

1.1 GENERAL INSTRUCTIONS

- .1 The General Conditions and General Requirements shall apply to and govern these Specifications.
- .2 Provide all material, equipment and labour required to complete the work indicated on the Tender Documents.
- .3 Should any work or material be needed, which is not specified or shown on the drawings and is nevertheless necessary for properly carrying out the obvious intent, such work or materials shall be provided without additional cost.
- .4 The Contractor shall familiarize himself with all drawings and specifications and shall arrange his equipment in proper relation to all architectural and mechanical features. The architectural drawings shall be consulted for dimensional information.
- .5 Should any discrepancy between the specifications and drawings leave the Contractor in doubt regarding the intent, an interpretation shall be obtained from the Departmental Representative before the tender is submitted. If this is not done, it will be assumed that the Contractor has included in his tender price the more expensive option.

1.2 MATERIALS

- .1 The drawings and specifications call for specific equipment. Alternate materials or equipment will not be considered.
- .2 Where two or more units of the same class are required, these units shall be the products of a single manufacturer.
- .3 All materials furnished shall be new and as specified, or an approved alternate. All electrical equipment and materials shall be CSA approved and bear approval marking.
- .4 Any substitutions made without approval render the material or equipment liable to rejection after installation.

1.3 WORKMANSHIP

- .1 The complete installation shall be carried out by qualified trades persons, in a neat workmanlike manner. The Contractor shall rectify unacceptable workmanship to the approval of the Departmental Representative. Upon completion of daily work, clean up and remove all unused material, debris, etc. from the site.
- .2 The electrical foreman must be named at the outset of the project and must continue in this position until project completion.

1.4 GUARANTEE

- .1 Repair or replace any defective materials or installations, at no additional cost for a period of one year from the date of Substantial Performance, and pay for all resulting damage (labour and material) which appears within this warranty period.

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- .2 Where, in the opinion of the Departmental Representative, an unreasonable delay in replacement or acceptable repair occurs on the part of the Contractor, repairs or replacement will be made by the Owner, and the cost of such repairs shall be borne by this Contractor.
- .3 No certificate given, payment made or use of the equipment or systems by the Owner shall be construed as acceptance of defective work.
- 1.5 **REGULATION**
- .1 The Electrical Systems and components shall conform to requirements of the following regulations:
- .1 Vancouver Building Bylaw - 2014
- .2 Canadian Electrical Code – 2015 including BC Electrical Safety Branch Directives and Bulletins.
- .3 CAN/ULC-S524-07 and CAN/ULC-S537-04
- .4
- 1.6 **SHOP DRAWINGS**
- .1 Six copies of complete and detailed shop drawings of each electrical component and system shall be submitted to the Departmental Representative for approval. Digital shop drawings will be acceptable provided certifications, stamps and signatures are non-removable.
- .2 Shop drawings submitted shall be certified by the manufacturer, checked by the Contractor and bear approval stamp and signature. Drawings not previously checked by the Contractor will not be reviewed.
- .3 The review of shop drawings by the Departmental Representative is for the sole purpose of ascertaining conformance with the general design. This review shall not mean that the Departmental Representative approves the detail inherent in the shop drawings, responsibility for which shall remain with the Contractor submitting same, and such review shall not relieve the Contractor of his responsibility for errors or omissions in the shop drawings or of his responsibility for meeting all requirements of the Contract Documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job site and for coordination of work of all relevant subtrades.
- .4 Shop Drawings shall bear relevant C.S.A. Standard Approvals.
- 1.7 **AS-BUILT DRAWINGS**
- .1 Obtain one set of the electrical drawings, for the sole purpose of recording any changes made to the original drawings in the process of construction. These as-built mark-up drawings shall be **kept on site**, made available upon Departmental Representative request, kept current and stamped "As-Built".
- .2 Record all changes to the original drawings including circuit numbers and equipment locations, riser diagrams and floor plan changes. The drawings are to be made on construction drawing backgrounds and submitted in an Adobe Acrobat PDF format.

- .3 Prior to Substantial Performance, these mark-up drawings shall be resubmitted, with any required changes, to the Departmental Representative for review and conversion to AutoCAD format as-built drawings. The project will not be considered substantially performed until corrected mark-up drawings have been submitted and approved.

1.8 IDENTIFICATION OF EQUIPMENT

- .1 Panelboards, circuit breakers, starters, switches, etc. shall be identified.
- .2 Panelboards shall be provided with word processor generated circuit directories clearly indicating usage of each breaker. Directories shall be removable, substantial cards held in a suitable card holder on the inside of the panel door. Additionally, one set of directories shall be submitted with maintenance manuals and electronic files shall be included. Acceptable format is Microsoft Word or Excel.
- .3 Identification of enclosures and panel boards shall be with "Lamicoid" nameplates with ¼" high letters. Provide list of nameplates and text to Departmental Representative for review and approval prior to manufacture. Panelboards shall have nameplates showing designation and supply source. Label for new circuit breaker panels shall be white lettering on black background for normal power and white lettering on red background for emergency power.
- .4 Low voltage cables shall be identified using Panduit laser printed labels at both ends of cables as well as at field and communication room devices

1.9 OPERATING AND MAINTENANCE MANUALS

- .1 The Contractor shall furnish the Departmental Representative with two complete maintenance manuals. The information shall be grouped in orderly arrangements and manuals shall have divider sheets with identifying tabs between categories. The final maintenance manual shall be provided in digital format on compact disk. The disk shall be provided with a laser-printed label indicating contents of disk and project identification information. Provide one disk in a ring-bound envelope in each maintenance manual.
- .2 The manuals shall include the following:
 - .1 A hard cover, 2" three ring binder labelled on the front cover and binder edge with the following information: building name and address, project number, project name and completion date.
 - .2 A title page indicating O & M Manual for building name and project. Include contractor name and contact information and Departmental Representative contact information.
 - .3 Table of Contents.
 - .4 Tab A: Dated and signed letter of warranty including contractors name and contact information. Identify project by name, location, warranty period. Any extended warranty of equipment to be included also.
 - .5 Tab B: sub-contractors name and suppliers' contact information
 - .6 Tab C: Copy of all reports, pre-functional tests, start-up reports, functional tests, performance verification reports, cabling verification reports, and any other building code certifications.

- .7 D-H: Tab for each piece of new equipment to include shop drawings and specific service and maintenance manuals.

1.10 RENOVATIONS IN EXISTING BUILDING

- .1 All wiring and equipment not required for final design shall be removed.
- .2 Identify all circuits in existing panels and provide new panel labels and directories.
- .3 Dispose of or return to owner all lighting fixtures and equipment removed and not scheduled for reuse. Consult owner regarding correct disposition for each item.
- .4 Supply and install all conduit and connectors required to re-connect existing circuits in the existing building that may be disrupted due to construction.
- .5 Renovations shall be made in the existing building as shown on the drawing. All conduit and wiring shall be installed concealed in new construction and concealed where possible in existing construction.
- .6 Schedule shut-downs and interruptions of all systems with Owner, providing two weeks advance notice. Provide overtime allowance for any activities that cannot be performed during regular hours.
- .7 Remove all unused wiring, cover all open junction boxes, secure all cables and conduits and otherwise make the building safe electrically.

1.11 CUTTING AND PATCHING

- .1 Provide all cutting and patching required for the electrical installations and not provided by other trades.
- .2 Prior to any drilling, cutting or coring work, review as-built drawings and X-ray. All costs for these activities shall be included in the Tender price.
- .3 All cuts in structural metal, cable trays etc. shall be ground, polished and provided with galvanizing paint finish.

1.12 FIRE STOPPING

- .1 All openings in floors and walls for electrical systems including conduits, ducts, cables etc, shall be sealed with listed fire stopping material.
- .2 Provide and install fire stop products listed in accordance with CAN4-S115-M, "Standard Method of Fire Tests of Fire Stop Systems". Work shall be carried out only by a certified installer experienced with fire stopping and smoke seals application.
- .3 Have specific listing documentation on hand during each installation and inspection and post a fire stop system label adjacent to each installation in order to indicate the listing used.

END OF SECTION

1.1 CONDUCTORS

- .1 Unless otherwise indicated, no conductor smaller than No. 12 AWG shall be used.
- .2 Wire sizes for control and low voltage systems are covered in their respective clauses.
- .3 All conductors shall be stranded copper with XLPE RW90, TWN75 or T90 insulation.
- .4 Conductors shall be sized to maintain voltage drop maximum 2% for feeders and 3% for branch circuits. Contractor shall be responsible for all voltage drop calculations.
- .5 All 120/208V conductors shall be identified as follows:
- .6 Phase A- Red, Phase B- Black, Phase C- Blue, Neutral- White, Ground- Green
- .7 All 347/600V conductors shall be identified as follows
- .8 Phase A- Brown, Phase B- Orange, Phase C- Yellow, Neutral- White, Ground- Green

1.2 GROUNDING

- .1 Provide grounding as indicated on the drawings and as required by all applicable codes.
- .2 All lugs provided for termination of conductors shall be long-barrel compression type with 2-hole mounting design.

END OF SECTION

1.1 GENERAL

- .1 Provide and install all hangers, anchors, strap, supports etc. required for a complete installation.
- .2 Electrical equipment shall be adequately supported with hangers and fastenings to structural building members.
- .3 No explosive charges are to be used for installing or anchoring hangers, supports or enclosures.
- .4 All cuts in structural metal, cable trays etc. shall be ground, polished and provided with galvanizing paint finish.
- .5 Fasteners shall not be used.
- .6 All equipment must be seismically secured to Code requirements. The Contractor shall engage the services of a Seismic Engineer to review-design all support methods and provide a stamp/seal on all support shop drawings. See Section 262800.

END OF SECTION

1.1 OUTLETS

- .1 All outlets shall be installed flush to finished surfaces unless they comprise part of an exposed conduit system.
- .2 Except as specified below, boxes for all flush single gang and double gang outlets for switches, receptacles and other devices shall be No. 52151 or No. 52171 (deep) with No. 52-C series covers (mudrings).
- .3 Boxes for surface-mounted outlets shall be No. 52151 with No. 8300 series 3/8" raised covers.
- .4 'MBD' series wall outlet boxes shall be provided for installations in concrete, masonry, or tile.
- .5 54500 series boxes shall be installed where boxes are located in concrete ceiling slabs.
- .6 Exterior wall device boxes shall be equipped with vapour barrier poly hats, model 5254-VB or equivalent for octagonal and multi gang device boxes.
- .7 Identify all junction box covers with indelible ink marker indicating system and circuiting.
- .8 Boxes and fittings for fire alarm system shall be painted red prior to installation. Boxes and fittings for security and access control system shall be painted blue prior to installation.
- .9 All device boxes shall be firmly anchored directly or with concealed bracing to building structural members only. Boxes must be attached so that they will not "rock" or "shift" at completion of rough wiring installations.

1.2 INSTALLATION OF WIRING DEVICES

- .1 Devices shall be located to suit the architectural details of the area involved. Refer to Architectural Elevation details, and millwork shop drawings prior to rough-in. Confirm all installation heights with the Consultant.
- .2 Wall-mounted receptacles shall be installed 18" above finished floor to centre of box or otherwise to conform with existing mounting heights. Receptacles mounted above counters shall be clear of the backsplash and otherwise 8" above counter to centre of box.
- .3 Switches shall be mounted at 48" above finished floor to centre of box except where required to suit special architectural features. Refer to the architectural drawings for final location of door frames, hinges etc. Switches shall generally be located on the strike side of the door.

1.3 COVERPLATES

- .1 Switch, telephone, convenience receptacle and other outlets shall be provided with stainless steel cover plates.

- .2 Where two or more devices are mounted together, they shall be ganged and a suitable cover plate shall be provided.
- .3 Provide black-on-clear "Brother" style label showing circuit number on cover plate of all receptacles.

1.5 RECEPTACLES

- .1 Specification grade, side wired 15/20A T-slot, 120VAC, white c/w stainless steel face plate.

END OF SECTION

1.1 WIRING METHODS

- .1 Except where stated otherwise, all wiring shall be installed in conduit.
- .2 All wiring shall be concealed. Where this is not possible, Wiremold V500 (power), Wiremold 2800 (communications) or Wiremold or approved equivalent surface raceway shall be used. Confirm colour with Departmental Representative. Within Electrical Rooms all wiring shall be installed in conduit.
- .3 Type AC cable (BX) may be used for concealed installation in existing and new partitions and in ceiling spaces for drops from junction boxes to lighting fixtures or partitions. Type AC cable shall not cross partitions to adjacent rooms and shall not be used for homeruns to circuit breaker panels. All installations shall be properly supported and shall not lay on ceiling tile or be hung on ceiling support wires. All other use is prohibited unless approved by the Departmental Representative.
- .4 Walls penetrated by conduits shall be sealed to the requirements of the Authority having Jurisdiction.
- .5 Every empty conduit shall be provided with a nylon pull string installed.
- .6 Electrical Nonmetallic Tubing shall not be used.
- .7 Nonmetallic Sheathed Cable shall not be used.
- .8 Connectors and couplings for fire alarm system shall be painted red prior to installation. Connectors and couplings for security and access control systems shall be painted blue prior to installation.

1.2 PULL BOXES AND TERMINATIONS

- .1 Supply and install all pull boxes as shown on the drawings or as required for a complete installation. All pull boxes shall conform to the Canadian Electrical Code in regard to size and gauge. In removable ceiling areas, pull box locations shall be coordinated to ensure maximum access.
- .2 Where electrical conduits are required to pass through the roof, supply and install necessary flashing and pitch pans and ensure that a waterproof installation is provided.
- .3 Where conduits, raceways, etc. are installed in concrete slabs or masonry walls across building expansion lines, an approved expansion joint or fitting shall be provided. Raceways shall be complete with grounding jumpers.

END OF SECTION

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END OF SECTION

1.1 GENERAL

- .1 Lighting control modifications include removal of existing on/off manual switches and installation of automatic lighting control devices.
- .2 New devices and associated wiring to be installed at locations shown on revised lighting plan.
- .3 New devices shall be automatic, dual-technology, vacancy sensors c/w 30min. delay. Leveton Decora style or approved equal.

END OF SECTION

1.1 MAIN DISTRIBUTION

- .1 Provide additions and modifications to the existing building electrical distribution system as indicated on Single Line Diagram - drawing E-01. Install main breaker in existing distribution.

1.2 PANELBOARDS

- .1 New panel boards are circuit breaker type 347/600V or 120/208 volt, 3-phase 4-wire, mounted as shown on the drawings. New panelboards shall be complete with trim, door, catch, lock and wordprocessor generated directory. Supply and install new circuit breakers, in branch circuit panels, to coordinate with new circuitry being provided.
- .2 All panelboards shall have a lamicoide nameplate with ¼" high letters permanently fixed on the front of the door to indicate the panel name as indicated on the drawing, panel fed from and voltage, e.g. "Panel 'A', 120/208V, FED from MDP2".
- .3 New panelboards shall have all spaces filled with circuit breakers (no spaces). Circuit breakers for panelboards shall be bolted type.
- .4 Provide new panel directories for all panelboards affected by this project. Trace existing circuits and provide updated circuit numbers on existing receptacles.

1.3 EQUIPMENT GROUNDING

- .1 Provide grounding systems to suit the code and as described herein and on the drawings.

1.4 DIGITAL INFO METERS

- .1 Install digital info meter as shown on electrical drawings.

END OF SECTION

1.1 GENERAL

- .1 All electrical equipment installations shall be provided with anchorage and restraints to meet the seismic requirements of the Vancouver Building Bylaw (2007 edition) sub-section 4.1.9 including table 4.1.9.E.
- .2 Supply all labour, materials and equipment required and necessary to isolate and restrain the equipment and guarantee the function of the materials and equipment supplied.
- .3 All electrical connections to vibration isolated equipment shall be made with flexible conduit or other flexible means acceptable to the Consultant so as not to restrict the maximum anticipated movement of the equipment under the design seismic excitation.
- .4 All equipment shall be tested in an independent testing laboratory or shall be certified by a Registered Professional Structural Engineer to demonstrate that the equipment meets the requirements of all Codes and Bylaws in terms of "withstanding" the lateral forces in any direction to be expected in the project seismic zone. "Withstanding" shall generally mean remaining in one piece and not breaking away from moorings.
- .5 Provide certified, professionally sealed shop and placement drawings for all electrical equipment and equipment assemblies showing the methods of attachment to the particular structure for each piece of equipment and assembly and provide anchorage/attachment details approved and sealed by a BC Registered Professional Engineer. Shop drawings shall show the equipment type, manufacturer's name, model number and weight of the equipment to be restrained.
- .6 Provide Letters of Assurance and Conformance in compliance with the specified Codes, Standards and Bylaws. Letters must be issued to the Consultant prior to Substantial Performance.

END OF SECTION

1.1 LIGHTING FIXTURES

- .1 Remove and dispose of off-site existing fixtures. Remove existing wiring and controls. Install new lighting fixtures c/w associated wiring, and control devices.

Refer to Revised Lighting Plan for fixtures quantities and types.

Luminaire Schedule:

Type 'A' – 120V, 2'x4', t-bar ceiling recessed, high output, high CRI LED, gasketed fixture. Fixture to be listed for food processing applications. Door frame: 304 stainless steel. Optics" FDA approved Food Zone clear polycarbonate lens (outer), diffused acrylic inner lens. 4000K, 5500lm output. Fixture control: occupancy sensor.

Type 'B' – 120V, linear, waterproof, high brightness, slim profile LED cove light. Fixture sector lengths to suit site conditions. 4000K, 600lm/m. **Provide two parallel runs of strip light in each cove sector.** Fixture control: occupancy sensor.

Type 'C' – 120V, 30W, recessed, open LED down listed for wet location. Fixture will be installed in exterior soffit. 4000K. Fixture control: programmable time-switch.

All fixture fixtures to be CSA listed.

1.2 EXIT LIGHTING

- .1 Exit lights shall be self-powered, 120VAC, 5W LED, green running man image. Ceiling or wall mounted, double face where shown on drawing.
- .2 Exit lights shall be mounted to provide maximum visibility. Where adequate visibility cannot be achieved, review with the Consultant prior to installation.
- .3 Provide wiring connections to exit lights from nearest emergency lighting circuit.
- .4 Circuit breakers feeding exit lights shall be provided with lock-on devices.
- .5 Commission and test exit lighting. Provide wordprocessor-generated test and commissioning report upon project completion.

1.3 EMERGENCY LIGHTING

Emergency lighting shall be provided via 120VAC/24VDC, 180W wall mounted, lithium battery pack and 24VDC, 9W LED, wall/ceiling mounted remote emergency lighting heads, or self-powered LED exit sign/emergency heads combo as shown on lighting plans.

1.1

General

1. Connect all mechanical equipment listed in Mechanical Motor List and shown on electrical plans. Install associated raceway, wiring and breakers.
2. Install motor controls as indicated on drawings including fire alarm interface where indicated.
3. Final connection to motor (last 6' of feeder) to be installed using flexible conduit and conductors. Bonding to be extended to motor terminals. Motor disconnect switch to be installed as required by C.E.C. Motor installed in exteriors to be provided with weather-proof disconnects and water-tight conduit connectors.
4. Each motor to be provided with suitable disconnect switch.

END OF SECTION