1.0 GENERAL REQUIREMENTS

1. The Specification covering the General Conditions of the Contract, Supplementary Conditions, General and Safety Requirements, Bid Opportunity, and all sections form an integral part of this Specification and shall be read in conjunction herewith.
2. Division 27 and 28 shall comply with the general requirements listed herein.

1.1 SCOPE

1. Provide all Materials, labour, Plant and equipment required for a complete and working installation as herein specified and as shown on the Drawings.
2. The installation shall be in accordance with the current edition of the Provincial and Municipal codes and regulations.
3. All equipment supplied under this Contract shall be new and C.S.A. approved.
4. Arrange for, and coordinate, rough-in and final inspections with inspection authority and Contract Administrator.
5. In the event of conflict between Contract documents and Codes, the more stringent requirement shall be adhered to at no additional cost.
6. Contract Administrator Site Reviews: Contractor's Work shall be periodically reviewed by the Contract Administrator for determining general quality of installation. Guidance will be offered as to interpretation of Contract documents and to assist in performing the installation. Inspections, reviews and directives issued in no way relieve the Contractor, his agents, employees or subtrades from Contractual obligations, conformance to codes or safe and recognized practices.
7. Apply for and pay for all required permits, licenses, inspections and fees.
8. Indicate all permit numbers on all progress draws.
9. Co-ordinate all telephone and cablevision conduit runs with Internet Service Provider before installation begins.

1.2 DEFINITIONS

The following are definitions of terms and expressions used in the Electrical and Mechanical Specification:

1. INSPECTION AUTHORITY means agent of any authority having jurisdiction over construction standards associated with any part of Work on Site.
2. SUPPLY AUTHORITY means electrical power utility company responsible for delivery of electrical power to project.
3. PROVIDE means to supply, install and leave in working order all Materials and necessary devices to ensure a fully functional system, tested and complete in every way, unless otherwise noted.
4. The term "Contractor" refers to the successful bidder engaged to perform the installation and to coordinate all sub trades engaged by the "Contractor".
5. The term "Drawings" and "Specifications" are complementary to each other. What is called for by one shall be binding to both.
6. The term "Contract Documents" refers to both Drawings and Specifications.
7. Standards, Regulations and Bylaws, hereafter referred to as Codes.

1.3 REQUEST FOR INFORMATION

1. Allow ten (10) full Working Days for Contract Administrator to respond to all requests for information.
2. Subcontractor shall review and approve all requests for information (RFI's) from sub-Contractors prior to submission.
3. Contractor shall review and approve all RFI's prior to submittal to ensure information is not already included in Contract documents or cannot be reasonably inferred from Contract documents.

1.4 SHOP DRAWINGS

1. Submit electronic Shop Drawings for review by the Contract Administrator prior to ordering equipment and commencing Work. Shop Drawings shall be specific to the equipment and Materials for this project. Changes to location and arrangement shall be reviewed prior to installation. Review of Shop Drawings by the Contract Administrator is for the sole purpose of ascertaining conformance to design intent. Contractor retains responsibility for all aspects of installation, performance and coordination.
2. Shop Drawing Procedures are as follows:
    1. Contractor and Subcontractor shall review, approve and stamp submittals prior to sending to Contract Administrator for review. Submittals without Contractor stamps will be rejected.
    2. A transmittal listing each item of equipment shall accompany each submission.
    3. Equipment must be labeled appropriately. Each item of equipment must bear the identifier used on the Drawings.
    4. Data sheets must clearly indicate model and options being utilized. All information that does not apply must be crossed off.
    5. Allow Contract Administrator ten (10) full Working days to review all Shop Drawings.
    6. All Shop Drawings should go through the Contract Administator.
    7. All deviations from specified equipment shall be highlighted by Contractor.

1.5 ACCURACY OF DATA

1. Drawings are schematic; exact locations, distances, levels and other dimensions shall be governed by the Architectural Drawings.
2. Devices or equipment shall be moved to any point within a 3m (10'-0") radius for coordination purposes or when the Contract Administrator requests relocation before the Work has been substantially completed, without additional cost.
3. Provide a typical mock-up of one area, if requested.
4. Drawings and Specifications establish scope of Work only and are not detailed installation instructions. Follow manufacturer's recommendations and adhere to all current and applicable Codes.
5. The Contract Administrator shall have the final say in matters of interpretation.
6. Branch circuit wiring shall be installed with circuits arranged exactly as shown on the Drawings. Conduit and cable runs shall be modified to suit the installation.

1.6 EXAMINATION

1. Examine entire Contract document package to ensure that the Work under this Contract can be satisfactorily carried out. Report any discrepancies to the Contract Administrator prior to submission of Bid.
2. Examine the Site, local conditions and all existing apparatus if any to be re-used and verify that the condition of this equipment is suitable for its intended use in the new construction.

1.7 WORKMANSHIP

1. Install equipment in a workmanlike manner to present a neat appearance to the satisfaction of the Contract Administrator. Install equipment parallel and perpendicular to building lines. Install neatly and group to present a tidy appearance.
2. Install equipment and apparatus including but not limited to junction boxes, adjustment or eventual replacement with adequate clearances and accessibility for same. Accessibility is deemed to be within 600mm (24") of accessible drywall ceiling opening and no more than 1m (39") above ACT.
3. Include in the Work, all requirements shown on the Shop Drawings or manufacturers' installation instructions.
4. Replace Work unsatisfactory to the Contract Administrator without extra cost.
5. Equipment exposed to exterior weather and / or moisture shall be corrosion and UV protected.

6. Only skilled and qualified licensed tradesperson shall perform the Work. Tradesperson shall provide proof of registered status when requested.
7. Contractor is responsible to carefully examine conditions at the intended place of Work. Verify all services, connection points, and all access openings to permit installation of new equipment.
8. All conduits shall be clipped to structure by means of anchors or supported by unistrut hangers as close to underside of structure as possible. Tie wraps for wire hanging and fastening or perforated strapping is not acceptable.
9. All support Material for all luminaires, outlet boxes, junction boxes, etc. in a non-combustible building shall be of non-combustible Material. Wood is not acceptable.

1.8 COORDINATION

1. Contractor shall co-ordinate all aspects of the installation with all other trades. There shall be no change notices issued nor changes to the building design (i.e. lowering ceiling heights) due to routing conflicts amongst trades or lack of coordination. When required, discuss the proposed routing with the Contract Administrator prior to installation. Final responsibility remains with the Contractor.
2. Connect to equipment specified in other sections, installed by other Contractors or The City.
3. Supply access doors or rated doors to match fire rating, at all service points for equipment. Indicate on project record documents the location of all access doors.
4. Openings shall be coordinated with the Contractor. Opening sizes shall be kept to a minimum
5. Contractor shall pay for professional trade to patch openings and install all finishing Materials (i.e. drywall, brick, etc.). Openings with potential to compromise the structure shall be approved by a registered professional prior to starting the opening. The Contractor shall contact the Contract Administrator for instructions prior to cutting or coring. Contractor is to scan structure before making openings and advise Contractor and Contract Administrator of any obstructions found prior to cutting or coring.
6. Electric motors equipped with variable speed controller as supplied by Mechanical Subcontractor shall be installed, wired and connected by Electrical Subcontractor.
7. Variable Frequency Drives (VFD) - Electric motors and cabling shall be compatible with variable frequency drives.

1.9 SUPERVISION

1. Supervise the Work at all times through a responsible and competent qualified tradesperson.
2. Full co-operation shall be shown with other trades to facilitate installations and to avoid delays in carrying out the Work.
3. Replace Site supervisor and/or foreman when requested by Contract Administrator.

1.10 CHANGE TO CONTRACT

1. Contractor change pricing shall include a complete breakdown of items of Material, labour hours, labour rates and markups. This review period will start when all information indicated above is received.
2. Contractor shall review and approve all Contractor change pricing and credits prior to submitting to Contract Administrator. Submission to the Contract Administrator indicates Contractor believes the pricing is fair and reasonable.

1.11 PROGRESS CLAIMS

1. Contractor progress claims will only be reviewed if they provide a complete breakdown by trade and sub trade and list all major equipment and labour complete with costs.

1.12 PROJECT CLOSE OUT

1. PROJECT RECORD DOCUMENTS
    1. Maintain accurate Project Record Documents and current on Site and same shall be present for review at each Site review. Submit these Project Record Documents in electronic format of same program and version of original Contract documents and PDF

for review at the completion of the project. Note that changes to Contract Administrator Ural, and structural and civil floor plans must be included.

2. A minimum of $1,000.00 per drawing shall be held-back until all Project Record Documents are submitted and deemed complete.
3. Transfer changes to electronic disc AutoCAD file. Submit disc and hard copy for final review and submission to The City.
4. After acceptance of Project Record Documents by the Contract Administrator, provide one (1) complete set of AutoCAD and PDF Project Record Documents on three (3) CD-ROM and one (1) set of hard copy design prints and one (1) set of hard copy red line Contractor markups.
    1. Electrical shall include:
        1. Circuiting of all new and existing equipment to remain;
        2. Accurate dimensions of all underground or in slab conduit or feeders;
        3. Identify all feeder / branch circuits and conduit routing and size including major junction box locations; and
        4. Any relocated or added equipment shall be identified.
5. The use of white out (liquid or tape) shall be used for correcting Contractor red line errors ONLY.
6. DO NOT use white out to delete original Contract Drawings deleted items shall be crossed out in red ink.
7. ME Schedules and sheets shall bear a watermark, indicating "REFER TO O&M".

2. OPERATION AND MAINTENANCE MANUALS
    1. Prior to requesting any Substantial Performance Site review, all aspects of the installed system shall be complete and operational. Testing shall be complete along with device and equipment identification, equipment startups.
    2. At the completion of Work submit three (3) electronic media storage devices and one (1) hard covered loose leaf binder showing all major components and divided by trade sections. Manuals shall be complete with all warranty information, instructions for operation, maintenance and replacement parts as required. Include copies of reviewed Shop Drawings, Contract Administrator contact information, Contractor and Sub-Contractor information. Include copies of valve tag lists, all inspection certificates, and balancing reports. The Contract Administrator may not perform final inspections nor certify for occupancy until the O&M Manuals are received, reviewed and approved.
        1. Provide manufacturers start-up reports and letters of certification that the following equipment and systems are started, commissioned and working correctly:
            1. Submit a Certificate of Inspection from the local Inspection Authority upon completion of Work and include with Project Record Documents.
    3. Each of the Contractors shall instruct The City's Operating Staff on the operation, maintenance, and adjustment of equipment and/or system that they have installed or set. Provide sign off sheets for training indicating who was trained and number of hours of training.
3. CERTIFICATION REQUIREMENTS
    1. The installation shall be completely tested demonstrating that the equipment and systems installed perform in the manner intended.
    2. Prior to electrical final inspection or certification provide the following:
        1. Fire Alarm Verification Report;
        2. Copies of manufacturer's startup or certification reports;
        3. Training sign off sheets; and
        4. Copy of the Electrical Permit

1.13 WARRANTY

1. The satisfactory operation of all Work and equipment shall be warrantied for a minimum of twelve (12) calendar months after substantial completion, unless otherwise noted.

1.14 REQUEST FOR EQUALS

1. Request for equals shall be made in accordance with B7.
2. Approvals shall be transmitted electronically. Include all pertinent information for a complete review by the Contract Administrator.

1.15 WORK IN EXISTING BUILDING

1. The building shall remain open and in normal operation during the construction period of this Contract.
2. Where existing services such as power, fire alarm, HVAC, plumbing or fire protection are required to be disrupted and/or shutdown coordinate the shut-downs with The City and carry out the Work at a time and in a manner acceptable to them. Carefully schedule all disruptions and/or shutdowns and ensure that the duration of same is kept to a minimum. Submit for approval, a written schedule of each disruption at least 72 hours in advance of performing Work and obtain The City's written consent prior to implementing.
3. Should any connections be required to maintain services during Work in the existing building, supply and install all necessary Material and equipment and provide all labour at no extra cost. Should any existing system be damaged, make full repairs without extra cost, and to the satisfaction of The City.
4. Contractor shall ensure that any coring of holes through the deck floors, walls and grade beams, etc. will not penetrate existing conduits, cables or mechanical equipment in or under the concrete. Contractor shall be responsible to take any and all action as deemed necessary by the Contract Administrator to correct any such penetrations at his cost. No coring shall be undertaken unless permission is given by the Contract Administrator.
5. When new ceilings are to be installed, existing devices are to be temporary removed, relocated, extended or modified to accommodate new ceiling level unless otherwise noted.
6. When painting is to commence, existing devices are to be temporary removed and reinstalled upon completion of painting unless otherwise noted.
7. The Drawings indicate major items of equipment to be deleted or relocated but do not indicate every item of equipment to be deleted or relocated. Be responsible for determining which existing equipment is to be deleted or relocated by examining the Site and Construction Documents. Reflect information on project record documents.
8. Where existing devices (receptacles, switches) mounted on a wall which will be covered with a new finish, provide an extension ring, coverplate, etc. as required to mount the device to the new wall.
9. Existing junction boxes shall remain accessible.
10. Refer to Contract documents for phasing and staging of Work and adhere to that program. Comply with instructions regarding Working hours necessary to maintain the building in operation.
11. All existing cables and conduits required to remain in an area of renovation must be repaired, re-secured or clipped to meet Specification and CEC standards.

1.16 BASIC MATERIAL AND METHODS

1.1 GROUNDING

1. The entire installation shall be grounded in accordance with the Canadian Electrical Code.

1.2 TEST

1. The electrical installation shall be completely tested demonstrating that the equipment and systems installed perform in the manner intended.

1.3 IDENTIFICATION OF EQUIPMENT

1. All equipment shall be identified with engraved lamacoid nameplates secured with self-adhesive backing. Lamacoid shall identify equipment designation, voltage, phasing and fed from.
2. The utilization of Dynamo Rhino Industrial 6000, P-Touch is acceptable for receptacles.
3. Wording for coverplates shall be confirmed by Contract Administrator.
4. All coverplates and junction boxes shall be identified with system and/or Panel/Voltage on cover.

1.4 USE OF EQUIPMENT BEFORE OCCUPANCY BY THE CITYS

1. The Contractor may operate equipment for testing and balancing only. The use of equipment for any other purpose must be approved by The City in writing prior to use. Approval must indicate who is paying for utilities used.
2. Any equipment that is placed in use for any reason prior to the beginning of the guarantee period shall be cleaned and provided with maintenance and repairs as required, to ensure conditions are equal to that of new equipment, or shall be replaced, at no cost to The City.

1.5 WIRING METHODS

1. Unless otherwise shown on the Drawings, all wires shall be copper, minimum #12 AWG with 90°C x-link insulation. Wiring to be installed in conduit.
2. Wiring in concrete or masonry construction shall be in steel electrical metallic tubing (EMT). Provide a separate grounding conductor in EMT conduit runs embedded in concrete slabs. Conduits installed in areas exposed to moisture shall have watertight fittings.
3. All wiring in finished areas shall be concealed. Conduits shall be run at right angles to the building lines.
4. Conduit and wiring shall be grouped where possible and clipped in a neat and workmanlike manner.
5. AC-90 cable to be used for drops from conduit systems to recessed lighting fixtures in accessible ceilings or outlet boxes in steel stud walls only. Home runs shall be in conduit. Maximum run of AC-90 in accessible ceiling space shall be 5'-0".
6. Existing AC-90 runs to base building panels shall be removed and replaced with conduit and wire within this Contract.
7. All unused communication and power wiring in ceiling space shall be removed.
8. Each circuit for computer equipment shall have a separate neutral conductor.
9. Conduit runs shall be installed and inspected before AC-90 runs are installed to ensure conformance with Item 5 herein.
10. Soft wiring NMD-7 may be utilized in all wood construction where same meets Code. Conduit shall be installed to central junction box for NMD-7 cable termination. All wiring in health care facilities shall be run in conduit.
11. The use of electrical non-metallic tubing (ENT) shall be limited to in-slab installations only.

1.6 MOUNTING

1. Mounting height of equipment is from finished floor to centerline of equipment unless specified or indicated otherwise.
2. If mounting height of equipment is not indicated, verify with Contract Administrator before proceeding with installation.
3. Install electrical equipment at the following heights unless indicated or directed otherwise.
   - .1 Outlets above counters: 6" (150mm); backsplash: 4" (100mm).
   - .2 General receptacles, telephone and television outlets: 18" (450mm).
   - .3 Receptacles in mechanical and shop areas: 42" (1075mm).

.4 Switches, dimmers, push buttons, Luxo bracket: 42" (1075mm).
.5 Fire alarm pullstations: 47" (1200mm).
.6 End of line resistors: 64" (1625mm).
.7 Fire alarm visual, audible, and combination devices:
1. 92" (2350mm) to top of device; or
2. 6" (150mm) below ceiling measured from top edge of device where mounting height will be lower than 92" (2350mm).
.8 Fire alarm horns complete with hush silence and remote silence switches: 47" (1200mm).
.9 Fire fighter handsets 59" (1500mm).
.10 Intercom stations, keypads: 47" (1200mm).
.11 Thermostats: 59" (1500mm).
.12 Electric hand dryers: 42" (1075mm).(confirm with The City, age dependant)
.13 Card readers, panic switches: 42" (1075mm)
.14 Branch circuit panels, control panels, annunciators, etc.: 71" (1800mm).
.15 Clock outlets: 84" (2125mm).
.16 Exit Lights: 94" (2400mm)
.17 Emergency Lights: 94" (2400mm)
.18 Accessibility suite switches, dimmers, pushbuttons: 35" (900mm).
.19 Accessibility suite thermostats: 47" (1200mm).
.20 Accessibility suite receptacles, telephone, television: 24" (600mm)

4. Occupancy sensor as per Manufacturer's instruction. Refer to accessibility design standards.
5. All transformers, motor control centres and floor-mounted distribution panels shall be mounted on 4" (100mm) concrete housekeeping pads. The Electrical Subcontractor shall be responsible for provision of these pads. Where ceiling heights will not allow housekeeping pads to be installed below distributions, and where pre-approved by the Contract Administrator, 1½" (38mm) galvanized cantruss shall be provided in place of the pad.

1.17 OUTLET BOXES

1. Outlet, junction and switch boxes shall be galvanized pressed steel of size and type to suit each individual application.
2. Where buildings have curtain walls outlets shall not be located anywhere on the outside curtain wall. Outlets shown thus shall be mounted on the nearest dividing wall 2' from outside wall, or nearest furred out column.
3. Recessed TV Boxes shall be equal to Pass & Seymour – 3 gang recessed TV box TV3WW mounting height shall be coordinated on Site with Contract Administrator or Interior Designer.
4. All outlet boxes exposed to damp locations shall be sealed FS/FD or RAB style.
5. Sectional boxes shall not be utilized.

1.18 MECHANICAL EQUIPMENT WIRING

1. Provide starters and wiring for all heating, ventilating and plumbing equipment unless specified otherwise.
2. All control wiring for mechanical equipment shall be performed by Electrical Subcontractor except for temperature/humidity control systems. Electrical Subcontractor shall provide 120V circuit in locations designated by Controls Subcontractor.
3. Electrical Subcontractor to provide all control wiring for The City supplied equipment and as designed on Drawing.
4. Refer to the mechanical Drawings for the exact location of mechanical equipment requiring an electrical connection.
5. Electrical Subcontractor shall report any discrepancies in voltage and control wiring Specifications.
6. Provide a means of disconnect for all mechanical equipment.

1.19 MISCELLANEOUS APPARATUS AND APPLIANCES

1.1 GENERAL

1. Provide all required electrical devices, components, conduits, fittings, wiring, disconnects, and miscellaneous equipment to make all connections to equipment.
2. Be familiar with the apparatus being supplied and carefully coordinate and cooperate with the supplier/installer to ensure a proper and complete installation.

1.2 BARRIER FREE DOOR OPERATORS AND CONTROLS

1. Wire and connect operator motors, and safety controls for the motorized entrance/exit doors as per the equipment supplier requirements.
2. Wire and connect associated controls including, but not limited to entry pushbuttons, kick buttons, power supplies, motion sensors, panic hardware switches, powered hinges, electric strikes, key switches etc.
3. Refer to Contract Adminitrator door hardware schedules and/or electrical door hardware schedule for further requirements.

1.3 RECEPTACLES

1. Where equipment has line cord and plug, ensure cap is compatible with receptacle. Provide cord sets to equipment where required.

1.4 BUZZER SYSTEM

1. Provide a weatherproof 24 volt pushbutton 66" (1.65 m) above floor adjacent to loading or entrance door as indicated.
2. Provide flush-mounted 24 volt buzzer with stainless steel coverplate in shipping office or as indicated. Buzzer to provide a 65 dB sound level at a 10'-0" (3 m) distance.
3. Provide 120/24V AC transformer in common backbox with the first buzzer. VA rating of transformer to be sized for the buzzer(s) load plus 25%.

1.20 ELEVATOR WIRING

1. Provide all electrical equipment, conduit, and wiring necessary to interconnect the elevator equipment, machine rooms, pits and shafts to the power distribution, fire alarm and telephone systems. Elevator feeder shall be 2 hour fire rated cable or mounted in 2 hour enclosure.
2. Obtain elevator Shop Drawings and install power supply, lighting, and communication conduit and fire alarm interconnections as required.
3. Provide separate lockable fused disconnect switch complete with auxiliary contacts and fuses in the elevator machine room for each elevator motor, locate each disconnect adjacent to the latch side of door. Fuses and switch ratings to be sized to suit the elevator equipment supplier's requirements.
4. Provide a fire alarm junction box in each machine room and tie in to the main fire alarm panel with 6#12 conductors in a 3/4" (19mm) conduit.
5. Provide a fixed temperature heat detector at the top of elevator shaft.
6. Provide smoke detectors in each machine room and on each floor in elevator lobbies.
7. Provide lighting, complete with switch and a 20amp t-slot G.F.I. type receptacle, in each elevator pit.
8. Provide emergency lighting, complete with switch and 20amp t-slot G.F.I. type receptacle in each machine room.
9. Install disconnects for the elevator motor, controller and cab lighting where indicated on elevator Shop Drawings. Wire and connect from power distribution to disconnects and from disconnects to the controller.
10. Provide dedicated ground conductor with feeder cable sized to suit manufacturer recommendations.

11. Install telephone junction box. Provide a 3/4" (19mm) conduit from the telephone demark to junction box in machine room and from the junction box to controller.
12. Fire alarm detector in elevator shaft shall be connected to a new dedicated zone on fire alarm panel and annunciator.

1.21 PANELBOARDS

1. Load centres are not acceptable. Panels shall be complete with panel trim having concealed hinges and trim mounting screws, locking door with flush catch.
2. Panelboards: to CSA C22.2 No. 29-M1989.
3. CDP panels: to CSA C22.2 No. 29-M1989 and shall be manufactured to allow installation of two 200A frame breakers adjacent to each other – horizontally.
4. Panelboards shall be product of one manufacturer throughout project.
5. 250V branch circuit panelboards: bus and breakers rated for 10 kA symmetrical interrupting capacity minimum or as indicated.
6. 600V branch circuit panelboards: bus and breakers rated for 18kA symmetrical interrupting capacity, unless otherwise indicated.
7. 250V CDP panelboards: bus and breakers rated for 25 kA symmetrical interrupting capacity, unless otherwise indicated. CDP panels shall be complete with doors.
8. 600V CDP panelboards: bus and breakers rated for 22kA symmetrical interrupting capacity, unless otherwise indicated. CDP panels shall be complete with doors.
9. Sequence phase bussing such that circuit breakers shall be numbered vertically in consecutive order. Each breaker shall be identified by permanent number identification as to circuit number.
10. Panelboards: mains, number of circuits, and number and size of branch circuit breakers as indicated.
11. Two keys for each panelboard and key panelboards alike.
    a. Copper bus with full size neutral.
    b. Flush or surface-mounted tubs as shown.
    c. Finish trim and door baked grey enamel.
    d. CDP-type panelboards (breakers or fusible) shall be provided with a minimum of 6 – 200A, 3-pole, frame spaces.
    e. All panelboards and CDP's shall have "sprinklerproof" enclosures.
12. Load centres are acceptable for residential suite panels only.
13. Affix typewritten directory to the inside of the panelboard indicating loads controlled by each circuit.
14. Panelboards to be surface or recessed mounted as indicated. All surface mounted panelboards in sprinklered buildings must be sprinkler proof.
15. Revise the directory in existing panels to suit revised circuiting (typewritten). Place existing directory behind new directory for verification by Contract Administrator.

1.22 MAIN DISTRIBUTION

1. Disconnect existing equipment and terminate cables or remove cables as indicated on the Drawings. All equipment to be handed over to The City for their utilization in the future.
2. Main distribution to incorporate main breaker, complete with enclosure and utility metering transformer cabinet and sub-feeder distribution CDP. Arrangements of components to be shown on the Drawings.
3. Submit Shop Drawings and product data.
4. Provide data for incorporation into Maintenance Manual.
5. Materials:
    1. Molded case circuit breakers: to CSA C22.2 No. 5.
6. Power Supply:
    1. Power supply; 120/208-volt, 3 phase, 4 wire, grounded neutral.
    2. The distribution section to consist of a CDP type panelboard with molded case circuit breakers. Each breaker shall be manually operated, fixed type with trip

ratings as shown on the Drawings. Minimum interrupting rating to be 42,000 amps symmetrical.

7. Main Disconnect:
    1. The main service disconnect to be a circuit breaker as indicated.
    2. The main circuit breaker shall be a manually operable, fixed mounted, molded case type mounted in an EEMAC '3R' enclosure. Ampere rating to be as indicated.
8. Hydro Utility Metering Cabinet:
    1. Separate compartment for exclusive use of utility company metering transformers.
    2. Provide mounting and wiring for the following:
        1. Potential transformers (600 volt supply only)
        2. Current transformers
        3. Hydro utility metering transformers to be supplied by the Hydro
        4. Utility and factory installed by the cabinet manufacturer.
9. Finishes:
    1. Apply finishes as follows:
        1. Distribution equipment finish to be interior gray.
        2. Supply two (2) spray cans touch-up enamel.
        3. Treated to inhibit rusting.
10. Equipment Identification:
    1. Provide equipment identification as follows:
        1. Nameplates: Black plate, white letters, size 7, to indicate voltage, amp rating and designation.
        2. Main disconnect: labelled "Main Breaker".
        3. Sub-breakers: labelled to indicate panel or equipment fed.
11. Manufacturers:
    1. Acceptable manufacturers: Cutler Hammer, Group Schneider, Square D & Siemens.
12. Grounding:
    1. Bond the non-current parts of the distribution equipment to the main ground point in the distribution.
    2. Bond the neutral point of the main disconnect to the main building ground electrode in accordance with the requirements of the local inspection authorities.
13. Installation:
    1. Locate service entrance equipment as indicated.
    2. Connect main secondary service entrance cables to line terminals of main disconnect.
    3. Connect load terminals of distribution breakers to outgoing feeders as indicated.
    4. Check factory-made connections for mechanical security and electrical continuity.
    5. Run one (1) #6, bare copper, grounding conductor in 1" (25mm) conduit from ground point to the main building ground.

1.23 WIRING DEVICES

1. Colours of receptacles, switches, outlets and coverplates shall be confirmed with Contract Administrator, Interior Designer or Contract Administrator.
2. Receptacles shall be 15 ampere, 125 VAC, ivory, parallel slot, U-ground, side and back wiring screw terminate. Approved manufacturers are: Hubbell No. 5262, Arrow Hart No. 5262, Bryant No. 5262 or equal in accordance with B7.
3. Isolated ground receptacles shall be Pass & Seymour IG6200 pr Bryant No. GF-5262-I with orange triangle.
4. Provide stainless steel coverplates for recessed devices.

5. Wet location covers shall be equal to Cooper, Metal WeatherBox While-In-Use protective covers, WIUMV-1 for vertical mounting and WIUMH-1 for horizontal mounting. Plastic covers will not be accepted.
6. Recessed TV Boxes shall be equal to Pass & Seymour – 3 gang recessed TV box TV3WW.
7. Provide recessed floor boxes as indicated:
    1. Poke-Thru Power/Communication/AV– Legrand Evolution 6AT Series Poke-Thru, 6ATCPBK recessed pre-wired assembly with surface style cover plate, black. Unit shall be complete with 2-15A duplex receptacles and 6MAAP2A cover plates and 2 data jacks, all AV jack shall be by The City.

1.24 LIGHTING

1. Supply and install all luminaires complete with lamps. All new luminaires shall be provided with Driver or electronic ballast, Power Smart approved.
2. Install luminaires supplied by The City, as indicated.
3. Re-lamp all fixtures to be re-used.
4. Any unused fixtures above the ceiling must be removed and circuits terminated. Turn fixtures over to the building The City.
5. Lighting shall adhere to the Manitoba Hydro Power Smart Program.
6. All compact fluorescent fixtures or LED fixtures shall utilize Power Smart approved ballasts or drivers.

1.25 LIGHTING CONTROLS

1. Switches shall be totally enclosed in moulded housing, 15AC1 or 20AC1 series, 15 amps or 20 amps, 125 VAC as indicated equal to Hubbell No. 1201, P & S No. 15AC1, or Bryant No. 4801.
2. Ceiling mounted motion sensors shall be equal to Watt Stopper DT- 355.
3. Wall mounted motion/manual vacancy sensor shall be equal to Leviton single pole and 3-way IPV15-ILZ.
4. Wall mounted motion/manual vacancy sensor and dimmer equal to Leviton single pole and 3-way IPVD6-ILZ.
5. Incandescent lighting dimmer controls shall be Lutron Nova T rated at 1500, 1000 or 600 watts as indicated on Drawing. Colour of dimmer snap-on cover shall be ivory colour or shall match existing, unless indicated otherwise on Drawing. Mount dimmers 48" A.F.F. unless otherwise noted.
6. Screw in LED lamp dimmer controls shall be Lutron or Leviton and shall be rated to meet the requirement of the lamp.
7. Hard wired dimmable LED luminaires shall be provided with 0-10V driver with compatible dimmer control. Approved dimmers are Lutron or Leviton.
8. Provide a dedicated neutral for all electronic dimming and driver controls.
9. Provide line voltage and control wiring in independent conduit systems as necessary for operational systems. Refer to Manufacturer's wiring diagrams.

1.26 UNIT EQUIPMENT FOR EMERGENCY LIGHTING

1. Provide emergency lighting battery units as indicated. Units shall be comprised of a steel cabinet with corrosion-resistant undercoating, removable front panel and shall be wall mounted and cord connected.
2. Units shall be rated for 24 volts and provided with a minimum 6 circuit fuse panel with number of heads indicated on Drawings and shall be rated for a minimum of 360 watts for minimum of 30 minutes.
3. Units shall be equal to Aimlite EBST series, approved manufacturers: Emergi-Lite, Emergi-Lite, Lumacell, Beghelli and Ready-Lite.

4. Remote heads shall be injection molded, impact resistant, flame retardant thermoplastic. The lens shall be inverse concave design and fully adjustable for aisle or area distribution.
5. Fixture shall be supplied with a canopy for installation on any four inch octagon box on wall or in ceiling as show on Drawings.
6. Lamps shall be 6W, MR16 LED and rated for 24 volts.
7. Remote heads shall be Amilite model no. RMMD or approved manufacturers: Emergi-Lite, Emergi-Lite, Lumacell, Beghelli and Ready-Lite.
8. Wire shall be minimum #12 AWG unless refused by code or noted otherwise.

1.27 EXIT LIGHTS

1. Exit lighting shall be made of white durable extruded, one-piece aluminum housing and shall incorporate a protective clear panel. Each face plate shall come standard with legend films for pictogram and direction selection. Units shall meet or exceeds CSA 22.2 No.141-10 standard for pictogram exit signs
2. Normal AC and emergency DC operation – 120/347 volts AC input; 24 volts DC input, voltage shall be confirmed on Site.
3. Highly energy efficient – consumes less than 2.5 watts in AC or DC mode
4. Units shall complete with canopy for universal mounting. Provide pendant for units mounted in open ceilings areas.
5. Exit light shall be: Aimlite RPALW Series approved equivalent in accordace with B6 manufacturers: Emergi-Lite, Lumacell, Beghelli and Ready-Lite.
6. Wire shall be minimum #12 AWG unless refused by code or noted otherwise.

1.28 SELF-CONTAINED EMERGENCY & EXIT LIGHTING

1. Provide self-contained exit sign, self-contained combinations exit sign and emergency lighting, and self-contained emergency lighting heads as indicated on Drawings.
2. Exit lighting shall be made of white durable extruded, one-piece aluminum housing and shall incorporate a protective clear panel. Each face plate shall come standard with legend films for pictogram and direction selection. Units shall meet or exceeds CSA 22.2 No.141-10 standard for pictogram exit signs.
3. The power pack shall be a completely self-contained emergency unit with its own charger and rechargeable battery. The housing shall be made of steel, painted factory white. The unit shall be designed to furnish exit illumination from the normal AC source.
4. When a power failure occurs the mounted heads along with the exit sign are illuminated in emergency mode for a minimum of 30 minutes and the battery shall be rated for 36 watts.
5. When a power failure occurs the mounted heads along with the exit sign are illuminated in emergency mode for a minimum of 60 minutes and the battery shall be rated for 18 watts.
6. Units shall be Aimlite CSRP exit sign and power pack series or approved manufactures: Emergi-Lite, Lumacell, Beghelli and Ready-Lite.
7. Battery bank units shall be complete with 6 watt LED MR16 heads or approved manufactures
8. Units shall be wall mounted and cord connected.
9. Wire shall be minimum #12 AWG unless refused by code or noted otherwise.

END OF SECTION