections that will fit into available galvanizing vats. Prior to galvanizing, weld the joints as specified in Section 460 and in accordance with the details shown in the Plans. Re-galvanize damaged parts as specified in Section 562.

Weld aluminum structures in accordance with Section 965.

Attach electronic display signs to the supporting structure in accordance with the manufacturer's recommendations using the mounting hardware provided by the manufacturer.

SUBARTICLE 700-4.2.3 is deleted and the following substituted:

700-4.2.3 Housing Face Requirements for all DMS: Ensure the sign face meets the requirements of NEMA TS 4-2005, Section 3.1.3. Ensure that all sign face surfaces are finished with a matte black coating system that meets or exceeds American Architectural Manufacturers Association (AAMA) Specification No. 2605. ~~Submit~~Provide certification that the sign face parts are coated with the prescribed thickness. Except for embedded DMS, ensure the sign face includes a contrast border that meets the requirements of NEMA TS 4-2005, Section 3.1.6.

700-4.2.3.1 Housing Face for Walk-In DMS: No exposed fasteners are allowed on the housing face. Ensure that display modules can be easily and rapidly removed from within the sign without disturbing adjacent display modules.

700-4.2.3.2 Housing Face for Front Access and Embedded DMS: Any exposed fasteners on the housing face must be the same color and finish as the housing face. Only captive fasteners may be used on the housing face.

700-4.2.3.3 External Fascia Panels: If the sign includes external fascia panels, ensure that they are constructed using aluminum. Finish each fascia panel with a matte black coating system that meets or exceeds AAMA Specification No. 2605.

700-4.2.3.4 Lens Panel Assembly: If the sign includes lens panel assemblies, ensure they are modular in design, removable, and interchangeable without misalignment of the lens panel and the LED pixels. The lens panel assembly must consist of an environmental shielding layer coating to protect and seal the LED and internal electronics. The coating must be a minimum 90% UV opaque. Lens panels must have a matte black coating that meets or exceeds AAMA Specification No. 2605. Lens panels must include a mask constructed of 0.080 inch minimum thickness aluminum. Ensure that the mask is perforated to provide an aperture for each pixel on the display module. Ensure that the apertures do not block the LED output at the required viewing angle.

SUBARTICLE 700-4.3.1 is deleted and the following substituted:

700-4.3.1 LED and Pixel Specifications: Ensure that LED lamps have a minimum viewing angle of 30 degrees.

Ensure that all pixels in all signs in a project, including operational support supplies, have equal color and on-axis intensity. Ensure that the sign display meets the luminance requirements of NEMA TS 4-2005, Section 5.4, for light emitting signs connected at full power. Ensure that amber displays produce an overall luminous intensity of at least 9200 candelas per square meter when operating at 100% intensity. Provide the LED brightness and color bins that are used in each pixel to the Engineer for approval. Ensure that the LED manufacturer demonstrates testing and binning according to the International Commission on Illumination (CIE) 127-1997 Standard.

Ensure that all LEDs operate within the LED manufacturer's recommendations for typical forward voltage, peak pulsed forward current, and other ratings. Component ratings must not be exceeded under any operating condition.

~~Provide Submit a pixel test as a form of status feedback to the transportation management center (TMC) from the local sign controller.~~ Ensure that the operational status of each pixel in the sign can be automatically tested once a day. Ensure that the pixel status test determines the functional status of the pixel as defined by the pixel Failure Status object in National Transportation Communications for ITS Protocol (NTCIP) 1203 v02.39 and does not affect the displayed message for more than half a second.

Ensure that LEDs are individually mounted directly on a printed circuit board (PCB).

SUBARTICLE 700-4.14 is deleted and the following substituted:

700-4.14 Documentation: ~~Submit~~Provide documentation for electronic equipment in accordance with 603-~~86~~.

SUBARTICLE 700-4.18.3 is deleted and the following substituted:

700-4.18.3 Pre-Installation Test Failure Consequence: If any unit fails, the unit shall be corrected or another unit substituted in its place and the test repeated.

If a unit has been modified as a result of a failure, a report shall be prepared and ~~submitted~~~~delivered~~ to the Engineer. The report shall describe the nature of the failure and the corrective action taken.

If a failure pattern develops, the Engineer may direct that design and construction modifications be made to all units without additional cost to the Department or an extension of the Contract Time.

SUBARTICLE 700-4.19 is deleted and the following substituted:

700-4.19 Installed Site Tests: Conduct an approved, stand-alone equipment installation test at the field site. Test all stand-alone (i.e., non-network) functions of the field equipment using equipment installed as detailed in the Plans and as approved by the Engineer.

Complete approved data forms and turn them over to the Engineer for review and as a basis for rejection or acceptance. Provide a minimum notice of 30 calendar days prior to all tests to permit the Engineer or ~~his~~~~their~~ representative to observe each test.

If any unit fails to pass its stand-alone test, correct the unit or substitute another unit in its place, then repeat the test.

If a unit has been modified as a result of a stand-alone test failure, prepare a report describing the nature of the failure and the corrective action taken and ~~submit~~~~deliver~~ it to the Engineer prior to re-testing the unit. If a failure pattern develops, the Engineer may direct that design and construction modifications be made to all units without additional cost to the Department or an extension of the Contract Time.

SUBARTICLE 700-4.20 is deleted and the following substituted:

700-4.20 System Testing: Conduct approved DMS system tests on the field equipment with the master equipment including, at a minimum, all remote control functions. Display the return status codes from the sign controller for a minimum of 72 hours. Complete approved data forms and turn them over to the Engineer for review, and as a basis for rejection or acceptance.

Demonstrate the sign's ability to display the proper predefined message or remain blank when power is restored following an AC power interruption.

If the system test fails because of any subsystem component, repair that component or substitute another in its place, then repeat the test. If a component has been modified as a result of a system test failure, prepare a report and ~~submit~~~~deliver~~ it to the Engineer prior to retesting.

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 ~~submit to~~~~furnish~~ the Contractor ~~with~~ a letter of approval and completion stating the first and last day of the 30 day test period.

SUBARTICLE 700-5.2.2.4 is deleted and the following substituted:

700-5.2.2.4 LED and Pixel Specifications: Ensure that all LEDs used in the display have a wavelength output that varies no more than plus or minus two nanometers from the specified peak wavelength. Ensure that the display and LED pixel cone of vision is a minimum of 15 degrees (centered around the optical axis, or zero point, of the pixel). The cone perimeter is defined by the point where light output intensity is 50% of the intensity measured at the zero point of the pixel. For all colors other than white, ensure that the sign display produces an overall luminous intensity of at least 9200 candelas per square meter when operating at 100% intensity. For white or full color matrix displays ensure that the sign display produces white with an overall luminous intensity of at least 12,400 candelas per square meter when operating at 100% intensity. ~~Submit~~~~Provide~~ documentation that indicates the LED brightness and color bins that are used in each pixel. Ensure that LEDs are individually mounted on a PCB, and are able to be removed and replaced using conventional electronic repair methods. Encapsulated LEDs within a pixel are not allowed. ERS LEDs must be arranged and powered in a manner that maintains a discernible message in the event of a single LED or pixel failure.

HIGHWAY SIGNING.**(REV 12-22-15)**

SUBARTICLE 700-1.5 is deleted and the following substituted:

700-1.5 Acceptance of Signs:

700-1.5.1 Sign Inspection: Submit certification that the sign assembly meets the material and installation requirements of the Contract Documents. The Engineer will inspect the signs upon delivery to the storage or project site and again at the final construction inspection. Repair and replace signs deemed unacceptable by the Engineer at no expense to the Department.

SUBARTICLE 700-2.2.4 is deleted and the following substituted:

700-2.2.4 Erection of Signs and Sign Supports: Do not erect overhead sign supports until the concrete strength in the support footing is at least 2,500 psi. Determine concrete strength from tests on a minimum of two test cylinders sampled and tested in accordance with ASTM C31 and ASTM C39 and verifying test results have been submitted to the Engineer.

Erect the signs and sign structures in accordance with the details shown in the Plans. The Contractor may fabricate the structural steel sign trusses in sections that will fit into available galvanizing vats. Prior to galvanizing, weld the joints as specified in Section 460 and in accordance with the details shown in the Plans. Re-galvanize damaged parts as specified in Section 562.

Weld aluminum structures in accordance with Section 965.

Attach electronic display signs to the supporting structure in accordance with the manufacturer's recommendations using the mounting hardware provided by the manufacturer.

SUBARTICLE 700-4.2.3 is deleted and the following substituted:

700-4.2.3 Housing Face Requirements for all DMS: Ensure the sign face meets the requirements of NEMA TS 4-2005, Section 3.1.3. Ensure that all sign face surfaces are finished with a matte black coating system that meets or exceeds American Architectural Manufacturers Association (AAMA) Specification No. 2605. Submit certification that the sign face parts are coated with the prescribed thickness. Except for embedded DMS, ensure the sign face includes a contrast border that meets the requirements of NEMA TS 4-2005, Section 3.1.6.

700-4.2.3.1 Housing Face for Walk-In DMS: No exposed fasteners are allowed on the housing face. Ensure that display modules can be easily and rapidly removed from within the sign without disturbing adjacent display modules.

700-4.2.3.2 Housing Face for Front Access and Embedded DMS: Any exposed fasteners on the housing face must be the same color and finish as the housing face. Only captive fasteners may be used on the housing face.

700-4.2.3.3 External Fascia Panels: If the sign includes external fascia panels, ensure that they are constructed using aluminum. Finish each fascia panel with a matte black coating system that meets or exceeds AAMA Specification No. 2605.

700-4.2.3.4 Lens Panel Assembly: If the sign includes lens panel assemblies, ensure they are modular in design, removable, and interchangeable without misalignment of the lens panel and the LED pixels. The lens panel assembly must consist of an environmental shielding layer coating to protect and seal the LED and internal electronics. The coating must be a minimum 90% UV opaque. Lens panels must have a matte black coating that meets or exceeds AAMA Specification No. 2605. Lens panels must include a mask constructed of 0.080 inch minimum thickness aluminum. Ensure that the mask is perforated to provide an aperture for each pixel on the display module. Ensure that the apertures do not block the LED output at the required viewing angle.

SUBARTICLE 700-4.3.1 is deleted and the following substituted:

700-4.3.1 LED and Pixel Specifications: Ensure that LED lamps have a minimum viewing angle of 30 degrees.

Ensure that all pixels in all signs in a project, including operational support supplies, have equal color and on-axis intensity. Ensure that the sign display meets the luminance requirements of NEMA TS 4-2005, Section 5.4, for light emitting signs connected at full power. Ensure that amber displays produce an overall luminous intensity of at least 9200 candelas per square meter when operating at 100% intensity. Provide the LED brightness and color bins that are used in each pixel to the Engineer for approval. Ensure that the LED manufacturer demonstrates testing and binning according to the International Commission on Illumination (CIE) 127-1997 Standard.

Ensure that all LEDs operate within the LED manufacturer's recommendations for typical forward voltage, peak pulsed forward current, and other ratings. Component ratings must not be exceeded under any operating condition.

Ensure that the operational status of each pixel in the sign can be automatically tested once a day. Ensure that the pixel status test determines the functional status of the pixel as defined by the pixel Failure Status object in National Transportation Communications for ITS Protocol (NTCIP) 1203 v02.39 and does not affect the displayed message for more than half a second.

Ensure that LEDs are individually mounted directly on a printed circuit board (PCB).

SUBARTICLE 700-4.14 is deleted and the following substituted:

700-4.14 Documentation: Submit documentation for electronic equipment in accordance with 603-6.

SUBARTICLE 700-4.18.3 is deleted and the following substituted:

700-4.18.3 Pre-Installation Test Failure Consequence: If any unit fails, the unit shall be corrected or another unit substituted in its place and the test repeated.

If a unit has been modified as a result of a failure, a report shall be prepared and submitted to the Engineer. The report shall describe the nature of the failure and the corrective action taken.

If a failure pattern develops, the Engineer may direct that design and construction modifications be made to all units without additional cost to the Department or an extension of the Contract Time.

SUBARTICLE 700-4.19 is deleted and the following substituted:

700-4.19 Installed Site Tests: Conduct an approved, stand-alone equipment installation test at the field site. Test all stand-alone (i.e., non-network) functions of the field equipment using equipment installed as detailed in the Plans and as approved by the Engineer.

Complete approved data forms and turn them over to the Engineer for review and as a basis for rejection or acceptance. Provide a minimum notice of 30 calendar days prior to all tests to permit the Engineer or their representative to observe each test.

If any unit fails to pass its stand-alone test, correct the unit or substitute another unit in its place, then repeat the test.

If a unit has been modified as a result of a stand-alone test failure, prepare a report describing the nature of the failure and the corrective action taken and submit it to the Engineer prior to re-testing the unit. If a failure pattern develops, the Engineer may direct that design and construction modifications be made to all units without additional cost to the Department or an extension of the Contract Time.

SUBARTICLE 700-4.20 is deleted and the following substituted:

700-4.20 System Testing: Conduct approved DMS system tests on the field equipment with the master equipment including, at a minimum, all remote control functions. Display the return status codes from the sign controller for a minimum of 72 hours. Complete approved data forms and turn them over to the Engineer for review, and as a basis for rejection or acceptance.

Demonstrate the sign's ability to display the proper predefined message or remain blank when power is restored following an AC power interruption.

If the system test fails because of any subsystem component, repair that component or substitute another in its place, then repeat the test. If a component has been modified as a result of a system test failure, prepare a report and submit it to the Engineer prior to retesting.

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 submit to the Contractor a letter of approval and completion stating the first and last day of the 30 day test period.

SUBARTICLE 700-5.2.2.4 is deleted and the following substituted:

700-5.2.2.4 LED and Pixel Specifications: Ensure that all LEDs used in the display have a wavelength output that varies no more than plus or minus two nanometers from the specified peak wavelength. Ensure that the display and LED pixel cone of vision is a minimum of 15 degrees (centered around the optical axis, or zero point, of the pixel). The cone perimeter is defined by the point where light output intensity is 50% of the intensity measured at the zero point of the pixel. For all colors other than white, ensure that the sign display produces an overall luminous intensity of at least 9200 candelas per square meter when operating at 100% intensity. For white or full color matrix displays ensure that the sign display produces white with an overall luminous intensity of at least 12,400 candelas per square meter when operating at 100% intensity. Submit documentation that indicates the LED brightness and color bins that are used in each pixel. Ensure that LEDs are individually mounted on a PCB, and are able to be removed and replaced using conventional electronic repair methods. Encapsulated LEDs within a pixel are not allowed. ERS LEDs must be arranged and powered in a manner that maintains a discernible message in the event of a single LED or pixel failure.