

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 26 05 00 - Common Work Results for Electrical.
- .2 Section 26 09 24 - Lighting Control Devices - Low Voltage.

**1.2 REFERENCE STANDARDS**

- .1 American National Standards Institute (ANSI)
  - .1 ANSI C82.1-04, Lamp Ballasts-Line Frequency Fluorescent Lamp Ballast.
- .2 American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE)
  - .1 ANSI/IEEE C62.41-1991, Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.
- .3 ASTM International Inc.
  - .1 ASTM F1137-00(2006), Standard Specification for Phosphate/Oil and Phosphate/Organic Corrosion Protective Coatings for Fasteners.
- .4 CSA Group (CSA).
- .5 ICES-005-07, Radio Frequency Lighting Devices.
- .6 Underwriters Laboratories of Canada (ULC).

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Provide manufacturer's printed product literature, specifications, and data sheets, and include product characteristics, performance criteria, physical size, finish, and limitations.
  - .2 Provide complete photometric data prepared by independent testing laboratory for luminaires where specified, for review and approval by Departmental Representative.
  - .3 Photometric data to include:
    - .1 Polarity diagram for light intensity distribution;
    - .2 Light efficacy;
    - .3 Utilization coefficient;
    - .4 Type of louver and lens finish;
    - .5 Luminaire spacing criteria;
    - .6 Photometric calculation from a software, if required.

- .3 Quality Assurance Submittals: Provide following in accordance with Section 01 45 00 - Quality Control.

- .1 Manufacturer's instructions: provide manufacturer's written installation instructions and special handling criteria, installation sequence, cleaning, and procedures.

#### **1.4 QUALITY ASSURANCE**

- .1 Provide mock-ups in accordance with Section 01 45 00 - Quality Control.

#### **1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .3 Packaging Waste Management: Remove for reuse in accordance with Section 01 74 19 - Waste Management and Disposal.
- .4 Divert unused metal materials from landfill to metal recycling facility.
- .5 Disposal and recycling of fluorescent lamps as per local regulations.

### **Part 2 Products**

#### **2.1 LAMPS**

- .1 Fluorescent lamps to be - T8, 32 Watt, medium bi-pin, rapid-start, 4100 K, 24,000-hour lamp life, 3,100 initial lumens, CRI 86; or as indicated.
- .2 Light emitting diode (LED) lamps:
  - .1 The LED lighting components must be compliant to ANSI C78-377, NEMA SSL 3, IES LM 79 and LM 80.
  - .2 The LED assembled lights must be replaceable independently from the luminaire.
  - .3 Power: to indications.
  - .4 Initial luminous flux: to indications.
  - .5 CRI: 86.
  - .6 Color temperature: 4,000K.
  - .7 Lamp life: 50,000 hours.
    - .1 Luminous flux after 50,000 hours: 70 % of initial luminous flux.
  - .8 The color changing lamps must be able to supply a complete LED light spectrum using red, blue, green and white colors.
  - .9 Dimmable control unit.
  - .10 UL1598 and UL2108 certification.

## **2.2 BALLASTS**

- .1 Fluorescent ballast: CBM and CSA certified, energy efficient type.
  - .1 Rating: 120 V, 60 Hz, for use with 2-T8, lamps.
  - .2 Supply array to allow for  $\pm 10\%$  of the nominal voltage.
  - .3 Totally encased and designed for 40°C ambient temperature.
  - .4 Ambient temperature: the ballast must start the lamps to a minimal 10 °C ambient temperature.
  - .5 Power factor: minimum 95 % with 95% of rated lamp lumens.
  - .6 Current crest factor: 1.7 maximum.
  - .7 Harmonics: 10 % maximum THD.
  - .8 Operating frequency of electronic ballast: 20 kHz minimum.
  - .9 Sound rated: Class A.
  - .10 Mounting: integral with luminaire.
  - .11 Electromagnetic transmissions: the electromagnetic transmissions must not exceed Class A, as defined by FCC, part 18, 15C, when it comes to EMI and RFI frequencies.
  - .12 Protection against transition flux: the ballast must support transitory voltages and electric noise, such as described in ANSI C62.31 and IEEE 587, with and without lamps in the secondary circuit.
  - .13 Thermal protection: the ballast must have a thermal protection, such as defined in CSA C22.2 no. 74-1969 art. 1.6.7.3 or comply to the technical information letter no. 37 of July 27<sup>th</sup>, 1988.
  - .14 Electronic ballasts to allow dimming for fluorescent lighting, direct with two conductors with filters, according to indications.

## **2.3 FINISHES**

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

## **2.4 OPTICAL CONTROL DEVICES**

- .1 As indicated in luminaire schedule.

## **2.5 LUMINAIRES**

- .1 As indicated in luminaire schedule on drawings.

## **2.6 STEEL LAMP POSTS**

- .1 Basic Characteristics:
  - .1 The lamp posts are manufactured to comply with the BNQ 4943-130 Standard and “Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals” of the American Association of State Highway and Transportation Officials (ASSHTO), and to the required static load

conditions due to the weight, dynamic loads, as well as the wind pressure and the safe friability of the supports. Consider a 140-km/h wind speed.



- .2 Poles.
  - .1 Pole anchorage pedestal.
    - .1 The pedestals shown on the drawing must be provided with four oblong holes according to the dimensions on the drawing.
  - .2 Pole materials.
    - .1 The poles are manufactured from a high-tension steel tube with a longitudinal weld. The exterior form is to be round conical. The pole is welded to the anchorage pedestal. The pole must be hot-dip galvanized after manufacturing and assembly (welding) of components.
    - .2 The outside pole surface will have the thickness required to resist to winds of 140 km/h and 30% superior gusts. The calculations must be conducted by accounting for the presence of the light fixtures and cameras.
  - .3 Electrical connection opening.
    - .1 On the right-hand side, in reference to the bracket projection at 450 mm above the concrete base, execute a 150 mm high and 75 mm wide rectangular opening by method of deep-drawing.
    - .2 This opening will be closed by a moulded steel lid of color matching the pole and held in place with anti-vandal screws.
  - .4 Mounting plate of the terminal connection.
    - .1 A 6-mm diameter 16 NC bolt, of 25 mm length, stainless-steel, to be screwed at the right-hand extremity of the mounting plate, with a stainless-steel nut and spring-ring. Two additional stainless-steel nuts to be screwed to the bolt to withhold the grounding cable.
    - .2 Mounting plate, with dimensions indicated the drawings, to be welded inside of the pole, in line with the connection opening.
  - .5 Welding.
    - .1 All the welding seams have to be done by welders qualified as per the “Canadian Welding Bureau”, following the CSA W47.2 and W59-1 Standards. Furthermore, the lamp post manufacturer must comply with the “Canadian Welding Bureau” requirements as to welding procedures and control methods.
  - .6 Cameras.
    - .1 Some of the lamp posts are used to support cameras. Refer to drawings to identify these posts. A flexible conduit in the interior of the post must be installed to insulate the different voltage sources.
  - .7 Finish.
    - .1 The pole surfaces must be grey color or equivalent, and applied with a cooked polyester powder. Smooth finish.

- .8 Hardware.
  - .1 The bolts, nuts, rings, and other hardware necessary to the lamp post assembly are to be in stainless steel, alloy No. 304, ASTM A 276.
  - .2 The bolts used to the anchoring of the pole must be hot-dipped galvanized steel according to the prescriptions established by the Canadian Standards Association (No. G-164).
  - .3 Supply pilot bolting circles to the "Civil" Division for the concrete base manufacturing, if required.
- .9 Luminaires.
  - .1 As described in the lighting schedule on drawings.



## 2.7 CONCRETE LAMP POSTS

- .1 Basic Characteristics:
  - .1 The lamp posts are manufactured to comply with the BNQ 4943-130 Standard and "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals" of the American Association of State Highway and Transportation Officials (ASSHTO), and to the required static load conditions due to the weight, dynamic loads, as well as the wind pressure and the safe friability of the supports. Consider a 140-km/h wind speed.
- .2 Pole.
  - .1 Concrete base poured on site for the poles.
    - .1 The concrete base must be equipped with a mortar collar as per drawing dimensions. The burial depth is indicated on drawings and must respect the concrete post installation details.
  - .2 Pole construction.
    - .1 The poles must be manufactured by centrifugation from prestressed concrete, placed in a tubular steel mold. The outside shape is conical round with a flat head. The concrete's minimal compression resistance must be of 65 MPa. The poles must be "F" Class minimum and compliant with CSA A 14-07 (R2012) Standard.
    - .2 Height and installation accessories according to drawing indications.
  - .3 Electrical connection opening.
    - .1 On the right-hand side, in reference to the bracket projection at 450 mm above the concrete base, execute a 150 mm high and 75 mm wide rectangular opening by method of deep-drawing.
    - .2 This opening must be constituted of a zinc and aluminium access box with a grounding connection, anti-vandal stainless-steel bolts, closed by an aluminium lid.
  - .4 Cable entries.
    - .1 In the inferior part of the pole, the cable entries must be 75 mm wide by 300 mm high for conduit insertion.

.5 Finish.

- .1 The pole surfaces must be grey to match the concrete color with a mat acrylic sealant. The finish must smooth without asperities.

**2.8 FUSES**

- .1 Each outdoor luminaire is protected by one or two fuses according to the operating voltage. These fuses are installed in the rubber receptacles. The fuses are “midget” type, 18 mm x 37 mm dimensions, and of a capacity in accordance with the operating voltage. The fuses are installed on the live conductors, connecting the underground conductors to the light fixtures, all as shown on drawings.

**2.9 MOUNTING ACCESSORIES**

- .1 Supply the necessary mounting accessories to install the light fixtures, including hooks, clamps, rods, posts, chains, miscellaneous appropriate material for the specified mounting method. The suspended light fixtures have to be equipped with seismic restraint supports.

**Part 3 Execution**

**3.1 INSTALLATION**

- .1 Locate and install luminaires as indicated.  
.2 Provide adequate support to suit ceiling system.

**3.2 WIRING**

- .1 Connect luminaires to lighting circuits:  
.1 Install flexible or rigid conduit for luminaires as indicated.

**3.3 LUMINAIRE SUPPORTS**

- .1 For suspended ceiling installations support luminaires independently of ceiling.  
.2 For surface mounted luminaires on suspended ceiling tiles, provide a metallic bar designed for this use, to place over the suspension to fix the light fixtures avec appropriate screws.  
.3 In mechanical rooms, the light fixture suspension must be done with suspension chains at the exact location determined on site.

**3.4 LUMINAIRE ALIGNMENT**

- .1 Align luminaires mounted in continuous rows to form straight uninterrupted line.  
.2 Align luminaires mounted individually parallel or perpendicular to building grid lines.





### **3.5 LAMP POST INSTALLATION**

- .1 Upon reception of the approval to proceed with the installation of the concrete bases from the Departmental Representative, the Contractor can install the lamp posts on these bases, cleaned beforehand. The posts are to be vertical; if needed, use galvanized rings or shims. The anchoring bolts and nuts must be coated in a fibrous grease and fully tightened, in such a way to have a snug fit.
- .2 For the steel lamp posts, install a flexible conduit inside the post to separate the camera communication cables from the electrical circuit feeding the luminaires. The flexible conduit for the camera cables is only required in the posts used to support a camera.
- .3 For the centrifuged concrete lamp posts, the posts must be installed according to the details on drawings. Install a sealant in the conduit opening to avoid the penetration of any backfilling soil in the concrete post.

### **3.6 CLEANING**

- .1 Clean in accordance with Section 01 74 00 - Cleaning.
  - .1 Remove surplus materials, excess materials, rubbish, tools, and equipment.
- .2 Waste Management: Separate waste materials in accordance with Section 01 74 19 - Waste Management and Disposal.

**END OF SECTION**