

**1.1 RELATED WORK**

1. Bidding & Contract Requirements Bid Opportunity
2. All Electrical Drawings and Division 16 Series Specification Sections.
3. All electrical work in Mechanical Division 15 drawings and specifications.

**1.2 QUALITY ASSURANCE**

1. Do complete installations in accordance with CSA C22.1-2002.
2. While not identified and specified by number in this Division, comply with CSA Electrical Bulletins in force at time of tender submission. Comply with the requirements of all Provincial and local laws, rules, ordinances and codes.
3. Electrical installation shall be in accordance with the current edition of the Canadian Electrical Code, Provincial and other codes, rules and regulations. Supply material and labour required to meet the requirements of these codes, rules and regulations even though the work is not shown on the drawings or mentioned in the specifications. Where the electrical installation calls for better quality materials or construction than the minimum requirements of these codes, rules and regulations, the electrical installation shall be as shown on the drawings and as specified.
4. Electrical installation shall be in accordance with the requirements of the electrical supply authority and local inspection authority.

**1.3 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. Obtain all necessary permits required for the electrical installation.
3. Pay all fees for permits and inspections as required for the electrical installation.

**1.4 MATERIALS AND EQUIPMENT**

1. Provide labour, materials, transportation, equipment and facilities, etc., required for the complete electrical installation as indicated or implied on the drawings and specifications.
2. Electrical equipment shall be new and of type and quality specified.
3. Equipment and material shall be CSA certified, and manufactured to standards described. Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from the appropriate Inspection Departments.
4. Request for approval of material, as equal, shall conform to Section 16050.1.16.

## **1.5 SUBMITTALS**

1. Submit shop drawings and product data for review by the Contract Administrator. All drawings shall be in English and Imperial dimensions or in metric where indicated. Manufacture of equipment shall not commence until shop drawings have been reviewed.
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 inter-connection with work of other sections.
5. Submit shop drawings of service entrance equipment to utilities.
6. Material submitted for Contract Administrator's review shall bear Contractor's, and where applicable, Utility reviewed stamp.

## **1.6 OPERATIONS AND MAINTENANCE DATA**

1. Provide operation and maintenance data for incorporation into Maintenance Manuals.
2. Include 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.
3. Include technical data, product data, supplemented by bulletins, component illustrations, exploded views, technical descriptions of items, and parts lists. Advertising or sales literature not acceptable.
4. Include names and addresses of local suppliers for items included in Maintenance Manuals.
5. Submit Maintenance Manuals to the Contract Administrator for review. Manuals that are incomplete shall be returned to the Electrical Sub-Contractor for completion. Completed manuals shall be submitted, to the satisfaction of the Contract Administrator, before final payment may be considered to be due.

## **1.7 MAINTENANCE MANUALS**

1. Provide maintenance materials as specified.
2. Turn materials over to Contract Administrator in an orderly fashion upon completion of installation.

## **1.8 VOLTAGE RATINGS**

1. Operating voltages: to CAN3-C235-83.
2. Motors, electrical heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.

Equipment shall operate in extreme operating conditions established in above standard without damage to equipment.

**1.9 INSPECTION**

1. Furnish a Certificate of Acceptance from the Inspection Authorities on completion of work. Copies of certificate shall be included in Maintenance Manuals.
2. Certificate of Inspection of Approval shall be submitted before final payment may be considered to be due.
3. During the course of the project construction, the Contract Administrator will carry out periodic site reviews and prepare a deficiency list for remedial action by the Electrical Subcontractor. When requested, the Electrical Contractor shall respond in writing to the Contract Administrator, stating corrective action and completion date for each item listed as deficient. This response shall be in the hands of the Contract Administrator within three working days of receipt of the Inspection Report.

**1.10 CARE, OPERATION AND START-UP**

1. Provide instruction in the operation, care and maintenance of equipment. Such instructional sessions shall be arranged with the Contract Administrator.
2. Arrange and pay for services of Manufacturer's factory service Contract Administrator to supervise start-up of installation, check, adjust, balance and calibrate components.
3. Provide these services for such a period, and for as many visits as necessary to put equipment into operation, and ensure that operating personnel are conversant with all aspects of its care and operation.

**1.11 FINISHES**

1. Finish outdoor electrical equipment such as parking lot panels, to match light standards.
2. Paint indoor switchgear and distribution enclosures light grey to EEMAC-2Y-1. Outdoor electrical equipment enclosures shall be painted "equipment green" to EEMAC 2Y-1.
3. Clean and touch up surfaces of shop-painted equipment, scratched or marred during shipment or installation, to match original paint.
4. Clean, prime and paint exposed hangers, racks, fastenings to prevent rusting.

**1.12 EQUIPMENT IDENTIFICATION**

1. Identify electrical equipment with lamacoid nameplates.
2. Provide lamacoid nameplates, 1/8" (3mm) thick plastic engraving sheet, black or red face, white core, mechanically attached (screwed or riveted) unless specified otherwise. Sizes as follows:

Size 0	3.8" x 1 1/2"	(10 x 38 mm)	1 line	1/8"	(3mm)	high letters
Size 1	3/8" x 4"		10 x 100mm)	1 line	1/8"	(3 mm) high letters
Size 2	1/2" x 3"		(13 x 75mm)	1 line	3/16"	(5 mm) high letters
Size 3	1/2" x 3"		(13 x 75mm)	2 lines	1/8"	(3 mm) high letters

Size 4	3/4" x 3"	(19 x 75mm)	1 line	3/8"	(10mm) high letters
Size 5	3/4" x 4"	(19 x 100mm)	2 lines	3/16"	(5 mm) high letters
Size 6	1" x 4"	(25 x 100mm)	1 line	1/2"	(13mm) high letters
Size 7	1" x 4"	(25 x 100mm)	2 lines	1/4"	(6 mm) high letters

3. Wording on nameplates shall be approved prior to manufacture. Submit schedule of nameplates and wording.
4. Allow for average of twenty-five (25) letters per nameplate.
5. Identification shall be English.
6. Nameplates for terminal cabinets and junction boxes shall indicate system and/or voltage characteristics.
7. Use black nameplates with white lettering for normal power and communications equipment. Use red nameplates with white lettering for emergency power and fire alarm equipment.

### **1.13 PROJECT RECORD DOCUMENTS**

1. Project record documents shall be transferred to electronic disc AutoCAD file and labelled "Record Drawings". The Electrical Sub-Contractor shall be responsible for the production of electrical as-constructed drawings which shall provide a complete and accurate record of the actual electrical installation. The Electrical Contractor shall affix his company name and the words "Record Drawings" on the drawings, and sign and date them. Submit disc and hard copy for final review and submission to the Contract Administrators upon completion. Record documents that are incomplete shall be returned to the Electrical Sub-Contractor for remedial measures. The Contract Administrators shall recommend a suitable deficiency holdback until such time as "record drawings" are submitted in the acceptable form.
2. Indicate on record drawings, location of all buried services. This information is to be certified correct by Contract Administrator before backfilling commences.
3. Contractor to take all schedules/details from specification and put onto additional drawing sheets for Record Drawings.

### **1.14 DEFINITIONS**

1. The following are definitions of terms and expressions used in the specification:
  - CONTRACT ADMINISTRATOR refer to D4 of the Bid Opportunity for definition and contact information.
  - INSPECTION AUTHORITY means agent of any authority having jurisdiction over construction standards associated with any part of electrical work on site.
  - SUPPLY AUTHORITY means electrical power utility company responsible for delivery of electrical power to project.
  - ELECTRICAL CODE means as shown on contract drawings or noted in Contract Documents.

- TYPE TESTED means that each piece of equipment produced by Manufacturer is not fully tested. An original piece with similar arrangement has been fully tested and results of that test are available.
- PROVIDE means to supply, install and leave in working order all materials and necessary wiring, supports, access panels, etc., as necessary for equipment indicated.

#### **1.15 LABELS AND WARNING SIGNS**

1. Manufacturer's nameplates and CSA labels shall be visible and legible after equipment is installed.
2. Provide warning signs on equipment, as required, to meet the requirements of the Inspection Authorities, including indication of multiple power sources.

#### **1.16 LOCATION OF OUTLETS**

1. Locate outlets as indicated.
2. Do not install outlets back-to-back in wall; allow minimum 16" (400 mm) horizontal clearance between boxes.
3. Drawings are schematic only and do not indicate all architectural, structural or mechanical elements.
4. Change location of outlets at no extra cost or credit, providing distance does not exceed 10'-0" (3 m) and information is provided before installation.
5. Co-ordinate mounting heights and location of all equipment with Architectural, Mechanical and Structural Drawings prior to installation of rough-in boxes.

#### **1.17 MOUNTING**

1. Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicate otherwise.
2. Install electrical equipment at the following heights unless indicated or directed otherwise (to bottom of outlet).
  - .1 General receptacles, telephone and television outlets: 16" (400mm).
  - .2 Receptacles in mechanical and shop areas: 40" (1m).
  - .3 Panelboards: 78" (2.0 m) to top.
  - .4 Heights as above or at bottom of nearest block or brick course.
4. All transformers, motor control centres and floor-mounted distribution panels shall be mounted on 4" (100 mm) concrete housekeeping pads. The Electrical Contractor 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, 1 1/2" (38mm) galvanized cantruss shall be provided in place of the pad.

**1.18 PROTECTION**

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

**1.19 TESTS**

1. Conduct and pay for tests including, but not limited to, the following systems:
  - .1 Circuits originating from branch distribution panels.
  - .2 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
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 Contract Administrator where directed.
4. Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
5. Submit test results in Maintenance Manuals.

**1.20 CLEANING**

1. At time of final cleaning, clean lighting reflectors, lenses, and other lighting surfaces that have been exposed to construction dust and dirt.

**1.21 DELIVERY STORAGE AND HANDLING**

1. Deliver all materials to site in an orderly fashion.
2. Store all materials in a clean and dry place, secure from vandalism or theft. All materials shall be left in shipping containers until required for use.
3. Provide additional protection such as tarps, padding, wood skids, etc., where such is required to ensure protection of equipment and as directed by the Architect.

**1.22 COORDINATION WITH OTHER TRADES**

1. Refer to Mechanical drawings and specifications for additional electrical work in connection with other Divisions. Where such work is included in other sections of the specifications, provide equipment, conduit, wiring, etc. (in accordance with the Manufacturer's approved shop drawings), as required, for operation of the specified equipment.
2. Schedule execution of electrical work with associated work specified in other Divisions.

3. Co-ordinate electrical work with work of other trades to avoid conflicts with pipes, air ducts or other equipment. Provide additional supports, wiring, etc. to relocate electrical equipment, as required, where structural members, air ducts, piping or other equipment interferes with the electrical installation.

#### **1.23 EXAMINATION OF SITE AND CONSTRUCTION DOCUMENTS**

1. Prior to submitting a tender, examine the site and local conditions which will affect the work. Refer to the Mechanical drawings, schedules and specifications for construction details to be certain that the electrical work can be satisfactorily carried out as specified. Claims for extra payments, resulting from conditions, which could reasonably be foreseen during an examination of the documents and/or site, will not be recognized.
2. Ensure that all equipment designated as "Existing to Remain" or "Existing to be Relocated" is suitable for its intended re-use, including panelboards and circuits. Report any discrepancies to the Contract Administrator BEFORE close.
3. Refer to General Conditions for instructions regarding a pre-arranged site visit during the tender period.

#### **1.24 CUTTING AND PATCHING**

1. Pay the costs of all cutting and patching required for the installation of electrical work. Payment for cutting and patching shall be made through the General Contractor.
2. Cutting and patching required for the installation of electrical work shall be done by the particular trade whose work is involved. No cutting or patching shall be carried out by the tradesman employed on the electrical work.
3. Obtain the approval of the Contract Administrator before arranging for any cutting. Patching shall restore the affected area to the original condition; materials and methods used for patching shall be in accordance with the requirements of the corresponding Divisions of the specification.

#### **1.25 WORKMANSHIP**

1. Install equipment, conduit and cables in a workmanlike manner to present a neat appearance to the satisfaction of the Contract Administrator. Install conduit and cable runs parallel and perpendicular to building lines in chases, behind furring or above ceilings, where such concealment is possible. In areas where systems are shall be exposed, install neatly and group in a tidy appearance.
2. Install equipment and apparatus requiring maintenance, adjustment or eventual replacement, with adequate clearances and accessibility for same.
3. Include, in the work, all requirements shown on the shop drawings or Manufacturer's installation instructions.
4. Replace work unsatisfactory to the Contract Administrator without extra cost.

**1.26 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 electrical power, fire alarm system, television system, are required to be disrupted and/or shutdown coordinate the shut-downs with the Contract Administrator 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 Contract Administrator'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 Contract Administrator.
4. The drawings indicate major items of equipment to be deleted or relocated but may not indicate every item of equipment or conduit 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.
5. 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.
6. Existing junction boxes shall remain accessible.
7. Refer to General Conditions for phasing and staging of work and adhere to that program. Comply with instructions regarding working hours necessary to maintain the building in operation.
8. It shall be the responsibility of the Electrical Contractor to ensure that any coring of holes through the deck will not penetrate existing conduits, cables or mechanical equipment in or under the floor slabs. He shall be responsible to take any and all action as deemed necessary by the Building Engineer to correct any such penetrations at his cost. No coring shall be undertaken unless permission is given by the Building Engineer.
9. Provide Lamacoid nameplates for all new breakers in distribution.
10. Update all existing panelboard schedules.

**END OF SECTION**