MATERIAL SPECIFICATION FOR SIGNAL HEADS

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2461.01 SCOPE

This specification covers the requirements for traffic signal heads and associated components and accessories.

2461.01.01 Specification Significance and Use

This specification is written as a municipal-oriented specification. Municipal-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of many municipalities in Ontario.

Use of this specification or any other specification shall be according to the Contract Documents.

2461.01.02 Appendices Significance and Use

Appendices are not for use in provincial contracts as they are developed for municipal use, and then, only when invoked by the Owner.

Appendices are developed for the Owner's use only.

Inclusion of an appendix as part of the Contract Documents is solely at the discretion of the Owner. Appendices are not a mandatory part of this specification and only become part of the Contract Documents as the Owner invokes them.

Invoking a particular appendix does not obligate an Owner to use all available appendices. Only invoked appendices form part of the Contract Documents.

The decision to use any appendix is determined by an Owner after considering their contract requirements and their administrative, payment, and testing procedures, policies, and practices. Depending on these considerations, an Owner may not wish to invoke some or any of the available appendices.

2461.02 REFERENCES

When the Contract Documents indicate that municipal-oriented specifications are to be used and there is a municipal-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.MUNI, unless use of a provincial-oriented specification is specified in the Contract Documents. When there is not a corresponding municipal-oriented specification, the references below shall be considered to be the OPSS listed, unless use of a provincial-oriented specification is specified in the Contract Documents.

This specification refers to the following standards, specifications, or publications:

Ministry of Transportation Publications

Ontario Traffic Manual (OTM):
Book 12 - Traffic Signals

CSA Standards

C22.2 No. 0.4-04 (R2013)	Bonding of Electrical Equipment
C22.2 No. 127-15	Equipment and Lead Wires
S157-05 (R2015)	Strength Design in Aluminum

Institute of Transportation Engineers

ST-017B Equipment and Material Standards of the Institute of Transportation Engineers, April 3, 2006
ST-052 Vehicle Traffic Control Signal Heads: Light Emitting Diode (LED) Circular Signal Supplement, June 27, 2005
ST-054 Vehicle Traffic Control Signal Heads: Light Emitting Diode (LED) Vehicle Arrow Traffic Signal Supplement, January 2008
Pedestrian Traffic Control Signal Indications - Part 2: Light Emitting Diode (LED) Pedestrian Traffic Signal Modules, March 19, 2004

ASTM International

D 4956-13 Retroreflective Sheeting for Traffic Control

Others

Federal Specification Colour Yellow 595B-33538
Federal Specification Colour Gray MVCL-14187
Ontario Highway Traffic Act, R.S.O. 1990, Chapter H.8

2461.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Backboard means a panel surrounding a signal head used for the purpose of increasing the attention value of the signal.

Chromaticity means the colour quality of light that is defined by the wavelength (hue) and saturation.

Lamp means a light emitting diode (LED) circular signal module, LED arrow signal module, LED pedestrian signal module, or incandescent bulb.

LED Arrow Signal Module means a signal unit comprised of an array of LEDs, lens, and related power supply that provides an arrow traffic signal indication.

LED Pedestrian Signal Module means a signal unit comprised of an array of LEDs, lens, and related power supply that provides a pedestrian signal indication consisting of a walking pedestrian or hand icon.

LED Signal Module means a signal unit comprised of any array of LEDs and related power supply and any required lenses that provides a circular traffic signal indication when connected to appropriate power.

Programmable Visibility Head means the traffic signal head that can be programmed to limit the visible area of the indication.

2461.04 DESIGN AND SUBMISSION REQUIREMENTS

2461.04.01 Design Requirements

2461.04.01.01 Signal Head Requirements

Signal heads shall be designed to be attached to the traffic signal hanger assemblies using cushion hangers, adjustable mid-section hangers, or dual-end hangers with standard 38 mm internal pipe size gusseted pipe and fittings. Structural design of aluminum shall be according to CAN/CSA S157.

2461.05 MATERIALS

2461.05.01 General

Signal heads, components, and accessories shall be according to ITE ST-017B and the Contract Documents.

2461.05.02 Signal Head Housings

Signal head housings shall be a die-cast aluminum or a moulded polycarbonate body with hinged door assembly to provide a water and dust tight enclosure. Openings of the signal head housing shall be provided with a removable sealing device. Aluminum alloy shall be according to CSA S157. The polycarbonate signal head shall be moulded, ultraviolet and heat stabilized, flame retardant resin, and shall be yellow according to Federal Specification Colour Yellow 595B-33538.

When specified in the Contract Documents, the colour of the signal head housing with grey body and the back of the aluminum or polycarbonate backboard shall be according to Federal Specification Colour Gray MVCL-14187.

Stainless steel reinforcing plates shall be provided according to the manufacturer's recommendation for the mounting arrangement specified in the Contract Documents for the signal head.

2461.05.03 Visors

Each section of a traffic signal head shall be provided with a removable visor as specified in the Contract Documents.

2461.05.04 Wiring

Wiring shall be #18 AWG stranded copper type TEW and according to CSA C22.2 No. 127.

2461.05.05 Ground Terminals

Metallic traffic signal heads shall be provided with a ground lug to accommodate a #14 AWG bonding wire.

2461.05.06 Backboards

As a minimum, backboards shall be fabricated from 1.00 mm thick aluminum sheets or 3.00 mm thick high-density polyethylene (HDPE) sheets and shall project a minimum of 125 mm all around beyond the signal head housing. The signal head backboard shall be yellow according to Federal Specification Colour Yellow 595B-33538.

All backboards shall be opaque.

When specified in the Contract Documents, the backboard shall be outfitted with a strip of 75 mm wide fluorescent yellow prismatic retroreflective sheeting according to ASTM D 4956, Type XI, around the front facing border.

When specified in the Contract Documents, the colour of the heads with gray body and the back of the aluminum or polycarbonate backboard shall conform to Federal Specification Colour Gray MVCL-14187.

2461.05.07 Paint

Paint shall be synthetic resin enamel and according to Federal Standard Colour Yellow 595B-33538.

2461.05.08 LED

2461.05.08.01 LED Modules

LED circular modules at minimum shall be according to ITE ST-052 and the Contract Documents.

As a minimum, LED arrow signal modules shall be according to ITE ST-054 and the Contract Documents.

Each LED module shall have a single lens with a smooth outer surface. All circular red lenses shall be tinted red and all circular amber lenses shall be tinted amber. The use of tinting or other materials to enhance ON/OFF contrasts shall not affect chromaticity and shall be uniform across the face of the lens. The LED module lens shall be UV stabilized and shall be capable of withstanding direct ultraviolet sunlight exposure for a minimum period of 60 months without exhibiting evidence of deterioration or colour change.

All circular red, amber, and green LED modules shall have an incandescent look that provides a softened and uniform appearance.

LED modules shall be capable of retrofitting and replacing incandescent lamps without modifications to a standard ITE traffic signal housing. Installation shall only require the removal of the existing lens, lamp reflector assembly, and gasket. Each LED module shall have secured jacketed and colour coded cables for connecting to power and for bonding to system ground. The connecting cable shall be rated 600 volts. All wire leads shall be one metre in length, pre-stripped, and tinned.

Each LED module shall be a sealed unit that includes all parts necessary for operation (e.g., printed circuit board, power supply, lens, and gasket) and shall be weatherproof after installation and connection. A one-piece 12.5 mm wide neoprene gasket shall be provided and installed on the LED module prior to delivery.

All LED modules shall be according to the size, colour, and design specified in the Ontario Highway Traffic Act and the OTM Book 12.

LED pedestrian displays shall be the single unit with the walking pedestrian and hand superimposed in the same unit according to the Ontario Highway Traffic Act and the OTM Book 12.

All LED modules shall be approved by the Electrical Safety Authority or by an organization accredited by the Standards Council of Canada.

LED modules for use in programmable visibility head shall comply with the general requirements for LED circular modules. Modules shall be designed and constructed to be installed in a programmable visibility head without modification to the housing.

2461.05.08.02 Electrical Requirements

Electrical requirements for LED circular modules shall be according to ITE ST-052; the LED arrow modules shall be according to ITE ST-054; and the LED pedestrian modules shall be according to ITE Pedestrian Traffic Control Signal Indications - Part 2: Light Emitting Diode (LED) Pedestrian Traffic Signal Modules.

Maximum power consumption for LED modules shall be according to Table 1 and 2.

Power factor shall be a minimum of 0.95.

2461.05.08.03 Photometric Requirements

Photometric requirements for LED circular modules shall be according to ITE ST-052. Photometric requirements for LED arrow modules shall be according to ITE ST-054.

All circular LED modules shall be the expanded view type.

2461.05.08.04 Physical and Mechanical Requirements

Physical and mechanical requirements for LED circular modules shall be according to ITE ST-052; the LED arrow modules shall be according to ITE ST-054; and the LED pedestrian modules shall be according to ITE Pedestrian Traffic Control Signal Indications - Part 2: Light Emitting Diode (LED) Pedestrian Traffic Signal Modules.

2461.05.08.05 LED Module Identification

Each module shall have the manufacturer's name, trademark, model number, serial number, and date of manufacture (i.e., month-year) marked on the back of the module.

The following operating characteristics shall be permanently marked on the back of the module: nominal operating voltage; power consumption, in watts; and volt-amperes.

Each module shall have a symbol of the type of module (e.g., circle or arrow) in the colour of the module marked on the back of the module. The colour of the module shall be written out next to the symbol.

When specific mounting orientation is required, each module shall have prominent and permanent marking consisting of an up arrow or the word UP or TOP.

2461.05.08.06 LED Module Warranty

A warranty shall be provided on all LED modules. This warranty shall be in addition to any other warranty specified in the Contract Documents. The warranty on all LED modules shall be according to ITE ST-052.

The warranty period for each LED module shall be 60 months, commencing from the date of Switch On for operation of the traffic signals in which the LED module is used. Any LED module deemed to have a visual or operational deficiency shall be replaced within 30 days. The warranty shall cover all delivery, parts, and material costs.

2461.07 PRODUCTION

2461.07.01 General

Sectional signal heads consisting of one to six sections shall be supplied as specified in the Contract Documents. Where multiple sections are specified, lenses shall be arranged in the following order commencing from the top of the signal head to the bottom:

a) Red

b) Amber

c) Green

d) Straight Through Green Arrow

e) Left Turn Green / (Amber) Arrow

f) Right Turn Green Arrow

When any of the foregoing indications are not required, the order of arrangement shall be maintained by omitting those sections, which are not required.

Each section shall consist of a signal head housing, wiring, and visor as specified in the Contract Documents. Each section shall consist of LED modules or incandescent lampholders, reflectors, and lens as specified in the Contract Documents. Each complete assembly shall consist of a ground terminal and, when specified in the Contract Documents, a backboard.

Pedestrian signal heads shall consist of one or two housing sections suitable for rectangular signals. One display shall be a translucent lunar orange hand and the other display shall be a translucent lunar white walking pedestrian. Standard square visors shall be provided.

2461.07.02 Wiring

Loops of 150 mm length of wire shall be left in each section.

2461.07.03 Bonding

Metallic components shall be bonded together and grounded to the ground terminal according to CAN/CSA C22.2 No. 0.4.

2461.07.04 Assembly

All components shall be factory assembled using mechanical devices according to the strength requirements of ITE ST-017B.

2461.07.05 Painting

All externally visible portions or components of the metal signal heads, with the exception of lenses and the underside of visors, shall be painted yellow. The underside of the visors of the metal signal heads and the visors of the polycarbonate signal heads shall be painted matte black.

2461.07.06 Signal Head Identification

Each signal head shall have identification markings in a visible location indicating the manufacturer's name or trademark, date of manufacture, and standard designation OPSS 2461.

Identification markings shall be embossed on the signal head or on a corrosion-resistant metal plate securely attached to the signal head.

2461.07.07 Packaging

Each signal head shall be packaged securely in cardboard cartons. Backboards and separately ordered components may be packaged separately.

2461.08 QUALITY ASSURANCE

2461.08.01 Inspection

All signal heads may be subject to an inspection by the Contract Administrator prior to shipment.

2461.09 OWNER PURCHASE OF MATERIAL

2461.09.01 Packaging and Shipment

The supplier shall provide 4 copies of Working Drawings, when required by the Owner. Working Drawings shall include all detailed dimensions and a complete list of component materials and accessories.

The supplier is responsible for loading, delivery, and off-loading of signal heads to designated areas. Signal heads shall be subject to inspection during and on completion of off-loading. If any damage to the signal heads is encountered during the inspection, the supplier shall be responsible for the necessary corrective measures, which are subject to the approval of the Owner.

The supplier shall advise the Owner 3 Business Days prior to the shipping date of the intent to deliver and confirm that arrangements for off-loading have been made.

2461.09.02 Measurement for Payment

For measurement purposes, a count shall be made of the number of signal heads delivered and accepted.

All signal heads shall be complete with components and accessories and, when specified, backboards.

Payment at the price specified in the purchasing order shall be for the supply of the signal heads delivered to the destination on the date and time specified.

The cost of all testing, except that performed by the Owner, shall be included in the price.

TABLE 1
LED Modules Maximum Power Consumption
watts

LED Signal Modules						
	Red		Amber		Green	
Temperature, °C	25	74	25	74	25	74
Circular 300 mm	11	17	22	25	15	15
Circular 200 mm	8	13	13	16	12	12
300 mm Arrow	9	12	10	12	11	11
Programmable Visibility Indication	11	17	22	25	15	15

TABLE 2
LED Modules Maximum Power Consumption
watts

LED Pedestrian Signal Modules		
Temperature, °C	25	74
Hand	10	12
Walking Pedestrian	9	12

Appendix 2461-A, November 2017
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

The designer should specify the following in the Contract Documents:

- Type of removable visor (i.e., cowl, tunnel, open bottom, louvre) (2461.05.03)

- LED circular module requirements. (2461.05.08.01)

- LED arrow module requirements. (2461.05.08.01)

- Sectional signal head requirements. (2461.07.01)

The designer should determine if the following are required and, if so, specify them in the Contract Documents:

- Signal head housing colour requirements. (2461.05.02)

- Retroreflective boarder requirements. (2461.05.06)

- Backboard requirements. (2461.07.01)

For Owner purchase of material, the following technical information should be given to the supplier in the purchasing order:

a) Type of signal heads.

b) Number and size of sections.

c) Number, size, colour, and type of lenses.

d) Number and type of visors.

e) Backboards, if required.

f) Components and accessories, if required.

The designer should ensure that the General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Related Ontario Provincial Standard Drawings

None