

ITEM 680.0047--25 - ONE-WAY LED LANE INDICATOR SIGNAL
ITEM 680.0048--25 - TWO-WAY LED LANE INDICATOR SIGNAL

1. DESCRIPTION:

- 1.01 Under this work the Contractor shall furnish and install LED (light emitting diode) Lane Indicator Signals (LIS) on overhead structures as shown on the plans, or as directed by the Engineer, and in accordance with this specification.

2. MATERIALS:

- 2.01 The signal modules shall have an illuminated area of 18 inches square. The surrounding black border shall be 3 inches on each side. The faceplate shall be a frosted polycarbonate lens.
- 2.02 The modules shall have a minimum of 126 LED's for the arrow and 150 for the cross with a spacing between LED's of 0.515 mm and 0.523 mm. The minimum intensity for each LED shall be 2 candelas.
- 2.03 Each module shall be capable of displaying a green ARROW, a red "X", and a yellow "X".
- 2.04 Each module shall be capable of a three-way display.
- 2.05 Each two-way signal shall have two (2) signal modules attached to opposite faces of a single housing. Each one-way signal shall have one (1) signal module per housing.
- 2.06 The housing for the signal shall be fabricated from 0.100 gauge (minimum) aluminum, painted black, in conformance with Section 724-04. Sun shields shall be provided on the top and sides of the signal.
- 2.07 Mounting brackets shall conform to Section 680 and 724-04.
- 2.08 Power and control wires to each indicator signal face shall be solid strand #14 -5 conductor cable.
- 2.09 **Electrical Requirements**

A. Light Emitting Diodes

The LED sign module shall conform to the institute of traffic engineers (ITE) proposed specification for LED vehicle traffic signal modules. LED color(s) shall be as indicated on the plans and as directed by the manual of uniform traffic control devices. The individual LED light sources shall be wired such that the failure of one LED light source will not result in the loss of illumination of any additional led light sources. The LED shall have a minimum:

1. Red LED; AlGaInP; 7000 mcd minimum brightness; viewing angel 30°
2. Green LED; InGaP; 7150 mcd minimum brightness; viewing angel 30°
3. Yellow LED; InGaP; 6000 mcd minimum brightness; viewing angel 30°

B. Circuit Board

All printed circuit boards shall meet [REDACTED] standards for quality control and workmanship.

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2. MATERIALS: (cont'd)

2.09 Electrical Requirements (cont'd)

C. Power Supply



2.10 Environmental Requirements

The equipment shall meet all of its specified requirements during and after subjection to any combination of the following requirements:



The Contractor shall furnish cut sheets, shop drawings and block and schematic diagrams which show in detail all proposed materials, dimensions, electronic layouts, part numbers, part values and operation parameters prior to construction of the LIS for the approval of the Engineer.

2.11 Document Requirements

Ten (10) complete sets of operation and maintenance manuals shall be provided for each assembly type utilized in the Contract. The manuals shall, as a minimum, include the following:

- A. Complete and accurate schematic diagrams
- B. Complete installation procedures
- C. Complete performance specifications (Functional, electrical, mechanical and environmental) on the equipment
- D. Complete parts list including names of vendors for parts not identified by universal part numbers such as JEDEC, RETMA, or ETA
- E. Pictorial of component layout on circuit board
- F. Complete maintenance and trouble-shooting procedures
- G. Complete stage-by-stage explanation of circuit theory and operation.

2.12 Quality Assurance Provision Requirements

Three (3) types of tests shall be required for each unit of equipment furnished: Design Approval Tests, Stand-Alone Tests, and Final Acceptance Tests. Each of these tests is described in the following sections.

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2. MATERIALS: (cont'd)

2.12 Quality Assurance Provision Requirements (cont'd)

The Contractor shall be responsible for developing detailed test procedures for each type of equipment and for conducting the specified tests to verify satisfactory operation of the equipment. The test procedures shall be submitted to the Engineer for approval prior to the tests. Only approved test procedures shall be used during the tests. A minimum of ten (10) work days shall be allowed for the Engineer's review and approval of the test procedures.

The Engineer shall be notified in writing a minimum of ten (10) work days in advance of the time when these tests are to be conducted.

Supplemental information for each test follows.

A. Design Approval Test

Design approval tests shall be conducted by the Contractor on one or more samples of each type, as approved by the Engineer, to determine if the design of the equipment meets the requirements of this specification. The tests shall be conducted in accordance with the approved test procedures.

In the case of standard product line equipment, the Engineer may waive the design approval tests, if the manufacturer's written specifications (functional and environmental) are equal to or better than those specified herein and he so states in writing or if the Contractor provides certification by an independent testing laboratory that these design approval tests have been previously satisfactorily completed. The design approval test shall cover the following, as a minimum:

1. Temperature: All functional operations of equipment shall be successfully performed under the following conditions and in the order specified below:
 - The equipment shall be stabilized at 32 degrees F. After stabilization at this temperature, the equipment shall be operated without degradation for 2 hours.
 - The equipment shall be stabilized at 122 degrees F. After stabilization, the equipment shall be operated without degradation for 2 hours.
2. Relative Humidity: All equipment shall meet its performance requirements when subjected to a temperature and relative humidity of 122 degrees F and 70% respectively. The equipment shall be maintained at the above condition for 48 hours. At the conclusion of the soak, within 30 minutes, the test shall verify that the equipment can meet all of the operational requirements.
3. Power Variation: The equipment shall meet all of the specified performance requirements when the input voltage is plus or minus 10 volts from the nominal value of 115 volts. The equipment shall be operated at the extreme limits for at least 15 minutes during which it shall meet all of its operation requirements.

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2. MATERIALS: (cont'd)

2.12 Quality Assurance Provision Requirements (cont'd)

A. Design Approval Test (cont'd)

4. Vibration: The equipment shall show no degradation of mechanical structure, soldered components, plug-in components, or satisfactory operation in accordance with the manufacturer's specification after being subjected to the following vibration test:
 - a. The equipment shall be secured to the (shaker) head of a suitable electro mechanical shaker in the vertical, lateral, and longitudinal planes respectively. The object of the test is to vibrate the equipment in each of the three mutual perpendicular axes, in accordance with the following parameters:
 - b. Amplitude: 0.06 inch "Double Amplitude" (peak-to-peak)
 - c. Linear Acceleration (g's): 5 maximum
 - d. Linear Velocity: approximately 7.4 inches per second
 - e. Duration: 5 minute dwell in each axis

If the equipment fails the design approval tests, the design fault shall be corrected and the entire design approval test shall be repeated. All deliverable equipment shall be modified, without additional cost to the State, to include design changes required to pass the design approval tests.

B. Stand-Alone Test

The Contractor shall conduct an approved stand-alone test of the equipment after installation at each field site shown on the plans. The test shall, as a minimum, exercise all stand-alone (non-network) for the equipment with all of the equipment installed per the plans as directed by the Engineer. Approved data forms shall be completed and turned over to the Engineer as the basis for review and rejection or acceptance.

If the equipment fails the stand-alone test, it shall be corrected or another substituted in its place and the test successfully repeated.

If a unit has been modified as a result of a stand-alone test failure, a report shall be prepared and delivered to the Engineer prior or retesting of the equipment. The report shall describe the nature of the failure and the corrective action taken. If a failure pattern develops, as defined by the Engineer, then he may direct that design and construction modifications be made to all equipment without additional cost to the State or extension of the contract period.

C. Final Acceptance Test

Following satisfactory completion of the stand-alone test, the equipment will be connected to the system and a final acceptance test shall be conducted. The final acceptance test shall, as a minimum, exercise all functional operations of the equipment as an integrated system. The test shall demonstrate all remotely controlled features (from central) and all local controlled features specified herein.

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2. MATERIALS: (cont'd)

2.12 Quality Assurance Provision Requirements (cont'd)

A. Final Acceptance Test (cont'd)

In the event of a failure of any Contractor supplied equipment, the test shall be restarted.

In the event of a failure of equipment installed by others, the test shall be suspended until the problems have been corrected, and then the test shall be resumed from the point of suspension.

3. CONSTRUCTION DETAILS:

- 3.01 The Contractor shall install the LIS equipment at locations as shown on the plans. Sign mounting shall be in accordance with the details shown on the plans or as directed by the Engineer.
- 3.02 The signal modules shall be mounted on the structure with bracket assemblies in a position centered over each traffic lane.
- 3.03 Each signal module shall be connected to the control cabinet located at the base of the structure with a 5 conductor communication cable and a power line.
- 3.04 All material shall be transported and handled in a manner that will cause no permanent deformation, injury, or damage. Material to be stored shall be stored above the ground in a manner and at a location approved by the Engineer. Any part of the entire sign or structure damaged during transportation, handling or erection shall be repaired, or if determined by the Engineer as unfit for use in the finished work, shall be removed from the site and replaced by the Contractor at his own expense. Subsection 645-3.09 of the Standard Specification shall apply.
- 3.05 Once installed, the LIS input signals shall be connected to the LIS Field Controller cabinet. Tests shall be conducted to verify that the signals are operational via the LIS Field Controller installed at the field cabinet. The contractor shall be responsible for all local programming of the LIS Field Controller necessary to achieve operation of the Lane Control Signals as shown on the plans.
- 3.06 All components to be supplied under this specification shall be warranted for a minimum of two-years from the conclusion of the final acceptance test of each assembly. This warranty shall include repair and/or replacement of all failed components via a factory authorized depot repair service. All items sent to the depot for repair shall be returned within two weeks of the date of receipt at the facility. The depot location shall be in the United States. Repairs shall not require more than two weeks from date of receipt and the provider of the warranty shall be responsible for all return shipping costs. The depot maintainer designated for each component shall be authorized by the original manufacturer to supply this service. A warranty certificate shall be supplied for each component from the designated depot repair site indicating the start and end dates of the warranty. The certificate shall be supplied at the conclusion of the system acceptance test and shall be for a minimum of two years after that point. The certificate shall name the State of New York or another agency to be designated by Special Note in the Proposal as the recipient of the service. The agency that is designated as the recipient of the service shall have the right to transfer this service to other agencies or parties who may be contracted to perform overall maintenance of the facility.

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3. CONSTRUCTION DETAILS: (cont'd)

- 3.07 One copy of all operations and maintenance manuals for each LIS signal shall be delivered for each signal installed. For this project, a training course shall be conducted to review the operations and maintenance of all components. The training course shall be scheduled for 20 persons and a minimum of one, 8-hour session

4. METHOD OF MEASUREMENT:

- 4.01 This work will be measured as the number of each LED Lane Indicator Signals furnished, satisfactorily installed and tested in accordance with the plans, specifications and as directed by the Engineer.

5. BASIS OF PAYMENT:

- 5.01 The unit price bid for the LED Lane Indicator Signal shall include the cost of furnishing all equipment, materials, labor, tools and testing required to satisfactorily complete the work as specified herein and as directed by the Engineer. Payment for all mounting hardware, internal cabling, wiring, and conduit, which are required for full assembly of the LIS signal, shall be included under this item.

- 5.02 Progress payment will be made as follows:

Approval of Shop Drawings - 10%
Installation on the Support Structure - 40%
Operational Stand-Alone Test of Assembly - 40%
Final Acceptance - 10%

- 5.03 Payment will be made under:

<u>Item No.</u>	<u>Description</u>	<u>Pay Unit</u>
680.0047--25	One-Way LED Lane Indicator Signal	Each
680.0048--25	Two-Way LED Lane Indicator Signal	Each