SPECIFICATIONS FOR
LED TRAFFIC SIGNAL MODULES
(Current Revision Dated 03-19-2008)

The purpose of this specification is to provide the minimum performance requirements for the following LED Traffic Signal Modules:

Circular Ball
Arrow - Single and Bi-Modal (Yellow and Green Arrow incorporated into one unit)
Pedestrian - Single (Hand or Walking Person) and Bi-Modal (Hand and Walking Person incorporated into one unit)

This specification refers to definitions and practices described in “Vehicle Traffic Control Signal Heads” referred to in this document as “VTCSH.” and “Pedestrian Traffic Control Signal Indications”, referred to in this document as “PTCSI”, published in the Equipment and Materials Standards of the Institute of Transportation Engineers.

Ball and Arrow LEDs shall be specified and supplied to this specification as a NYSDOT Standard and Type “A” - See Paragraph 5.0 (NYSDOT Standard LED Module Definitions) for detailed features. All Ball and Single Arrow LED modules may be procured from this specification will be NYSDOT Standard and Type “A”. Single Pedestrian, Bi-Modal Pedestrian and Bi-Modal Arrows will be procured as Type “A” only.

All unit types designed to this specification shall be operationally compatible with the traffic signal equipment that each type is designed and intended to interface with. This equipment includes all controllers, conflict monitors, current monitors, switchpacks and flashers currently in use by the New York State Department of Transportation.

1. CIRCULAR BALL SPECIFICATIONS

Circular Ball Modules shall be designed, built and tested per the ITE’s performance specification titled “Vehicle Traffic Control Signal Heads: Light Emitting Diode (LED) Circular Signal Supplement”- Dated June 27, 2005. Minimum maintained luminous intensity values shall be per Table 1 of the specification. Circular Ball Modules shall also conform to the additions and exceptions to specifications noted herein.

2. LED ARROW (SINGLE AND BI-MODAL) SPECIFICATIONS

Led Arrow Modules shall be designed, built and tested per the ITE’s performance specification titled “Vehicle Traffic Control Signal Heads: Light Emitting Diode (LED) Vehicle Arrow Supplement”- Dated April 3, 2006. Minimum maintained luminous intensity values shall be per Table 3 (Omni Directional) of the specification. The Single LED Arrow module shall be designed to display an Arrow of either a Yellow or Green color. The Bi-Modal LED Arrow
module shall be designed to display both a Yellow and Green Arrow in the same unit. Led Arrow Modules shall also conform to the additions and exceptions to specifications noted herein.

3. LED PEDESTRIAN MODULES (SINGLE AND BI-MODAL) SPECIFICATIONS

Led Pedestrian Modules shall be designed, built and tested per the ITE’s performance specification titled “Pedestrian Traffic Control Signal Indications - Part 2: Light Emitting Diode (LED) Pedestrian Traffic Signal Modules”- Dated March 19, 2004. The Single LED Pedestrian module shall be designed to display either a “HAND” or “WALKING PERSON”. The Bi-Modal LED Pedestrian module shall be designed to display both the “HAND” and “WALKING PERSON” in the same module. Led Pedestrian Modules shall also conform to the additions and exceptions to specifications noted herein.

Pedestrian LED Modules shall be designed as either having a Message Bearing Surface of 12 inches by 12 inches or 16 inches by 18 inches

The 16 inches by 18 inches module shall be built to the dimensions shown below and fit in pedestrian housings of the manufacturers listed.

Dimensional Requirements for 16 inches by 18 inches Pedestrian Signal:

<table>
<thead>
<tr>
<th>Height</th>
<th>WIDTH</th>
<th>CORNER RADIUS</th>
<th>FITS HOUSINGS DESIGNED BY</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 in</td>
<td>17.7 in</td>
<td>2.36 in</td>
<td>ICC, IDC &amp; McCAIN</td>
</tr>
</tbody>
</table>

4.0 ADDITIONS AND EXCEPTIONS TO SPECIFICATIONS FOR ALL MODULES EXCEPT WHERE NOTED

4.1 A one piece “U” shaped cross section rubber gasket or other suitable means shall be provided with each module to insure a weather tight fit between the door of the signal housing and the module. The quality of gasketing supplied, and any method used to adhere the gasketing to the module if the gasketing is affixed to the module using adhesive, shall be such that the gasketing and adhesion technique shall not appreciably deteriorate over the life of the module when used the module is used in its intended application.

4.2 Wiring for electrical connections to the module shall be terminated with insulated 0.250 inch female quick disconnect push on terminals.

4.3 Each LED signal module shall be identified on the back side with the following:

    ---- Manufacturer’s Name or Trade Mark and Manufacturer’s Model Number
    ---- Part number as shown in the NYS DOT’s LED Traffic Signal Module QPL
---- Serial number
---- Voltage rating
---- Power consumption (Watts and Volt-Ampere)
---- Vertical indexing indicator (i.e., “up arrow”, or the word “UP” or “TOP”) if specific orientation of the module is required.
---- Date of Manufacture (minimum information required - month & year)
---- Single units shall have identification markings as to the type and color of the module. Bi-Modals shall be marked with module type.

4.3.1 Barcoding. All LED signal modules shall be barcoded using Barcode type 128. Barcodes shall be printed on a quality polyester white label (Black print only) where the print on the label and adhesion of the label to the surface shall be weather, UV and temperature resistant. Size of the label shall be 0.5 inch wide by 1.75 inch long. All barcodes shall be printed entirely on the label and be completely legible. Text of the Barcode Information shall also be legibly printed on the label.

Information on the Barcode shall be separated into the following four parts, but printed continuously on the label in the order shown:

---- Model Number - 2 Digits (See Table 1 at the end of this specification for Model Number Digits)

---- Manufacturer - 2 Digits. Digits assigned by NYSDOT upon Product Qualification

---- Date of Manufacture - 4 Digits. First two digits represents Month of Manufacture, Second two digits represent Year of Manufacture

---- Manufacturers Serial Number of Module - 10 digits maximum

An example of the information printed on the barcode for a NYSDOT STANDARD 12” (300mm) Red Ball LED module manufactured in June of 2005 and received by NYSDOT in June of 2006 with a serial number of 0183 by a company whose manufacturers’ code is XX would be R1XX06050183.

Barcode labels, meeting the same requirements of the labels above, shall also be placed on the outside of all shipping boxes. Example: Should the shipping box contain six LED modules, individual barcode labels for all of the six modules inside the box shall be affixed to the outside of the box. The labels shall also be grouped together so that they can be easily and quickly scanned by a barcode reader.

4.4 All “Red” LED signal module lenses supplied to this specification shall be tinted with the appropriate color to enhance on/off contrast. The material used to tint the lens shall not affect the luminous intensity or chromaticity and shall be uniform across the face of the lens. The “Yellow” and “Green” units shall be supplied with untinted lenses.
4.5 All wiring and terminal blocks shall meet the requirements of Section 13.02 Wiring of the VTCSH standard. Each wire shall be approximately 1 m long. All wiring shall be rated for use over the temperature range of -40 deg F to +165 deg F. Under normal handling of the module over the specified temperature range, the wiring insulation shall not crack or fray along its entire length.

Units shall be supplied with colored coded wires as defined below:

- Red Balls & Red Arrows - Red & White
- Yellow Balls & Yellow Arrows - Yellow & White
- Green Balls & Green Arrows - Brown & White
- Bi-Modal Arrows - Brown(Green Arrow), Yellow & White(Common)
- Bi-Modal Pedestrians - Orange (Hand), Blue (Person) & White (Common)
- Single Pedestrians - Hand - Orange & White
- Single Pedestrians - Walking Person - Blue & White

4.6 All modules shall contain filtering dedicated to prevent inducing electronic noise into the AC power lines.

4.7 Failed State Impedance. Failed State Impedance shall be 1 Megohm minimum across the input power leads.

4.8 Yellow Ball and Yellow Arrow Modules supplied to this specification shall only be required to meet the Minimum Maintained Luminous Intensities of the applicable specification for that device at 77 deg F.

4.9 Initial Luminous Intensities of the Modules built to this specification shall equal or exceed the Minimum Maintained Luminous Intensities applicable for that device at 77 deg F as follows.

Circular Ball Modules:

- Red - 125% of the Minimum Maintained Luminous Intensity values
- Green - 115% of the Minimum Maintained Luminous Intensity values
- Yellow - 110% of the Minimum Maintained Luminous Intensity values

Led Arrow Modules:

- Red - 125% of the Minimum Maintained Luminous Intensity values
- Green - 115% of the Minimum Maintained Luminous Intensity values
- Yellow - 110% of the Minimum Maintained Luminous Intensity values

Led Pedestrian Modules:

- Walking Person - 150% of the Minimum Maintained Luminous Intensity values
- Hand - 120% of the Minimum Maintained Luminous Intensity values
4.10 All modules shall be fused. The fuse shall be located before any electronic component used in the module and placed in series with the colored wire of the unit. If multiple fuses are used in the design of the module, the main surge protection fuse shall be placed in the location above. The main surge protection fuse can be internal or external to the unit. Should fusing be external to the unit by placing inline fuse holders into the wiring of the unit, the fuse holder shall be installed so that it is between six to ten inches from the housing of the unit. Fuse selection shall be such that it provides reliable operation for its intended operation.

5.0 NYSDOT Standard and Type A LED Module Definitions.

5.1 NYSDOT Standard units shall be designed so that a normally functioning signal module will generate the needed current to prevent a Model 215 Current Monitor from detecting a loss of current over the voltage range of between 95 and 135 volts rms. The minimum current required to prevent the Model 215 monitor from detecting a loss of current is a 500 milliamp peak AC or pulsed current. Signal modules designed to specifically generate current pulses to prevent the monitor from tripping shall, as a minimum, generate 6 pulses per second. Generated current pulses shall be evenly spaced, with the first pulse generated within 100 msec after the application of AC power. (Additional information regarding the operation of the Model 215 Current Monitor can be obtained in the latest "New York State Transportation Management Equipment Specifications").

Type “A” units shall be supplied without the necessary circuitry to function with a Model 215 current monitor.

All Ball and Single Arrow LED modules may be procured using this specification as either NYSDOT Standard or Type A units. Single Pedestrian, Bi-Modal Pedestrian and Bi-Modal Arrows will be procured as Type A only.

5.2 Power Factor. LED signal modules supplied to this specification shall have power factors of 0.90 or greater without the current generating circuitry included in the calculations for power factor for NYSDOT Standard units.

5.3 Harmonic Distortion. Harmonic Distortion induced into the AC power line for Type A units operating at 120V rms shall not exceed 20 percent. NYSDOT Standard units supplied will meet the same low distortion standards without the current generating circuitry included in the measurements.

5.4 Electronic Noise. Type A units supplied to this specification shall meet the requirements of the Federal Communication Commission Title 47, Subpart B, Section 15 regulations concerning the emission of electronic noise by Class A digital devices. Standard units shall meet the same requirements except without the current generating circuitry included in the measurements.

6.0 PRODUCTION TESTS & INSPECTIONS

Production Tests and Inspections shall be per the ITE specifications for the particular device except as follows:
6.1 Luminous Intensity. Modules shall be tested for luminous intensity. A single point measurement, with a correlation to the Initial Luminous Intensity requirements specified in paragraph 4.0 of this document may be used. Failure of a module to meet the requirements for the Initial Luminous Intensity specified or Maximum Permissible Luminous Intensity shall be cause for rejection of the module.

6.2 Current Consumption Measurement: All modules (Standard and Type “A” Units) shall be measured for current flow in Amperes. The measured current values shall be compared against the design current values for the unit. A measured current consumption in excess of 120% of the design current value for an ambient temperature of 77 deg F shall be cause for rejection of the module.

6.3 Power Factor. All modules (Standard and Type “A” Units) shall be measured for Power Factor. The measured values for Type “A” units shall be greater than 0.90, for “Standard” units the approximate design value for that device.

6.4 Current Monitor Compatibility (Standard Units Only). All Standard type modules shall be tested to ensure that the unit is generating the necessary current for compatibility with the Model 215 Current Monitor. Test to be performed at 77 deg F and 120 V rms.

6.5 Visual Inspection: All modules shall be visually inspected for any exterior physical damage or assembly anomalies. Careful attention shall be paid to the surface of the lens to ensure there are no scratches (abrasions), cracks, chips, discoloration, or other defects. The presence of any such defects shall be cause for rejection of the module.

7. MISCELLANEOUS

7.1 Independent Laboratory Test Reports shall be required for all products that are placed on New York State Department of Transportation Management Equipment Qualified Products List for LED Signal Indications. Test reports demonstrating the following requirements shall be provided:

— Lens Abrasion
— Chromaticity
— Initial Luminous Intensities as defined in Paragraph 4.0 of this specification

7.2 Information on each shipment of LED modules shall be supplied to the NYSDOT Signal Equipment Lab. This shall be in the form of an electronic file (Excel Spreadsheet). The spreadsheet shall contain a minimum of five fields with the following information:

— Serial Number of Unit
— Manufacturers Part Number of Unit as listed on NYSDOT’s QPL.
— NYSDOT’s PO Number
— Region No. of Region receiving shipment (1 thru 10). For shipments to the Signal Equipment Lab, these shall be noted as “Lab” in the “Region No” field
— NYSDOT’s Barcode ID number. This ID number is the “Text of the Barcode Information” as specified in the “Barcoding” paragraph of this specification.

8. WARRANTY PROVISIONS
The unit shall be repaired or replaced by the manufacturer if it exhibits a failure due to workmanship, material defects or fails to meet any of the specifications of this document or the applicable ITE specification within the first 60 months of field operation. Responsibilities for shipping costs of warranty units shall be the responsibility of the manufacturer.

9. SAMPLE SUBMISSION

Low bidder(s) may be required to submit up to five sample units. In the event that a sample is required, it shall be provided within ten (10) working days of receipt of the request. Each device submitted shall be accompanied by five copies of the complete circuit schematic for the unit, one standard catalog cut and one manufacturers specification sheet for the individual LED light sources used in the unit. Documentation shall also be provided describing the techniques used to ensure the units will satisfy the luminous intensity requirements over the life of the warranty. This documentation may include items such as the description of circuitry incorporated in the module needed to meet this requirement or literature from the LED manufacturer describing the expected degradation of luminous intensity of the individual LED light sources used in the fabrication of the module over the life of the unit and operating temperature range.

TABLE 1

MODEL NUMBER BARCODE IDENTIFICATION CODES FOR LED SIGNAL MODULES

NYSDOT STANDARD UNITS

<table>
<thead>
<tr>
<th>MODULE TYPE</th>
<th>CODE</th>
<th>MODULE TYPE</th>
<th>CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>8&quot; (200 mm) RED BALL</td>
<td>R8</td>
<td>12&quot; (300 mm) GREEN BALL</td>
<td>G1</td>
</tr>
<tr>
<td>8&quot; (200 mm) GREEN BALL</td>
<td>G8</td>
<td>12&quot; (300 mm) YELLOW BALL</td>
<td>Y1</td>
</tr>
<tr>
<td>8&quot; (200 mm) YELLOW BALL</td>
<td>Y8</td>
<td>12&quot; (300 mm) RED ARROW</td>
<td>RA</td>
</tr>
<tr>
<td>12&quot; (300 mm) RED BALL</td>
<td>R1</td>
<td>12&quot; (300 mm) GREEN ARROW</td>
<td>GA</td>
</tr>
<tr>
<td>12&quot; (300 mm) YELLOW ARROW</td>
<td>YA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TYPE A UNITS - MODEL 330 CABINET COMPATIBLE

<table>
<thead>
<tr>
<th>MODULE TYPE</th>
<th>CODE</th>
<th>MODULE TYPE</th>
<th>CODE</th>
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<tbody>
<tr>
<td>Dimension</td>
<td>Color</td>
<td>Description</td>
<td>Code</td>
</tr>
<tr>
<td>--------------------</td>
<td>-------</td>
<td>--------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>12'' (300 mm) BI-MODAL ARROW</td>
<td>YG</td>
<td>12'' X 12'' (305 mm x 305 mm) SINGLE PEDESTRIAN - HAND ONLY</td>
<td>H1</td>
</tr>
<tr>
<td>12'' X 12'' (305 mm x 305 mm) SINGLE PEDESTRIAN - WALKING PERSON ONLY</td>
<td>WP</td>
<td>12'' X 12'' (305 mm x 305 mm) BI-MODAL PEDESTRIAN</td>
<td>CS</td>
</tr>
<tr>
<td>16'' X 18'' (410 mm x 450 mm) BI-MODAL PEDESTRIAN</td>
<td>CL</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>