

PART 1 - GENERAL

1.1 REFERENCES

- .1 Ontario Electrical Safety Code (OESC) 2012.
- .2 National Building Code - 2010.
- .3 Illuminating Engineering Society of North America (IESNA).
- .4 Certified Ballast Manufacturer (CBM).

1.2 MEASUREMENT AND
PAYMENT

- .1 Payment for provision of all items specified in this Section shall be by Lot Price. No separate payment will be made for work specified in the Contract Documents. All costs incurred by Contractor in meeting with the requirements of this Section shall be included in the bid price for the Work.

1.3 RELATED
SECTIONS

- .1 Section 26 05 21: Wires and Cables (0-1000 V).
- .2 Section 26 05 34: Conduits, Conduit Fastenings and Conduit Fittings.
- .3 Section 26 27 26: Wiring Devices.

1.4 SUBMITTALS

- .1 Submittals, product data and shop drawings shall be in accordance with Specification Sections 01 33 00 and 26 05 00.
- .2 Submit complete photometric data prepared by independent testing laboratory for luminaries' where specified, for review by Departmental Representative.
- .3 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

1.5 QUALITY
ASSURANCE

- .1 Test Reports: Certified test reports showing Assurance compliance with specified performance characteristics and physical properties.
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1.5 QUALITY
ASSURANCE
(Cont'd)

- .2 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Pre-installation & mid-Installation Meetings: Conduct pre-installation and mid-installation meetings to verify project requirements, manufacturer's written installation instructions and manufacturer's warranty requirements.
- .4 The use of testing services does not relieve the Contractor of his responsibility to provide materials and construction in compliance with the Drawings and Specifications.
- .5 Luminaires described in the Lighting Fixture Schedule identify quality, performance criteria and other parameters, as indicated for this project.
- .6 Fixtures from other manufacturers may be acceptable provided:
 - .1 Appearance and lighting performance are similar.
 - .2 Quality is equal or better.
 - .3 Lamp and ballast criteria remain the same.
 - .4 The fixture is provided with modifications and accessories to provide a complete product in keeping with the intent of the project.
 - .5 Approval in writing is obtained from the Departmental Representative to the supplier/manufacturer 5 days prior to bid closing date.
 - .6 Shop Drawings to be submitted and reviewed by the Departmental Representative before equipment is purchased.

PART 2 - PRODUCTS

2.1 LIGHTING
FIXTURES

- .1 As indicated in luminaire schedule on drawings. Provide 10% spare lamps of each type noted in luminaire schedule.

2.2 LAMPS

- .1 Fluorescent lamps to be - T8, 32 Watt, medium bi-pin, rapid or instant start to suit application, 4100 K, 30,000 hour lamp life, 2950 initial lumens, CRI 80; or as indicated.
- .2 Metal halide lamps to be clear, E17, 70 Watt, medium base, horizontal burn, 4100 K, 12,000 hour lamp life, 6,000 initial lumens, CRI 93, open or enclosed type to suit the luminaire; or as indicated.
- .3 Metal halide lamps to be clear, BT28, 250 Watt, mogul base, horizontal burn, 4100 K, 12,000 hour lamp life, 22,000 initial lumens, CRI 65, open or enclosed type to suit the luminaire; or as indicated.
- .4 Metal halide lamps to be - clear, BT37, 400 Watt, mogul base, horizontal burn, 4100 K, 15,000 hour lamp life, 36,000 initial lumens, CRI 65, open or enclosed type to suit the luminaire; or as indicated.
- .5 Compact fluorescent lamps to be - 32 Watt, G24q-2 base, 12,000 hour lamp life, 2,400 initial lumens, 3500 K, CRI 80; or as indicated.

2.3 BALLASTS

- .1 Fluorescent ballast: CBM and CSA certified, energy efficient type, IC electronic.
 - .1 Rating: 120 V, 60 Hz, solid state electronic ballast.
 - .2 Designed for low temperature; -18°C ambient temperature.
 - .3 High power factor: minimum 97 %
 - .4 Low harmonic distortion: 10 % maximum THD.
 - .5 Ballast Factor: greater than 0.90.
 - .6 Mounting: integral with luminaire.
 - .7 Shall contain auto restart circuit.
- .2 Metal halide ballast: design.
 - .1 Rating: 60 Hz voltage as indicated, for use with metal halide lamp as indicated. Provide circuitry for standby light to provide light for starting and restart.
 - .2 Totally encased and designed for 40 °C ambient temperature.
 - .3 Power factor: minimum 95 % with 95% of rated lamp lumens.
 - .4 Type: constant wattage auto-transformer or solid state.
 - .5 Minimum starting temperature: minus 29 °C at 90% line voltage.

2.3 BALLATS
(Cont'd)

- .2 (Cont'd)
- .6 Mounting: indoor or outdoor integral with luminaire.
- .7 Current crest factor: 1.6 maximum current.

2.4 LIGHTING
POLES

- .1 Lighting Poles, Fixtures And Related Hardware:
 - .1 Provide poles, bases, fixtures and lamps as designated or required by site conditions. Aim fixtures as required. Submit applicable photometric test results.
 - .2 Co-ordinate with the manufacturer's representative to ensure installation procedures and adjustments are in accordance with manufacturer's written recommendations.
 - .3 All materials shall be stored in a secure, dry storage facility until installation is undertaken.
 - .4 Poles shall be handled using suitable slings at the pole pick up points specified by the pole manufacturer.
 - .5 Reflectors, glassware and lamps shall not be installed until the pole has been erected and the brackets and luminaires mounted and levelled.
 - .6 Luminaires shall not be exposed to conditions where moisture can damage the insulation and reflecting surfaces of the optical system, and when removed from cartons during the process of installations, they shall be protected with a covering acceptable to the Departmental Representative until the reflector, glassware and lamps are installed.
 - .7 Each pole shall have a number of fixtures as indicated on the drawings.
 - .8 Fixtures are to be as stated or reviewed equivalent. Fixtures shall have suitable beam cut off properties.
 - .9 Lamps shall be General Electric or Philips.
 - .10 Provide all grounding to the authorities approval.
 - .11 The Contractors shall supply and install ground rods at pole footings as indicated on Contract Drawings. Ground rods shall be installed 1 m from poles footing and top of ground rod shall be a minimum of 600 mm below finished grade. Connect ground cables to ground rods by exothermic welding.

2.4 LIGHTING
POLES
(Cont'd)

- .1 (Cont'd)
- .12 All ground rods shall be 19 mm copper clad steel.
- .2 Poles:
 - .1 Poles and pole length included in light fixture schedule.
 - .2 Poles shall be hot dipped galvanized steel and polyester powder coat finish, square, welded base and c/w steel anchor base covers and galvanized anchor bolts, nuts and washers.
 - .3 Handhole opening shall be 64 mm x 125 mm minimum located near the bottom of the pole. Handhole cover shall be gasketted and secured with stainless steel hardware.
 - .4 Ground nut welded to the pole shall be located near the handhole opening.
- .3 Fuses and Fuseholders:
 - .1 Install weather proof fuseholder and suitable fuse for each circuit inside hand-hole near bottom of pole.
- .4 Contactors & photocells:
 - .1 All lighting contactors to be held, electrically complete with enclosure and control transformer. Switch shall have contacts to suit. Provide hand-off-auto switch.
- .5 Photocell controller:
 - .1 Highly durable polycarbonate housing with field adjustable 13 mm threaded swivel base.
 - .2 Supplied complete with adjustable slider bar to vary turn-on level.
 - .3 300 mm #14 AWG wire leads rated at 105° C.
 - .4 Fail mode ON, contacts normally closed.

2.5 FINISHES

- .1 Light fixture finish and construction to meet ULC listings and CSA certifications related to intended installation.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Locate and install luminaires as indicated.
- .2 Special installation:
 - .1 Luminaire design:

3.1 INSTALLATION
(Cont'd)

.2 (Cont'd)

.1 (Cont'd)

- .1 Support light fixtures independently of ceiling suspension systems. Support outlet and junction boxes independently of conduits running to them. Use chain galvanized plated, with a rated strength of 180 lbs. (800 N). Use 'S' hook No. 6 type with a rated strength of 180 lbs. (800 N) . For chain hung light fixtures loop chain around spring-fixture shock absorber.
- .2 Reinstall any fixtures, which in the opinion of the Departmental Representative, are not installed properly.
- .3 Install fixtures shown in continuous (or broken) rows in a straight line.
- .4 In services rooms, install fixtures after majority of the mechanical/electrical equipment is in place. Mount fixtures at a common elevation as directed by the Departmental Representative.
- .5 Where pendant mounted fixtures are required, use rod type hangers in conjunction with ball aligners.
- .6 Where fixtures are chain hung, use chain of closed link type capable to support ten times the actual fixture weight, with 4 bolts for chain ends and GTF fixture wire.
- .7 Furnish fixtures with suitable plaster ring, fitter or other device to suit the ceiling in the areas in which they are installed.
- .8 Wire recessed or semi-recessed fixtures with 1M (min) of flexible steel conduit to adjacent outlet box placed above the finished ceiling but within reach from the fixture hole.
- .9 Examine the room finish schedule and supply fixtures which are suitable for the ceiling specified.
- .10 Attach safety cables to the high bay lighting fixtures.
- .11 Leave lighting fixtures and glassware, thoroughly cleaned.

3.2 WIRING

.1 Connect luminaires to lighting circuits.

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| <u>3.2 WIRING</u>
(Cont'd) | .1 | (Cont'd) |
| | .1 | Install flexible conduit for vertical power supply drop to luminaires as indicated. Horizontal wiring using flexible conduit is not permitted. |
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| <u>3.3 LUMINAIRE</u>
<u>SUPPORTS</u> | .1 | For suspended ceiling installations support luminaires from ceiling grid in accordance with local inspection requirements. |
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| <u>3.4 LUMINAIRE</u>
<u>ALIGNMENT</u> | .1 | Align luminaires mounted in continuous rows to form straight uninterrupted line. |
| | .2 | Align luminaires mounted individually parallel or perpendicular to building grid lines. |
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| <u>3.5 FIELD QUALITY</u>
<u>CONTROL</u> | .1 | Perform tests in accordance with Section 26 05 00 and Section 01 91 13. |