PART 1 - GENERAL

1.1 References

.1 Canadian Standards Association (CSA International)

.1 Do complete installation in accordance with CSA C22.1-15, Canadian Electrical Code, Part 1 (latest Edition), Safety Standard for Electrical Installations, except where specified otherwise.

.2 Comply with CSA Certification Standards and Electrical Bulletins in force at time of Tender submission.

.3 CAN3-C235-83(R2015), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

.2 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)

.1 EEMAC 2Y-1-1958, Light Gray Colour for Indoor Switch Gear.

.3 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)

.1 IEEE 100, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

1.2 Definitions

.1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE 100.

1.3 Design Requirements

.1 Operating voltages: to CAN3-C235.

.2 Motors, electric heating, control and distribution 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 nameplates and labels for control items in English.

1.4 Submittals

.1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

1.4 Submittals (Cont'd)

.2 Product data : Submit WHMIS SMDS in accordance with Section 01 47 17 - Sustainable Requirements: Contractors Verification.

.3 Shop drawings:
.1 Submit shop drawings, product data and samples in accordance with Section 01 33 00.
.2 Submit drawings to be stamped and signed by professional engineer.
.3 Where applicable, submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.
.4 Where applicable, identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
.5 Where applicable, indicate on drawings clearances for operation, maintenance, and replacement of operating equipment devices.
.6 If changes are required, notify Engineer of these changes before they are made.

.4 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 inspection authorities for special 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, upon completion of Work, load balance report as described in PART 3 - LOAD BALANCE.
.6 Submit certificate of acceptance from Electrical Inspection Department upon completion of work to Engineer.

1.5 Quality Assurance

.1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.

.2 Qualifications: electrical Work to be carried out by qualified, licensed journeymen electricians or apprentices in accordance with authorities having jurisdiction
.1 Employees registered in provincial apprentices program: permitted, under direct

1.5 Quality Assurance (Cont'd)

.2 Qualifications:(Cont'd)
.1 (Cont'd)
supervision of qualified licensed electrician, to perform specific tasks.
.2 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.

.3 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.6 Delivery, Storage and Handling

.1 Material Delivery Schedule: provide Engineer 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.

1.7 System Startup

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

.2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.

.3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.

1.8 Operating Instructions

.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.

.2 Operating instructions to include following:
.1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
.2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.
.3 Safety precautions.

1.8 Operating Instructions (Cont'd)

.2 (Cont'd)
.4 Procedures to be followed in event of equipment failure.
.5 Other items of instruction as recommended by manufacturer of each system or item of equipment.

.3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.

.4 Post instructions where directed.

.5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.

.6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

1.9 Operation and Maintenance Data

.1 Provide operation and maintenance data for incorporation into operation and maintenance manual specified in Section 01 33 00.

.2 Include in operations and maintenance data:
.1 Details of design elements, construction features, component function and maintenance requirements, to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of any portion or feature of installation.
.2 Technical data, product data, supplemented by bulletins, component illustrations, exploded views, technical descriptions of items, and parts lists. Advertising or sales literature not acceptable.
.3 Wiring and schematic diagrams and performance curves.
.4 Names and addresses of local suppliers for items included in maintenance manuals.
.5 Copy of reviewed shop drawings.

1.10 Permits, Fees and Inspections

.1 Submit to Electrical Inspection Department and Supply Authority necessary number of drawings and specifications for examination and approval prior to commencement of work.

.2 Pay associated fees.

.3 Engineer will provide drawings and specifications required by the Electrical

1.10 Permits, Fees and Inspections (Cont'd)

.3 (Cont'd)
Inspection Department and Supply Authority at no cost.

.4 Notify Engineer of changes required by Electrical Inspection Department prior to making changes.

.5 Furnish Certificates of Acceptance from Electrical Inspection Department and authorities having jurisdiction on completion of work to Engineer.

1.11 Contract Drawings

.1 The Drawings for the Electrical work are diagrammatic performance Drawings only, intended to convey the scope of work and indicate the general arrangement and approximate location of apparatus and fixtures, and the approximate sizes and locations of equipment and outlets. The Drawings do not intend to show Architectural, Mechanical or Structural details.

.2 Do not scale or measure Drawings, but obtain information regarding accurate dimensions, from the dimensions shown on the Architectural Drawings, or by site measurements. Follow the Electrical Drawings for laying out the work.

.3 Refer to the other Division's Coordination Drawings, to become familiar with all conditions affecting the work, and verify suitable spaces exist, in which the equipment will be installed.

.4 Make, at no additional cost, any changes or additions to materials and equipment necessary to accommodate Structural conditions (offsets around beams, columns, etc.).

.5 Alter at no additional cost, the location of materials and/or equipment as directed, provided that the changes are made before installation, and do not necessitate additional materials.

.6 Install ceiling mounted components (such as lighting fixtures, heat detectors, speakers, etc.) in accordance with dimensioned reflected ceiling drawings, prepared by the (Architectural) Consultant.

.7 Leave space clear, and install equipment to accommodate future materials and/or equipment as indicated or specified, or to accommodate

1.11 Contract Drawings (Cont'd)

.7 (Cont'd) equipment and/or materials supplied by other Contractors.

.8 Verify that the spaces in which the equipment is to be installed is sufficient and install all equipment to maintain head room and clearances, to conserve space, comply with codes, and to ensure adequate space for future servicing.

.9 Confirm at the site, the exact location of equipment, outlets and fixtures, and the location of outlets for equipment supplied by other Contractors, before installation.

1.12 As-Built Drawings

.1 Provide As-Built Drawings of the installation from the Record Drawings.

1.13 Completion of Contract

.1 All the equipment must be cleaned and tested, before final acceptance by the Consultant.

.2 From the date of issuance of a "Certificate of Substantial Performance", all equipment, materials and workmanship, other than lamps, must be unconditionally warranted for not less than 1 (one) year.

.3 Defects and deficiencies which originate or become evident during the warranty period must be repaired or replaced, at no cost.

.4 If, during the warranty period, transformers, ballasts or other noise and vibration producing equipment are considered by the Consultant to exceed acceptable standards, then these must be replaced without delay or additional cost to the Owner. All work relating to the replacement of defective items must be carried out after normal working hours and at a time which is acceptable to the Owner.

1.14 Existing Conditions

.1 Visit the site and examine existing conditions affecting the work of this Division.

PART 2 - PRODUCTS

2.1 Sustainable Requirements

.1 Materials and products in accordance with Section 01 47 15 - Sustainable Requirements: Construction.

.2 Do verification requirements in accordance with Section 01 47 17 - Sustainable Requirements: Contractor's Verification.

2.2 Materials and Equipment

.1 Provide material and equipment in accordance with Section 01 61 00 - Common Product Requirements.

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

.3 Factory assemble control panels and component assemblies.

2.3 Electric Motors, Equipment and Controls

.1 Supplier and installer responsibility is indicated on the Drawings and in the Motor Control Schedule. Mechanical responsibility is indicated on the Mechanical Drawings and in the Mechanical Specification.

.2 Control wiring and conduit: in accordance with Section 26 29 03 - Control Devices except for conduit, wiring and connections below 50 V which are related to control systems specified in mechanical sections and as shown on mechanical drawings.

2.4 Warning Signs

.1 Warning Signs: in accordance with requirements of authority having jurisdiction inspection authorities and Engineer.

.2 Decal signs, minimum size 175 x 250 mm (7" x 10").

2.5 Wiring Terminations

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

2.6 Equipment Identification

.1 Identify electrical equipment with nameplates and labels as follows:

.1 Nameplates: lamicoid 3 mm (1/8") thick plastic engraving sheet, black face, white core, lettering accurately aligned and engraved into core, self adhesive unless specified otherwise.

.2 Sizes as follows:

NAMEPLATE SIZES

Size 1	10 x 50 mm(2/5"x 2")	1 line	3 mm(1/8") high
Size 2	12 x 70 mm(1/2"x 2 3/4")	1 line	5 mm(1/5") high
Size 3	12 x 70 mm(1/2"x 2 3/4")	2 lines	3 mm(1/8") high
Size 4	20 x 90 mm(3/4"x 3 1/2")	1 line	8 mm(1/3") high
Size 5	20 x 90 mm(3/4"x 3 1/2")	2 lines	5 mm(1/5") high
Size 6	25 x100 mm(1" x 4")	1 line	12mm(1/2") high
Size 7	25 x100 mm(1" x 4")	2 lines	6 mm(1/4") high

.2 Labels: embossed plastic labels with 6 mm (1/4") high letters unless specified otherwise.

.3 Wording on nameplates and labels to be approved by Engineer prior to manufacture.

.4 Allow for minimum of twenty-five (25) letters per nameplate and label.

.5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

.6 Disconnects, starters and contactors: indicate equipment being controlled and voltage.

.7 Terminal cabinets and pull boxes: indicate system and voltage.

.8 Transformers: indicate capacity, primary and secondary voltages.

2.7 Wiring Identification

.1 Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

2.7 Wiring Identification (Cont'd)

.2 Maintain phase sequence and colour coding throughout.

.3 Colour coding: to CSA C22.1.

.4 Use colour coded wires in communication cables, matched throughout system.

2.8 Conduit and Cable Identification

.1 Colour code conduits, boxes and metallic sheathed cables.

.2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.

.3 Colours: 25 mm (1") wide prime colour and 20 mm (3/4") wide auxiliary colour.

	Prime	Auxiliary
up to 250 V	Yellow	
Telephone	Green	
Other Communication Systems	Green	Blue
Fire Alarm	Red	
Emergency Voice	Red	Blue
Other Security Systems	Red	Yellow

2.9 Finishes

.1 Shop finish metal enclosure surfaces by removal of rust and scale, cleaning, application of rust resistant primer inside and outside, and at least two coats of finish enamel.

.1 Paint indoor switchgear and distribution enclosures light gray to EEMAC 2Y-1-1958.

2.10 Standard of Acceptance

.1 Means that item named meets specifications in all respects regarding performance, quality of material and workmanship, and is acceptable to Engineer without qualification. Equipment proposed shall meet same standards and must be approved ten (10) days prior to tender closing.

.2 Requests for approvals will only be accepted from manufacturers or their representatives.

.3 "Approved Equals" will be acceptable as a base bid item.

2.10 Standard of Acceptance (Cont'd)

.4 "Approved Alternates" will be indicated with the tender on the form supplied, indicating price increase or decrease to the bid, should the alternate be accepted.

PART 3 - EXECUTION

3.1 Installation

.1 Do complete installation in accordance with CSA C22.1 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.

.1 Sleeves through concrete: plastic, sized for free passage of conduit, and protruding 50 mm (2").

.2 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.

.3 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

3.4 Location of Outlets

.1 Locate outlets in accordance with Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings, where indicated on the Drawings.

.2 Do not install outlets back-to-back in wall; allow minimum 150 mm (6") horizontal clearance between boxes.

.3 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm (10') , and information is given before installation.

.4 Locate light switches on latch side of doors.
.1 Locate disconnect devices in mechanical and elevator machine rooms on latch side of floor.

3.5 Mounting Heights

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

.3 Install electrical equipment at following heights unless indicated otherwise.
.1 Local switches: 1200 mm (48").
.2 Wall receptacles:
.1 General: 450 mm (18").
.2 Above top of continuous baseboard heater: 200 mm (8").
.3 Above top of counters or counter splash backs: 175 mm (7").
.3 Telephone and interphone outlets: 450 mm (18").

3.6 Co-ordination of Protective Devices

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

3.7 Field Quality Control

.1 Load Balance:

.1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
.2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
.3 Provide upon completion of work, load balance report as directed in PART 1 - SUBMITTALS: phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.

.2 Conduct following tests in accordance with Section 01 45 00 - Quality Control.
.1 Power generation and distribution system including phasing, voltage, grounding and load balancing.
.2 Circuits originating from branch distribution panels.
.3 Lighting and its control.
.4 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.

3.7 Field Quality Control (Cont'd)

.2 (Cont'd)
.5 Systems: fire alarm system, communications.
.6 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.

.3 Carry out tests in presence of Engineer.

.4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

3.8 Cleaning

.1 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

.2 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

3.9 Protection

.1 Protect exposed live equipment during construction for personnel safety.

.2 Shield and mark live parts "LIVE 120 VOLTS", or with appropriate voltage in English.

3.10 Fireproofing

.1 Where cables, cable tray or conduits pass through non fire-rated floors, walls or roof, provide internal and external sealing thereto.

.2 Retain the service of a specialty sealant contractor for the work required.

.3 Comply with manufacturer's installation instructions for all sealant applications.

.4 For non fire-rated locations, sealant shall be silicone that meets the requirements of CGSB 19-GP-23, for the size of the joint required, and the types of materials being bonded.

.5 For fire rated locations, the fire stop shall meet the requirements of ULC with regards to the type of assembly and the fire separation.

3.11 Co-ordination of Protective Devices

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

3.12 Cutting and Patching

.1 All cutting and patching shall be provided by the General Contractor in accordance with Section 01 73 00.

.2 This Contractor to provide layout drawings for all openings required for the completion of their work.

3.13 Demolition

.1 All demolition shall be the responsibility of the General Contractor in accordance with Section 02 41 99.

3.14 Noise and Vibration

.1 Electrical equipment is to operate without objectionable noise or vibration. If, in the opinion of the Consultant, the equipment operates with excessive noise or vibration, then the equipment must be replaced or noise or vibration eliminated.

.2 Connections to noise-producing and vibrating equipment (i.e. transformers) must be made with flexible conduit. Use a minimum of 1m (3 ft.)of flexible cable at each device, formed into a 360 deg. loop.

.3 Vibration isolators are to be provided where indicated or required.

END

PART 1 - GENERAL

1.1 Section Includes

.1 Materials and installation for wire and box connectors.

1.2 Related Sections

.1 Section 01 74 21 - Construction/Demolition Waste Management And disposal.

1.3 References

.1 Canadian Standards Association (CSA International)
- .1 CAN/CSA-C22.2 No.18.2-06, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.
- .2 CSA C22.2 No.65-13, Wire Connectors.

.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)
- .1 EEMAC 1Y-2, 1961 Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).

.3 National Electrical Manufacturers Association (NEMA)

1.4 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Divert unused wiring materials from landfill to metal recycling facility as approved by Engineer.

PART 2 - PRODUCTS

2.1 Materials

.1 Pressure type wire connectors to: CSA C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.

.2 Fixture type splicing connectors to: CSA C22.2 No.65, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.

.3 Bushing stud connectors: to EEMAC 1Y-2 to suit conductor.

.4 Clamps or connectors for armoured cable and flexible conduit as required to: CAN/CSA-C22.2 No.18.

PART 3 - EXECUTION

3.1 Installation

.1 Remove insulation carefully from ends of conductors and:
.1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.
.2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2 No.65.
.3 Install fixture type connectors and tighten. Replace insulating cap.
.4 Install bushing stud connectors in accordance with EEMAC 1Y-2.
.5 Install crimp type connectors with snap-on nylon caps on splices and joints in branch circuits.

END

PART 1 - GENERAL

1.1 Related Sections

.1 Section 26 05 20 - Wire and Box Connectors - 0 - 1000 V.

1.2 References

.1 CSA C22.2 No .0.3-09, Test Methods for Electrical Wires and Cables.

.2 CAN/CSA-C22.2 No. 131-14, Type TECK 90 Cable.

1.3 Product Data

.1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.

1.4 Waste Management and Disposal, Disposal

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And and with the Waste Reduction Workplan.

.2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

.3 Fold up metal banding, flatten and place in designated area for recycling.

1.5 Wiring Methods

.1 Wiring methods used shall be in accordance with the Canadian Electrical Code, Part 1, CSA Standard C22.1 - latest edition and the requirements of the Electrical Inspection Department of Prince Edward Island. The standards of this specification shall not be reduced to the minimum safety standards of the above.

.2 All conductors shall be copper; aluminum is not acceptable except for overhead triplex or quadruplex neutral supported cable.

.3 Branch feeders from the service distribution and subdistribution equipment to panels, major equipment, etc. shall be sized as indicated on the drawings. Conductors in conduit shall be used unless otherwise indicated.

.4 Branch circuit wiring shall be conductors in conduit: where subject to mechanical damage; in concrete; underground; in concrete block walls;

1.5 Wiring Methods (Cont'd)

.4 (Cont'd)
in wet locations and where indicated. Armoured cable Type AC90 (BX) may be used for light fixture drops in accessible ceilings and for wiring in stud walls. Fixture drop length not to exceed 3 meters (10 ft.).

PART 2 - PRODUCTS

2.1 Building Wires

.1 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.

.2 Copper conductors: size as indicated, with 600V insulation of chemically cross-linked thermosetting polyethylene material rated RW90.

2.2 Armoured Cables

.1 Conductors: insulated, copper, size as indicated.

.2 Type: AC90.

.3 Armour: interlocking type fabricated from aluminum strip.

2.3 Control Cables

.1 Type LVT: 2 soft annealed copper conductors, sized as indicated, with thermoplastic insulation, outer covering of thermoplastic jacket, and fire rated FT4.

.2 Low energy 300 V control cable: annealed copper conductors sized as indicated, with PVC insulation type TW or TWH and shielding over each conductor and overall PVC jacket, fire rated FT4.

PART 3 - EXECUTION

3.1 Installation of Building Wires

.1 Install wiring as follows:

.1 In conduit systems in accordance with Section 26 05 34.

3.2 Installation of Armoured Cables

.1 Group cables wherever possible.

3.2 Installation of Armoured Cables (Cont'd)

.2 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors - 0 - 1000 V.

3.3 Installation of Control Cables

.1 Install control cables as indicated on drawings.

.2 Ground control cable shield.

3.4 Installation of Cables and Voltage Drop

.1 Any wire or group of wires shall be sized according to the following chart. The voltage drop calculations are based on a 12 amp load on a 15 amp 120 volt circuit as per CEC C22.1 8-102.

Size of Wire	Distance
#12 AWG	0 m to 25 m (0ft to 82ft)
#10 AWG	25 m to 40 m (83ft to 131ft)
# 8 AWG	40 m to 63 m (132ft to 207ft)
# 6 AWG	63 m to 100 m (208ft to 328ft)
# 4 AWG	100 m to 155 m (329ft to 509ft)

END

PART 1 - GENERAL

1.1 Related Sections

.1 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

.2 Section 26 05 00 - Common Work Results - Electrical.

1.2 References

.1 Canadian Standards Association, (CSA International).
.1 Grounding and bonding equipment to: CSA C22.2 No. 41-13.

1.3 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Divert unused metal materials from landfill to metal recycling facility as approved by Engineer.

.5 Fold up metal banding, flatten and place in designated area for recycling.

PART 2 - PRODUCTS

2.1 Equipment

.1 Grounding conductors: bare stranded copper, un-tinned, soft annealed, unarmoured, size as indicated.

.2 Insulated grounding and bonding conductors: green, type as per Section 26 05 21.

.3 Non-corroding accessories necessary for grounding and bonding system, type, size,

2.1 Equipment (Cont'd)

.3 (Cont'd)
material as indicated, including but not necessarily limited to:
.1 Grounding and bonding bushings.
.2 Protective type clamps.
.3 Bolted type conductor connectors.
.4 Bonding jumpers, straps.
.5 Pressure wire connectors.

2.2 Manufacturers

.1 Standard of Acceptance: Burndy Corp., McGraw-Edison (Canada) Ltd.

PART 3 - EXECUTION

3.1 Installation General

.1 Install complete permanent, continuous grounding and bonding systems including, electrodes, conductors, connectors, accessories. Where EMT is used, run ground or bond wire in conduit. Installation should conform to the requirements of the Engineer and Local Authorities having jurisdiction over the installation.

.2 Install connectors in accordance with manufacturer's instructions.

.3 Protect exposed grounding and bonding conductors from mechanical injury.

.4 Use mechanical connectors for grounding and bonding connections to equipment provided with lugs.

.5 Soldered joints not permitted.

.6 Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.

.7 Make grounding and bonding connections in radial configuration only, with connections terminating at single grounding point. Avoid loop connections.

.8 Bond single conductor, metallic armoured cables to cabinet at supply end, and provide non-metallic entry plate at load end.

3.2 System and Circuit Grounding

.1 Install system and circuit grounding connections to neutral of secondary 120/208V system.

3.3 Field Quality Control

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical.

.2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Engineer and Local Authority having jurisdiction over installation. Provide a written report of results to the Engineer.

.3 Perform tests before energizing electrical system.

.4 Disconnect ground fault indicator during tests.

END

PART 1 - GENERAL

1.1 Related Sections

.1 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

1.2 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Divert unused metal materials from landfill to metal recycling facility as approved by Engineer.

.5 Fold up metal banding, flatten and place in designated area for recycling.

PART 2 - PRODUCTS

2.1 Support Channels

.1 U shape, size 41 x 41 mm (1 3/5" x 1 3/5"), 2.5 mm (1/10") thick, surface mounted, suspended or set in poured concrete walls and ceilings.

PART 3 - EXECUTION

3.1 Installation

.1 Secure equipment to hollow or solid masonry, tile and plaster surfaces with anchors to suit.

.2 Secure equipment to poured concrete with expandable inserts.

.3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.

.4 Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings.

3.1 Installation (Cont'd)

.4 (Cont'd)
Ensure that T bars are adequately supported to carry weight of equipment specified before installation.

.5 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

.6 Fasten exposed conduit or cables to building construction or support system using straps.
.1 One-hole steel straps to secure surface conduits and cables 50 mm (2") and smaller.
.2 Two-hole steel straps for conduits and cables larger than 50 mm (2").
.3 Beam clamps to secure conduit to exposed steel work.

.7 Suspended support systems.
.1 Support individual cable or conduit runs with 6 mm (1/4") dia. threaded rods and spring clips.
.2 Support 2 or more cables or conduits on channels supported by 6 mm (1/4") dia. threaded rod hangers where direct fastening to building construction is impractical.

.8 For surface mounting of two or more conduits use channels at 1.5 m (5') on centre spacing.

.9 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

.10 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

.11 Do not use wire lashing or perforated strap to support or secure raceways or cables.

.12 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Engineer.

.13 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

END

PART 1 - GENERAL

1.1 Shop Drawings and Product Data

.1 Submit shop drawings and product data for cabinets in accordance with Section 01 33 00 - Submittal Procedures.

1.2 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal, and with the Waste Reduction Workplan.

.2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

.3 Fold up metal banding, flatten and place in designated area for recycling.

PART 2 - PRODUCTS

2.1 Junction and Pull Boxes

.1 Welded steel construction with screw-on flat covers for surface mounting.

.2 Covers with 25 mm (1") minimum extension all around, for flush-mounted pull and junction boxes.

PART 3 - EXECUTION

3.1 Junction, Pull Boxes and Cabinets Installation

.1 Install pull boxes in inconspicuous but accessible locations.

.2 Only main junction and pull boxes are indicated. Install pull boxes so as not to exceed 30 m (100') of conduit run between pull boxes.

3.2 Identification

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results - Electrical.

3.2 Identification (Cont'd)

.2 Install size 2 identification labels indicating system name, voltage and phase, as applicable.

END

PART 1 - GENERAL

1.1 References

.1 CSA C22.1-2015, Canadian Electrical Code, Part 1.

1.2 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal, and with the Waste Reduction Workplan.

.2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

PART 2 - PRODUCTS

2.1 Outlet and Conduit Boxes General

.1 Size boxes in accordance with CSA C22.1.

.2 102 mm (4") square or larger outlet boxes as required for special devices.

.3 Gang boxes where wiring devices are grouped.

.4 Blank cover plates for boxes without wiring devices.

.5 Combination boxes with barriers where outlets for more than one system are grouped.

2.2 Sheet Steel Outlet Boxes

.1 Electro-galvanized steel, single and multi gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm (3" x 2" x 1 1/2")or as indicated. 102 mm (4") square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.

.2 Electro-galvanized steel utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm (4" x 2 1/8" x 1 7/8").

.3 102 mm (4") square or octagonal outlet boxes for lighting fixture outlets.

2.2 Sheet Steel Outlet Boxes (Cont'd)

.4 102 mm (4") square outlet boxes with extension and plaster rings for flush mounting devices in finished plaster or tile walls.

2.3 Conduit Boxes

.1 Cast FS or FD feraloy boxes with factory-threaded hubs and mounting feet for surface wiring where rigid steel conduit is used.

2.4 Fittings - General

.1 Bushing and connectors with nylon insulated throats.

.2 Knock-out fillers to prevent entry of debris.

.3 Conduit outlet boxes for conduit up to 32 mm (1 1/4") and pull boxes for larger conduits.

.4 Double locknuts and insulated bushings on sheet metal boxes.

PART 3 - EXECUTION

3.1 Installation

.1 Support boxes independently of connecting conduits.

.2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.

.3 For flush installations, where required, mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm (1/4") of opening.

.4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Reducing washers are not allowed.

END

PART 1 - GENERAL

1.1 References

.1 Canadian Standards Association (CSA)

.1 CAN/CSA C22.2 No. 18.2-06, Outlet Boxes, Conduit Boxes, and Fittings and Associated Hardware.

.2 CSA C22.2 No. 45-M1981(R2008), Rigid Metal Conduit.

.3 CSA C22.2 No. 56-13, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.

.4 CSA C22.2 No. 83-M1985(R2013), Electrical Metallic Tubing.

.5 CSA C22.2 No. 211.2-06(R2016), Rigid PVC (Unplasticized) Conduit.

.6 CAN/CSA C22.2 No. 227.3-05(R2010), Flexible Nonmetallic Tubing.

1.2 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal, and with the Waste Reduction Workplan.

.2 Place materials defined as hazardous or toxic waste in designated containers.

.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

.4 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

1.3 Location of Conduit

.1 Drawings do not indicate all conduits. Those indicated are in diagrammatic form only.

PART 2 - PRODUCTS

2.1 Conduits

.1 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with steel set screw couplings and connectors.

.2 Flexible metal conduit: to CSA C22.2 No. 56, liquid-tight flexible metal.

2.2 Conduit Fastenings

.1 One hole steel straps to secure surface conduits 50 mm (2") and smaller. Two hole steel straps for conduits larger than 50 mm (2").

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports for two or more conduits at 1.5 m (5') oc.

.4 Threaded rods, 6 mm (1/4") dia., to support suspended channels.

2.3 Conduit Fittings

.1 Fittings: manufactured for use with conduit specified. Coating: same as conduit.

.2 Factory "ells" where 90° bends are required for 25 mm (1") and larger conduits.

.3 Watertight connectors and couplings for EMT. Set-screws are not acceptable.

2.4 Fish Cord

.1 Polypropylene.

PART 3 - EXECUTION

3.1 Installation

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Conceal conduits except in mechanical and electrical service rooms and in unfinished areas.

.3 Use electrical metallic tubing (EMT) except in cast concrete for feeders and branch circuits

3.1 Installation (Cont'd)

.3 (Cont'd) above 2.4 m (8') and below where not subject to mechanical injury.

.4 Use flexible metal conduit for connection to motors in dry areas and connection to surface or recessed fluorescent fixtures.

.5 Minimum conduit size for lighting and power circuits: 16 mm (1/2").

.6 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.7 Mechanically bend steel conduit over 19 mm (3/4") dia.

.8 Install fish cord in empty conduits.

.9 Remove and replace blocked conduit sections. Do not use liquids to clean out conduits.

.10 Dry conduits out before installing wire.

3.2 Surface Conduits

.1 Run parallel or perpendicular to building lines.

.2 Run conduits in flanged portion of structural steel.

.3 Group conduits wherever possible on suspended or surface channels.

.4 Do not pass conduits through structural members except as indicated.

.5 Do not locate conduits less than 75 mm (3") parallel to steam or hot water lines with minimum of 25 mm (1") at crossovers.

3.3 Concealed Conduits

.1 Run parallel or perpendicular to building lines.

.2 Do not install horizontal runs in masonry walls.

END

PART 1 - GENERAL

1.1 Section Includes

.1 Switches, receptacles, wiring devices, cover plates and their installation.

1.2 Related Sections

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

.3 Section 26 05 00 - Common Work Results - Electrical.

1.3 References

.1 Canadian Standards Association (CSA International)
.1 CSA-C22.2 No.42-10(R2015), General Use Receptacles, Attachment Plugs and Similar Devices.
.2 CSA-C22.2 No.42.1-13, Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).
.3 CSA-C22.2 No.55-15, Special Use Switches.
.4 CSA-C22.2 No.111-10(R2015), General-Use Snap Switches (Bi-national standard, with UL 20, twelfth edition).

1.4 Shop Drawings and Product Data

.1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.

1.5 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Engineer.

PART 2 - PRODUCTS

2.1 Switches

.1 15 or 20 A, 120 V, single pole, three-way and four-way switches to: CSA-C22.2 No.55 and CSA-C22.2 No.111.

.2 Manually-operated general purpose ac switches with following features:
.1 Terminal holes approved for No. 10 AWG wire.
.2 Silver alloy contacts.
.3 Urea or melamine moulding for parts subject to carbon tracking.
.4 Side wiring only.
.5 White toggle.
.6 Standard of Acceptance: 15A, 120V, single pole, Hubbell #DS115W.
.7 Standard of Acceptance: 15A, 120V, three-way, Hubbell #DS315W.

.3 Toggle operated, fully rated for LED lamps, and up to 80% of rated capacity of motor loads.

.4 LED Dimmer switches, sized and rated for LED load it is controlling. Lutron Diva Series#DVSTV-WH or equal.

.5 Acceptable manufacturers: Hubbell, Leviton Lutron or Cooper.

2.2 Receptacles

.1 Duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, to: CSA-C22.2 No.42 with following features:
.1 White thermoplastic base, nylon face.
.2 Suitable for No. 10 AWG for side wiring only.
.3 Break-off links for use as split receptacles.
.4 Eight back wired entrances, four side wiring screws.
.5 Triple wipe contacts and rivetted grounding contacts.
.6 Standard of Acceptance: Hubbell #DR15WHI.

.2 USB receptacles 15A, 125V with two USB Ports 3A, 5VDC. Hubbell #USB15X2W.

.3 Acceptable manufacturers: Hubbell, Leviton or Cooper.

2.3 Cover Plates

.1 Cover plates for wiring devices to: CSA-C22.2 No.42.1.

.2 Cover plates from one manufacturer throughout project.

.3 Sheet steel utility box cover for wiring devices installed in surface-mounted utility boxes.

.4 Stainless steel, vertically brushed, 1 mm (1/25") thick cover plates for wiring devices mounted in flush-mounted outlet box.

.5 Cast cover plates for wiring devices mounted in surface-mounted FS or FD type conduit boxes.

PART 3 - EXECUTION

3.1 Installation

.1 Switches:
.1 Install single throw switches with handle in "UP" position when switch closed.
.2 Install switches in gang type outlet box when more than one switch is required in one location.
.3 Mount toggle switches at height in accordance with Section 26 05 00 - Common Work Results - Electrical as indicated.

.2 Receptacles:
.1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.
.2 Mount receptacles at height in accordance with Section 26 05 00 - Common Work Results - Electrical or as indicated on the drawings.

.3 Cover plates:
.1 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.
.2 Install suitable common cover plates where wiring devices are grouped.
.3 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

END

PART 1 - GENERAL

1.1 Section Includes

.1 Materials for moulded-case circuit breakers, circuit breakers, and ground-fault circuit-interrupters

1.2 Related Sections

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.3 References

.1 Canadian Standards Association (CSA International).
.1 CSA-C22.2 No. 5-16, Moulded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, tenth edition, and the second edition of NMX-J-266-ANCE).

1.4 Submittals

.1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.

1.5 Waste Management and Disposal

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.2 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.3 Separate for reuse and recycling and place in designated containers metal and plastic waste in accordance with Waste Management Plan.

PART 2 - PRODUCTS

2.1 Breakers General

.1 Moulded-case circuit breakers, circuit breakers, and ground-fault circuit-interrupters: to CSA C22.2 No. 5.

.2 Bolt-on moulded case circuit breaker: quick-make, quick-break type, for manual and automatic operation with temperature compensation for 40 degrees C ambient.

.3 Common-trip breakers: with single handle for multi-pole applications.

.4 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting.
.1 Trip settings on breakers with adjustable trips to range from 3-10 times current rating.

.5 Circuit breakers with interchangeable trips as indicated.

.6 Circuit breakers to have symmetrical rms interrupting capacity rating as indicated on the drawings. Minimum rating of 10,000 kA.

.7 All circuit breakers to be new and purchased through an authorized dealer.

2.2 Thermal Magnetic Breakers

.1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

2.3 Manufacturers

.1 Acceptable manufacturers: To match existing.

PART 3 - EXECUTION

3.1 Installation

.1 Install circuit breakers as indicated.

END

PART 1 - GENERAL

1.1 Section Includes

.1 Materials and installation for fused and non-fused disconnect switches.

1.2 Related Sections

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 35 29.06 - Health and Safety Requirements.

.3 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.4 Section 26 05 00 - Common Work Results - Electrical.

1.3 References

.1 Canadian Standards Association (CSA International).
.1 CAN/CSA C22.2 No.4-16, Enclosed Switches.
.2 CSA C22.2 No.39-13, Fuseholder Assemblies.

1.4 Submittals

.1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.

1.5 Health and Safety

.1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.6 Waste Management and Disposal

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

1.6 Waste Management and Disposal (Cont'd)

.4 Separate for reuse and recycling and place in designated containers metal and plastic waste in accordance with Waste Management Plan.

.5 Fold up metal banding, flatten and place in designated area for recycling.

PART 2 - PRODUCTS

2.1 Disconnect Switches

.1 Fusible, non-fusible and horsepower rated disconnect switches in CSA Enclosures, to CAN/CSA C22.2 No.4, size as indicated.

.2 Provision for padlocking in off switch position by three locks.

.3 Mechanically interlocked door to prevent opening when handle in ON position.

.4 Quick-make, quick-break action.

.5 ON-OFF switch position indication on switch enclosure cover.

2.2 Equipment Identification

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results - Electrical.

.2 Indicate name of load controlled on size 4 nameplate.

2.3 Manufacturers

.1 Acceptable manufacturers: Cutler Hammer, Schneider Canada, Siemens or approved equal.

PART 3 - EXECUTION

3.1 Installation

.1 Install disconnect switches complete with fuses if applicable.

END

PART 1 - GENERAL

1.1 Shop Drawings

.1 Submit shop drawings in accordance with Section 01 33 00.

.2 Include schematic, wiring, interconnection diagrams.

PART 2 - PRODUCTS

2.1 AC Control Relays

.1 Convertible contact type: contacts field convertible from NO to NC, electrically held with pneumatic timer and 3 timed poles, 3 instantaneous poles. Coil rating: 120V.

2.2 Relay Accessories

.1 Standard contact cartridges: normally-open - convertible to normally-closed in field.

.2 Overlap contact cartridges: supplied in pairs having NO contact that closes before NC contact opens.

.3 Mounting strips: indexed strips easily cut to required length and bolted, rivetted, or spot-welded in place. Relays are installed in rows on strip with captive mounting screws. Rows of relays on mounting strip form their own wiring trough.

2.3 Operator Control Stations

.1 Enclosure: CSA Type 1 surface mounted in unfinished spaces, fan rooms, etc. flush mounting in finished spaces including shop areas.

2.4 Selector Switches

.1 Maintained 2 position labelled as indicated heavy duty operators standard knob cylinder lock where indicated, contact arrangement as indicated.

2.5 Indicating lights

.1 Standard type, lens colour: red, green as indicated, supply voltage: 120V, lamp voltage.

2.6 Control and Relay Panels

.1 CSA Type 1 sheet steel enclosure with hinged padlockable access door, accommodating relays timers, labels, as indicated, factory installed and wired to identified terminals.

2.7 Control Circuit Transformers

.1 Single phase, dry type.

.2 Primary: 600V or 208V, 60 Hz ac. as required.

.3 Secondary: 120 V, ac.

.4 Rating: As required.

.5 Secondary fuse: Size as required.

.6 Close voltage regulations as required by magnet coils and solenoid valves.

2.8 Manufacturers

.1 Acceptable manufacturers: Allen Bradley, Siemens, Cutler-Hammer, Schneider, or approved equal.

PART 3 - EXECUTION

3.1 Installation

.1 Install pushbutton stations, control devices as indicated and interconnect as indicated.

3.2 Tests

.1 Perform tests in accordance with Section 26 05 00.

.2 Depending upon magnitude and complexity, divide control system into convenient sections, energize one section at a time and check out operation of section.

.3 Upon completion of sectional test, undertake group testing.

.4 Check out complete system for operational sequencing.

END

PART 1 - GENERAL

1.1 References

.1 American National Standards Institute (ANSI)

.2 American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE)
.1 ANSI/IEEE C62.41-1991, Surge Voltages in Low-Voltage AC Power Circuits.

.3 American Society for Testing and Materials (ASTM)
.1 ASTM F 1137-11, Specification for Phosphate/Oil and Phosphate/Organic Corrosion Protective Coatings for Fasteners.

.4 United States of America, Federal Communications Commission (FCC)
.1 FCC (CFR47) EM and RF Interference Suppression.

1.2 Related Sections

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

.3 Section 01 45 00 - Quality Control.

1.3 Shop Drawings and Product Data

.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit complete photometric data prepared by independent testing laboratory for luminaires where specified, for approval by the Engineer.

.3 Photometric data to include: electronic ies files.

1.4 Waste Management and Disposal. Disposal

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And

.2 Place materials defined as hazardous or toxic waste in designated containers.

.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

1.4 Waste Management and Disposal. Disposal (Cont'd)

.4 Disposal of flourescent lamps must be treated as hazardous waste, collected and disposed of by an authorized hazardous waste disposal company in accordance with local environmental regulations.

1.5 Guarantee

.1 Replace:
.1 LED lamps and drivers burning out within 5 years of takeover.

PART 2 - PRODUCTS

2.1 Finishes

.1 Baked enamel finish:
.1 Conditioning of metal before painting:
.1 For corrosion resistance conversion coating to ASTM F 1137.
.2 For paint base, conversion coating to ASTM F 1137.
.2 Metal surfaces of luminaire housing and reflectors finished with high gloss polyester powdercoat to give smooth, uniform appearance, free from pinholes or defects.
.3 Reflector and other inside surfaces finished as follows:
.1 White, minimum reflection factor 85%.
.2 Colour fastness: yellowness factor not above 0.02 and after 250 hours exposure in Atlas fade-ometer not to exceed 0.05.
.3 Film thickness, not less than 0.03 mm average and in no areas less than 0.025 mm.
.4 Gloss not less than 80 units as measured with Gardner 60° gloss meter.
.5 Flexibility: withstand bending over 12 mm mandrel without showing signs of cracking or flaking under 10 times magnification.
.6 Adhesion: 24 mm square lattice made of 3 mm squares cut through film to metal with sharp razor blade. Adhesive cellulose tape applied over lattice and pulled. Adhesion satisfactory if no coating removed.

.2 Alzak finish:
.1 Aluminium sheet fabricated from special aluminum alloys and chemically brightened, subsequently anodically treated to

2.1 Finishes (Cont'd)

.2 Alzak finish:(Cont'd)
.1 (Cont'd)
specifications established by Alcoa, to produce:
.1 Finish for mild commercial service, minimum density of coating 7.8 g/m^2, minimum reflectivity 83% for specular, 80.5% for semi-specular and 75% for diffuse.
.2 Finish for regular industrial service, minimum density of coating 14.8 g/m^2, minimum reflectivity 82% for specular and 73% for diffuse.
.3 Finish for heavy duty service, minimum density of coating 21.8 g/m^2, minimum reflectivity 85% for specular, 65% for diffuse.

2.2 Luminaires

.1 Refer to Luminare Schedule in Appendix A.

PART 3 - EXECUTION

3.1 Installation

.1 Locate and install luminaires as indicated.

3.2 Luminaire Supports

.1 For suspended ceiling installations support luminaires independently of ceiling.

3.3 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.

END

PART 1 - GENERAL

1.1 Section Includes

.1 Materials and installation for emergency lighting systems.

1.2 Related Sections

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

.3 Section 26 05 21 - Wires and Cables (0-1000 V).

.4 Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

1.3 References

.1 Canadian Standards Association (CSA International)
.1 CSA C22.2 No.141-15, Unit Equipment for Emergency Lighting.

1.4 Submittals

.1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.

.2 Data to indicate system components, mounting method, source of power and special attachments.

1.5 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Divert unused metal and wiring materials from landfill to metal recycling facility.

.5 Dispose of unused batteries at official hazardous material collections site.

1.5 Waste Management and Disposal (Cont'd)

.6 Fold up metal banding, flatten and place in designated area for recycling.

1.6 Warranty

.1 For batteries, the 12 months warranty period prescribed in subsection GC32.1 of General Conditions "C" is extended to 120 months, with no-charge replacement during the first 5 years and pro-rate charge on the second 5 years.

PART 2 - PRODUCTS

2.1 Equipment

.1 Emergency lighting equipment: to CSA C22.2 No.141.

.2 Supply voltage: 120/347 V, ac.

.3 Output voltage: 12 V dc.

.4 Operating capacity time: 72W for 30 min.

.5 Battery: sealed, maintenance free.

.6 Charger: solid state, multi-rate, voltage/current regulated, inverse temperature compensated, short circuit protected with regulated output of plus or minus 0.01V for plus or minus 10% input variations.

.7 Solid state transfer circuit.

.8 Low voltage disconnect: solid state, modular, operates at 80% battery output voltage.

.9 Signal lights: solid state, for 'AC Power ON' and 'High Charge'.

.10 Lamp heads: integral on unit, adjustable. Lamp type: MR16, LED, 7 W.

.11 Cabinet: suitable for direct mounting to wall and c/w knockouts for conduit. Removable or hinged front panel for easy access to batteries.

.12 Finish: White.

2.2 Wiring of Remote Heads

.1 Conductors: AC90 type in accordance with Section 26 05 21 - Wires and Cables 0-1000 V, sized in accordance with manufacturer's recommendations.

PART 3 - EXECUTION

3.1 Installation

.1 Install unit equipment and remote mounted fixtures as indicated.

.2 Direct heads for most effective coverage.

END

PART 1 - GENERAL

1.1 References

.1 Canadian Code for Preferred Packaging

.2 Canadian Standards Association (CSA)
.1 CSA C22.2 No.141-15, Unit Equipment for Emergency Lighting.
.2 CSA C860-11-(R2016), Performance of Internally-Lighted Exit Signs.

.3 National Fire Protection Association (NFPA) requirements

1.2 Submittals

.1 Submit product data in accordance with Section 01 33 00 - Submittals.

.2 Submit product data sheets for exit lights. Include product characteristics, performance criteria, physical size, limitations and finish.

1.3 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal, and with Waste Reduction Workplan.

.2 Place materials defined as hazardous or toxic waste in designated containers.

.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

.4 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

.5 Fold up metal banding, flatten and place in designated area for recycling.

PART 2 - PRODUCTS

2.1 Self-Powered Units

.1 Exit lights: to CSA C22.2 No.141 and CSA C860, packaged in accordance with the Canadian Code for Preferred Packaging guidelines.

.2 Housing: extruded aluminum housing.

.3 Lamps: High brightness LED, 20 year life.

.4 Operation: designed for 20 years of continuous operation without relamping.

.5 White picogram on green background "Running Man".

.6 Supply voltage: 120/347 ac.

.7 Output voltage: 12 V, dc.

.8 Operating time: 90 min.

.9 Finish: Brushed Aluminum.

2.2 Design

.1 Universal mounting.

.2 Single or Double face with die-cast face plate to remain captive for relamping.

.3 Arrow: right, left or both directions knock-outs, as indicated.

PART 3 - EXECUTION

3.1 Installation

.1 Install exit lights as indicated on the drawings.

.2 Connect fixtures to exit light circuits.

.3 Ensure that exit light circuit breaker is locked in "On" position.

END