

PART 1 - GENERAL

1.1 RELATED SECTION

- .1 Section 260502 - Electrical Basic Material and Methods
- .2 Section 260534 - Conduits, Conduit Fastenings and Conduit Fittings
- .3 Section 260555 - Installation of Cables in Duct
- .4 Section 265619 - Site Lighting

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA C22.1-06, Canadian Electrical Code, Part 1 (20th Edition), Safety Standard for Electrical Installations.
 - .2 CAN/CSA-C22.3 NO 1-06, Overhead Systems.
 - .3 CAN3-C235, Preferred Voltage Levels for AC Systems, 0 to 50 000 V
 - .4 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.
- .2 Ontario provincial Standard Specifications:
 - .1 OPSS 106 – General Specification for Electrical Work
 - .2 OPSS 602 – Construction Specification for Installation of Electrical Chambers
 - .3 OPSS 603 - Construction Specification for Installation of Duct
 - .4 OPSS 604 - Construction Specification for Installation of Cable
 - .5 OPSS 609 – Construction Specification for Grounding
 - .6 OPSS 615 – Construction Specification for Erection of Poles.
 - .7 OPSS 616 – Construction Specification for Footings & Pads for Electrical Equipment.
 - .8 OPSS 617 – Construction Specification for Roadway Luminaires.

1.3 DEFINITIONS

- .1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

1.4 DESIGN REQUIREMENTS

- .1 Operating voltages: to CAN3-C235.
- .2 Electrical devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.
 - .1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.
- .3 Language operating requirements: provide identification labels for control items in English and French.

1.5 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Quality Control: in accordance with Section 01 45 00 - Quality Control.
 - .1 Provide CSA certified equipment and material.
 - .2 Where CSA certified equipment and material is not available, submit such equipment and material to the Departmental Representative for approval before delivery to site.
 - .3 Submit test results of installed electrical systems and instrumentation.
 - .4 Permits and fees: in accordance with General Conditions of contract.
 - .5 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to the Departmental Representative.

1.6 QUALITY ASSURANCE

- .1 Quality Assurance: As per OPSS 106

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Material Delivery Schedule: provide the Departmental Representative with schedule within 2 weeks after award of Contract.
- .2 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.8 SYSTEM STARTUP

- .1 Instruct operating personnel in operation, care and maintenance of systems, system equipment and components.

1.9 BASIS OF PAYMENT

- .1 Electrical Handhole - 600mm x 600mm - The work includes the supply and installation of electrical handholes as indicated and as per OPS standards. The work under this item includes but is not limited to the following: excavation and backfilling, compaction, and placement of pre-cast handhole, frame and cover. The contract lump sum price bid shall include full compensation for all labour, equipment and material necessary to complete the installation, including disposal of surplus material off-site.
- .2 Item No. E-001: 50mm Rigid Duct, Concrete Encased - The work includes the supply and installation of rigid ducts, concrete encased consisting of the size and number of ducts as indicated, electrical non-metallic tubing connections between direct buried ducts and concrete footings, and as per OPS standards. The work under this item includes but is not limited to the following: excavation and backfilling of trench, compaction of trench, boring through existing building wall, grouting and waterproofing the conduit entry points, and placement of ducts and all associated fittings. Measurement for payment shall be made in metres, along the horizontal axis of the duct. Measurement shall be made from end to end where ducts do not terminate at a structure (pole, foundation, electrical chambers or pads) or from centre to centre of structure. Payment at the unit contract price (metre) shall include full compensation for all labour, equipment and material necessary to complete installation, testing and commissioning of the work including disposal of surplus material off-site.
- .3 Item No. E-002: #2 AWG Low Voltage Cables, in Ducts - The work includes the supply and installation of cabling consisting of the type and wire size and as indicated as per OPS standards. The work under this item includes but is not limited to the following: vertical runs of cable, coils of cable, slack cable, waste cable, splices where applicable, and connections. Measurement for payment shall be made horizontally in metres for each cable,

along the longitudinal axis of the duct. Measurement shall be made from centre to centre of structure (pole, foundation, electrical chambers or pads). Payment at the unit contract price (metre) shall include full compensation for all labour, equipment and material necessary to complete installation, testing and commissioning of the work.

- .4 Item No. E-003: #6 AWG Low Voltage Cables, in Ducts - The work includes the supply and installation of cabling consisting of the type and wire size as indicated and as per OPS standards. The work under this item includes but is not limited to the following: vertical runs of cable, coils of cable, slack cable, waste cable, splices where applicable, and connections. Measurement for payment shall be made horizontally in metres for each cable, along the longitudinal axis of the duct. Measurement shall be made from centre to centre of structure (pole, foundation, electrical chambers or pads). Payment at the unit contract price (metre) shall include full compensation for all labour, equipment and material necessary to complete installation, testing and commissioning of the work.
- .5 Item No. E-004: #6 AWG Insulated Ground Wire - The work includes the supply and installation of cabling consisting of the type and wire size as indicated and as per OPS standards. The work under this item includes but is not limited to the following: vertical runs of cable, coils of cable, slack cable, waste cable, splices were applicable, and connections. Measurement for payment shall be made horizontally in metres, along the longitudinal axis of the duct. Measurement shall be made from centre to centre of structure (pole, foundation, electrical chambers or pads). Payment at the unit contract price (metre) shall include full compensation for all labour, equipment and material necessary to complete installation, testing and commissioning of the work.
- .6 #6 AWG Bare Ground Wire - The work includes the supply and installation of cabling consisting of the type and wire size as indicated and as per OPS standards. The work under this item includes but is not limited to the following: vertical runs of cable, coils of cable, slack cable, waste cable, splices were applicable, and connections. The contract lump sum price bib shall include full compensation for all labour, equipment and material necessary to complete installation, testing and commissioning of the work.
- .7 Water Proof Splice Kit - The work includes the supply and installation of water proof splice kits as indicated and as per OPS standards. The work under this item includes but is not limited to the following: installation of the water proof splice kit for each wire spliced inside the hand hole. The contract lump sum price bib shall include full compensation for all labour, equipment and material necessary to complete installation, testing and commissioning of the work as per OPS.
- .8 Ground Electrodes - The work includes the supply and

installation of ground electrode (rods) as indicated. The work under this item includes but is not limited to the following: excavation and backfilling compaction, and placement ground electrodes. The contract lump sum price bib shall include full compensation for all labour, equipment and material necessary to complete installation, testing and commissioning of the work.

- .9 Salvaged Pole with Luminaire - The work includes the supply and installation of a salvaged pole with luminaires as noted. The work under this item includes but is not limited to the following: installation of pole with luminaires including re-lamping the luminaire, riser wires and connections, luminaire ground wire and connections, fuse holders and fuses, luminaires, bracket assemblies and overall pole assembly . The contract lump sum price bib shall include full compensation for all labour, equipment and material necessary to complete installation, testing and commissioning of the work.
- .10 Salvaged Concrete Footing in Earth - The work includes the supply and installation of a salvaged concrete foundations in earth as indicated and as per OPS standards. The work under this item includes but is not limited to the following: excavation and backfilling, compaction, concrete, reinforcement, forming, anchorage assemblies and sleeves. The contract lump sum price bib shall include full compensation for all labour, equipment and material necessary to complete installation, testing and commissioning of the work.
- .11 Salvaged Electrical Panel - The work includes the supply and installation of a salvaged Electrical Panel as indicated and as per OPS standards. The work under this item includes but is not limited to the following: vertical runs of conduit and cables, connections and fittings, protective moulding, vertical The contract lump sum price bib shall include full compensation for all labour, equipment and material necessary to complete installation, testing and commissioning of the work.
- .12 Concrete Pad in Earth for Salvaged Electrical Panel - The work includes the supply and installation of Concrete Pad in Earth for Salvaged Electrical Panel as indicated and as per OPS standards. The work under this item includes but is not limited to the following: excavation and backfilling, compaction, concrete, reinforcement, forming, and sleeves. The contract lump sum price bib shall include full compensation for all labour, equipment and material necessary to complete installation, testing and commissioning of the work.
- .13 Remove and Salvage Electrical Equipment -The work under this item consists of removal and salvage of poles, brackets, luminaires, foundations, wiring in underground duct (duct to be abandoned) as indicated and as per OPS standards, electrical panel (foundation to be re-used if possible during removal). The contract lump sum price bib shall be full compensation for all labour, materials and equipment to do the work

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- .1 Material and equipment to be CSA certified. Where CSA certified material and equipment are not available, obtain special approval from the Departmental Representative before delivery to site and submit such approval as described in PART 1 - SUBMITTALS.

2.2 WIRING TERMINATIONS

- .1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

2.3 WIRING IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, numbered, coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Maintain existing phase sequence and colour coding throughout.
- .3 Colour coding: to CSA C22.1.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.
- .2 Do overhead and underground systems in accordance with CSA C22.3 No.1 except where specified otherwise.

3.2 NAMEPLATES AND LABELS

- .1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

3.3 CONDUIT AND CABLE INSTALLATION

- .1 Install conduit and sleeves prior to pouring of concrete.

3.4 MOUNTING HEIGHTS

- .1 Mounting height of equipment is from finished grade to centreline of equipment unless specified or indicated otherwise.
- .2 If mounting height of equipment is not specified or indicated, confirm before proceeding with installation.

3.5 CO-ORDINATION OF PROTECTIVE DEVICES

- .1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

3.6 FIELD QUALITY CONTROL

- .1 Conduct following tests in accordance with Section 01 45 00 - Quality Control.
 - .1 Power system including phasing, voltage, grounding and load balancing.
 - .2 Circuits originating from branch distribution panels.
 - .3 Lighting and its control.
 - .4 Insulation resistance testing:
 - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
 - .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
 - .3 Check resistance to ground before energizing.
- .2 Carry out tests in presence of the Departmental Representative.
- .3 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

3.7 CLEANING

- .1 Clean and touch up surfaces of galvanized and powder coated equipment with zinc rich galvanizing paint to match original finish.

***** END OF SECTION *****