

PART I – GENERAL

RELATED DOCUMENTS

- Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections apply to the work of this Division.

SUBMITTALS

- Unless otherwise noted, the contractor shall prepare all shop drawings, product literature, etc. only as required to properly coordinate and construct the project.
- Review of submittals by the Professional of Record is limited to specific shop drawings as called for in the Project Manual.

DESCRIPTION OF WORK

- All work covered in Division 16, as described in the following sections, is subject to "General Conditions" and "Division 1 - General Requirements", as hereinbefore included. Furnish all materials, equipment, labor including supervision, permits, plan check fees, insurance and services required for the installation of all electrical work and as required to provide a complete and operable electrical system as indicated by drawings and/or specified herein. For a listing of all required contact information, refer to the "Required Vendor List" located on the drawings.
- Any items not mentioned in these specifications or not indicated on drawings, but are necessary for successful and efficient operation of the work shall be held to be implied and shall be furnished and installed as part of the contract at no additional cost.
- Incidental items not indicated on drawings, nor mentioned in specifications that can legitimately and reasonably be inferred to belong to the work described or be necessary in good practice.
- Drawings showing electrical work are wholly diagrammatic and are not intended to show in detail all features of the work. No extra payment will be allowed where obstructions in work of other trades or work under this section require offsets, etc. Take measurements and do fitting on job. Check location of electrical work to determine in advance that it clears all openings and that equipment clears all other cabinets, fixed equipment, windows, door openings, etc.
- Do not scale for dimensions.
- Take all dimensions and measurements from Architectural Drawings and actual equipment to be furnished. All dimensions and measurements must be verified in the field since actual locations, distances, and elevations will be governed by actual field conditions. Contractor shall be responsible for all measurements taken in the field and coordinate with other trades.
- Study and review all contract documents, including drawings and specifications for architectural, structural, mechanical and other portions of the work to avert possible installation conflicts. Adjust

electrical work to conform to all conditions indicated thereon. Should conflicts arise which require changes in the contract documents, notify the Professional of Record. Secure written approval and agreement on necessary adjustments before the installation is started, or be held responsible to correct work at no extra charge.

ELECTRIC AND TELEPHONE UTILITIES

Consult with the utility company and Owner to verify all conditions affecting the service, type of terminations required, etc., and coordinate work with the utility company and Owner.

The electrical service for this project shall be as shown on the Electrical drawings.

MATERIALS

All materials shall be new and in good condition, the product of substantially established and recognized manufacturers. All materials shall comply with applicable codes and standard provisions as stated in each particular section, and where applicable, shall comply with utility company specifications and local codes.

WORKMANSHIP - CODES

The complete installation and all materials for all the systems shall comply with the requirements of all local building and electrical codes; with the Electrical Safety Authority and the local fire department; with the latest edition of the Canadian Electrical Code (CEC) and with the requirements of the utility companies furnishing service to the project.

The Drawings and Specifications take precedence when they are more stringent than codes, ordinances, or statutes in effect. The following standards, codes, and specifications are minimum requirements: (Date of issue subject to City requirements)

- National Electrical Manufacturers Association Standards (NEMA)
- Provincial Building Code
- Underwriters Laboratories Canada (ULC)
- American National Standards Institute (ANSI)
- NFPA 101, 72 (Life Safety Code)
- Canadian Electrical Code (CEC)
- Canadian Standards Association (CSA)
- Provincial Fire Code
- Institute of Electrical and Electronics Engineers Standards (IEEE)
- Illuminating Engineers Society of North America (IESNA)

The Contractor shall maintain at the Project at all times during the construction a superintendent capable of coordinating the Work, and to receive instructions from the Owner's representative.

Make available to Professional of Record and maintain, in good condition, on the jobsite the following:

- Two sets of contract documents (keep one set current, neatly corrected and up to date with "As-Built" data and revisions for all electrical changes from the original set). At completion of all work, furnish to Professional of Record a set of sepia's with dimensions from columns and walls of all electrical underground conduit and feeder runs.
- One copy of all applicable local, county, provincial, federal, serving utility companies' codes, rules and regulations, e.g. current Canadian Electrical Code.
- All elements of the construction are to be performed by workmen skilled in the particular craft involved and regularly employed in that particular craft. All work is to be performed in a neat workmanlike manner in keeping with the highest standards of the craft.

COORDINATION OF WORK

- All items of work by other trades which is necessary for completion of work under this division of the specifications shall be the responsibility of the General Contractor. The General Contractor shall thoroughly understand the scope of work required of each trade and shall appropriately coordinate subcontractors, suppliers, etc., and arrange for such work to be performed in an orderly course of the project. Where work of this trade joins that of other trades, there shall be no discrepancies.
- Special attention shall be given to coordination between Electrical and Mechanical subcontractors. Comply with Section 15000, General Mechanical Provisions, Electrical Coordination.
- Plan and install work in such manner as to conform to the structure, avoid obstructions, preserve headroom, and keep openings and passageways clear. Consult general contract drawings for conditions affecting this work and verify spaces in which work will be installed. Notify Professional of Record immediately of possible conflicts. Where interferences with structural, mechanical, or other features exist, or where job conditions require reasonable changes in locations and arrangement of indicated equipment, conduit, outlets, or wiring. Contractor shall make such changes without extra cost to Owner.
- Study the suppliers' detailed shop drawings and wiring diagrams, sleeves, anchor bolts, supports, hangers, openings, conduits, and outlets, and provide such items as necessary to make the installation complete and functional. In particular, verify all motor and control outlet locations and conduit sizes with the supplier of motor driven equipment. Secure rough-in dimensions and electrical characteristics of all equipment before installation or work.

STORAGE AND HANDLING

Receive, accept and provide protection and be completely responsible for all electrical equipment materials, including same, that may be furnished by others (F.B.O.) and is to be installed, electrically connected, etc., under this section of work prior to and after installation of same until completion of all work and final acceptance of same by Professional of Record, e.g. provide a dry storage area for lighting fixtures; store conduit a minimum of six inches above grade and slope to drain. Cover service and distribution equipment with approved plastic or equal cover (secure tightly to prevent weather and other elements from damaging factory finishes), etc. Arrange for introduction into the building for equipment too large to pass through finished openings.

All materials, equipment, devices, etc., when installed either partial or complete, shall be properly protected throughout the remainder of the project construction. Failure to do so shall be sufficient cause of rejection of any items.

The Electric Prefabricated power center is to be unloaded and placed by the contractor - see documents for other items of coordination for proper installation and obligations.

AS-BUILT DRAWINGS

Maintain at the Project, a set of prints, on which a daily record of changes and deviations from Contract drawings and Specifications are recorded. All buried or concealed conduit, size 1" and larger, both inside and outside of the building, shall be located by dimensions from grid lines and elevation of these prints. Include all other pertinent information necessary for maintenance and possible future renovations. Comply with Division 1 - Project Closeout (Section 01700).

CUTTING, PATCHING, AND SLEEVES

- Cutting and patching shall be done by mechanics skilled in the various trades.
- No cutting or patching shall impair the strength, function, or aesthetics of Work being cut, i.e., holes through exterior walls and ground floor shall be waterproofed. Patches in finished surfaces shall be invisible.
- Escutcheon plates shall be provided for all exposed pipes passing through walls, floors, and ceilings. Plates shall be nickelplated, (chrome plated in exposed locations) split ring type. Where plates are provided for pipes passing through sleeves which extend above surface, provide deep recessed plates to conceal the pipe sleeves.
- Roof flashing assemblies shall be provided for all pipes passing through roof.

HANGERS AND SUPPORTS

Furnish and install necessary hangers, supports, fasteners, frames and other similar construction necessary for the proper and safe support of conduit and equipment furnished under this Division. Support conduits from building structure, not from ceiling supports. Supports for lighting fixtures, panelboards, exposed feeders, and similar items shall be CSA approved type.

TEMPORARY CONSTRUCTION POWER

Furnish and install temporary construction power as required to provide sufficient power and lighting for construction needs. Temporary receptacles shall be grounded type Ground Fault Interrupters per CEC. Provide temporary lighting as required for adequate illumination for construction for safety purposes. If at all possible the electric prefabricated power center is to be set and is to be used for temporary power.

Minimum of 200 amp service.

PAINTING

Provide a prime coat of paint for unprotected supports, hangers, frames, and similar items furnished and installed under this Division of the Specifications. Panels and cabinets in unfinished areas shall have a standard factory finish grey in color.

IDENTIFICATION

All distribution equipment (service entrance, switchboards, cabinets, transformer, motor and equipment controls, starters, disconnect switches, etc.) shall be identified with engraved white letters 3/16" high on 1/2" high black micarte nameplates and screwed on the front of the equipment, e.g., "Panel HA".. Provide letters to identify each A/C, heating, and ventilating unit to include corresponding panel and circuit breaker identification number per panel schedules. Screw on each name plate nearest the electrical connection.

PROTECTION OF WORK

Protect work at all times from damage and replace damaged work. Use every precaution to protect the work of others and be responsible for damage to other work caused by work accomplished under this Division. Provide space for storage of materials and apparatus and assume complete responsibility for losses due to any cause whatsoever. In no case shall storage interfere with traffic conditions in any public thoroughfare or constitute a hazard to persons in the vicinity.

EXCAVATION AND BACKFILL

Perform all necessary excavations, shoring, and backfilling required for the proper laying of all pipes and conduits inside the building and premises, and outside as may be necessary. Conform to Section 2 - Site Work requirements. Remove all excess excavation materials from the site, except as otherwise directed.

Electrical System:

The bank of trenches for electrical cables, conduits and duct lines need not be kept vertical, but may be sloped or widened to such general limits, as to allow for a gradual cushioning toward the point of abrupt dropoff due to rock to levels being considerably below the grade of the duct.

Provide for backfilling and compaction in accordance with the requirements of Section 2 - Site Work requirements to required density. Make the first two feet of fill in six-inch layers, each thoroughly compacted as directed, and free from rocks, large clods, leaves, branches, and debris. Compact the rest of the backfill as directed, using in the backfill rocks not larger than two inches in diameter, and using no rocks at all in the top twelve inches.

Provide a minimum of two inches of sand cushioning between all ducts and conduits.

CONCRETE WORK

Where used for structures provided under this Section, such as bases, manholes, cable trenches, pull pits, and isolated vaults, setting pads, concrete and concrete work with associated reinforcing shall be as specified in Section 3 - Concrete. However, if the Contractor fails to provide sleeves, inserts, and templates, or to notify other trades well in advance of requirements, the Contractor shall then be held responsible to pay for all cutting and patching required. See drawings for details.

Concrete used for conduit envelopes, backfill at footings, and miscellaneous shall be 3000 psi at 28 day compressive strength concrete. Slump test per Section 3.

Furnish and set all mounting bolts, conduit, and accessories for equipment located on concrete bases.

SEISMIC RESTRAINT

Where required by local Code, all electrical equipment including light fixtures, transformers, distribution equipment, etcetera, shall be supported from the building structure with appropriate supports, anchorages, and restraints to meet the requirements of the Code.

The Contractor shall arrange and pay for the services of a seismic engineer registered in the project province to design and review the installation of seismic supports and anchorage. Prior to substantial performance, a letter from the seismic engineer shall be forwarded to the Consultant certifying that all electrical equipment has been seismically restrained and the installation has been reviewed in accordance with the local authorities having jurisdiction.

TESTS AND ADJUSTMENTS

- *Before energizing any circuits:* Test circuits with a "megger" tester to determine that insulation values conform to applicable NEMA Standards. Check motor controllers to determine that properly sized overload devices are installed. Check motors for proper rotations. Test other electrical equipment for proper operation. Provide complete list of findings.

- Test auxiliary systems for proper operation. Thoroughly familiarize maintenance personnel with the proper operating procedures of each system.
- Tests and adjustments shall be made prior to energization and final acceptance. Provide certificate of inspection and acceptance of the electrical installation by local inspection authorities. Equipment or wiring which proves by testing, to be defective or operating improperly, shall be corrected or replaced promptly at no additional cost to the Owner. Electrical Contractor shall pay the cost of testing for failed tests, including replacement of damaged equipment resulting from testing within designed loads.
- Adjust voltage taps on transformers for optimum operating level.
- Measure load balance on panelboards and reconnect loads as may be necessary to obtain a balanced load on all phases. There shall be no more than a 10% difference between the high and low phases. Provide complete list of findings and final corrected loads measured.
- Demonstrations and instructions - Contractor shall demonstrate to the Owner and operation personnel, all essential features of all systems and instruct them in the proper operation and maintenance of such systems. Systems to be demonstrated are as follows: Lighting System and Controls. Electrical service and power distribution systems. Sequence and controls for A/C, heating, and ventilating systems. Emergency Power System - in the presence of the Owner.
- Contractor shall arrange for manufacturer's representative of all special systems to be present during the demonstrations.
- Upon completion of all tests, demonstrations, and instructions, the Contractor shall submit to the Owner, a signed, written statement certifying that all demonstrations and instructions have been completed. The statement shall be countersigned by the Owner. Contractor shall include copies of all tests and readings taken.
- Contractor shall submit all certificates of inspections and approvals as directed by the Professional of Record. At completion of installation, submit a letter to the Professional of Record stating that project was installed in accordance with all contract documents and if not, where and how work was accomplished. The entire installation shall be subject to the Professional of Record's approval.

CLEANING UP PREMISES:

At all times keep the premises free from accumulation of waste materials or rubbish caused by employees. Metal floor pans shall be provided for pipe threading machines and benches, being used at all times to prevent concrete floors from becoming oil soaked. Upon completion of the job remove all debris, clean all switch plates, fixtures, panel trims and, in general, leave the premises in a clean and tidy condition.

FINAL INSPECTION

At the time of final inspection, the Project Foreman shall remove cover plates, panel covers, and other access panels for the inspecting personnel, to allow complete inspection of the entire electrical system.

Submit a list of spare parts (the fuses, lamps, etc.) to Owner with a copy to the Professional of Record.

GUARANTEE:

Fully guarantee all Work under this section, for a period of two years minimum stated in these specifications from the date of substantial completion, against imperfect workmanship or failure or malfunction of materials and/or equipment due to faulty or imperfect workmanship. Give this guarantee in writing to the Owner at the time of issuing finals certificate. Work found to be defective within this period shall be replaced without cost to the Owner.

PART II – PRODUCTS

(Not applicable)

PART III – EXECUTION

(Not applicable)

END OF SECTION