

PART 1 - GENERAL

1.1 General

- .1 Include in electrical section, provision of labour, new materials, tools, transportation, services and facilities for a complete electrical installation. The installation shall be left complete in all respects and ready for operation to the complete satisfaction of the responsible Professional Engineer.

- .2 The electrical scope of work includes, but is not necessarily limited to the following provisions:
 - .1 Provision of power to feed a new electrical panel in the Control Room from the electrical service in the adjacent Rawinsonde building, including trenching.
 - .2 Provision of lighting associated switching and branch circuitry. (See Luminaire Schedule for details).
 - .3 Provision of code conforming exit signage and emergency lighting fed from emergency battery bank circuits.
 - .4 Provision of receptacles and branch circuitry as indicated on the drawings and as per code.
 - .5 Provision of power supply to all mechanical equipment. Mechanical equipment to be supplied by others. (See Motor Schedule and Mechanical drawings for details).
 - .6 Provision of uninterruptible power supply (UPS) and power connections to owners equipment including Hogen.
 - .7 Provide electrical demolition as required to completely remove all existing electrical systems, equipment and associated wiring and raceways at the project site and building.
 - .8 Provision of electric baseboard heaters.
 - .9 Provision of bounding grid and system.
 - .10 Provision of explosion-proof heat tracing of piping system.
 - .11 Provision of removal of fire alarm ultra-violet/infra-red detector, and addition of auxiliary monitoring of the control system for the control system UV/IR detectors connected to the fire alarm panel in the adjacent Rawinsonde building.

END

PART 1 - GENERAL

1.1 Codes and Standards

- .1 Do complete installation in accordance with CSA C22.1-2012 as amended by the Alberta Building Code, except where specified otherwise.
- .2 Comply with CSA Electrical Bulletins in force at time of tender submission, while not identified and specified by number in this Division, are to be considered as forming part of related CSA Part II standard.
- .3 Do overhead and underground systems in accordance with CSA C22.3No.1-M1979 except where specified otherwise.
- .4 Do complete installation in accordance with latest Electrical Bulletins of the local inspection authority.
- .5 Abbreviations for electrical terms: to CSA Z85-1963.

1.2 Permits, Fees

- .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.

1.3 Shop Drawings, Product Data and Samples

- .1 Submit shop drawings, product data and samples in accordance with Section 0133 00 - Submittal Procedures.
- .2 Indicate details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment or material.
- .3 Where applicable, include wiring, single line and schematic diagrams.
- .4 Include wiring drawings or diagrams showing interconnection with work of other Sections and Divisions.
- .5 Include shop drawings for all electrical items and equipment including wiring devices, motor starters, distribution equipment, luminaires, etc.

1.4 Operation and Maintenance Data

- .1 Provide operation and maintenance data for incorporation into maintenance manual specified in Section 01 78 00 - Closeout Submittals.
- .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.
- .3 O & M manuals to be provided in hard copy and electronic "PDF" format

1.5 Maintenance Materials

- .1 Provide maintenance materials in accordance with Section 01 78 00 – Closeout Submittals.

1.6 Care, Operation and Start-up

- .1 Instruct operating personnel in the operation, care and maintenance of equipment
- .2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components.
- .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

1.7 Voltage Ratings

- .1 Operating voltages: to CSA C235-1969(R1979).
- .2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.
- .3 Where appliances such as stoves are supplied by other sections, advise the General Contractor in writing of the voltage at the outlet.

1.8 Inspection

- .1 Furnish a Certificate of Acceptance from Inspection Department on completion of work.

1.9 Materials and Equipment

- .1 Shall be new and CSA or ULC approved
- .2 Shall be manufactured in accordance with current CEMA, NEMA, or CSA standards
- .3 Bidders shall submit a quotation only on the material and equipment specified and as shown on the drawings.
- .4 No lot pricing shall be allowed. Distributors submitting prices to Electrical Contractors shall not group products and materials.
- .5 Requests for approval of material and equipment, other than those specified on the drawings, shall be submitted not later than seven working days before the close of tender. Requests for approval shall be submitted with complete details of the construction and performance of the materials and equipment. Requests submitted without sufficient supporting information shall be rejected.
- .6 Materials and equipment of the same classification, type of function, shall be provided by the same manufacturer.

1.10 Electric Motors, Equipment and Controls

- .1 Supplier and installer responsibility is indicated in Motor, Control and Equipment Schedule on electrical drawings and related mechanical responsibility is indicated on Mechanical Equipment Schedule on mechanical drawings.
- .2 Control wiring and conduit is specified in Division 26 except for conduit, wiring and connections below 50 V which are related to control systems specified in Division 23 and shown on mechanical drawings.

1.11 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 outdoor electrical equipment "equipment green" finish to EEMAC Y1-1-1955.
 - .2 Paint indoor switchgear and distribution enclosures light grey to EEMAC 2Y-1-1958.
- .2 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
- .3 Clean, prime and paint exposed hangers, racks, fastenings to prevent rusting.

1.12 Equipment Identification

- .1 Identify electrical equipment with nameplates and labels as follows:
- .2 Nameplates:
 - .1 Lamacoid 5mm thick plastic engraving sheet, black face, white core, mechanically attached unless specified otherwise

NAMEPLATE SIZES

Size 1	13	x	38	mm	1 line 3mm high letters
Size 2	13	x	51	mm	1 line 5mm high letters
Size 3	13	x	51	mm	2 lines 3mm high letters
Size 4	19	x	76	mm	1 line 8mm high letters
Size 5	19	x	76	mm	2 lines 3mm high letters
Size 6	25	x	102	mm	1 line 13mm high letters
Size 7	25	x	102	mm	2 lines 6mm high letters

- .3 No lot pricing shall be allowed. Distributors submitting prices to Electrical Contractors shall not group products and materials.
- .4 Allow for average of twenty-five (25) letters per nameplate.
- .5 Identification to be English
- .6 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .7 Identify all electrical equipment such as motor starters, panelboards, distributions, distribution circuit breakers with nameplates.

1.13 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 code: to CSA C22.1.
- .4 Use colour coded wires in communication cables, matched throughout system.
- .5 Identify all underground wiring with Brady Identoline underground warning tape. Installation to be as per manufacturers typical installation procedure.

1.14 Conduit and Cable Identification

- .1 Colour code conduits 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 to be 1 inch wide prime colour and 19mm wide auxiliary colour.

	<u>Prime</u>	<u>Auxiliary</u>
up to 250 V	yellow	
up to 600 V	yellow	green
up to 5 kV	yellow	blue
up to 15 kV	yellow	red
Telephone	green	
Lighting	green	blue
Fire alarm	red	
Emergency voice	red	blue
Other systems	red	yellow

1.15 Wiring Terminations

- .1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.

1.16 Manufacturers and CSA labels

- .1 Manufacturers nameplates and CSA labels to be visible and legible after equipment is installed.

1.17 Warning Signs

- .1 Provide warning signs, as specified or to meet requirements of Inspection Department and Engineer.

1.18 Wiring Identification

- .1 Make all necessary adjustments after interior finishes are completed.
- .2 Do not install outlets back-to-back in wall; allow minimum 150mm horizontal clearance between boxes.
- .3 Change location of outlets at no extra cost or credit, providing distance does not exceed 3m, and information is given before installation.
- .4 Locate light switches on latch side of doors. Locate disconnect devices in mechanical rooms on latch side of door. Confirm direction of door swing on Architectural drawings prior to installation.

1.19 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 indicated verify before proceeding with installation.
- .3 Confirm luminaire locations with Architect prior to rough-in.
- .4 Install electrical equipment at the following heights unless indicated otherwise.
 - .1 Local switches: 1200mm
 - .2 Wall receptacles:
 - .1 General: 300mm.
 - .2 Above top of continuous baseboard heater: 200mm.
 - .3 Above top of counters or splash back: 200mm.
 - .4 In mechanical rooms: 1400mm
 - .3 Panelboards: 1200mm or as required by Code.
 - .4 Telephone outlets: 300mm
 - .5 Wall mounted telephone outlets: 1400mm
 - .6 Fire alarm stations: 1200mm
 - .7 Fire alarm audible devices: 2000mm
 - .8 In accordance with accessibility guidelines.

1.20 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.

1.21 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, a report listing phase and neutral currents on panelboards, operating under normal load. State hour and date on which each load was measured, and voltage at time of test.

1.22 Conduit and Cable Installation

- .1 Install conduit, and sleeves, prior to pouring of concrete. Sleeves through concrete: metal, sized for free passage of conduit, and protruding 52mm.
- .2 Install cables, conduits, and fittings to be embedded or plastered over, neatly and close to building structure so furring can be kept to minimum.
- .3 All penetrations through exterior walls are to be made water and weatherproof.

1.23 Fireproofing

- .1 Where cables or conduits pass through floors and fire rated walls, complete integrity of wall type to the satisfaction of the Engineer and local inspection authority.
- .2 All emergency feeders and control wires to be 2 hour rated via use of mineral insulated cables or equivalent fireguard application by electrical section.

1.24 Tests

- .1 Conduct and pay for tests of the following:
 - .1 Power 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.
- .5 Systems: fire alarm system.
- .6 Emergency power system UPS.
- .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 Carry out tests in presence of Engineer.
- .4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
- .5 Submit test results.

1.25 Insulation Resistance Testing

- .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
- .2 Check resistance to ground before energizing.

1.26 Co-ordination of Protective Devices

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

1.27 Cleaning

- .1 Clean all outlets, cabinets, enclosures, tubs and similar electrical equipment of all construction dust and dirt.
- .2 At time of final cleaning, clean lighting reflectors, lenses, and other lighting surfaces that have been exposed to construction dust and dirt.
- .3 Clean all coverplates and insure all paint is removed from wiring devices, panels, luminaires and other electrical equipment.

1.28 Excavation and Backfilling

- .1 Ensure that excavation for underground electrical services is in location and at depth indicated. Electrical contractor to directly supervise excavation and backfilling.
- .2 All work to be accordance with CSA-22.1 Section 12.

1.29 Guarantee

- .1 The Electrical Contractor shall guarantee the satisfactory operation of all work and apparatus included and installed under this section of the specification.
- .2 Replace forthwith at no additional material, or labour cost any part which may fail or prove defective within a period of twelve (12) calendar months after the final acceptance of the complete building, provided that such failure is not due to improper usage, or ordinary wear and tear.
- .3 No certificate given payment made, partial or entire use of the equipment by the Owner, shall be construed as acceptance of defective work.
- .4 This general guarantee shall not act as a waiver of any specified guarantee for any greater length of time.

1.30 Cutting and patching

- .1 Pay all costs for cutting and patching required for the installation of electrical work.
- .2 Assume full responsibility for laying out electrical work and for any damage caused by incorrectly located equipment or improper performance of this work.
- .3 Study the architectural plans and co-operate with other trades so that the elevation of all outlets shall not necessitate any unnecessary cutting of dados, mirrors, tiles or other construction material. If this is not done, the Electrical Contractor may be required by the Engineer to move these outlets at no additional cost to the Owner (including repair).

1.31 Co-operation

- .1 Schedule execution of work with associated work specified in other Divisions. Check shop drawings of other sections prior to electrical rough-in to co-ordinate physical and

electrical requirements. Adjust as required.

1.32 Spare Materials

- .1 Provide the following spare parts:
 - .1 Lighting, 5% of all lamps.
 - .2 Exit Signage/Emergency Lighting, 2 double remote heads
 - .3 Other spare parts as noted in individual sections.

1.33 Drawings

- .1 Carefully examine all drawings and specifications relating to the work to be certain that the work under this contract can be satisfactorily carried out and prior to submission of tender, examine the work of the other trades and report at once to the Engineer, any defect, discrepancy, omission or interference affecting the work of section or the warranty of same.
- .2 The drawings accompanying these specifications are intended to show the general arrangement and extent of the work to be done, but the exact location and arrangement of all parts shall be determined as the work progresses. The location of the outlets, equipment, etc. as given on the drawings are approximately correct but it shall be understood that they are subject to such modifications as may be found necessary or desirable at the time of installation to meet any structural, mechanical or architectural conditions. Such changes shall be made by the Electrical Contractor, as directed by the Engineer without additional charge.
- .3 At completion of project, provide a complete print of revisions, changes and conduit location as-built drawings to the satisfaction of the responsible Professional Engineer. Provide electronic AutoCAD ".dwg" format files of all changes, revisions, and conduit layouts suitable for printing drawing size reproductions of electrical drawings. Engineer will provide electronic copies of original electrical drawings.

END

PART 1 - GENERAL

1.1 Related Work

- .1 Wire and Cable: Section 26 05 21
- .2 Outlet Boxes: Section 26 05 32

PART 2 - PRODUCTS

2.1 Materials

- .1 Connectors complete with locking bushings for armoured cable.
- .2 Aluminum "wet" type or "dry" type for aluminum sheathed cable depending on application.
- .3 Wet type connectors for sealtite flexible conduit.
- .4 Hazardous areas shall have connectors matching Class and Zone of area as identified.

PART 3 - EXECUTION

3.1 Installation

- .1 Remove insulation carefully from ends of conductors and:
 - .1 Install connector in box.
 - .2 Install conductor in connector and tighten. Complete joints inside box using Marrette type connectors.

END

PART 1 - GENERAL

1.1 Related Work Specified elsewhere

- .1 Conduit: Section 26 05 34

PART 2 - PRODUCTS

2.1 Materials

- .1 Conductors: stranded for 8 AWG and larger.
- .2 Copper conductors sized as indicated with minimum size to be #12 AWG rated R90: to CAN/CSA-C22.2 No. 0.3-M96.
- .3 Copper conductors with minimum size #18 AWG for fire alarm initiating circuits only.

2.2 Armoured Cables

- .1 Insulated conductors copper, sizes as indicated.
- .2 Type AC90: to CSA C22.2 No.51.
- .3 Armour: interlocking type fabricated from aluminum strip.
- .4 Minimum size: 12 AWG

2.3 Aluminum Sheathed Cable

- .1 Conductors: copper sized as indicated.
- .2 Insulation: type RA90 rated 90 °C at 600 V.
- .3 Sheath: aluminum applied to form continuous corrugated seamed sheath.
- .4 Outer jacket of pvc applied over sheath for direct burial and wet locations.

2.4 Fire Alarm Cable in Conduit

- .1 Conductors: copper sized as indicated.
- .2 Insulation: 105°C, Fire Alarm & Signals Cable (FAS), FT4 rated.
- .3 Rating: 300V.
- .4 Armour: unarmoured in conduit.
- .5 Provide all wiring according to manufacturer's recommendations.

2.5 Fastenings

- .1 Two hole aluminum straps to secure surface cables.
- .2 Channel type supports for two or more conductors.
- .3 6 mm diameter threaded rods to support suspended channels.

PART 3 - EXECUTION

3.1 Installation

- .1 In conduit systems in accordance with Section 26 05 34.
- .2 Armoured Cables shall be installed only where permitted in lieu of flexible conduit as indicated in Section 26 05 34.
- .3 Armoured cable shall not be surface run.
- .4 Home runs to panelboards shall not be armoured cable.
- .5 Group aluminum sheathed cables wherever possible on channels.
- .6 Terminate cables in accordance with manufacturers' instructions and to the satisfaction of the local inspection authority.
- .7 Hazardous area wiring shall match Class and Zone identified.

3.2 Wire Size Schedule

- .1 Fire Alarm System Circuits: Initiating, IDC (conventional) conductor: No. 14 AWG minimum and in accordance with manufacturer's recommendations.

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- .2 Power Circuits: No. 12 AWG minimum, except as follows:
- .1 No. 10 AWG for 15 A, 120 V circuits longer than 23 m.
 - .2 No. 8 AWG for 15 A, 120 V circuits longer than 45 m.

3.3 Wiring. Fire Alarm

- .1 Make conductor terminations in panel on terminal strips with separate terminal for each conductor.
- .2 Neatly install wiring clamped with nylon cable straps or laced with jute cord.
- .3 Number identify all strips as indicated on shop drawings.
- .4 All conductors shall be identified with circuit number at both ends.
- .5 Attach wiring diagram to inside of panel door.

END

PART 1 - GENERAL

1.1 Related Sections

- .1 Section 26 05 01 - Common Work Results - Electrical.

1.2 References

- .1 Institute of Electrical and Electronics Engineers (IEEE) 515.1, Standard for Testing, Design, Installation, and Maintenance of Electrical Resistance Trace Heating for Commercial Applications.
- .2 CSA C22.2 No. 130.2, Heat Cable Systems for Use in Other Than Industrial Establishments.

PART 2 - PRODUCTS

2.1 Heat Trace Cable

- .1 Type: self-regulating.
- .2 Application: pipe freeze protection.
 - .1 Pipe types: metallic, coordinate with other divisions for exact piping dimensions.
- .3 Watt Density: as indicated on drawings.
- .4 Supply Voltage: as indicated on drawings.
- .5 Rating: Hazardous Location Class I, Zone 1, Group IIC.
- .6 Accessories: all required power connections, terminations, splices, tie wraps, clips, hangers and supports as required for a complete and operational system.
- .7 Controls: weather-proof pipewall sensing thermostat, and any required mechanical contactors.
- .8 Manufacturers: Chromalox or approved equal.

PART 3 - EXECUTION

3.1 Installation

- .1 Install system in accordance with manufacturer's requirements.
- .2 External AC Power Source:
 - .1 Provide Ground Fault Interrupting (GFI) circuit protection.

END

PART 1 - GENERAL

PART 2 - PRODUCTS

2.1 Materials

- .1 Grounding equipment to: CSA C22.2No.4
- .2 Copper grounding conductors: ASA G7.1

2.2 Equipment

- .1 Clamps for grounding of conductor, size as required to electrically conductive ground rods as required by inspection authority.
- .2 System and circuit, equipment, grounding conductors, bare stranded copper, soft annealed, size as required (minimum 2/0).
- .3 Insulated grounding conductors to Section. 26 05 21.
- .4 Non-corroding accessories necessary for grounding systems, type, size, material as required, including but not necessarily limited to:
 - .1 Grounding and bonding bushings.
 - .2 Compression type conductor connectors.
 - .3 Bonding jumpers, straps.
 - .4 Ground Bars: solid copper, pre-drilled from two-hole lug connections with a minimum thickness of ¼ inch for wall mounting using standard insulators.

2.3 Manufacturers

- .1 Acceptable manufacturers: Burndy

PART 3 - EXECUTION

3.1 Installation

- .1 Install complete permanent, continuous, system and circuit, equipment, grounding systems including, electrodes, conductors, connectors, accessories, as indicated, to conform to requirements of Engineer and local authority having jurisdiction over installation. Where EMT is used, run ground wire in conduit.
- .2 Install connectors to manufacturer's instructions.
- .3 Protect exposed grounding conductors from mechanical injury.
- .4 Make buried connections, and connections to conductive water main, electrodes, using compression type connectors.
- .5 Use mechanical connectors for grounding connections to equipment provided with lugs.
- .6 Soldered joints not permitted.
- .7 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.
- .8 Route all ground conductors back to existing main building ground.

3.2 Electrodes

- .1 Install rods as required by local inspection authority. Provide all grounding as per local inspection authority requirements.

3.3 Tests

- .1 Perform tests in accordance with Section 260501.
- .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.
- .3 Perform tests before energizing electrical system.
- .4 Disconnect ground fault indicator during tests.

END

PART 1 - GENERAL

1.1 Related Work

- .1 General Provisions: Section 26 05 01

PART 2 - PRODUCTS

2.1 Support Channels

- .1 U shape, size 38mm x 38mm, 25mm thick, surface mounted, suspended, set in poured concrete walls and ceilings as required.

2.2 Manufacturers

- .1 Acceptable manufacturers: Burndy, Electrovert, Unistrut

2.3 Fastenings

- .1 Lead anchors or nylon shields to secure equipment and conduit straps.

PART 3 - EXECUTION

3.1 Installation

- .1 Secure fastenings and supports as required for each type of equipment, cables and conduits and to manufacturers 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 260501.

PART 2 - PRODUCTS

2.1 Splitters

- .1 Sheet metal enclosure, welded corners and formed hinged cover suitable for locking in closed position.
- .2 Main and branch lugs to match required size and number of incoming and outgoing conductors as indicated.
- .3 At least three spare terminals on each set of lugs in splitters less than 400 A.
- .4 Where used as weatherproof transformer tap boxes, to be approved by Engineer prior to ordering. Manco or Ace type shall be used.

2.2 Junction and Pull Boxes

- .1 Welded steel construction with screw-on flat covers for surface mounting.
- .2 Covers with 25mm minimum extension all around, for flush-mounted pull and junction boxes.
- .3 Provide cast junction boxes for all exterior/weatherproof installations.
- .4 Explosion proof type boxes in hazardous locations matching Class and Zone identified.

PART 3 - EXECUTION

3.1 Splitter Installation

- .1 Install splitters as indicated and mount plumb, true and square to the building lines.
- .2 Extend splitters full length of equipment arrangement except where indicated otherwise.
- .3 Where required, shall be mounted on concrete base supplied by General contractor complete with two piles.

3.2 Junction, Pull Boxes and Cabinets Installation

- .1 Install pull boxes in inconspicuous but accessible locations.
- .2 Mount cabinets with top not higher than 1830mm above finished floor.
- .3 Provide pull boxes so as not to exceed 30m of conduit run between pull boxes.

3.3 Identification

- .1 Install size 2 identification labels indicating system name voltage and phase in accordance with Section 26 05 01.

PART 1 - GENERAL

1.1 Related Work

- .1 Box connectors: section 26 05 20

PART 2 - PRODUCTS

2.1 Outlet and Conduit Boxes General

- .1 Size boxes in accordance with CSA C22.1, Section 12.
- .2 100mm 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.

2.2 Sheet Steel Outlet Boxes

- .1 Electro-galvanized steel single and multi gang flush device boxes for flush installation, minimum size 75mm x 50mm x 38mm or as required. 100mm 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 100mm x 50mm x 50mm.
- .3 100mm square or octagonal outlet boxes for lighting fixture outlets.
- .4 100mm 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 Concrete Boxes

- .1 Electro-glvanized sheet steel concrete type boxes for flush mount in concrete with matching extension and plaster rings as required.

2.5 Conduit Boxes

- .1 Cast FS boxes with factory-threaded hubs and mounting feet for surface wiring of switches and receptacle in exterior or wet or Class 1 areas.

2.6 Fittings- General

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

2.7 Outlet Boxes - Explosion Proof Type

- .1 In hazardous locations all boxes shall match Class and Zone identified.

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 construction material.

- .3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6mm of opening.
- .4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Reducing washers not allowed.
- .5 Use of boxes with built-in connectors is not permitted.
- .6 Use of sectional boxes is not permitted.

END

PART 1 - GENERAL

1.1 Location of Conduit

- .1 Drawings do not show all conduits. Those shown are in diagrammatic form only.

PART 2 - PRODUCTS

2.1 Conduits

- .1 Rigid galvanized steel threaded conduit: size as indicated or required; to CSA C22.2 No.45
- .2 Electrical metallic tubing (EMT), with couplings to CSA22.2 No.83
- .3 Rigid pvc conduit: size as indicated; to CSAC22.2 No.136.
- .4 Flexible metal conduit and liquid-tight flexible metal conduit: size as indicated; to CSAC22.2 No. 56.

2.2 Conduit Fastenings

- .1 One hole steel straps to secure surface conduits 53mm and smaller. Two hole steel straps for conduits larger than 53mm.
- .2 Beam clamps to secure conduits to exposed steel work.
- .3 Channel type supports for multiple conduits.
- .4 6mm dia. threaded rods to support suspended channels.

2.3 Conduit Fittings

- .1 Fittings manufactured for use with conduit specified.
- .2 Factory "ells" where 90° bends are required for 27mm and larger conduits.
- .3 For conduits penetrating hazardous locations, conduit fittings and seals shall be provided in accordance with Section 18 of the Canadian Electrical Code.

2.4 Firestop Systems

- .1 Submit shop drawings and product data in accordance with Section 26 05 01. Provide written confirmation that the manufacturer has tested the firestop system for prevention of gas leakage for air tightness in use to maintain vapour-tight walls.
- .2 Test Requirements: ULC-S115-M or CAN4-S115-M, "Standard Method of Fire Tests of Through Penetration Fire Stops".
- .3 For conduits penetrating between building interior non-hazardous and hazardous locations through vapour-tight walls, the penetration shall be done using a system that provides an equal level of sealing protection as the vapour-tight wall.
- .4 Ensure that integrity of the fire rated element is maintained, with a rating of "FT".
- .5 Firestop systems are to be tested to ASTM E-814 criteria.
- .6 Acceptable manufacturers: Hilti or approved equal.

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 or as otherwise noted.
- .3 Use rigid galvanized steel threaded conduit in Class I, Zone 1 and Zone 2 areas and where otherwise noted.
- .4 Use electrical metallic tubing (EMT) unless otherwise noted.
- .5 Use rigid pvc conduit underground, unless otherwise prohibited or noted.
- .6 Use flexible metal conduit or AC90 for connection to motors in dry areas, connection to recessed incandescent fixtures without a prewired outlet box, connection to surface or recessed fluorescent fixtures, work in movable metal partitions.
- .7 Use liquidtight flexible metal conduit for connection to motors in damp or wet locations.

- .8 Use explosion proof flexible connection for connection to explosion proof motors.
- .9 Install conduit sealing fittings in hazardous areas. Fill with firestop system according to manufacturer's instructions.
- .10 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .11 Mechanically bend steel conduit over 21mm dia.
- .12 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
- .13 Install polypropylene fish cord in empty conduits.
- .14 Where conduits become blocked, remove and replace blocked section.
- .15 Dry conduits out before installing wire.
- .16 Minimum conduit size to be 21mm.

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

3.3 Concealed Conduits

- .1 Do not install horizontal runs in masonry walls.
- .2 Do not install conduits in terrazo or concrete toppings.

3.4 Conduits in Poured 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.
- .6 Co-ordinate electrical work and requirements in poured construction with General Contractor and insure installation is complete prior to pour.

3.5 Conduits in Poured Slabs on Grade

- .1 Run conduits 27mm and larger below slab and encased in 78mm concrete envelope. Provide 53mm of sand over concrete envelope below floor slab.

3.6 Conduits Underground

- .1 Slope conduits to provide drainage.
- .2 Waterproof joints (pvc excepted) with a heavy coat of bituminous paint.

PART 1 - GENERAL

1.1 Section Includes

- .1 Materials and installation for standard and custom breaker type panelboards.

1.2 Related Work

- .1 Moulded Case Circuit Breakers: Section 26 28 21.

1.3 References

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

1.4 Shop Drawings and Product Data

- .1 Submit shop drawings and product data in accordance with Section 26 05 01.
- .2 Drawings to include electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimension.

PART 2 - PRODUCTS

2.1 Panelboards

- .1 Panelboards: to CSA C22.2No.29 and product of one manufacturer.
 - .1 Install circuit breakers in panelboards before shipment.
 - .2 In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.
- .2 250 V panelboards: bus and breakers rated for (symmetrical) interrupting capacity as indicated on drawings.
- .3 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.
- .4 Panelboards: mains, number of circuits, and number and size of branch circuit breakers as indicated.
- .5 Two keys for each panelboard and key panelboards alike.
- .6 Copper bus with neutral of same ampere rating as mains.
- .7 Mains: suitable for bolt-on breakers.
- .8 Trim with concealed front bolts and hinges.
- .9 Trim and door finish: baked grey enamel.

2.2 Breakers

- .1 Breakers: to Section 26 28 21 - Moulded Case Circuit Breakers.
- .2 Breakers with thermal and magnetic tripping in panelboards except as indicated otherwise.
- .3 Main breaker: separately mounted on top or bottom of panel to suit cable entry. When mounted vertically, down position should open breaker.

2.3 Equipment Identification

- .1 Provide equipment identification in accordance with Section 26 05 01 – Electrical General Provisions.
- .2 Nameplate for each panelboard size 4 engraved.
- .3 Complete circuit directory with typewritten legend showing location and load of each circuit.

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.
 - .3 Mount panelboards to height specified in Section 26 05 01 - Electrical General Provisions or as indicated.
 - .4 Connect loads to circuits.
 - .5 Connect neutral conductors to common neutral bus.

END

PART 1 - GENERAL

1.1 Shop Drawings and Product Data

- .1 Submit shop drawings and product data in accordance with Section 26 05 01.

PART 2 - PRODUCTS

2.1 Switches

- .1 15 A, 120 V, single pole, double pole, three-way, four-way switches as indicated.
- .2 Manually-operated general purpose ac switches as indicated and with following features:
 - .1 Terminal holes approved for No. 10 AWG wire.
 - .2 Silver alloy contacts.
 - .3 Urea or melamine molding for parts subject to carbon tracking.
 - .4 Suitable for back and side wiring.
 - .5 White toggle.
- .3 Toggle operated fully rated for tungsten filament and fluorescent lamps, and up to 80% of rated capacity of motor loads.
- .4 Switches of one manufacturer throughout project.
- .5 Devices to be specification grade.
- .6 Acceptable manufacturers: Arrow Hart, Bryant, Hubbell, Smith and Stone, Leviton 1200 series.

2.2 Receptacles

- .1 Duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, with following features:
 - .1 White urea molded housing.
 - .2 Suitable for No. 10 AWG for back and side wiring.
 - .3 Break-off links for use as split receptacles.
 - .4 Eight back wired entrances, four side wiring screws.
 - .5 Double wipe contacts and rivetted grounding contacts.
- .2 Other receptacles with ampacity and voltage as indicated.
- .3 Receptacles of one manufacturer throughout project.
- .4 Devices to be specification grade.
- .5 Acceptable manufacturers: Arrow Hart, Bryant, Hubbell, Eagle, Leviton 5262-S series.
- .6 Isolated ground receptacles to match above characteristics with the exception of the isolated ground feature. Colour to be orange.

2.3 Specialty Equipment

- .1 Complete installation shall be to the satisfaction of the Engineer.
- .2 Electrical sections shall wire and connect all specialty equipment as shown and/or required so as to leave all equipment in an operating condition to the satisfaction of the Engineer, the local inspection authority. Any equipment that is supplied with a cord and cap and is not deemed portable by the Engineer and shall be direct wired at no additional subsequent cost. Electrical section shall supply and install all disconnects and starters for equipment not supplied with same. Shop equipment to be connected via Cabtyre ceiling drop supported with Kellems grip. Ampacity and number of conductors of cord to match nameplate rating of equipment

2.4 Cover Plates

- .1 Provide cover plates for all wiring devices.
- .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 cover plates, thickness 3/16" for wiring devices mounted in a flush-mounted outlet box.

- .5 Weather proof double lift spring loaded cast aluminum cover plates, complete with gaskets for duplex receptacles as indicated.
- .6 Outlet boxes and coverplates located in hazardous area shall match Class and Zone identified.

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 specified in Section 26 05 01 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 specified in Section 26 05 01 or as indicated.
 - .3 Where split receptacle has one portion switched, mount vertically and switch upper portion.
 - .4 Install size 1 identification labels indicating circuit designation in accordance with Section 26 05 01.
- .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 Product Data

- .1 Submit product data in accordance with Section 26 05 01.

PART 2 - PRODUCTS

2.1 Breakers General

- .1 Bolt-on moulded case circuit breaker, quick- make, quick-break type, for manual and automatic operation.
- .2 Common-trip breakers with single handle for multipole applications.
- .3 Magnetic instantaneous trip elements in circuit breakers, to operate only when the value of current reaches setting.
- .4 Instantaneous interrupting capacity to be co-ordinated with available fault current.
- .5 Moulded case circuit breakers: to CSA C22. No. 5

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 under overload conditions and instantaneous magnetic tripping for short circuit protection.

2.3 Manufacturers

- .1 Acceptable manufacturers: to match existing equipment, and panel board manufacturers.

PART 3 - EXECUTION

3.1 Installation

- .1 Install circuit breakers as indicated.
- .2 Provide short circuit fault study with shop drawings. Study shall bear the seal of Engineer.
- .3 Coordinate short circuit interrupting capacity with the existing equipment. Provide written report and submit to engineer and power authorities.

PART 1 - GENERAL

1.1 Product Data

- .1 Submit product data in accordance with Section 26 05 01.

PART 2 - PRODUCTS

2.1 Equipment

- .1 Enclosed manual air break switches in non- hazardous locations: to CSA C22.2No.4-1974.
- .2 Fuseholder assemblies to CSA C22.2No.39-1972.
- .3 Fusible and non-fusible disconnect switch in CSA Enclosure 1.
- .4 Fusible and non-fusible disconnect switch in CSA Enclosure 3 if located on exterior of building.
- .5 Fusible and non-fusible disconnect switch to match hazardous location Class and Zone as identified.
- .6 Provision for padlocking.
- .7 Mechanically interlocked door to prevent opening when handle in ON position.
- .8 Fuses as required where indicated.
- .9 Fuseholders in each switch suitable without adaptors, for type of fuse as indicated.
- .10 Quick-make, quick-break action.
- .11 ON-OFF switch position indication on switch enclosure cover.

2.2 Equipment Identification

- .1 Indicate name of load controlled on size 4 nameplate to Section 26 05 01.

PART 3 - EXECUTION

3.1 Installation

- .1 Install disconnect switches complete with fuses as indicated.

END

PART 1 - GENERAL

1.1 Shop Drawings and Product Data

- .1 Submit shop drawings and product data in accordance with Section 26 05 01.
- .2 Indicate:
 - .1 Mounting method and dimensions.
 - .2 Starter size and type.
 - .3 Layout of identified internal and front panel components.
 - .4 Enclosure types.
 - .5 Wiring diagram for each type of starter.
 - .6 Interconnection diagrams

1.2 Operation and Maintenance Data

- .1 Provide data for incorporation into maintenance manuals.
- .2 Include operation and maintenance data for each type and style of starter.

PART 2 - PRODUCTS

2.1 Materials

- .1 Starters: to CSA C22.2No.14, EEMAC E14-1.
 - .1 Half size starters not acceptable.

2.2 Manual Motor Starters

- .1 Manual motor starters of size, type, rating, and enclosure type as indicated, with components as follows:
 - .1 Switching mechanism, quick make and break.
 - .2 Overload heaters, manual reset, trip indicating handle.
- .2 Accessories: Toggle switch: standard labeled as indicated.
 - .1 Indicating light: standard and color as indicated.
 - .2 Locking tab to permit padlocking in "ON" or "OFF" position.

2.3 Full Voltage Magnetic Starters

- .1 Combination magnetic starters of size, type, rating and enclosure type as indicated with components as follows:
 - .1 Contactor solenoid operated, rapid action type.
 - .2 Motor overload protective device in each phase, manually reset from outside enclosure.
 - .3 Power and control terminals.
 - .4 Wiring and schematic diagram inside starter enclosure in visible location
 - .5 Identify each wire and terminal for external connections, within starter, with permanent number marking identical to diagram.
 - .6 Two spare auxilliary contacts.
 - .7 Provide HOA or ON-OFF switches as required and pilot lights.
 - .8 Complete with control transformer and fusing.

2.4 Identification

- 1. Install size 2 identification labels indicating system name voltage and phase in accordance with Section 26 05 01.

2.5 Manufacturers

- .1 Acceptable manufacturers are: Eaton, Allen Bradley, Siemens, Square D, General Electric.

PART 3 - EXECUTION

3.1 Installation

- .1 Install starters, connect power and control as indicated.

-
- .2 Ensure correct fuses and overload devices elements installed.

3.2 Tests

- .1 Perform tests in accordance with Section 26 05 01 and manufacturer's instructions.
.2 Operate switches, contactors to verify correct functioning.
.3 Perform starting and stopping sequences of contactors and relays.
.4 Check that sequence controls, interlocking with other separate related starters, equipment, control devices, operate as indicated.

PART 1 - GENERAL

1.1 Description of System

- .1 System to consist of:
 - .1 Rectifier.
 - .2 Invertor.
 - .3 Battery
 - .4 Bypass switch
 - .5 controls and meters
 - .6 External maintenance bypass switch
- .2 System to use normal power supply mains and battery to provide continuous, regulated ac power to isolated load.
- .3 Equipment to operate continuously and unattended.
- .4 Ensure that UPS is compatible with equipment that it feeds.
- .5 UPS to be CSA C282-latest edition compliant. Provide remote annunciation as required by standard.

1.2 Shop Drawings

- .1 Submit shop drawings in accordance with Section 26 05 01.

1.3 Operation and Maintenance Data

- .1 Provide data for incorporation into operation and maintenance manual specified in Section 26 05 01.

1.4 Maintenance Materials

- .1 Provide maintenance materials in accordance with Sections 26 33 53.
- .2 Include:
 - .1 Four sets of each type and size of fuses used.
 - .2 Four sets indicating lamps.
 - .3 Spare parts provided.

1.5 Source Quality Control

- .1 Complete system including rectifier, inverter, bypass switch, remote annunciator panel, controls and battery site tested in presence of Owner's Representative.

1.6 Guarantee

- .1 Provide a written guarantee stating that the battery is guaranteed against defects in material and workmanship for a period of 10 years. This guarantee to be for 100% replacement for the first year and prorated in equal yearly decreasing increments for the remaining 9 years until the expiration of the guarantee at the end of 9 years of the Final Certificate of Completion

PART 2 - PRODUCTS

2.1 Uninterruptible Power System

- .1 Input Power:
 - .1 Single phase, 240V, 3 wire, grounded neutral, 60 Hz.
- .2 Output power:
 - .1 Single phase, 240V, wire, grounded neutral, 60 Hz.
 - .2 Full load output at unity power factor 12kVA.
 - .3 Overload capability: 125% of rated full load current at unity power factor and rated voltage for 10 min.
 - .4 Duration of full load output after mains failure not less than 10 min.
 - .5 Output voltage control:
 - .1 Continuously adjustable on load at least 5% from rated value.
 - .2 Voltage regulation: voltage not to change by more than 2% as load increases gradually from zero to 100%, or for specified duration of full load after mains failure.
 - .3 Transient voltage change not to exceed +/- 10% of rated voltage upon 50% sudden load change, loss or return of ac input voltage to system when fully loaded or transfer of full load from inverter to bypass and vice versa, and

- return to normal within 3 Hz.
- .4 Harmonics over entire load range:
 - .1 Total rms value not to exceed 5% rms value of total output voltage.
 - .2 Single harmonic not to exceed 3% of total output voltage.
- .5 Proper angular phase relation maintained within 4 electrical degrees at up to 20% load unbalance.
- .6 Features: Lightning, noise and surge protection, spike and transient protection.
- .7 Interference suppression:
 - .1 If UPS equipment generates electromagnetic rf interference at levels which adversely affects other equipment in vicinity, install suppression circuits or shielding as required to eliminate such interference.
 - .2 If harmonics reflected back to mains from rectifier adversely affect other loads connected to same bus, install suppression circuits to prevent that condition.
- .3 External maintenance bypass switch:
 - .1 Ratings as per drawings.
 - .2 Transfer to be quick make before break to ensure no interruption to load.
 - .3 Bypass switch to be able to be operated manually under full load conditions.
 - .4 Complete with LED indication to identify if the load is on UPS or bypass power.

2.2 System Performance

- .1 Normal operation:
 - .1 System operates on mains power when mains voltage is within +/- 10% of nominal value and mains frequency is between 59.5 and 60.5 Hz.
- .2 Battery operation:
 - .1 System transfers automatically to battery operation.
 - .1 When manually selected at control panel.
 - .2 When mains power fails.
 - .3 When mains voltage varies more than 10% from nominal or mains frequency varies more than 0.5 Hz from 60 Hz.
 - .4 When mains power is restored and mains voltage is within 10% of nominal and mains frequency is within 0.3 Hz of 60 Hz, system automatically resynchronizes with mains.
 - .5 Slew rate of frequency during transition period of system output automatically synchronizing with mains and return to its internal frequency to be set between 0.5 to 1.0 Hz per second.
- .3 Bypass operation:
 - .1 For maintenance purposes, system can be bypassed automatically by manual selection at control panel to connect load directly to ac mains. Transfer without load interruption and leaving inverter energized.
 - .2 Load transfer from mains back to system automatically by manual selection at control panel when maintenance completed.
 - .3 Automatic transfer of load to mains in not more than 1/4 cycle including sensing with inverter left energized but disconnected from load in case of:
 - .1 Inverter overloaded.
 - .2 Short circuit in load.
 - .4 Automatic retransfer of load to system without load interruption when above conditions disappear.
 - .5 Automatic transfer of load to mains in not more than 1/4 cycle including sensing and shutdown of inverter in case of inverter internal malfunctions.
 - .6 Automatic transfer of load to mains without load interruption and inverter shutdown in case of:
 - .1 Overtemperature harmful to system.
 - .2 Loss of forced ventilation.
 - .3 Low voltage of dc supply to inverter.
 - .7 Bypass capable of closing onto and withstanding momentary fault current of

800% of rating for 0.01 s.

2.3 Manufacturers

- .1 UPS: Eaton
- .2 Suppression: Eaton – Power conditioner (no battery)

PART 3 - EXECUTION

3.1 Installation

- .1 Locate UPS cubicles, battery rack and battery as indicated.
- .2 Locate and install remote mode lights and alarm cabinets as indicated.
- .3 Assemble and interconnect components to provide complete UPS as specified.
- .4 Connect ac mains to main input terminal
- .5 Connect UPS output to load.
- .6 Start-up UPS and make preliminary tests to ensure satisfactory performance.
- .7 Demonstrate operation of maintenance bypass switch to owner's representative and engineer.

END

PART 1 - GENERAL

1.1 Shop Drawings and Product Data

- .1 Submit shop drawings and product data in accordance with Section 26 05 01.

1.2 Accessories

- .1 Provide supporting devices, plaster frames, rings, integral surface mounted junction boxes and outlet boxes where required.

PART 2 - PRODUCTS

2.1 Luminaires

- .1 Provide luminaires as indicated on luminaire schedule and as indicated.

2.2 Lamps

- .1 Normal operation:
 - .1 System operates on mains power when mains voltage is within +/- 10% of nominal value and mains frequency is between 59.5 and 60.5 Hz.
- .2 Provide lamps as indicated.

2.3 Ballasts and Accessories

- .1 All ballasts to be electronic, Utility Power Smart approved and suitable for mounting in location indicated.

PART 3 - EXECUTION

3.1 Installation

- .1 Locate luminaires as indicated.
- .2 Clean all construction dirt and dust from luminaires prior to building turnover.
- .3 Install lamps.

3.2 Wiring

- .1 Connect luminaires to lighting circuits as indicated.
- .2 Connect luminaires to dimmers as indicated.

3.3 Tests

- .1 Perform tests in accordance with Section 26 05 01.
- .2 Check luminaires and replace defective lamps, ballasts and accessories.

PART 1 - GENERAL

1.1 Product Data

- .1 Submit product data in accordance with Section 26 05 01.

PART 2 - PRODUCTS

2.1 Materials

- .1 Housing: as indicated in fixture schedule.
- .2 Universal mounting: As indicated on drawings.
- .3 Running man symbol.
- .4 Lamps: LED with 25 year life expectancy.
- .5 CSA C860 Compliant
- .6 Supply voltage: to match general lighting in the area.
- .7 Battery: sealed, maintenance free.
- .8 Charger: solid state, multi-rate, voltage/current regulated, inverse temperature compensated, short circuit protected with regulated output of plus or minus 0.01 V for plus or minus 10% input variations.
- .9 Solid state transfer circuit.
- .10 Low voltage disconnect: solid state, modular, operates at 80% battery output voltage.
- .11 Signal lights: solid state, for 'AC Power ON'.
- .12 Lamp heads: LED.
- .13 Auxiliary equipment:
 - .1 Test switch.

PART 3 - EXECUTION

3.1 Installation

- .1 Install exit lights as indicated, and to requirements of ABC-2006.
- .2 Connect fixtures to exit light circuits as indicated.
- .3 Mount at suitable height. Provide rigid pendant if required. Provide single or double faceplate as required. Provide mounting as required.
- .4 Fasten properly and level.
- .5 Ensure that exit light circuit breaker is locked in on position.

END