
Note to the Designer/Architect/Engineer: These Specifications are basic minimum criteria to be met in preparing the final project specifications for this section, which is the responsibility of the Designer

York University Building Standards

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1.0 GENERAL

1.0 Conditions

1.1 Sustainable Design Requirements

- .1 Consider the use of Light Emitting Diode (LED) or Light Emitting Plasma (LEP) or other high efficiency lamps for parking lot, and roadway and walkway lighting as an energy efficient and long lasting alternative to Metal Halide, or High Pressure Sodium lamps

1.2 Scope of Work

- .1 This section defines relevant York University standards related to exterior lighting, including, but not limited to lighting zones such as:
 - .1 Lighting for Parking lots
 - .2 Lighting for parking structures
 - .3 Lighting for pedestrian walkways
 - .4 Lighting for roadways and intersections
 - .5 Landscape lighting
 - .6 Building exterior lighting
 - .7 Lighting for sports and recreation fields
 - .8 Lighting for advertisements (illuminated billboards etc.,)
 - .9 Emergency Telephone Lighting (also known as Blue Light system)

1.3 Related York University Standards and Guidelines

- .1 Metering and Switchboard Instruments Section 26 27 13
- .2 AutoCAD Requirements Section 01 33 23
- .3 York University Keele Campus Walkways Lighting Systems, Lighting Perceptions Inc., March 22, 2002
- .4 York University Keele Campus Lighting Standards, Lighting Perceptions Inc., February 18, 2002
- .5 Light Pole Numbering – Lighting Reports York University goSAFE

1.4 Performance Standards References

- .1 Comply with all applicable municipal, provincial, federal and trade standards in this specification, unless more stringent requirements are given herein.
- .2 Canadian Standards Association (CSA)CAN/CSA – C22.2 No. 74-96 (R2000) Equipment for use with electric discharge lamps.
- .3 CAN/CSA – C22.2 No. 9 (R2002) General requirements for luminaries

- .4 CAN/CSA-C654-M91 (Amended 2001) Fluorescent Lamp Ballast Efficacy Measurements
- .5 CAN/CSA-C819-95 (R2001) Performance of General Service Fluorescent Lamps
- .6 CAN/CSA C863-04 Energy Efficiency of High-Intensity Discharge (HID) and Low-Pressure Sodium (LPS) Lamp Ballasts
- .7 Illumination Engineering Society of North America published standards and handbook
- .8 Ontario Building Code, latest applicable version
- .9 Electrical Safety Authority, Electrical Code, latest applicable version
- .10 Crime Prevention Through Environmental Design (CPTED), Design Guidelines
- .11 International Dark Sky Association (IDA), Fact Sheet, Outdoor Lighting Guidance
- .12 Illumination Engineering Society of North America "Lighting for Exterior Environments" IES RP-33-99 (1999)
- .13 City of Toronto "Bird Friendly Development Rating System and Acknowledgement Program"
- .14 Transport Canada Standard 621.19 – Standards Obstruction Markings 2000
- .15 National Electric Manufacturers Association (NEMA) ANSI and ANSLG (American National Lighting Group) – C78.43-2007 American National Standard for Electric Lamps – Single Ended Metal Halide Lamps
- .16 National Electric Manufacturers Association (NEMA) ANSI and ANSLG (American National Lighting Group) – C78.42-2007 American National Standard for Electric Lamps –High Pressure Sodium Lamps
- .17 AASHTO LTS-5 Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Sign (2010)
- .18 NEMA ICS 6 Industrial Control and Systems: Enclosures (2011)
- .19 ASTM A123/A123M (2009) Standard Specification for Zinc (Hot-dip Galvanized) Coating on Iron and Steel Products
- .20 NEMA C136.20: Roadway and Area Lighting Equipment – Fiber-Reinforced Composite (FRC) Lighting Poles (2008)
- .21 ASTM A153/A153M (2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel hardware
- .22 IESNA G-1-03 Guideline for Security Lighting for People, Property and Public Spaces
- .23 IESNA Design Guide for Roundabout Lighting (DG-19-08)
- .24 Light Pollution guidelines in Toronto Green Standard "Making a Sustainable City Happen" Revised December 31, 2010

1.5 Guideline Principles

- .1 CPTED design principles for improving campus safety and security through outdoor lighting shall be evaluated and employed in the

- development of exterior lighting plan for new building and major building renovations
- .2 Exterior lighting plans for new buildings and any major building renovation shall take into consideration the need to minimize light pollution (up lighting) through the adoption of Dark Sky lighting design principles as identified in IDA
 - .3 New building, and major building renovation shall employ (given financial considerations) the most appropriate, energy efficiency technology available at the time as a way to minimize energy consumption and improve energy efficiency.
 - .4 Lighting standards identified in the most recent Illumination Engineering Society (IES) published standards and handbook shall be used as guideline in the development of a lighting plan
 - .5 Exterior lighting for all new buildings and major renovation project shall take into consideration these guiding principles in an effort to establish a safe and comfortable working and learning environment for the University community, ensuring consistency in lighting levels and lighting quality according to specific areas on campus
 - .6 For modifications or additions to existing exterior lighting systems, the new components shall be compatible with the existing systems. Where new poles and luminaries are added to existing systems these shall have approximately the same dimensions and aesthetic characteristics as the existing equipment

1.6 Submittals

- .1 Show and identify all project luminaries on the AUTOCAD electrical drawings
- .2 Show and identify external luminaries (including numbers, models, lamp type, wattage and lumens output, {if pole mounted then also show: pole length and pole material}) on York University lighting plan
- .3 Provide technical data sheets for all luminaries as well as lumens level plots
- .4 Provide lumens distribution, plotting the lumens levels on the ground, at the designated mounting heights
- .5 If project includes more than three (3) external luminaries, provide calculation summaries for lumens levels on the lighting plan, noting the maximum, average and minimum levels, as well as uniformity ratio of maximum to minimum, and average to minimum levels.
- .6 Provide total lumens per fixture, and total area (in sq. meters) to be illuminated
- .7 Provide relevant information on mounting heights, distance and methods (i.e. pole mounting, mounting on building exterior walls etc.)
- .8 Provide luminaries shielding information

- .9 To demonstrate adherence and conformance to this standard a comprehensive photometric report may be requested of the proponent at the discretion of the York University project representative
- .10 For Light Poles, provide material used (metal, concrete, or fiberglass poles), dimensions, wind load information, pole deflection, pole class and other applicable information. For concrete poles include section and details to indicate quantities and positions of prestressing steel, spiral steel, inserts and through holes; initial prestressing steel tension; and concrete strengths at release, and at 28 days

1.7 Design Requirements

- .1 Building and major renovations taking place in the immediate vicinity and or affecting the University's Observatory (Petrie Science and Engineering) shall employ appropriate light shielding to prevent light pollution affecting research carried out at this campus installation
- .2 Building flood lighting is not permitted on campus. Flood lighting to highlight landscape, or outdoor art will be assessed on a case-by-case basis. Assessments will be arranged through CSBO Facilities Development or Planning and Renovations
- .3 Light pole set-back for pedestrian walkways is one (1) meter from the nearest edge of the walkway. Light pole setback from roadways is 1.5 meters from the road's nearest edge
- .4 Unless specified in this standard, exterior lighting shall meet Illumination levels and light uniformity ratios as recommended in the latest edition of the IESNA's "Recommended Practice Manual: Lighting for Exterior Environments", as well as "The IESNA lighting handbook"

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- .1 Roadways and open parking areas maintained illumination shall comply with the following tables (Ratios listed are maximum values)

ROADWAYS

	Avg. Maintained Lux (Min)	Avg./Min Ratio (Max)
Roadway Illumination @ Grade	16.15	3 : 1

- .2 Bus stops including the area of roadway traversing the length of the bus pull-off and all roadway pedestrian crosswalks within the area of the bus stop
- .3 Roundabouts on campus shall be light in accordance with illumination levels, and general lighting shall be in accordance with the IESNA Design Guide for Roundabout Lighting (DG 19-08)

Horizontal Illumination Requirements at Roundabouts

Illumination for Roundabouts					
Functional Classification		Maintained Average Horizontal Illuminance in Lux on the Pavement based on Pedestrian Area Classification			Uniformity E avg. / E min
		High	Medium	Low	
At least one of the approach or intersecting roadways is continuously lighted	Major/Major	34.0	26.0	18.0	3:1
	Major/Collector	29.0	22.0	15.0	3:1
	Major/Local	26.0	20.0	13.0	3:1
	Collector/Collector	24.0	18.0	12.0	4:1
	Collector/Local	21.0	16.0	10.0	4:1
None of the approach or intersecting roadways is continuously lighted	Local/Local	18.0	14.0	8.0	6:1
	Major/Major	18.0	14.0	8.0	6:1
	Major/Collector	18.0	14.0	8.0	6:1
	Major/Local	18.0	14.0	8.0	6:1
	Collector/Collector	18.0	14.0	8.0	6:1
	Collector/Local	18.0	14.0	8.0	6:1
	Local/Local	18.0	14.0	8.0	6:1

The roadway and pedestrian area definitions are according to the IES Design Guide for Roundabout Lighting (DG-19). Brief descriptions of the roadway definitions, and the corresponding MTO roadway classifications, are provided in Appendix 1.

BUS STOP AREAS

	Avg. Maintained Lux (Min)	Avg./Min Ratio (Max)
Bus Stop Area Illumination @ Grade	27	3:1

.3 Exterior Open Parking Facilities

EXTERIOR OPEN PARKING FACILITIES

	General Parking & Pedestrian Areas		Vehicle Use Only	
Activity Level	Min Lux @ Grade	Avg./Min Ratio (Max)	Avg. Lux @ Grade	Avg./Min Ratio (Max)
*High	9.7	4: 1	21.5	3: 1
Medium	6.5	4: 1	11	3: 1

.4 Walkway Lighting

- .1 Light Source: Light sources for walkway lighting shall be either Light Emitting Diode (LED), or high intensity discharge, ceramic metal halide type clear lamp, pulse-start. Source shall provide a minimum color rendition index (CRI) of 92 and a Kelvin temperature of 4000. Where sidewalks are adjacent to roadways, the roadway light source shall be deemed acceptable where the minimum lighting levels are satisfied. Otherwise, the lighting proponent shall review alternatives with York University's project representative

WALKWAYS

Walkway Classification	Avg. Maintained Lux @ Grade (Min)	Min Vertical Lux @ 6 ft. Above Grade	Avg./Min Ratio (Max)
Roadside Walkways	11	16.15	4: 1 or less
Walkways Distant from Roadways	5.4	5.4	4: 1 or less

Walkway calculations shall include a 1.83 meter area bordering the walk on each side, illuminated to a level of 30% of the levels suggested for walkways for additional pedestrian safety.

1.8 Lighting Colour

- .1 Shall be 4000 K for LED lamps

1.9 Brightness and Glare Control

- .1 Shall be appropriate for specific outdoor application and shall conform to latest iteration of Illumination Engineering Society of North America published standards and handbook

1.10 Uniformity of Light

1.11 Light Shielding

- .1 All exterior luminaries with more than 1000 initial lamp lumens must be shielded to prevent up lighting, and all luminaries with more than 3500 initial lamp lumens must meet Full Cutoff IESNA Classification.

1.12 Exterior lighting metering – exterior lighting is not separately metered

1.13 Standard Warranties and Extended Warranties (S.W. / E.W.)

- .1 A one-year manufacturer's warranty from the date of installation for light poles and luminaries is required

2.0 PRODUCTS

2.1 Coordination

- .1 Coordinate the installation of external light poles and luminaries with York University project representative, CSBO, Maintenance Section Exterior Lighting Subject Matter Expert CSBO, representative from Energy Management CSBO and the Manager of Community Relations and Crime Prevention, Security Services, CSBO

2.2 Lamps

- .1 For exterior applications the following lamps are acceptable; deviations from these lamp types will need to be evaluated by the University's project representative, and York University's Maintenance exterior lighting subject matter expert:

- .1 Light Emitting Diodes (LED)
 - .1 LED lamps shall meet operating temperature of -40°C to 50°C
 - .2 Corrected Colour Temperature (CCT): 2700K, 3000K, 3500K, 4000K, 4500K, 5000K, 5700K, 6500K
 - .3 Colour Rendering Index (CRI): ≥ 65
 - .4 The manufacturer of LED lamps shall have performed JEDEC (Joint Electron Devices Council) reliability tests on

the LEDs as follows: High temperature Operating Life (HTOL), Room Temperature Operating Life (RTOL), Low Temperature Operating Life (LTOL), Powered Temperature Cycle (PTMCL), Non-Operating Thermal Shock (TMSK), Mechanical Shock Variable Vibration Frequency, and Solder Heat Resistance (SHR)

- .5 LED Lamps shall be CSA and/or UL approved and labeled
- .2 Metal Halide
 - .1 Metal Halide lamps shall conform to NEMA ANSI-ANSLG C78.43 (2007)
 - .2 Metal Halide lamps shall be CSA and/or UL approved and labeled
- .3 High Pressure Sodium (HPS)
 - .1 HPS lamps shall be compliant with NEAM ANSI-ANSLG C78.42 (2007)
 - .2 lamps shall have a minimum average rate life of 24,000 hours
 - .3 HPS lamps shall be CSA and/or UL approved and labeled
- .4 Mercury vapor shall not be used for any exterior lighting application

2.3 Ballasts and Drivers

- .1 Metal Halide Core and Coil Ballasts
 - .1 Shall be pulse start, linear reactor type for 277-volt luminaires and constant-wattage autotransformer (CWA) type for other voltage luminaires (if not otherwise specified)
 - .2 Ballasts shall have individual overcurrent protection in each ungrounded supply conductor
 - .3 Power factor shall be not less than 90%
 - .4 Ballast shall have allowable line voltage variations of $\pm 5\%$ for linear reactor type and $\pm 10\%$ for CWA, with a maximum 20% lamp wattage regulation spread
 - .5 Ballast shall have a minimum starting temperature of -40°C , and an operating temperature range of -40°C to 50°C
 - .6 Lamp current crest factor shall be 1.8 or less, in accordance with lamp manufacturer recommendations
 - .7 Ballasts shall be CSA and/or UL approved and labeled
- .2 Metal Halide Electronic Ballasts
 - .1 Ballast shall be low-frequency electronic type, and shall operate pulse start and ceramic metal halide lamps at a frequency of 90 Hz to 200 Hz square wave
 - .2 Ballast shall be labeled Type '1' outdoor, suitable for recessed use, Class 'P'

- .3 Ballast shall have auto-resetting thermal protector to shut off ballast when operating temperatures reach unacceptable levels
- .4 Ballast shall have an end of lamp life detection and shutdown circuit
- .5 Lamp current crest factor shall be 1.5 or less
- .6 Ballasts shall comply with FCC Title 47 CFR Part 18 Non-consumer RFI/EMI Standards
- .7 Ballast shall have a minimum ballast factor of 1.0
- .8 Input current THD shall not exceed 20% for the primary lamp
- .9 Ballasts shall have ANSI C62.41, category 'A' transient protection
- .10 Ballasts shall have power factor greater than 90%
- .11 Ballast shall have a Class 'A' sound rating
- .12 Ballasts shall be CSA and/or UL approved and labeled

.3 LED Drivers

- .1 Drivers shall have a minimum efficiency of 85%
- .2 Starting Temperature: -40°C, operating temperature range shall be -40° C to 50° C
- .3 Input Voltage: 120 to 480 (±10%) Volt
- .4 Power Supplies: Class I or II output
- .5 Surge Protection: The system must survive 250 repetitive strikes of "C Low" (C Low: 6kV/1.2 x 50 µs, 10kA/8 x 20 µs) waveforms at 1-minute intervals with less than 10% degradation in clamping voltage. "C Low" waveforms are as defined in IEEE/ASNI C62.41.2-2002, Scenario 1 Location Category C
- .6 Power Factor (PF): ≥ 0.90
- .7 Total Harmonic Distortion (THD): ≤ 20%
- .8 Drivers shall be reduction of hazardous substances (ROHS)-compliant
- .9 Drivers shall be CSA and/or UL approved and labeled

2.4 Light Poles

- .1 Height – light pole height is measured from grade or surface on which the light pole is mounted to the bottom of the light fixture and is limited as follows:
 - .1 Pedestrian walkways maximum light pole height is 4.27 m (14')
 - .2 Parking Lots maximum light pole height is 7.32 m (24')
 - .3 Top of Parking structures
 - .4 Roadways and intersections maximum light pole height is 6.1 m (20')
 - .5 Outdoor sports/recreation fields, no light pole height restrictions are in place. However, a sports field/recreation

- field illumination plan must be developed and submitted the University project representative and CSBO Maintenance for review and approval as part of the project planning
- .2 Light poles shall be numbered in accordance with existing York University goSAFE Lighting Reports numbering standard
 - .3 Light pole construction, acceptable light pole construction for:
 - .1 roadways is aluminum or concrete
 - .2 pedestrian walkways is fiberglass, concrete or aluminum
 - .3 parking lots and top level of parking structures is steel or aluminum
 - .4 sports/recreation fields is steel
 - .5 Unless otherwise specified, all metal light poles shall be painted black. Metal light poles shall be finished with a minimum of a three-stage finishing process consisting of: a) acid etching, b) priming and c) baked enamel finish, having a minimum thickness of 5 mil (alternate finish for this stage can be integral colour anodizing)
 - .6 Metal light poles shall be manufactured from one (or two) piece of metal with octagonal or round tapered shaft. Shaft shall be continuously welded top and bottom.
 - .7 Metal light poles shall have a reinforced handle hole with cover and ground lug shall be provided 457 mm from the base
 - .8 Light poles shall be supplied with a base plate cover that shall completely cover the anchor bolts and base plate. The cover shall be drilled and tapped to allow attachment of the cover to the light pole
 - .9 Light pole selection, design, placement and anchoring shall be reviewed and approved by structural engineer for wind load
 - .10 pressure treated wood light poles are only acceptable as temporary construction site light poles.
 - .4 Concrete Light Poles
 - .1 Concrete light poles shall conform to ASTM C1089
 - .2 Cross sectional shape shall be round (or multi-sided)
 - .3 Concrete light poles shall have steel reinforcing – pre-stressed concrete pole shafts shall be reinforced with steel prestressing members. Design shall provide internal longitudinal loading by either pre-tensioning or post tensioning of longitudinal reinforced members

- .4 Primary reinforcement steel used for a pre-stressed concrete light pole shaft shall be tensioned between 60% and 70% of its ultimate strength.
 - .5 Where minimum internal coverage cannot be maintained next to regular core openings, such as hand hole or wiring inlet, reinforcing shall be protected with a vandal proof noncorrosive sleeve over the length without the 13mm concrete coverage
 - .6 Concrete shaft preparation – pre-stressed concrete light pole shall have a hard, smooth, nonporous surface that is resistant to soil acids, road salts, and attacks of water and frost, and shall be clean, smooth and free of surface voids and internal honeycombing. Concrete light poles shall not be installed for at least 15 days after manufacturing
- .5 Aluminum Light Poles
- .1 Aluminum light poles shall be manufactured of corrosion resistant aluminum alloys
 - .2 Light poles shall be seamless extruded or spun seamless type with a minimum 4.8 mm wall thickness
 - .3 Poles shall be equipped with grounding connection designed to prevent electrolysis when used with copper grounding wire
 - .4 Tops of shafts shall be outfitted with round or tapered cover
 - .5 Base shall be anchor bolt mounted, to be made of cast 356-T6 aluminum alloy
 - .6 Hardware shall be either 2024-T4 anodized aluminum alloy or stainless steel
 - .7 Aluminum light poles shall have a uniform satin black or gray finish to match fixtures
- .6 Steel Light Poles
- .1 Steel light poles shall be minimum of 3.18 mm (11-gauge) steel with minimum yield/strength of 331 MPa 48,000 psi and hot dipped galvanized in accordance with ASTM A123/A123M
 - .2 Poles shall be equipped with grounding connection designed to prevent electrolysis when used with copper grounding wire
 - .3 Poles shall be direct set anchor bolt mounted type
 - .4 Poles shall be constructed from one piece of metal with no bolts, rivets or other means of fastening except as specifically approved

- .5 Base covers for steel light poles shall be structural quality hot-rolled carbon steel plate having a minimum yield of 284 MPa 36,000 psi
- .7 Fiberglass Light Poles
 - .1 Fiberglass light poles shall conform to NEMA C136.20 and shall be specifically designed to support luminaries and shall have factory-formed cable entrance and hand hole
 - .2 Pigment and resin colour shall be black or gray to conform with existing light poles on campus, pigment shall provide uniform coloration throughout entire wall thickness
 - .3 Finish surface shall be pigmented polyurethane having a minimum dry film thickness of 0.038 mm
 - .4 Polyurethane may be omitted if the surface layer of the pole is inherently ultraviolet inhibited
 - .5 Minimum fiberglass content shall be 65% with resin and pigment comprising the other 35% material content
- .8 Light pole bases
 - .1 Light pole bases: shall be concrete with rebar reinforcement and embedded anchor bolts, There shall be a minimum of four (4) galvanized (in accordance with ASTM A153/A153M) anchor bolts with 8 nuts and washers and a pressed wood base and bolt circuit template
- .9 Light Pole Labels
 - .1 Provide labeled luminaries in accordance with UL1598 requirements
 - .2 Labels shall be easy to read when standing next to the equipment, and durable to match the life of the equipment to which they are attached
 - .3 Labels shall include the following information:
 - .1 Lamp diameter code (if applicable)
 - .2 Lamp type, wattage, bulb type, and coating
 - .3 CSA or ANSI Ballast type
 - .4 Correct Colour Temperature (CCT) and Colour Rendering Index (CRI)
 - .5 Luminaire/pole number

2.5 External Luminaries

- .1 External luminaries shall have at a minimum the following features:

- .1 circular style consistent with luminaries already in place on campus
 - .2 Shall incorporate ballast (if required) within the luminaries housing
 - .3 Lenses shall be frame-mounted, heat resistant, borosilicate glass with prismatic reflectors
 - .4 Attach the frame to the luminaire housing by hinges or chain. Use heat and aging-resistant, resilient gaskets to seal and cushion lenses and reflectors in luminaire doors
 - .5 Lamp sockets for high intensity discharge (HID) fixture shall have locking-type porcelain enclosures in accordance with ANSI C81.61 and UL 496
 - .6 Pre-wire internal components to terminal strips at the factory
 - .7 Bracket-mounted luminaries shall have leveling provisions and clamp-type adjustments slip filters with locking screws
 - .8 Materials shall be rustproof. Latches and fittings shall be non-ferrous metal
 - .9 Luminaries shall carry factory labels, showing complete, specific lamp and ballast information
 - .10 Luminaries shall be CSA or UL approved and labeled
 - .11 Full cut off lighting fixture is required
- .2 Building Exterior lighting (Architectural Lighting)
- .1 Where possible, every effort shall be made to reduce the proliferation of architectural lighting for exterior use. In part, this guideline is attributable to a desire to establish a uniform look for exterior lighting, as well as for practical and economic considerations vis-à-vis on-going maintenance of this infrastructure. The adoption of various types models and makes of architectural lighting for exterior application increases the number of replacement parts that need to be stocked and increases maintenance budget
- .3 Exterior step illumination
- .1 York University discourages the use of step lighting for exterior applications. Planned use of this type of lighting shall be reviewed by the University's project Representative and the Maintenance exterior lighting subject matter expert. If the use of step lighting is deemed acceptable, this decision shall be documented in writing as part of the project documentation.
- .4 Illuminated Bollards
- .1 The use of illuminated bollards for pedestrian walkway lighting is only acceptable where York University's Maintenance Department has difficulty accessing the area with a boom truck. The preferred

method for addressing pedestrian walkway lighting is through the employment of a combination of light poles and building affixed luminaries. If the use of step lighting is deemed acceptable, this decision shall be documented in writing as part of the project documentation.

- .5 Light activation and shut off control method
 - .1 Exterior lighting shall be controlled by astronomical time clock, programmed for dusk and dawn activation and shut off with specific light activation times to be coordinated with York University CSBO Maintenance
 - .2 Luminaries shall incorporate a capacitor (or other device) to maintain accurate time for a minimum of seven (7) hours following a power failure. Time switch with a manual on-off bypass shall be used. Housing for the time switch shall be surface mounted enclosure conforming to NEMA ICS 6
- .6 Internally illuminated signs
 - .1 Internally illuminated signs are prohibited on campus
- .7 Parking lot Lighting curfews
 - .1 Where practical and safe to do so, investigate the possibility of a 2:00am cut off for lighting for exterior parking lots
- .8 Construction lighting
 - .1 Construction lighting shall be equipped with 100% cut off
- .9 Obstruction Lighting
 - .1 For Buildings, Smoke Stacks, Cooling Towers, Fuel Tanks and other obstructions exterior lighting shall comply with Transport Canada Standard 621.19

3.0 EXECUTION

3.1 Coordination

- .1 Coordinate installation of electrical cabling, conduits, foundation for light standards, luminaries and other external lighting components with Campus Services and Business Operations (CSBO) Facilities Development for planning purposes, CSBO Central Utilities and CSBO Maintenance

3.2 Installation

- .1 Ground conductor shall be attached to ground stud on light pole and shall be connected to rebar within the light pole base for all light pole mounted assemblies. Additionally, a green insulated wire shall be required back to the panel board.
- .2 Surge protection is required for all exterior light poles and luminaries assemblies including LED fixtures.
- .3 The base of light poles shall be shimmed such that a true vertical position is achieved for each light pole
- .4
 - .1 Light pole bases for pedestrian walkways shall be X mm above finished grade
 - .2 Light pole bases for roadways shall be Y mm above finished grade
 - .3 Light pole bases for parking lots and parking structures shall be 400 mm above finished grade
- .5 The depth of the light pole bases shall be based on wind load assessment and reviewed and approved by a structural engineer
- .6 Direct burial light pole installation is acceptable
- .7 Electrical connection light pole to light pole shall be achieved through buried electrical wire 38.1 mm (1.5") with RWU conductors or a tech cable as a substitute enclosed in conduit as per ESA Electrical Code requirements.
- .8 Are J-boxes permitted?
- .9 Exterior lighting design shall include light pole-to-light pole installation of conduit and wire.
- .10 Grounding
 - .1 Ground noncurrent-carrying parts of equipment, including metal poles, luminaries, mounting arms, brackets, and metallic enclosures as per ESA Electrical Code requirements
 - .2 Where copper grounding conductor is connected to a metal other than copper, provide specially-treated or lined connectors suitable and recommended by the manufacturer for this purpose
- .11 Install luminaries, light poles, ballasts, and other related equipment in accordance with documented manufacturers' instructions
- .12 Install light poles – pole foundation
 - .1 Excavate only as necessary, to provide necessary working clearance for the installation of forms and proper use of tamper to the full depth of excavation
 - .2 Prevent surface water from flowing into the excavation area
 - .3 Compact and backfill with compacting arranged to prevent pressure between conductor, jacket, or sheath, and the end of circuit
 - .4 Set anchor bolts in accordance with the anchor bolt pattern provided by the pole manufacturer
 - .5 Install pole as necessary to provide a permanent vertical

- position with the bracket arm in proper position for luminaire location
- .6 After the poles have installed, shimmed and plumbed, grout the spaces between the pole bases and the concrete base with non-shrink concrete grout material.
 - .7 Provide plastic or copper tube, of not less than 9 mm inside diameter through the grout, tight to the top of the concrete base to prevent weeping from the interior of the pole
 - .8 Install lamps (in accordance with manufacturer's documented instructions)
 - .9 Adjust luminaries that require field adjustment or aiming

End of Section