

## SECTION 16010

## ELECTRICAL GENERAL PROVISIONS

## PART 1 - GENERAL

## 1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplemental Conditions and Division 1 Specification Sections, shall apply to this Section.

## 1.02 WORK INCLUDED

- A. Provide materials, labor and equipment to permanently relocate equipment, as shown on drawings, for completely operational, coordinated and tested electrical backboard renovation and related work, including but not limited to:
  - 1. Relocation of a CT cabinet, meter sockets, disconnect switches and transformers.
  - 2. New interior and exterior light fixtures.
  - 3. Reconnection to existing feeders, branch circuit wiring and grounding.
  - 4. New feeders and branch circuit wiring.
  - 5. Power and control wiring.
  - 6. New underground and spare conduits for power and communications.
  - 7. Dry type transformers.
  - 8. Testing.
  - 9. Demolition work; disconnecting and removal of wiring associated with the existing electrical distribution equipment.
- B. Work to be performed, furnished, installed, located, or set by others as listed or described under this section or in other sections of these specifications shall be coordinated by the Contractor for wiring and connection.

## 1.03 INTENT

- A. The intent of this specification and accompanying construction drawing is to describe and indicate the furnishing, erection, installation and connections to the equipment as specified and shown on the drawing. It is not intended that the specifications and drawing describe and indicate each piece of equipment required for installation, for where items are intended or required for satisfactory installation and are considered to be the accepted practice of the trade, they shall be considered to be both specified and indicated.

- B. Furnish all plant, labor and material necessary for the complete and satisfactory installation of all work for this contract.
- C. Assume the entire responsibility for the materials, workmanship, and satisfactory operation of the various systems, and other work as specified herein and or as shown on the drawings.
- D. Schedule and coordinate all work in close cooperation with all Contractors working on this project and Central Maine Power.

#### 1.04 RELATED REQUIREMENTS

- A. Division 1 - General Requirements.
- B. Division 2 – Site Work.

#### 1.05 DEFINITIONS

- A. The following definitions of terms and expressions used in this section are in addition to the listing given in Supplementary Conditions:
  - 1. "Provide" shall mean, "furnish and install," unless otherwise indicated.
  - 2. "Wiring" shall mean conduit, fittings, boxes, accessories, conductors (wires) and connections as required for a complete operating system.

#### 1.06 CONTRACTOR'S RESPONSIBILITY

- A. Be familiarized with the existing facilities and difficulties by visiting the job site. The Contractor shall be responsible for the execution of all work related to the Construction Documents. No extra money claims will be allowed resulting from any discrepancies.
- B. Establish grades and elevations, and check all interferences, and verify all dimensions and locations in the field.
- C. The drawings are intended to indicate only diagrammatically the extent, general character and locations of work included. Work intended, but with minor details obviously omitted, shall be furnished and installed complete to accomplish the function required. If any obstructions or interferences should be encountered which are not shown on the drawings or described in the specifications, install the equipment, etc., as closely as possible to the locations indicated on the drawings, or as required. Equipment installation shall approximate the mounting heights of the adjacent equipment. Such changes shall be subject to the approval of the Owner prior to the installation and shall be made at no increase in contract price.
- D. Conduit and circuiting, designations, etc., shall be installed as indicated on the drawings unless prior approval in writing has been obtained for such changes. When changes occur, sketches shall be submitted to the Owner showing all deviations from the contract drawings.
- E. The locations of equipment, conduits, outlets, etc., as shown on the drawings, are correct to the extent permitted by the scale of the drawings, but are subject to such

modifications as may be found necessary or desirable at the time of installation in order to meet any structural conditions. Such changes shall be brought to the attention of the Owner and made by the Contractor without extra charge.

- F. The Owner specifically reserves the right, up to the time of roughing-in, to exactly define the position of the equipment to be installed and connected to, and the arrangement of these connections, where they do not substantially affect the agreed upon construction costs.
- G. Equipment such as junction and pull boxes, switches, controls and such other apparatus as may require maintenance and operation from time to time shall be installed to be easily accessible thereafter. Although the equipment may be shown on the Drawings in certain locations, the construction may disclose the fact that such locations do not make its position readily accessible. In such cases, the Contractor shall bring it to the attention of the Owner of the condition before advancing the construction to a point where a change will reflect additional expenses.
- H. Attention is called to the Construction Documents involving special details. The Contractor shall carefully scrutinize all documents for the details affecting the performance of the work.

#### 1.07 REGULATORY REQUIREMENTS

- A. The installation shall comply with state and local laws and regulations applying to installations in the City of Portland, with applicable requirements of the National Code and its latest revisions.

#### 1.08 PERMITS AND FEES

- A. The Contractor shall obtain all permits, pay all fees and give authority having jurisdiction requisite notices.

#### 1.09 MATERIALS AND WORKMANSHIP

- A. Materials shall be new and shall conform with the standard of the Underwriters' Laboratories, Inc. in every case where such a standard, listing or label has been established for the particular type of material in question.
- B. Names of manufacturers, catalog numbers, models or types, when used in this section and the included drawings, are intended to indicate the standards of type and quality of material.
- C. Where two or more units of the same class of equipment are required, these units shall be the product of a single manufacturer.

#### 1.10 DRAWINGS

- A. The drawings shall show the layout of the system and indicate the approximate locations of apparatus and equipment. The runs of feeders shall be indicated and the exact routing of conduit shall be determined by the field conditions and other obstructions.

- B. Verify in the field and consult all Construction Documents to determine conditions that may affect the location of any apparatus and equipment to avoid possible interference and permit full coordination of work. The right to make any reasonable change in location of apparatus and equipment up to the time of roughing-in is reserved by the Owner.

#### 1.11 RECORD DRAWINGS

- A. Maintain at the job site at all times a complete set of blueline prints of the work on which shall be marked, clearly, neatly, accurately and promptly as the work progresses.
- B. Record drawings shall conform to the requirements of Division 1.

#### 1.12 SUBMITTALS

- A. Submit shop drawings and samples (refer to Division 1 and the individual specification sections requirements).
- B. Submit shop drawings giving dimensions and details to insure compliance to the project documents.
- C. General bulletins or catalogs will not be accepted as shop drawings unless the equipment on which approval is to be obtained is specifically marked and information pertaining to the item, including dimensions where required for installation, is included.
- D. Submit copies of test plans and reports.

#### 1.13 GUARANTEE

- A. The Contractor shall guarantee systems to be free from short circuits, open circuits, loose connections, overheating and such other defects.

#### 1.14 EQUIPMENT AND SCAFFOLDING

- A. The Contractor shall be responsible for furnishing all tools and equipment, scaffolding and other temporary construction required for the execution of the work under Division 16.

#### 1.15 INSPECTION AND TESTS

- A. Connections at cabinets, switches, circuit breakers and all splices must be made at the time of final inspection and testing. Circuits shall be continuous from service switches to each outlet. Each system shall test free from short circuits and ground and shall have an insulation resistance between conductors and ground based on maximum load not less than requirements of the latest edition of the National Code.
- B. Voltages shall be tested at the line side of the main breaker with switches or circuit breakers in the open position. After proper voltage has been established at the main service, measure minimum and maximum voltages, measure voltages between phases, neutral and grounds of all feeder circuits.

- C. The Contractor shall be responsible for correct voltages, tap settings and correct phase designations on all equipment.
- D. The grounding installation shall be tested and the resistance between ground and absolute earth shall not exceed 25 ohms and shall be measured by the Contractor before equipment is placed in operation.
- E. Testing equipment necessary to satisfactorily conduct the tests mentioned above shall be provided. The tests shall be made under the direction of and at no additional expense to the Owner.
- F. Failure or defects in workmanship or materials revealed by tests or inspection shall be corrected promptly and tests shall be re-conducted. Defective material shall be replaced promptly at no additional expense to the Owner. Insofar as practicable a normal full load test shall be made on the power and lighting systems.
- G. If the voltage and regulation are not within acceptable limits, coordinate with the Owner to correct for proper voltage.
- H. Copies of all test reports shall be in conformance with NETA ATS, its latest edition, submitted for approval to the Owner under provisions of Division 1.

#### 1.16 COORDINATION

- A. Coordinate work with Section 01010 - Summary of Work.
- B. Fully coordinate the various parts of the work included under this Section, with other Sections throughout the various phases of construction and before the ordering or fabrication of the various parts of the work, so as to insure compliance with the drawings and specifications, and as necessary to provide the installations complete and in satisfactory operating condition.
- C. Coordinate electrical equipment installation with existing building components.
- D. Coordinate installing required supporting devices and other structural components as they are constructed.
- E. Sequence, coordinate and integrate installing electrical materials and equipment for efficient flow of the work in accordance with the Owner's requirements.
- F. Coordinate connecting electrical wiring to existing components.
- G. Coordinate requirements for electrical items requiring access per National Electric Code.
- H. Coordinate installing electrical identification after completion of finishing where identification is applied to field-finished surfaces.

#### 1.17 TYPES OF SERVICE

- A. Electrical equipment will be served from the electrical service rated at 480Y/277 Volts, 3 phase, 4 wire; and 208Y/120 volts, 3 phase, 4 wire from the electrical distribution equipment.

#### 1.18 NOTIFICATION

- A. Arrange with the Owner for switching, connecting, tapping and phasing of the electric lines.

#### 1.19 ELECTRICAL EQUIPMENT IDENTIFICATION

- A. Ensure that equipment identification applied is confirmed by field investigation/ survey. Indicate loads served by all overcurrent protective devices. This requirement applies to all equipment located on the existing equipment backboard, including "existing to remain" and "existing to be relocated."
- B. Equipment 120 volts and above shall also indicate voltage, phases and other ratings per National Electrical Code.

#### 1.20 NAMEPLATES/WARNING SIGNS

- A. Provide nameplates for equipment and enclosure identification, as required by other sections of Division 16 and the National Electrical Code.
- B. Provide warning signs for equipment and enclosures in accordance with the National Electric Code, or as required by other sections of Division 16.

### PART 2 - PRODUCTS

#### 2.01 MATERIALS

- A. Provide equipment of the exact type and quality specified herein and indicated on the drawings in order to achieve design requirements.
- B. Use UL labeled and listed equipment where listing has been established. Other qualified testing laboratories may be used if UL listing is not available with prior approval of the Engineer.

#### 2.02 NAMEPLATES

- A. Provide nameplates for all new and existing electrical equipment. Nameplates shall be permanent identification of a plastic nameplate with engraving through to a white core.

### PART 3 - EXECUTION

#### 3.01 GENERAL

- A. When changes in location of any work are required, obtain approval of Engineer/ Owner before making change.

- B. Do not change indicated sizes without written approval of Engineer/Owner. Sizes shall be increased if required by codes or manufacturer's recommendation.
- C. Provide all necessary offsets and crossovers in conduits, and raceways.
- D. Install exposed conduits parallel to walls and ceilings and vertically plumb, unless otherwise indicated.

### 3.02 CUTTING AND PATCHING

- A. Perform or pay for all cutting, fitting, repairing, patching and finishing of work required under Division 16. Repair or replace existing or new work disturbed.
- B. Before cutting, obtain approval of the Engineer/Owner.
  - 1. Perform only approved methods.
  - 2. Cut all holes neatly and as small as possible to admit work. Holes shall be cut with diamond core drills or concrete saws.
- C. Locate openings and sleeves to permit neat installation of conduits and equipment.

### 3.03 SEALING OF PENETRATIONS

- A. Floor, exterior wall and roof seals shall be watertight. Walls and floors which are cored for installation of conduit shall be sleeved with steel tubing, grouted, and the space between the conduit and sleeve filled as specified herein.
- B. When conduits penetrate exterior walls, foundations, or roof, coordinate and carry all costs associated with sealing the penetrations for this work.

### 3.04 INSTALLATION OF EQUIPMENT

- A. Install all equipment in accordance with manufacturer's recommendations.
- B. Provide all necessary anchoring devices and supports.
  - 1. Use structural supports suitable for equipment.
  - 2. Check loadings and dimensions of equipment with shop drawings.
- C. Verify that equipment will fit layouts indicated.
  - 1. Where substitute equipment is used, revise layouts to fit at no additional cost.
- D. Arrange for necessary openings to allow entry of equipment.
- E. Install equipment to permit easy access for normal maintenance and Code required clearances.
  - 1. Maintain code-required access to switchboard, panelboards, switches, pull boxes, receptacles, etc.
  - 2. Relocate items which interfere with access.
- F. Provide overcurrent protection, accessories and installation as required by the National Electric Code for specific equipment not provided as part of the manufactured equipment.

### 3.05 FIELD QUALITY CONTROL

- A. Perform indicated tests to demonstrate workmanship, operation, and maintenance.
  - 1. Conduct tests in presence of Engineer/Owner and, if required, inspectors of agencies having jurisdiction.
  - 2. Arrange date of tests two work weeks in advance with Engineer/Owner, manufacturer and installer.
  - 3. Give minimum of one workweek notice to all inspectors.
- B. Repair or replace equipment and systems installed under this contract that are found inoperative or defective and retest.
  - 1. If equipment or system fails retest, replace it with products conforming with Conceptual Documents.
  - 2. Continue remedial measures and retests until satisfactory results are obtained.
- C. Test equipment and systems as required for each item, unless otherwise recommended by manufacturer.

### 3.06 FINAL ACCEPTANCE TEST



- A. Perform test as required in accordance with the respective section of this specification and approved test plan.

### 3.07 ADJUST AND CLEAN

- A. Inspect all equipment and put in good working order.
- B. Clean all exposed and concealed items.
- C. Where new work occurs in existing areas where no other work has been done, clean area and restore to original condition.

### 3.08 EQUIPMENT START-UP

- A. Equipment shall satisfactory operate prior to final acceptance, at a time agreed to by the Engineer/Owner.
- B. Operate all systems in good working order for a period of 5 working days before acceptance.

### 3.09 NAMEPLATES/WARNING SIGNS

- A. Nameplates shall be secured with a minimum of two suitable screws, or an approved method of attachment.
- B. Nameplates on equipment 120 volts and above shall indicate voltage, phases, and other ratings.

END OF SECTION 16010