

SECTION 16010 - GENERAL ELECTRICAL REQUIREMENTS

GENERAL

1.1 SECTION INCLUDES

- A. Furnish all materials, labor, tools, transportation, incidentals, and appurtenances to complete in every detail and leave in working order all items of work called for herein or shown on the accompanying drawings.
- B. Include any minor items of work necessary to provide a complete and fully operative electrical system.
- C. The Contractor for this work is referred to other pertinent Sections of these Specifications. These sections describe work that is a part of this Contract. The following General Provisions amplify and supplement these Sections of Specifications. In cases of conflicting requirements, the stipulations set forth in Bidding Requirements, General Conditions, Special Provisions, and Temporary Services supersede and must be satisfied by the Contractor.

1.2 GENERAL REQUIREMENTS

- A. Contractor shall read the entire specifications covering other branches of work. He is responsible for coordination of his work with work performed by other trades.
- B. Consult all Contract drawings which may affect the location of any equipment or apparatus furnished under this work and make minor adjustments in location as necessary to secure coordination. Contractor shall consult architectural reflected ceiling plans for exact locations of ceiling mounted lighting fixtures. Contractor shall consult architectural interior elevations for mounting heights of wiring devices, fire alarm devices and clock panels. Contractor shall consult architectural exterior elevations for mounting heights of wall mounted exterior lighting fixtures.
- C. System layout is schematic and exact locations shall be determined by structural and other conditions. This shall not be construed to mean that the design of the system may be arbitrarily changed. The equipment layout is to fit into the building as constructed and to coordinate with equipment included under other Divisions of work.
- D. Contractor shall contact the Resident immediately if he notices any discrepancies or omissions in either the drawings or the specifications, or if there are any questions regarding the meaning or intent thereof.
- E. Submit all changes, other than minor adjustments, to the Resident for approval before proceeding with the work.

1.3 PRODUCTS FURNISHED UNDER OTHER DIVISIONS

- A. Products provided under other Divisions of work and to be connected with electrical power circuits under Division 16:
 - 1. Elevator provided under Division 14.
 - 2. Mechanical systems equipment provided under Division 15.
- B. The Contractor shall review submittal data for all items being provided under other Divisions of work and shall coordinate electrical services required.

1.4 SUBMITTALS

- A. Submit under provisions of the following.
- B. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal. Indicate overall equipment dimensions and electrical characteristics including voltage, frame and trip ratings and short circuit-withstand rating where applicable.

1.5 REGULATORY REQUIREMENTS

- A. Complete installation shall conform with all applicable Federal, State and Local laws, Codes and Ordinances, included but not limited to latest approved editions of the following:
 - 1. State Building Codes.
 - 2. Specific Construction Safety Requirements, State Industrial Commission.
 - 3. National Electrical Code (NFPA 70).
 - 4. National Fire Code (NFPA 72).
 - 5. Life Safety Code, (NFPA 101).
 - 6. American with Disabilities Act (ADA).
 - 7. Occupational Safety and Health Act (OSHA) of 1971 and all amendments thereto.
 - 8. Maine State Elevator Code.
- B. Nothing contained in the drawings and specifications shall be construed to conflict with these laws, codes, and ordinances, and they are thereby included in these specifications.
- C. Obtain and pay for all necessary electrical permits. Request inspections from authority having jurisdiction.

1.6 ALTERNATE BID ITEMS

- A. The Contractor shall refer to project Drawings and Bidding Documents for a complete description of all Alternate Bid Items.
- B. Alternate Bid #1
 - 1. Base Bid: Provide the following only as part of the Base Bid scope of work:
 - a. Cut and terminate the existing 15kV cable that extends underground from Substation #1 to Substation #4 in existing manhole EMH-2. Provide pre-manufactured 15kV cable terminations for the cable ends within EMH-2.

- Disconnect the cable at Substation #4 and remove the cable length from EMH-2 to Substation #4.
- b. Provide an empty 4-inch conduit from electrical manhole EMH-2 to the south side of the Terminal Building. Route the conduit along the east face of the pier structure. Terminate the conduit at the pier (south of the Terminal Building) in a 24" X 24" x 12" stainless steel NEMA 4X box.
 - c. In the Substation #4 electrical room, disconnect and remove the existing 480/277-volt feeder from Substation #4 that serves the existing 480/277-volt, 3-phase distribution panelboard that is located on the electrical room end wall.
 - d. Provide a temporary 480/277-volt, 3-phase 4-wire feeder to serve the existing 480/277-volt distribution panelboard in the Substation #4 electrical room. Connect this temporary feeder to a 100-ampere, 3-pole circuit breaker to be provided at switchboard SWBD-T in the Terminal Building. Extend the temporary feeder in a 4-inch conduit through the wiring box south of the Terminal Building (par. 1.6.B.1.b), and then on to the Substation #4 electrical room. The temporary feeder shall be 4 #2, 1 #6 gnd.
2. Alternate Bid: Provide the following only as part of Alternate Bid #1 scope of work:
- a. Cut and terminate the existing 15kV cable that extends underground from Substation #1 to Substation #4 in existing manhole EMH-2. Provide pre-manufactured 15kV cable terminations for the cable ends within EMH-2. Disconnect the cable at Substation #4 and remove the cable length from EMH-2 to Substation #4.
 - b. Provide a 4-inch conduit from electrical manhole EMH-2 to the south side of the Terminal Building. Route the conduit along the east face of the pier structure. Terminate the conduit at the pier (south of the Terminal Building) in a 24" X 24" x 12" stainless steel NEMA 4X box.
 - c. Provide 4-inch conduit from 24" x 24" x 12" box to Substation #4.
 - d. Provide a 15kV cable from EMH-2 to Substation #4, to be run in the 4-inch conduit provided under this Alternate (par. 1.6.B.2.a and 1.6.B.2.b).
 - 1) 15kV cable shall be as manufactured by The *Okonite Company*, "Okoguard Type MV-105" series.
 - (a) Conductor: Annealed uncoated copper compact strand per ASTM B-496.
 - (b) Strand Screen: Extruded semi-conducting EPR strand screen meeting or exceeding the electrical and physical requirements of ICEA S-68-516, AIEC CS6 and UL 1072.
 - (c) Insulation: 133% insulation level; meeting or exceeding the electrical and physical requirements of ICEA S-68-516, AIEC CS6 and UL 1072.
 - (d) Insulation Screen: Extruded semi-conducting EPR.
 - (e) Shield: 5 mil bare copper tape helically applied.
 - (f) Jacket: Polyvinyl chloride.
 - (g) Operating Temperature Rating: 105°C continuous.
 - (h) Size: #1/0
 - e. Provide 15 kV pre-manufactured cable connectors as manufactured by *Elastimold* for the cable connection in manhole EMH-2.

- C. Alternate Bid #9:
 - 1. Base Bid: No Work under Base Bid.
 - 2. Alternate Bid: Provide the following only as part of Alternate Bid #9 Scope of Work:
 - a. Provide an electrical service for the Receiving Building air conditioning condensing unit CU1, consisting of the following:
 - 1) Provide a 90-ampere, 3-pole circuit breaker for Panel R-L1.
 - 2) Provide a feeder consisting of 3#4, 1#8GND in a 1-1/2-inch conduit. Extend the feeder from R-L1 to the condensing unit.
 - 3) Provide a 100-ampere, 3-pole unfused disconnect switch to be located at the condensing unit.
 - b. Provide an electrical service for the Terminal Building air conditioning air-cooled chiller ACH1, consisting of the following:
 - 1) Provide a 150-ampere, 3-pole circuit breaker for Switchboard SWBD-T.
 - 2) Provide a feeder consisting of 3#3/0, 1#2GND in a 2-inch conduit. Extend the feeder from SWBD-T to the chiller.
 - 3) Provide a 200-ampere, 3-pole unfused disconnect switch to be located at the chiller.

1.7 ELECTRICAL MOTORS

- A. In general, motors will be furnished and installed under other Divisions of work as a factory-installed item. Unless they are factory installed on the unit, all wiring, safety switches and motor starters shall be furnished and installed by the Electrical Contractor, field coordinate prior to bids.
- B. Electrical Contractor shall obtain all wiring diagrams necessary to connect and control equipment requiring electrical energy.

1.8 RECORD DRAWINGS

- A. Record any changes in location of concealed boxes, service runs, and similar construction on a set of prints and deliver them to the Resident upon completion of the work.
- B. Record location and depth of exterior work carefully for future reference.

1.9 OPERATING AND MAINTENANCE INSTRUCTIONS

- A. Provide a Complete Instruction and Maintenance Manual: Prepare in the form of an instructional manual for use by Owner's personnel. Provide one (1) draft copy and two (2) final copies.
 - 1. Format:
 - a. Size: 8-1/2" x 11", 20 lb. minimum weight white paper for typed pages, either manufacturer's printed data, or neatly typewritten.
 - b. Drawings: Provide reinforced punched binder tab, bind in with text. Fold larger drawings to size of text pages. Clear plastic "binding tape" (not "Scotch" tape) applied to edge of sheet and then punched is acceptable.
 - c. Single-sheet product literature and contractor-prepared pages: Provide reinforced punched binder tab. Clear plastic "binding tape" (not "Scotch" tape) applied to edge of page and then punched is acceptable.

- d. Provide indexed tabs and flyleaf for each separate product, or each piece of operating equipment. Include typed description of product, and major component parts of equipment.
 - e. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS".
 - f. Binders:
 - 1) Commercial quality three-ring binders with durable and cleanable plastic covers, 1" minimum, 2" maximum ring size.
 - 2) When multiple binders are used, collate the data into related consistent groupings and provide a spine label that includes the volume number and contents of the binder.
- B. Provide content as listed in separate Sections of Division 16 of these specifications.
- 1.10 PROJECT/SITE CONDITIONS
- A. Install work in locations shown on drawings, unless prevented by project conditions.
 - B. Prepare drawings showing proposed rearrangement of work to meet project conditions, including changes to work specified in other Sections. Obtain permission of Resident before proceeding.
- 1.11 COORDINATION WITH WORK PROVIDED UNDER DIVISION 15
- A. Electrical work for mechanical systems equipment furnished under Division 15 shall be coordinated with Specification Section 15100.
 - B. Power wiring and connections shall be provided under Division 16 for all Division 15 equipment, including:
 - 1. Branch circuit power wiring.
 - 2. Local disconnect switches for 480-volt and/or 208-volt single and three phase equipment items (except where an integral means of disconnect is specified to supplied with the equipment item by the manufacturer).
 - 3. Magnetic motor starters for 480-volt and/or 208-volt single and three phase equipment items (except where an integral starter is specified to supplied with the equipment item by the manufacturer).
 - 4. SPST Manual motor starter switch for 120-volt motors.
 - C. Work provided under Division 15 shall include:
 - 1. Motors.
 - 2. Motor speed controller switches.
 - 3. Low-voltage automatic temperature controls and associated wiring.
 - 4. Heat tracing for piping, and associated controls.
 - 5. Variable speed drives for motors.

1.12 TEMPORARY POWER AND LIGHTING

- A. The Contractor shall be responsible for provision of temporary electrical power and lighting as required to facilitate construction work.
 - 1. Temporary electrical power shall be obtained from the serving utility company as required. The Contractor shall make all necessary arrangements for the connection of a temporary power service.
 - 2. The costs for monthly service charges from the serving utility company included in the Contractor's bid.
 - 3. The Contractor shall provide temporary electrical power distribution as required to facilitate construction activities including:
 - a. Wire/conduit
 - b. Over-current protection
 - c. Receptacle outlets
 - d. Motor disconnect means
 - e. Grounding
 - 4. The Contractor shall provide temporary lighting as required to facilitate construction activities.
 - 5. All temporary electrical power and lighting shall be completely removed prior to substantial completion of the project.

PRODUCTS

2.1 MATERIALS

- A. Furnish new and undeteriorated materials and of a quality not less than what is specified.
- B. The selection of materials and equipment to be furnished shall be governed by the following:
 - 1. Where single trade name, brand of manufacturer or material is listed in the specification, the exact equipment listed shall be used in the bid.
 - 2. Where more than one name is listed, Contractor may select any one of the several brands specified.
 - 3. Where trade name, brand of manufacturer of equipment or material is listed in the specification followed by the word "or approved equal," the Contractor may substitute product of equal quality from another manufacturer for consideration by the Resident.

EXECUTION

3.1 PROTECTION AND CLEANING

- A. Protect all electrical work and products against damage during construction and pay the cost of repair or replacement of electrical products made necessary by failure to provide suitable safeguards or protection.
- B. After all work has been inspected and approved, thoroughly clean all equipment, provided under this work.

- C. Repair all dents and scratches in factory prime or finish coated on all electrical equipment.

3.2 CUTTING AND PATCHING

- A. Cut and patch as required to install new work. Patching shall match existing surfaces in kind and finish.
- B. Obtain prior approval from the Resident before cutting any structural members.

3.3 EXCAVATION COORDINATION

- A. The Contractor shall contact *Dig Safe* at least three business days, but not more than 30 calendar days, in advance of any excavation work (1-888-DIGSAFE).

3.4 FIRE STOPPING

- A. Provide UL Listed fire stop for all conduits and cables that pass through fire-rated walls. Fire stop materials and methods shall be as specified in Section 16111.

END OF SECTION