



**CONSTRUCTION SPECIFICATION FOR
INSTALLATION OF ROADWAY LUMINAIRES**

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617.01 SCOPE

This specification covers the requirements for the installation of luminaires and brackets on poles complete with associated wiring and connections.

617.01.01 Specification Significance and Use

This specification has been developed for use in provincial- and municipal-oriented Contracts. The administration, testing, and payment policies, procedures, and practices reflected in this specification correspond to those used by many municipalities and the Ontario Ministry of Transportation.

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

617.01.02 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.

617.02 REFERENCES

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

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:

Ontario Provincial Standard Specifications, Construction

OPSS 604	Installation of Cable
OPSS 609	Grounding
OPSS 610	Removal of Electrical Equipment and Materials

Ontario Provincial Standard Specifications, Material

OPSS 2432	High Pressure Sodium Luminaires for Highway Lighting
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CSA Standards

C22.2 No. 9.0-96 (R2011)	General Requirements for Luminaires
C22.2 No. 65-13	Wire Connectors
C22.2 No. 211.2-06 (R2011)	Rigid PVC (Unplasticized) Conduit
C22.2 No. 248.8-11	Low-Voltage Fuses - Part 8: Class J Fuses
C83-96 (R2011)	Communication and Power Line Hardware

American National Standards Institute (ANSI)

C78.380-2007 High-Intensity Discharge Lamps, Method of Designation

Illuminating Engineering Society of North America (IESNA)

LM-63-02 Standard File Format for Electronic Transfer of Photometric Data and Related Information
LM-79-08 Electrical and Photometric Measurements of Solid-State Lighting Products

617.03 DEFINITIONS

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

Certificate of Conformance means a document issued by the Quality Verification Engineer confirming that the specified components of the Work are in general conformance with the requirements of the Contract Documents.

Engineer means a professional engineer licensed by the Professional Engineers Ontario to practice in the Province of Ontario.

Quality Verification Engineer (QVE) means an Engineer retained by the Contractor qualified to provide the services specified in the Contract Documents.

617.04 DESIGN AND SUBMISSION REQUIREMENTS

617.04.01 Submission Requirements

A photometric test report shall be submitted for each photometric curve used in the luminaires to be installed under the Contract. The testing and test reports for high intensity discharge (HID) luminaires (e.g., high pressure sodium) shall be according to IESNA LM-63. The testing and test reports for LED luminaires shall be according to IESNA LM-79. The testing and test reports shall be completed by an independent laboratory or a National Voluntary Laboratory Accreditation Program (NVLAP) accredited laboratory, which is accredited for testing the type of luminaire to be installed under the Contract (i.e., accredited for IESNA LM-63 for HID luminaires or IESNA LM-79 for LED luminaires). Each test report shall be dated and signed. The test reports shall be submitted to the Contract Administrator prior to the commencement of fabrication.

617.05 MATERIALS

617.05.01 Luminaires

617.05.01.01 Roadway Lighting Type

Roadway lighting luminaires shall be according to OPSS 2432 and the Contract Documents.

617.05.01.02 High Mast Lighting Type

High mast lighting luminaires shall be according to OPSS 2432 and the Contract Documents.

617.05.01.03 Floodlighting Type

Floodlighting luminaires shall be according to CSA C22.2 No. 9.0 and the Contract Documents.

617.05.02 Lamps

Lamps shall be high pressure sodium according to ANSI C78.380 with ANSI lamp designations shown in Table 1. Lamp wattages shall be permanently marked using a label affixed to the underside of the luminaires as specified in the Contract Documents.

617.05.03 Low-Voltage Cables

Single conductor low-voltage cables shall be according to OPSS 604.

617.05.04 Wire Connectors

Wire connectors shall be of the compression type and shall be according to CAN/CSA C22.2 No. 65.

617.05.05 Insulating Covers

Insulating covers for connectors shall be of the vinyl snap lock type or heat shrink tubing type and rated at 600 V.

617.05.06 Brackets

Brackets shall be as specified in the Contract Documents.

617.05.07 Conduit and Fittings

Conduit and fittings required for wooden pole mounting shall be of the rigid PVC type according to CSA C22.2 No. 211.2.

617.05.08 Hardware

Hardware for wooden pole mounting shall be according to CSA C83.

617.05.09 Grounding Materials

Ground wire and connectors shall be according to OPSS 609.

617.05.10 Fuse Holders and Fuses

Fuse holders shall be of the in-line type suitable for use with #12 AWG conductors, rated 600 V, and shall be complete with protective boots. Fuses shall be according to CSA C22.2 No. 248.8, 600 V with a current rating as specified in the Contract Documents.

617.07 CONSTRUCTION

617.07.01 General

General requirements for electrical work shall be as specified in the Contract Documents.

617.07.01.01 Ordering Luminaires

Immediately following the award of the Contract, the Contractor shall order the luminaires as required for this Contract.

The Contractor shall obtain verification of the delivery dates of the luminaires from the supplier and notify the Contract Administrator of the delivery dates within 72 hours after the award of the Contract.

The Contractor shall ensure there is timely and accurate communication with both the Owner and the supplier regarding the delivery, schedules, and requirements for the luminaires.

Delivery and off-loading of the luminaires shall be completed in a timely and efficient manner.

617.07.02 Removals

Removals shall be according to OPSS 610.

617.07.03 Lamp Installation

Lamps shall be installed after poles have been erected and the brackets and luminaires mounted and levelled.

617.07.04 Brackets

617.07.04.01 Roadway Lighting Type

Brackets shall be installed at right angles to the centreline of the roadway being served. Bracket clamping assemblies shall be securely tightened. Brackets shall be mounted on wooden poles using 16 mm diameter galvanized steel square head through bolts, nuts, and 50 x 50 mm washers.

617.07.04.02 Floodlighting Type

Bracket assemblies shall be oriented to give the floodlight aiming specified in the Contract Documents. Bracket clamping assemblies shall be securely tightened.

617.07.05 Luminaires

617.07.05.01 General

Luminaires shall be stored in conditions free of moisture, dirt, and other factors that could damage the ballasts or reflecting surfaces of the optical system.

Luminaires shall be mounted on brackets and shall be installed level along both the longitudinal and transverse axis.

Luminaire clamping assemblies shall be securely tightened upon completion of levelling.

Luminaires shall be orientated and aimed using the horizontal and vertical angles specified in the Contract Documents. When instructed by the Contract Administrator, each luminaire or luminaire component shall be readjusted once under nighttime operating conditions.

Glass refractors shall be installed complete with gaskets. Mounting hardware shall be securely tightened. The luminaire reflector and refractor shall be thoroughly cleaned prior to installing lamps. Lamps shall be installed with the installation date marked on the lamp base.

If required, the refractor and the lamp holder shall be reset or replaced according to manufacturer's instructions to give the proper type of light distribution specified in the Contract Documents.

When specified in the Contract Documents, the luminaires shall be equipped with shields. The shields shall be mounted in such a manner so as to prevent loosening, turning, or falling when subject to vibration or wind loading in the installed position and to permit relamping without removing or distorting the alignment of the shields.

The shield shall be installed according to the manufacturer's instructions. The orientation of each shield shall be as specified in the Contract Documents. After the shield is attached to the luminaire-retaining ring, it shall be rotated such that its centre (the deepest point) is aligned with the specified angle. The angle specified is based on geometric rotation with the true north as its reference (0 degrees). Once the shield is aligned to the specified angle, it shall be secured in place by tightening the holding ring.

The luminaire assembly when closed and in the operating position shall not be subject to damage by vibration.

617.07.05.02 High Mast Lighting Type

A maximum of one luminaire shall be installed on each arm of the luminaire ring.

Each luminaire shall be bolted and secured onto its respective luminaire arm.

617.07.06 Wiring and Connections

Riser wires in metal and concrete poles shall be terminated at the luminaire terminal block and installed through the bracket and pole to the pole handhole.

Riser wires on wooden poles shall enter the bracket with a drip loop and shall be installed in conduit when the distance from the bracket to the low voltage bus exceeds 450 mm.

Connections or riser wires to the assigned feeder conductors shall be made with compression connectors insulated with insulating covers.

In-line fuse holders and fuses shall be installed in the pole handhole and placed in an accessible location. For wooden poles, in-line fuse holder and fuses shall be installed at the point of connection.

617.07.07 Grounding

Grounding shall be according to OPSS 609.

For metal or concrete pole mounting, a #12 AWG insulated (green) stranded copper ground wire shall be installed between the luminaire housing ground terminal and the ground stud in the pole handhole.

For wooden pole mounting, a #12 AWG insulated (green) stranded copper ground wire shall be installed between the luminaire housing ground terminal and the system ground.

617.07.08 Replacing Luminaires

Existing luminaires shall be removed and new luminaires shall be installed according to the Contract Documents. Existing riser wires and luminaire ground wire shall be salvaged and connected to the new luminaires.

617.07.09 Relamping

When required, existing lamps shall be removed. The existing luminaires shall be thoroughly cleaned and new lamps shall be installed according to the Contract Documents.

617.07.10 Quality Control

617.07.10.01 Pre-Installation Testing and Inspection

Luminaires, brackets, socket setting, refractor type and ballast type shall be tested and inspected to ensure that they are according to the Contract Documents.

617.07.10.02 Proof of Performance Testing and Inspection

Luminaires shall be tested and inspected to ensure that they are levelled correctly and according to the Contract Documents. All lamps installed in luminaires shall have a minimum burning-in period of 100 nighttime hours prior to acceptance of the work by the Contract Administrator. All luminaire shielding shall be installed prior to the start of the burn-in period.

All tests required on the wiring system shall be according to OPSS 604.

A Certificate of Conformance shall be submitted to the Contract Administrator upon completion of the work. The Quality Verification Engineer shall affix his or her seal and signature to the completed Certificate of Conformance confirming that the following are in general conformance with the requirements of the Contract Documents:

- a) Work
- b) Material and installations
- c) Inspection, testing, and test results

617.07.11 Temporary Electrical Work

The work for temporary electrical installations shall be the same as for permanent installations of the same type of work, except the work shall include the removal of the installations when they are no longer required.

617.07.12 Management of Excess Material

Management of excess material shall be according to the Contract Documents.

617.09 MEASUREMENT FOR PAYMENT

617.09.01 Actual Measurement

617.09.01.01 Roadway Lighting Luminaires and Bracket Assemblies

For measurement purposes, a count shall be made of the number of roadway lighting luminaires and bracket assemblies installed.

617.09.01.02 High Mast Lighting Luminaires

For measurement purposes, a count shall be made of the number of high mast lighting luminaires installed.

617.09.01.03 Floodlighting Luminaires and Bracket Assemblies

For measurement purposes, a count shall be made of the number of floodlighting luminaires and bracket assemblies installed.

617.09.01.04 Replace Roadway Lighting Luminaires

For measurement purposes, a count shall be made of the number of roadway lighting luminaires replaced.

617.09.01.05 Replace High Mast Lighting Luminaires

For measurement purposes, a count shall be made of the number of high mast lighting luminaires replaced.

617.09.01.06 Replace Floodlighting Luminaires

For measurement purposes, a count shall be made of the number of floodlighting luminaires replaced.

617.09.01.07 Relamp Roadway Lighting Luminaires

For measurement purposes, a count shall be made of the number of new lamps installed in existing roadway lighting luminaires.

617.09.01.08 Relamp High Mast Lighting Luminaires

For measurement purposes, a count shall be made of the number of new lamps installed in existing high mast lighting luminaires.

617.09.01.09 Relamp Floodlighting Luminaires

For measurement purposes, a count shall be made of the number of new lamps installed in existing floodlighting luminaires.

617.09.02 Plan Quantity Measurement

When measurement is by Plan Quantity, such measurement shall be based on the units shown in the clauses under Actual Measurement.

617.10 BASIS OF PAYMENT

- 617.10.01 Roadway Lighting Luminaires and Bracket Assemblies - Item**
- High Mast Lighting Luminaires - Item**
- Floodlighting Luminaires and Bracket Assemblies - Item**
- Replace Roadway Lighting Luminaires - Item**
- Replace High Mast Lighting Luminaires - Item**
- Replace Floodlighting Luminaires - Item**
- Relamp Roadway Lighting Luminaires - Item**
- Relamp High Mast Lighting Luminaires - Item**
- Relamp Floodlighting Luminaires - Item**

Payment at the Contract price for the above tender items shall be full compensation for all labour, Equipment, and Material to do the work.

- 617.10.02 Roadway Lighting Luminaires and Bracket Assemblies (Temporary) - Item**
- Floodlighting Luminaires and Bracket Assemblies (Temporary) - Item**
- High Mast Lighting Luminaires (Temporary) - Item**

Payment at the Contract price for the above tender items shall be full compensation for all labour, Equipment, and Material to do the work.

Progress payments for the above tender items shall be based on the following percentages of the Contract price:

- 80% for supply and installation
- 20% for removal

**TABLE 1
Lamps for Roadway Lighting**

Lamp Type	Lamp Wattage	Lamp Nominal Operating Voltage	Lamp Finish	ANSI Lamp Designation
High Pressure Sodium (HPS)	100	55	Clear	S54-100
	150	55	Clear	S55-150
	200	100	Clear	S66-200
	200	100	Coated	S66/D-22
	250	100	Clear	S50-250
	310	100	Clear	S67-310
	400	100	Clear	S51-400
	600	105	Clear	S106-600
	750	120	Clear	S111-750
	1000	250	Clear	S52-1000

**Appendix 617-A, November 2013
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:

- Roadway lighting luminaire requirements. (617.05.01.01)
- High mast lighting luminaire requirements. (617.05.01.02)
- Floodlighting luminaire requirements. (617.05.01.03)
- Bracket type. (617.05.06)
- Fuse current rating. (617.05.10)
- Floodlight bracket orientation. (617.07.04.02)
- Light distribution requirements. (617.07.05.01)
- High mast lighting horizontal and vertical orientation angles. (617.07.05.01)

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

- Luminaire shields. (617.07.05.01)
- Luminaire shield orientation. (617.07.05.01)

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

OPSD 2418.010	1.8 m and 2.7 m Steel Truss Bracket for Steel Poles
OPSD 2420.01	1.8 m and 2.4 m Aluminum Tapered Elliptical Bracket
OPSD 2421.010	Lamp Wattage Label for Luminaire
OPSD 2453.000	High Mast Lighting Pole, Luminaire and Handhole Orientation
OPSD 2453.060	High Mast Lighting Pole, Flood Light Luminaire Mounting Details
OPSD 2453.070	High Mast Lighting Pole, Luminaire Support Ring
OPSD 2453.090	High Mast Lighting Pole, Luminaire Shroud
OPSD 2453.091	High Mast Lighting Pole, Luminaire Shroud Details

**Appendix 617-B, November 2013
FOR USE IN MUNICIPAL CONTRACTS, WHEN REFERENCED IN THE CONTRACT DOCUMENTS**

Note: This is a non-mandatory Additional Information Appendix intended to provide supplementary requirements for the OPS specification in a municipal contract, when the appendix is invoked by the Owner. It is written in mandatory language to permit invoking it by reference in the Contract Documents. If the appendix has not been invoked by reference in the Contract Documents, it does not apply.

Supplemental Requirements for Using OPSS 617 in Municipal Contracts

OPSS 617 Installation of Roadway Luminaires, is amended as follows:

617.03 Definitions

Section 617.03 is amended by the deletion of the definition for Quality Verification Engineer and replaced by the following:

Quality Verification Engineer (QVE) means a representative of the Owner qualified to provide the services specified in the Contract Documents.