

## **PART 1 GENERAL**

### **1.1 REFERENCES**

- .1 This Section supplements Division 01 and forms part of every Section 26, Section 02 41 19 and Section 02 80 00.
- .2 Canadian Standards Association (CSA International)
  - .1 CSA C22.1-15, Canadian Electrical Code, Part 1 (23<sup>rd</sup> Edition), Safety Standard for Electrical Installations.
  - .2 CAN3-C235-83(R2000), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.
- .3 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)
  - .1 IEEE SP1122-2000, 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 SP1122.

### **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 SCOPE OF WORK**

- .1 This work includes, but is not limited to:
  - .1 The supply and installation of supervision, labour, permits, equipment, materials, and consumables necessary to provide this facility with complete and operational systems as indicated on drawings, and as described in the specifications.
  - .2 Demolition of existing electrical as indicated on the Contract Drawings, not limited to, removal of existing main floor wiring, devices, and lighting.
  - .3 New power and distribution systems including but not limited to, new main floor panelboard, receptacles and outlets, connections to mechanical and other equipment as indicated on the Contract Drawings.
  - .4 New lighting systems, including but not limited to, interior lighting, exit signage, emergency lighting, and lighting controls as indicated on the Contract Drawings.
  - .5 Start-up and testing of systems.

### **1.5 COORDINATION WITH POWER SUPPLY AUTHORITY**

- .1 Coordinate and meet requirements of local power supply Authority.

- .2 Arrange for temporary shut-downs and re-energization. Ensure availability of power when required.
- .3 Coordinate with NB Power and pay associated costs.

#### **1.6 COORDINATION WITH TELECOMMUNICATIONS AUTHORITY**

- .1 Coordinate with telecommunications authority Aliant to ensure availability of service.
- .2 Coordinate with Telecom Service Provider Aliant and pay associated costs.

#### **1.7 EXAMINATION OF SITE AND DRAWINGS**

- .1 The contractor shall examine the site and local conditions affecting the work under this contract. No additional costs will be considered due to existing site conditions.
- .2 The Consultant reserves the right to alter locations of devices or equipment without incurring additional costs provided such changes are made before the Contractor has begun fabrication of the work in question.
  - .1 The Contractor shall carefully examine the Architectural and Mechanical drawings and satisfy himself that the work under this division can be carried out without changes to the equipment as shown on the drawings. Before commencing the work, the Contractor shall examine the work of other trades and report at once any defect or interference affecting the work of this division.
  - .2 Notes on the drawings are intended to form a part of this specification and shall be examined by the contractor.
  - .3 After review of documents associated with other trades, forward questions and obtain answers by Addendum, prior to tender submission.
  - .4 Submission of tender by electrical contractor acknowledges coordination with other trades as part of these contract documents.

#### **1.8 DESIGN DOCUMENTS**

- .1 The drawings and these specifications are complementary each to the other and what is called for by one shall be binding as if called for by both.
- .2 Drawings for the electrical work are, in part diagrammatic. They are intended to convey the scope of work and to indicate the general arrangement of equipment, and outlets.
- .3 The drawings, which form an integral part of this contract, shall serve as the working drawings. They indicate the general layout of the complete electrical system, arrangement of feeders, circuits, outlets, switches, controls, panelboards, distribution centres, equipment, luminaires, and other work. The drawings indicate the general location and routes to be followed, but do not show all conduit and/or wiring or all the civil, structural, mechanical, and architectural details. Plan and install conduit runs respecting all applicable conditions including civil, structural, mechanical, and architectural details.
- .4 Communications systems drawings, which form an integral part of this contract, shall serve as the working drawings. They indicate general schematics and functionality of the systems, but do not show all wiring and devices. The Contractor shall be responsible for the proper installation of these systems to ensure proper interconnectivity and functionality.

- .5 Before carrying out the work, verify that there are no apparent obstructions or interferences. Changes to the work made necessary by failure to make this verification will not be considered for extra payment.
- .6 Coordinate the locations of outlets with architectural and structural details and elevations as well as millwork and pertinent furniture layouts, etc.
- .7 The location of equipment or outlets may be changed by the Consultant at any time prior to installation, within a radius of 3 metres from the location shown on the drawings, at no extra cost to the Contract.

#### **1.9 PERMITS, FEES, AND INSPECTION**

- .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 Consultant will provide drawings and specifications required by Electrical Inspection Department and Supply Authority at no cost.
- .4 Notify Consultant of changes required by Electrical Inspection Department prior to making changes.
- .5 Furnish Certificates of Acceptance from Electrical Inspection Department and Authorities Having Jurisdiction upon completion of work to Consultant.

#### **1.10 SUBMITTALS**

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures. Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures and per technical section requirements.
- .2 Record drawings:
  - .1 Prior to start of testing and commissioning; finalize production of as-built drawings.
  - .2 Identify each drawing in lower right-hand corner in red ink as follows: - "RECORD DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW ELECTRICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (date).
  - .3 Submit to Consultant for review and make corrections as directed.
  - .4 Submit completed reproducible record drawings with Operating and Maintenance Manuals in accordance with Section 01 78 00 – Closeout Submittals.
- .3 Operation and Maintenance Data:
  - .1 Provide operation and maintenance data for electrical work for incorporation into maintenance manual in accordance with Section 01 78 00.
  - .2 Include in operations and maintenance data:
    - .1 Details with respect to 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 all items included in maintenance manual.
- .4 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.
    - .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 Post instructions where directed.

#### **1.11 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 electricians in accordance with authorities having jurisdiction.
- .3 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.
- .4 Submit applicable manufacturer's test reports and certificates in accordance with Section 01 78 00 – Closeout Submittals

#### **1.12 SYSTEM STARTUP**

- .1 Instruct Consultant and operating personnel in operation, care and maintenance of systems, system equipment, and components.
- .2 Arrange and pay for services of manufacturer's factory service representative 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.

#### **1.13 WARRANTY**

- .1 Prior to expiration of the construction contract warranty, the owner will carry out functional performance testing (FPT). The Contractor will cooperate with the Owner or Owner's representative's request for warranty service and pay for associated costs.

### **PART 2 PRODUCTS**

#### **2.1 SUSTAINABLE REQUIREMENTS**

- .1 Materials and products in accordance with Section 01 61 00 – Common Product Requirements.
- .2 Do verification requirements in accordance with Section 01 61 00 – Common Product Requirements.

## 2.2 MATERIALS AND EQUIPMENT

- .1 Provide material and equipment in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Provide CSA certified equipment and material. Where CSA certification is not available, obtain special approval from Electrical Inspection Department before delivery to site and submit such approval as described in PART 1 - SUBMITTALS.
- .3 Factory assemble control panels and component assemblies.
- .4 Equipment and materials specified to conform to an applicable code and/or standard shall be listed and labelled under the provisions of such code.
- .5 Electrical equipment and enclosures to be suitable for environment in which it is to be installed.

## 2.4 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

- .1 Verify installation and co-ordination responsibilities related to motors, equipment and controls, as indicated. Supplier, installer, and wiring responsibility is indicated on electrical drawings and related mechanical responsibility is indicated on mechanical drawings.
- .2 Control wiring and conduit is specified in Division 26 except for conduit, wiring and connections which are related to control systems specified in mechanical division and shown on mechanical and controls drawings and specifications as being by the mechanical division.
- .3 Coordinate final connection to mechanical equipment and controls with mechanical and controls divisions.

## 2.5 WARNING SIGNS

- .1 Warning Signs: in accordance with requirements of Electrical Inspection Authorities.
- .2 Porcelain enamel decal signs, minimum size 175 x 250 mm.

## 2.6 WIRING TERMINATIONS

- .1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.
- .2 Provide, install, terminate, and identify phone cables and BIX termination panels.

## 2.7 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with nameplates as follows:
  - .1 Nameplates: Lamacoid 3mm thick plastic engraving sheet, black face, white core, attached with adhesive.
  - .2 Sizes as follows:

### NAMEPLATE SIZES

Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters

#### NAMEPLATE SIZES

Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

- .2 Labels: embossed plastic labels with 6mm high letters unless specified otherwise.
- .3 Wording on nameplates to be approved by Consultant prior to manufacture.
- .4 Nameplates for distribution switchboards and panelboards shall indicate designated name of equipment, overcurrent protection device rating, voltages, number of phases and wires.
- .5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .6 Disconnects, starters, VFDs, and contactors: indicate equipment being controlled and voltage.
- .7 Transformers: indicate designation, capacity, primary and secondary voltages.
- .8 Receptacles installed in ceiling space shall be labeled indicating panel and circuit designation (i.e. 1A-7).
- .9 Junction and/or pull boxes shall be marked with an indelible ink marker to designate the circuit number of enclosed wiring, the designated panel name.

## 2.8 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 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.

## 2.9 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 wide prime colour and 20 mm wide auxiliary colour.

Service	Prime	Auxiliary
50 V to 249 V Normal	Green	
50 V to 249 V Emergency	Orange	
250 V to 749 V Normal	Blue	
250 V to 749 V Emergency	Yellow	
750 V and up	Grey	
Fire Alarm	Red	
Emergency Voice	Red	Black
Intrusion Alarm	Red	Blue
CCTV	Red	Green
Door Access	Red	Orange
Medical Gas Alarms	Red	Yellow

Telephone	White	
Nurse Call	White	Red
Television	White	Black
Data	White	Yellow
Public Address	White	Green
Intercom (Point to Point)	White	Blue
Controls	Brown	Orange

## 2.10 FINISHES

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
  - .1 Paint indoor switchgear and distribution enclosures light grey to EEMAC 2Y-1.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- .1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.
- .2 Comply with CSA Certification Standards and Electrical Bulletins in force at time of tender submission.
- .3 Do overhead and underground systems in accordance with:
  - .1 CSA C22.3 No.1.
  - .2 Énergie NB Power Standard Construction Practices Underground.
  - .3 Énergie NB Power Utility Service Entrance Standards.

### 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 Conduit and wiring shall be concealed in walls and boxes shall be recessed throughout the building with the exception of the electrical and mechanical rooms. Conduit and wiring in ceiling spaces shall be installed tight to building steel and as high as possible. Coordinate with other trades.
- .2 Install conduit and sleeves prior to pouring of concrete.
  - .1 Sleeves through concrete: sized for free passage of conduit, and protruding 50 mm.
- .3 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.
- .4 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.
- .5 Firestopping shall be by Division 07 – Firestopping. This Contractor shall be responsible for firestop preparation and coordination of locations related to conduit, cable, and equipment supplied and installed by Division 26 requiring firestopping with Division 07.

### **3.4 LOCATION OF OUTLETS**

- .1 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.
- .2 Change location of outlets at no extra cost or credit, providing distance does not exceed 3 m, and information is given before installation.
- .3 Locate light switches on latch side of doors unless otherwise indicated.

### **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.
  - .2 Wall receptacles:
    - .1 General: 450 mm.
    - .2 Above top of counters or counter splash backs: 150 mm.
    - .3 In service rooms: 1200 mm.
  - .3 Panelboards: 1500 mm or as required by Code.
  - .4 Door Operator pushbuttons: 865 mm minimum, 1200 mm maximum and as per barrier-free requirements.

### **3.6 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 Submit, at completion of work, report listing phase and neutral currents on panelboards, and dry-core transformers operating under normal load. State hour and date on which each load was measured, and voltage at time of test.

### **3.7 PROTECTION**

- .1 Protect exposed live equipment during construction for personnel safety.
- .2 Shield and mark all live parts "LIVE 600 VOLTS" or with appropriate voltage in English and French.
- .3 Arrange for installation of temporary doors for rooms containing electrical distribution equipment. Keep these doors locked except when under direct supervision of electrician.

### **3.8 CO-ORDINATION OF PROTECTIVE DEVICES**

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

### **3.9 FIELD QUALITY CONTROL**

- .1 Conduct and pay for following tests:
  - .1 Power distribution system including phasing, voltage, grounding, and load balancing.
  - .2 Circuits originating from branch distribution panels.

- .3 Lighting and lighting controls.
- .4 Communication Systems.
- .2 Furnish manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions.
- .3 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.
- .4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
- .5 Data communications system to be tested by a Nordx certified installer or equal.
- .6 Complete in accordance with 01 45 00 - Quality Control.
- .7 Submit test results in accordance with Section 01 33 00 - Submittal Procedures.

### **3.10 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 At time of final cleaning, clean lighting reflectors, lenses, pot lights, and other lighting surfaces that have been exposed to construction dust, dirt and fingerprints.
- .4 Reference Section 01 74 00 – Cleaning for further requirements.

### **3.11 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance 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.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 RELATED REQUIREMENTS**

- .1 Section 26 – Electrical.
- .2 Section 27 – Communications.
- .3 Section 28 – Electronic Safety and Security.
- .4 Section 01 35 29 – Health and Safety Requirements

**1.2 REFERENCES**

- .1 Comply with National Code, Part 8, Construction Safety Measures at Construction and Demolition Sites, and Provincial requirements.
- .2 See Section 01 35 29 – Health and Safety Requirements

**1.3 PROTECTION**

- .1 Protect existing items and surfaces designated to remain and materials designated for salvage. In the event of damage to such items, immediately replace or make repairs to approval of Consultant and at no cost.

**1.4 NOTICE**

- .1 Notify maintenance and staff before disrupting building access or services.
- .2 Coordinate the removal or alterations of existing services with the local utility.

**PART 2 GENERAL**

**2.1 NOT USED**

- .1 Not used.

**PART 3 EXECUTION**

**3.1 PREPARATION**

- .1 Refer to Electrical Drawings, the architectural drawings and specifications, and coordinate with other Divisions to determine scope and sequencing of work.
- .2 The intent of the electrical demolition is to remove existing main floor electrical power, lighting, and wiring as indicated on the Contract Drawings.

**3.2 REMOVAL**

- .1 Remove items for reuse, salvage or disposal as indicated herein, on the drawings, and as directed by Consultant.
- .2 Do not disturb adjacent items designated to remain in place

**3.3 SALVAGE**

- .1 .1 Carefully dismantle items containing materials for salvage and stockpile salvaged materials at locations as directed by Consultant.

**END OF SECTION**

## PART 1 GENERAL

### 1.1 REFERENCES

- .1 Canadian Standards Association (CSA).
  - .1 CSA C22.2 No .0.3-96, Test Methods for Electrical Wires and Cables.
  - .2 CAN/CSA-C22.2 No. 131-M89 (R1994), Type Teck90 Cable.

### 1.2 SHOP DRAWINGS AND PRODUCT DATA

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

## PART 2 PRODUCTS

### 2.1 BUILDING WIRES

- .1 Use standard building wire in conduits for branch circuits in corridors, into rooms, and in all open ceiling spaces and rooms unless otherwise indicated.
- .2 In rooms with dropped T-bar or accessible ceilings, main branch circuits may be converted one meter inside room from conduit to AC90 for all branch circuits and drops to devices, fixtures, etc., unless otherwise indicated. All cables above T-bar ceilings to be properly secured.
- .3 Conductors: Stranded for 10 AWG and larger. Minimum size 14 AWG.
- .4 Copper conductors: size as indicated, with 600 V insulation of chemically cross-linked thermosetting polyethylene material rated RW90. Coloured green for bond wire.
- .5 Voltage drop shall not exceed 3% of line voltage. The following is for all 120V, 15A branch circuits and include horizontal and vertical conductor lengths.

Branch Circuit Length of Run	Phase Wire Size	Separate Neutral	Common Neutral	Bond Size
1' to 80'	#12	#12	#10	#14
81' to 125'	#10	#10	#8	#12
126' to 185'	#8	#8	#6	#10

### 2.2 ARMoured CABLE

- .1 Conductors: insulated, copper, quantity and size as indicated.
- .2 Type: AC90.

### 2.3 TECK CABLE

- .1 Cable: to CAN/CSA-C22.2 No. 131.
- .2 Conductors:
  - .1 Grounding conductor: copper.
  - .2 Circuit conductors: copper, quantity, and size as indicated.
- .3 Insulation:
  - .1 Type: ethylene propylene rubber.
  - .2 Chemically cross-linked thermosetting polyethylene rated type RW90, 600V.
- .4 Inner jacket: polyvinyl chloride material.
- .5 Overall covering: thermoplastic material.

- .6 Fastenings:
  - .1 One-hole steel straps to secure surface cables 50 mm and smaller. Two-hole steel straps for cables larger than 50 mm.
- .7 Watertight connectors approved for TECK cable.

## **2.4 COMMUNICATION WIRING**

- .1 Communications wiring and cables shall be installed in EMT stubbed up to accessible ceiling space.
- .2 Wire and cables installed in exposed areas shall be run in EMT.
- .3 Telephone and Data cabling are each to be run separately.
- .4 Fire alarm, and CCTV wiring may be grouped together.
- .5 Fire alarm cables must have armoured jacket.
- .6 Sleeve all cable runs through walls and ceilings which restrict free run of cables.
- .7 All communications cables to be identified as per Section 26 05 00 – Common Work Requirements - Electrical.

## **PART 3 EXECUTION**

### **3.1 INSTALLATION OF BUILDING WIRES**

- .1 In conduit systems in accordance with Section 26 05 34 – Conduits, Conduit Fastenings and Conduit Fittings.
- .2 Conduit shall be concealed outside of the basement.
- .3 As indicated in Part 2.1 of this section.

### **3.2 INSTALLATION OF ARMOURED CABLE**

- .1 Group cables wherever possible.
- .2 Cables shall be concealed outside of the basement.
- .3 Where AC90 is used for drops to lighting fixtures, install only from junction box to fixture. Loops between fixtures are not acceptable.
- .4 Armoured cables are to be installed concealed, parallel, and perpendicular to building lines and shall be adequately secured to the building structure at no less than 1.5 m intervals or as otherwise indicated, protecting cables from mechanical damage.
- .5 The laying of un-supported cables directly on top of ceiling grid system is prohibited.

### **3.3 INSTALLATION OF TECK CABLE 0-1000V**

- .1 Group cables wherever possible on channels.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 RELATED REQUIREMENTS**

- .1 Section 26 05 34 – Conduit, Conduit Fastenings, and Conduit Fittings.

**1.2 REFERENCES**

- .1 CSA C22.1-15, Canadian Electrical Code, Part 1 (23<sup>rd</sup> Edition), Safety Standard for Electrical Installations.

**1.3 SHOP DRAWINGS AND PRODUCT DATA**

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

**PART 2 PRODUCTS**

**2.1 OUTLET AND CONDUIT BOXES**

- .1 Size boxes in accordance with CSA C22.1, 23<sup>rd</sup> edition.
- .2 102 mm 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 or as indicated. 102 mm 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.
- .3 102 mm square or octagonal outlet boxes for lighting fixture outlets.
- .4 102 mm square outlet boxes with extension and plaster rings for flush mounting devices in finished plaster or tile walls.

**2.3 MASONRY BOXES**

- .1 Electro-galvanized steel masonry single and multi-gang boxes for devices flush mounted in exposed block walls.

**2.4 FITTINGS**

- .1 Bushing and connectors with nylon insulated throats.
- .2 Knock-out fillers to prevent entry of debris.
- .3 Conduit outlet bodies for conduit up to 32 mm and pull boxes for larger conduits.
- .4 Double locknuts and insulated bushings on sheet metal boxes.

**PART 3 EXECUTION**

**3.1 INSTALLATION**

- .1 Wall boxes to be recessed except in basement, electrical, and mechanical room.
- .2 Support boxes independently of connecting conduits.

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- .3 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.
  - .4 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.
  - .5 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Reducing washers are not allowed.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 RELATED REQUIREMENTS**

- .1 Section 26 05 21 – Wires and Cables 0-1000V.

**1.2 REFERENCES**

- .1 Canadian Standards Association (CSA):
  - .1 CAN/CSA C22.2 No.18-98(R2003), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
  - .2 CSA C22.2 No. 45-M1981 (CR 1999), Rigid Metal Conduit.
  - .3 CSA C22.2 No. 56-1977 (R1999), Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
  - .4 CSA C22.2 No. 83-M1985 (R1999), Electrical Metallic Tubing.
  - .5 CSA C22.2 No. 211.2-M1984 (R1999), Rigid PVC Conduit.
  - .6 CAN/CSA C22.2 No. 227.3-M91 (R1999), Flexible Nonmetallic Tubing.

**1.3 PRODUCT DATA**

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

**1.4 CONDUIT LOCATIONS**

- .1 Drawings do not show all conduit runs. Conduit runs indicated are shown diagrammatically. Contractor shall verify, field route, and support as required.

**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 Rigid metal conduit: to CSA C22.2 No. 45, galvanized steel threaded.
- .3 Rigid PVC conduit: to CSA C22.2 No. 211.
- .4 Flexible metal conduit: to CSA C22.2 No. 56, liquid-tight flexible metal.
- .5 Rigid PVC ducts Type DB2 for direct burial to CSA C22.2 No. 211.1.

**2.2 CONDUIT FASTENINGS**

- .1 One-hole steel straps to secure surface conduits 50 mm and smaller.
- .2 Two-hole steel straps for conduits larger than 50 mm.
- .3 Beam clamps to secure conduits to exposed steel work.
- .4 Channel type supports for two or more conduits, maximum spacing:
  - .5 1.5 m for 16 mm and 21 mm conduit.
  - .6 2 m for 27 mm and 35 mm conduit.
  - .7 3 m for 41 mm conduit and larger.
  - .8 6 mm diameter threaded rods to support suspended channels.

**2.3 CONDUIT FITTINGS**

- .1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.
- .2 Ensure factory "ells" where 90 degrees bends for 25 mm and larger conduits.

## **2.4 EXPANSION FITTINGS FOR RIGID CONDUIT**

- .1 Weatherproof expansion fittings with internal bonding assembly suitable for 100 mm linear expansion.
- .2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 20 mm deflection in all directions.
- .3 Weatherproof expansion fittings for linear expansion at entry to panel.

## **2.5 FISH CORDS**

- .1 Polypropylene.

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

- .1 Install conduits as high as possible and tight to building steel.
- .2 Conceal conduits except in mechanical and electrical service rooms.
- .3 Use electrical metallic tubing (EMT) for branch circuit work except in poured concrete or underground unless indicated otherwise. Install a separate integral bond wire sized in accordance with CEC.
- .4 Use rigid PVC conduit underground, under floor slab, and in poured concrete unless indicated otherwise.
- .5 Minimum conduit size for lighting and power circuits: 16 mm.
- .6 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .7 Mechanically bend steel conduit over 21 mm diameter.
- .8 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
- .9 Install fish cord in empty conduits.
- .10 Where conduits become blocked, remove and replace blocked section. Do not use liquids to clean out conduits.
- .11 Dry conduits out before installing wire.

### **3.2 MANUFACTURER'S INSTALLATION**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

### **3.3 SURFACE CONDUIT INSTALLATION**

- .1 Run parallel or perpendicular to building lines.
- .2 Run conduits in flanged portion of structural steel.
- .3 Group conduits wherever possible on suspended surface channels.
- .4 Do not pass conduits through structural members except as indicated.
- .5 Do not pass conduits through structural members except as indicated. Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

### **3.4 CONCEALED CONDUIT INSTALLATION**

- .1 Run parallel or perpendicular to building lines.
- .2 Do not install horizontal runs in masonry walls.
- .3 Do not install conduits in terrazzo or concrete toppings.

**3.5 CONDUIT IN CAST IN PLACE CONCRETE**

- .1 Locate to suit reinforcing steel. Install in centre one-third of slab.
- .2 Protect conduits from damage where they stub out of concrete.
- .3 Install sleeves where conduits pass through slab or wall.
- .4 Where conduits pass through waterproof membrane, provide oversized sleeve before membrane is installed. Use cold mastic between sleeve and conduit.
- .5 Encase conduits completely in concrete.

**3.6 CONDUIT IN CAST IN PLACE SLABS ON GRADE**

- .1 Run conduits 25 mm and larger below slab. Provide 50 mm of sand over conduits below floor slab.

**3.7 UNDERGROUND CONDUIT**

- .1 Slope conduits to provide drainage.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 RELATED REQUIREMENTS**

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

**1.2 REFERENCES**

- .1 Canadian Standards Association (CSA International):
  - .1 CSA C22.2No.29-M1989(R2000), Panelboards and enclosed Panelboards.

**1.3 SHOP DRAWINGS AND PRODUCT DATA**

- .1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Drawings to include electrical detail of panel, branch breaker type, quantity, ampacity, ratings, and enclosure dimensions.

**1.4 OPERATION AND MAINTENANCE DATA**

- .1 Provide operation and maintenance data for panel boards for incorporation into manual in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Include:
  - .1 Operation and maintenance data for complete panel boards to permit effective operation and maintenance.
  - .2 Technical data – illustrated parts list with catalog numbers.
  - .3 Copy of approved shop drawings.
- .3 Submit copy of typewritten as-built Panel Schedules with O&M manual.

**PART 2 PRODUCTS**

**2.1 PANELBOARDS**

- .1 Panelboards: product of one manufacturer.
  - .1 Install circuit breakers in panelboards before shipping.
- .2 250 VAC rated panelboards: bus and breakers rated for 10 kA to 14 kA (symmetrical) interrupting capacity or as indicated.
- .3 600 VAC rated panelboards: bus and breakers rated for 22 kA (symmetrical) interrupting capacity or as indicated.
- .4 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number and phase.
- .5 Panelboard mains, circuit quantity, and number and size of branch circuit breakers as indicated.
- .6 Two keys for each panelboard and key panelboards alike.
- .7 Copper or aluminum bus with neutral of same ampere rating as mains.
- .8 Install spare breakers as indicated.
- .9 Mains: suitable for bolt-on breakers.
- .10 Size to suit actual connected load.
- .11 Sprinkler proof enclosure in sprinklered spaces.

## **2.2 BREAKERS**

- .1 Breakers with thermal and magnetic tripping in panelboards except as indicated otherwise.
- .2 Main breaker: separately mounted on top or bottom of panel to suit cable entry. When mounted vertically, down position should open breaker.
- .3 Quantity and ratings for new and existing loads to be re-connected to new panelboard.
- .4 Lockable red fire alarm breakers, installed as indicated
- .5 Lockable exit light breakers, installed as indicated.

## **2.3 EQUIPMENT IDENTIFICATION**

- .1 Provide equipment identification as per Section 26 05 00 - Common Work Results - Electrical.
- .2 Nameplate for each panelboard size 4 engraved as indicated.
- .3 Complete circuit directory with typewritten legend showing location and load of each circuit.

## **2.4 MANUFACTURERS**

- .1 Acceptable manufacturers or approved equal:
  - .1 Siemens
  - .2 Eaton
  - .3 Schneider

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

- .1 Locate panelboards as indicated and mount securely, plumb, true, and square to adjoining surfaces.
- .2 Install surface mounted panelboards on plywood backboards. Where practical, group panelboards on common backboard.
- .3 Mount panelboards to height specified in Section 26 05 00 - Common Work Results - Electrical or as indicated.
- .4 Connect new and existing loads to panelboard and test circuits.

**END OF SECTION**

## **PART 1 GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 26 05 00 – Common Work Results – Electrical.

### **1.2 REFERENCES**

- .1 Canadian Standards Association (CSA International):
  - .1 CAN/CSA C22.2 No.4-M89 (R2000), Enclosed Switches.
  - .2 CSA C22.2 No.39-M89 (R2003), Fuse holder Assemblies.

### **1.3 SHOP DRAWINGS AND PRODUCT DATA**

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

### **1.4 OPERATION AND MAINTENANCE DATA**

- .1 Provide operation and maintenance data for disconnect switches for incorporation into manual in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Include:
  - .1 Operation and maintenance data for disconnect switches to permit effective operation and maintenance.
  - .2 Technical data – illustrated parts list with catalog numbers.
  - .3 Copy of approved shop drawings.

## **PART 2 PRODUCTS**

### **2.1 DISCONNECT SWITCHES**

- .1 Fusible, non-fusible, disconnect switch in CSA Enclosure. Ratings, fusing, and enclosure as indicated.
- .2 Provision for padlocking in off switch position by multiple locks.
- .3 Mechanically interlocked door to prevent opening when handle in ON position.
- .4 Fuses: size as indicated.
- .5 Fuseholders: to CSA C22.2 No.39 suitable without adaptors, for type and size of fuse indicated.
- .6 Quick-make, quick-break action.
- .7 ON-OFF switch position indication on switch enclosure cover.

### **2.2 MANUAL MOTOR STARTERS**

- .1 Single or Three phase manual motor starters of size, type, rating, and enclosure type as indicated, with components as follows:
  - .1 Single pole, double pole, three-way switches as indicated, rated for load controlled.
  - .2 Switching mechanism, quick make and break.
  - .3 Overload heaters, manual reset, trip indicating handle.
- .2 Accessories:
  - .1 Toggle switch: heavy duty labelled as indicated.
  - .2 Indicating light.

- .3 Locking tab to permit padlocking in "ON" or "OFF" position.

## **2.3 MANUAL MOTOR SWITCHES**

- .1 Manual motor switch, with components as follows:
  - .1 Single pole, double pole, three-way switches as indicated, rated for load controlled.
  - .2 Switching mechanism, quick make and break.
  - .3 Toggle switch: heavy duty labelled as indicated.
  - .4 Locking tab to permit padlocking in "ON" or "OFF" position.

## **2.4 EQUIPMENT IDENTIFICATION**

- .1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results.
- .2 Indicate name of load controlled on size 4 nameplate.

## **2.5 MANUFACTURERS**

- .1 Acceptable manufacturers or approved equal:
  - .1 Siemens
  - .2 Eaton
  - .3 Schneider

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

- .1 Install disconnect switches complete with fuses if applicable.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 REFERENCES**

- .1 Section 26 05 32 – Outlet, Boxes, Conduit Boxes and Fittings.

**1.2 REFERENCES**

- .1 Canadian Standards Association (CSA):
  - .1 CSA-C22.2 No.42-99(R2002), General Use Receptacles, Attachment Plugs and Similar Devices.
  - .2 CSA-C22.2 No.42.1-00, Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).
  - .3 CSA-C22.2 No.55-M1986(July 2001), Special Use Switches.
  - .4 CSA-C22.2 No.111-00, General-Use Snap Switches (Bi-national standard, with UL 20, twelfth edition).

**1.3 SUBMITTALS**

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

**PART 2 PRODUCTS**

**2.1 SWITCHES GENERAL**

- .1 15 A, 120 V, single pole, double pole, three-way switches as indicated.
- .2 Manually-operated ac switches with following features:
  - .1 White toggle as indicated.
  - .2 Silver alloy contacts.
  - .3 Suitable for back and side wiring.
  - .4 Terminal holes approved for No. 10 AWG wire.
  - .5 Urea or melamine molding for parts subject to carbon tracking.
- .3 Switch operated fully rated for tungsten filament and fluorescent lamps, and up to 80% of rated capacity of motor loads.
- .4 General lighting switches to be decorative rocker style in finished areas.
- .5 General lighting switches to be toggle style for service, storage, unfinished areas.
- .6 Switches of to be heavy duty specification grade and of one manufacturer throughout project.
- .7 Acceptable manufacturers:
  - .1 Leviton
  - .2 Cooper
  - .3 Hubbell

**2.2 MOTOR RATED SWITCH**

- .1 20 A, 120 V, double pole, toggle operated with black nylon handle.
- .2 Industrial specification grade
- .3 Enclosure shall have lockout capabilities
- .4 Acceptable manufacturers:
  - .1 Leviton
  - .2 Cooper
  - .3 Hubbell

## 2.3 SWITCH MOUNTED VACANCY SENSOR

- .1 Wall mounted, line voltage, 180 degrees, white finish
- .2 Push button programmable
- .3 Manual on, automatic off
- .4 1/4 Hp motor load rating
- .5 Acceptable Material:
  - .1 Sensor Switch
  - .2 Leviton
  - .3 Hubbell

## 2.4 RECEPTACLES

- .1 Duplex receptacles, CSA type 5-15R, 125 V, 15 A, U ground, with following features:
  - .1 White urea molded housing.
  - .2 Break-off links for use as split receptacles.
  - .3 Suitable for No. 10 AWG for back and side wiring.
  - .4 Eight back wired entrances, four side wiring screws.
  - .5 Triple wipe contacts and rivetted grounding contacts.
- .2 Duplex receptacles, CSA type 5-20R, 125 V, 20 A, U ground, with following features:
  - .1 White urea molded housing.
  - .2 Break-off links for use as split receptacles.
  - .3 Suitable for No. 10 AWG for back and side wiring.
  - .4 Eight back wired entrances, four side wiring screws.
  - .5 Triple wipe contacts and riveted grounding contacts.
- .3 Ground Fault Circuit Interrupter Duplex receptacle, CSA Type 5-15, 125V, 15 Amp with following features:
  - .1 White flush nylon face.
  - .2 Back and side wired.
  - .3 Multiple drive screws.
  - .4 Matching wall plate.
- .4 Ground Fault Circuit Interrupter Duplex receptacle, CSA Type 5-20, 125V, 20 Amp with following features:
  - .1 White flush nylon face.
  - .2 Back and side wired.
  - .3 Multiple drive screws.
  - .4 Matching wall plate.
- .5 Receptacles to be heavy duty specification grade and of one manufacturer throughout project.
- .6 Acceptable manufacturers:
  - .1 Leviton
  - .2 Cooper
  - .3 Hubbell

## 2.5 COVER PLATES

- .1 Cover plates to be white nylon for wiring devices located in finished areas.
- .2 Stainless steel cover plates for wiring devices located in service, storage, unfinished areas.
- .3 Weatherproof in-use covers for duplex exterior receptacles and where indicated.
  - .1 CSA Listed for wet locations.

- .2 Heavy duty transparent polycarbonate construction, fully gasketed.
- .3 Latching cover, bottom large cord openings, lockable.
- .4 Cover plates and covers from one manufacturer throughout project.

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

- .1 Switches:
  - .1 Where switches from different manufacturers are ganged, devices must fit in single cover plate. Cutting of cover plates is not acceptable.
  - .2 Install single throw switches with handle in "UP" position when switch closed.
  - .3 Install switches in gang type outlet box when more than one switch is required in one location.
  - .4 Mount toggle switches at height as specified in Section 26 05 00 – Common Work Results – Electrical, or 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 as specified in Section 26 05 00 – Common Work Results – Electrical, or as indicated.
  - .3 Where split receptacle has one portion switched, mount vertically and switch upper portion.
- .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.
  - .4 Install in-use covers per manufacturer's instructions with cord openings at bottom.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 RELATED REQUIREMENTS**

- .1 Section 26 24 17 – Panelboards Breaker Type.

**1.2 REFERENCES**

- .1 Canadian Standards Association (CSA International):
  - .1 CSA-C22.2 No. 5-02, Moulded-Case Circuit Breakers, Moulded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, tenth edition, and the second edition of NMX-J-266-ANCE).

**1.3 SHOP DRAWINGS AND PRODUCT DATA**

- .1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Include time-current characteristic curves for breakers with ampacity of 400A and over.

**1.4 OPERATION AND MAINTENANCE DATA**

- .1 Provide operation and maintenance data for circuit breakers for incorporation into manual in accordance with Section 01 33 00 - Submittal Procedures.

**PART 2 PRODUCTS**

**2.1 BREAKERS GENERAL**

- .1 Breakers installed in existing panelboards shall match manufacturer, existing breaker type. Submit manufacturer's letter of authenticity upon request by Consultant.
- .2 Bolt-on moulded case circuit breaker: quick- make, quick-break type, for manual and automatic operation with temperature compensation for 40C. 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. 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 minimum 10 kA symmetrical RMS interrupting.
- .7 Ground fault interrupting capability (5 mA maximum) where indicated.

**2.2 THERMAL MAGNETIC BREAKER (DESIGN A)**

- .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.

**PART 3        EXECUTION**

**3.1            INSTALLATION**

- .1        Install circuit breakers as indicated.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 REFERENCES**

- .1 Canadian Standards Association (CSA)
  - .1 C22.2 No. 9.0-96 (R2011), General Requirements for Luminaires.
  - .2 C866-12, Performance of LED luminaires.

**1.2 SHOP DRAWINGS AND PRODUCT DATA**

- .1 Submit shop drawings and complete product data in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop drawings to include electrical characteristics and system wattages.
- .3 Shop drawings to include installation instructions.
- .4 Submit complete photometric data prepared by independent testing laboratory for luminaires.

**1.3 OPERATION AND MAINTENANCE DATA**

- .1 Provide operation and maintenance data for incorporation into manual in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Include:
  - .1 Operation and maintenance data for all luminaires to permit effective operation and maintenance.
  - .2 Technical data – illustrated parts list with catalog numbers.
  - .3 Copy of approved shop drawings.

**PART 2 PRODUCTS**

**2.1 GENERAL**

- .1 Contractor is responsible for providing controls which are compatible with switching functions and luminaires as indicated.

**2.2 LUMINAIRES**

- .1 Type "A" – Up-light wall task light
  - .1 120V, two (2) BR30 LED lamps, 3500K. Lamps: Sylvania, GE, Philips.
  - .2 Two lamp holder utility task light, weatherproof, die cast aluminum, finish to be selected by consultant from manufacturers complete colour range.
  - .3 Acceptable Material: Crouse-Hinds TP7332, approved alternates by Thomas & Betts, Ipex.
- .2 Type "B" – Wall sconce
  - .1 LED, 120V, 10W, nominal 530 lumens, <80CRI, 3500K
  - .2 5" round, 2.5" deep wall sconce made from marine grade die-cast aluminum c/w integral heat sink, high impact resistant, injection molded polycarbonate lens and eyelid. Fixture is IP65 rated and finish to be selected from manufacturers complete colour range or match colour selected by consultant.
  - .3 Acceptable Material: FC Lighting FCW3042-120-LED-35K-530, approved alternates by Lithonia Lighting, Eaton Lighting.
- .3 Type "B1" – Wall sconce

- .1 LED , 120V, 43W, nominal 2100lumens, <80CRI, 3500K
- .2 10" round, 4" deep wall sconce made from marine grade die-cast aluminum c/w integral heat sink, high impact resistant, injection molded polycarbonate lens and eyelid. Fixture is IP65 rated and finish to be selected from manufacturers complete colour range or match colour selected by consultant.
- .3 Acceptable Material: FC Lighting FCW3052-120V-LED-35K-2100, approved alternates by Lithonia Lighting, Eaton Lighting
- .4 Type "C" – Ceiling mount pendant
  - .1 LED, 120V, 24W, nominal 1500 lumens, <80CRI, 3500K
  - .2 16" round frosted acrylic lenses pendant suspended by solid stem. Confirm stem length on site prior to ordering. Finish to be selected from manufacturers complete colour range or match colour selected by consultant.
  - .3 Acceptable Material: Senso Lighting #716-83-3500-951-03-STD-120, approved alternates by Lithonia Lighting, Phillips Lighting
- .5 Type "D" – Ceiling surface mounted
  - .1 LED , 120V, 26W, ~2600lumens, <80CRI, 3500K
  - .2 10" round, 4" deep surface mounted fixture made from marine grade die-cast aluminum c/w integral heat sink, high impact resistant, injection molded polycarbonate lens. Fixture is IP65 rated and finish to be selected from manufacturers complete colour range or match colour selected by consultant.
  - .3 Acceptable Material: FC Lighting FCW3060-120-35k-2600, approved alternates by Lithonia Lighting, Eaton Lighting

### **PART 3 EXECUTION**

#### **3.1 INSTALLATION**

- .1 Locate and install luminaires complete with accessories as indicated.

#### **3.2 WIRING**

- .1 Connect luminaires to lighting circuits as indicated.

#### **3.3 LUMINAIRE SUPPORTS**

- .1 For suspended ceiling installations support luminaires from ceiling grid in accordance with local inspection requirements.

#### **3.4 LUMINAIRE ALIGNMENT**

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

**END OF SECTION**

**PART 1 GENERAL**

**1.1 REFERENCES**

- .1 Canadian Standards Association (CSA International).
  - .1 CSA C22.2 No.141-M1985(R1999), Unit Equipment for Emergency Lighting.

**1.2 SHOP DRAWINGS AND PRODUCT DATA**

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

**1.3 OPERATION AND MAINTENANCE DATA**

- .1 Provide operation and maintenance data for emergency lighting equipment for incorporation into manual in accordance with Section 01 33 00 - Submittal Procedures.

**2 Products**

**2.1 EMERGENCY LIGHTING UNITS**

- .1 Emergency lighting equipment to CSA C22.2 No 141.
- .2 Supply voltage: 120 VAC..
- .3 Battery Pack: Lead-acid, sealed, maintenance free, 30-minute run time nominal load (up to 1 hour run time with heads as indicated).
- .4 Charger: Solid state, multi-rate, voltage/current regulated, inverse temperature compensated, short circuit protected with regulated output.
- .5 Solid state transfer circuit.
- .6 Diagnostic LED indicator lights, integrated test switch.
- .7 Remote Lamp heads: Two head remotes, 12V, 5 watt, LED MR16 lamps, integral on unit, horizontal and vertical adjustment without the use of tools. Colour to be determined with shop drawing review.
- .8 Battery Cabinet: Heavy duty steel, suitable for direct mounting to wall and c/w knockouts for conduit. Removable or hinged front panel for easy access to batteries. Colour white.
- .9 Acceptable manufacturer or approved equal:
  - .1 Lumacell catalogue number Signature Series Collection DR2130MR16

**3 Execution**

**3.1 INSTALLATION**

- .1 Connect fixtures to lighting circuits as indicated.
- .2 Install battery pack as indicated.
- .3 Direct heads as required and test battery and units.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 REFERENCES**

- .1 CSA C22.2 No.141-02, Unit Equipment for Emergency Lighting.
- .2 CSA C860-01(December 2002), Performance of Internally-Lighted Exit Signs.

**1.2 SHOP DRAWINGS AND PRODUCT DATA**

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

**1.3 OPERATION AND MAINTENANCE DATA**

- .1 Provide operation and maintenance data for emergency lighting equipment for incorporation into manual in accordance with Section 01 33 00 - Submittal Procedures.

**2 Products**

**2.1 PICTOGRAM EXIT SIGNS**

- .1 Edge lit "Running Man" exit signs to CSA C22.2 No 141.
  - .1 White powdercoat finish steel housing, universal mounting. Finish colour to be confirmed with shop drawing review.
  - .2 120 volt, LED light source, 90 minute Ni-CAD battery.
  - .3 Solid state transfer and charger.
  - .4 Standard of acceptance: Aimlite catalogue number RPDBWHT-BAT.

**3 Execution**

**3.1 INSTALLATION**

- .1 Connect fixtures to exit light circuits.
- .2 Ensure that exit light circuit breaker is locked in ON position.
- .3 Test battery operation.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 RELATED SECTIONS**

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 78 00 - Closeout Submittals.

**1.2 REFERENCES**

- .1 Canadian Standards Association (CSA International)
  - .1 CSA C22.2 No.46-M1988 (R2006), Electric Air-Heaters.

**1.3 SHOP DRAWINGS AND PRODUCT DATA**

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

**1.4 OPERATION AND MAINTENANCE DATA**

- .1 Provide operation and maintenance data for exit signage for incorporation into manual in accordance with Section 01 33 00 - Submittal Procedures.

**PART 2 PRODUCTS**

**2.1 BASEBOARD HEATER (H-1)**

- .1 208 volt, 2000 watt, low profile, full length wirewayHeavy duty, white epoxy-polyester powdercoat housing. Nominal size 78mm (D) x 160mm (H) x 1524mm (L).
- .2 Controls:
  - .1 Built-in thermostat
- .3 Standard of Acceptance: Stelpro SBB602008, SBBT1.
- .4 Acceptable manufacturers:
  - .1 Stelpro
  - .2 Dimplex
  - .3 Ouellet

**PART 3 EXECUTION**

**3.1 INSTALLATION**

- .1 Install heaters plumb and true with building lines in wall as indicated and make power connections.

**END OF SECTION**