

## SECTION 26 00 00 - GENERAL ELECTRICAL REQUIREMENTS

### PART 1 - 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, including work related to:
  - 1. Modification of existing service/distribution equipment.
  - 2. Electrical distribution including new circuit breaker panelboards, and associated feeders.
  - 3. Electrical branch circuits, including wiring and devices.
  - 4. Emergency power system including a generator, transfer switches, panelboards, and wiring.
  - 5. Interior lighting including luminaires, lamps, wiring and controls.
  - 6. Exterior lighting including luminaires and wiring and controls.
  - 7. Fire alarm system including control panel, initiating devices, indicating devices, and wiring.
  - 8. Cable television system including outlets and wiring.
  - 9. Voice/data network system including outlets and wiring.
  - 10. Door access control system including door controls, control panels, and wiring.
- 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 Bidding Requirements, General Conditions, Special Conditions, Temporary Services and other pertinent Sections of these Specifications. These sections describe work that is a part of this Contract as contained in Division 01. The following General Provisions amplify and supplement these Sections of Specifications. In cases of conflicting requirements, the stipulations set forth in Division 01 supersede and must be satisfied by the Contractor.

#### 1.2 RELATED SECTIONS

- A. 26 05 26 – Grounding
- B. 26 05 33 – Raceway and Boxes for Electrical Systems

#### 1.3 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code.
- B. ANSI/NFPA 101 - Life Safety Code.
- C. OSHA 1910 - Occupational Safety and Health Act.
- D. ADA - Americans with Disabilities Act.

#### 1.4 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. 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 Owner's Representative 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 Architect for approval before proceeding with the work.

#### 1.5 SUBMITTALS

- A. Submit under provisions of the following and Division 01.
- B. Submittal shall include complete Specifications, including type of materials, electrical characteristics, capacities, performance and power requirements to determine compliance with Contract Documents. All data submitted shall be complete and shall apply only to this specific project. All extraneous material shall be deleted or marked out. Items to be supplied shall be specifically indicated using a method that will be visible after photocopying.
- C. Regardless of any information included in the submittal submitted for review, the requirements of the Drawings and Specifications shall not be superseded in any way by the review. Review by the Architect-Engineer does not relieve responsibility for submittal errors or from meeting the requirements of the Contract Documents.
- D. It is intended that Submittal data be complete and accurate at the first submission. If the Submittal is returned marked "Resubmit" only one additional submission will be permitted.
- E. Submit related Submittal at one time. **SUBMIT ALL ITEMS IN A SPECIFICATION SECTION AT THE SAME TIME.** Incomplete submittal will be held until a complete submittal is accumulated or may be rejected without further review and returned to the applicable parties. Include a copy of the Specification Paragraphs pertaining to the items submitted.
- F. If proposed equipment deviates from the Specifications or Drawings, indicate in writing on Company letterhead those differences and provide sufficient data to justify acceptance.

FAILURE TO INDICATE DEVIATIONS OR SUBSTITUTIONS IMPLIES FULL COMPLIANCE WITH DRAWINGS AND SPECIFICATIONS.

- G. The term "by others" or similar wording shall not be used on Submittal. Submittal shall state by whom related items of work are to be provided. Where not indicated, it is implied that the work or item is provided under this Section.
- H. Shop Drawings: Provide shop drawings as required by the individual Specification Sections. Submit shop drawings indicating physical size and arrangement, (plans and elevations) construction details, provisions for conduits, access requirements for installation and maintenance, finishes, and materials used in fabrication for all equipment. Supplement shop drawings with wiring diagrams for all systems with wiring connections for multiple components.
- I. Submittals shall be made as paper copies. Submittals transmitted only by electronic email shall not be accepted.

1.6 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. Occupational Safety and Health Act (OSHA) of 1971 and all amendments thereto.
  - 7. ADA - Handicap Accessibility Requirements.
  - 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. All work shall comply with the 2008 edition of NFPA 70, The National Electrical Code. It shall be the Contractor's responsibility to assure that electrical work is in full compliance with the NEC.
- C. The Contractor shall visit the site to become familiar with all existing conditions affecting this work. No claim will be recognized for extra compensation due to failure of contractor to familiarize himself/herself with the conditions and extent of proposed work.
- D. Obtain and pay for all necessary permits. Request inspections from authority having jurisdiction.

1.7 RECORD DRAWINGS

- A. Record any changes in location of concealed boxes, equipment items, receptacle and device outlets, lighting fixtures, fire alarm devices, underground utility service conduits, and similar construction items on a set of prints and deliver them to the Owner's Representative upon completion of the work.
- B. Record location and depth of exterior work carefully for future reference.

## 1.8 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 26 of these specifications.

## 1.9 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 Architect/Engineer before proceeding.

## 1.10 COORDINATION WITH WORK PROVIDED UNDER DIVISIONS 22 AND 23

- A. Electrical work for mechanical systems equipment furnished under Divisions 22 and 23 shall be coordinated with these respective Divisions.
- B. Power wiring and connections shall be provided under Division 26 for all Division 22 and 23 equipment, including:
  1. Branch circuit power wiring.
  2. Local disconnect switches for 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. Motor starters for 208-volt single and three phase equipment items (except where an integral starter is specified to supplied with the equipment item by the manufacturer or where a variable speed drive is provided under Division 23).
4. SPST Manual motor starter switch for 120-volt motors.

C. Work provided under Divisions 22 and 23 shall include:

1. Motors.
2. Motor speed controller switches.
3. Low-voltage automatic temperature controls and associated wiring.
4. Variable speed drives for motors.

D. In general, motors will be furnished and installed under other Divisions of work as a factory-installed item. Unless they are factory installed on equipment units supplied under other Divisions, all safety switches and motor starters shall be furnished and installed by the Electrical Contractor. Coordinate prior to submission of bid.

1. Electrical Contractor shall obtain all wiring diagrams necessary to connect and control equipment requiring electrical energy.

#### 1.11 COORDINATION WITH WORK PROVIDED UNDER OTHER DIVISIONS

A. Division 14 - Elevator: Provide all necessary connections to the existing elevator as required by the elevator supplier/installer. All work shall conform to the State Elevator Code. Provide all necessary components and wiring connections for full conformance with the Elevator Code.

B. Division 27 - Telecommunications:

1. Provide 120-volt power requirements for all telecommunications equipment items.
2. Provide conduit and boxes for telecommunications systems wiring.

C. Division 28 – Alarms:

1. Provide 120-volt power requirements for the fire alarm equipment control panel.
2. Provide conduit and boxes for interior fire alarm system wiring.
3. Provide conduit and boxes for door access control system wiring.

#### 1.12 COORDINATION WITH OWNER FURNISHED ITEMS

A. Provide 120-volt power requirements for the door access control system power panels.

#### 1.13 UTILITY SERVICE WORK

A. The Contractor shall modify the existing electrical service/distribution system to accommodate new branch circuit panelboards and equipment feeders. Work shall include the following:

1. Coordinate the modifications to existing service metering with the *Central Maine Power Company*.
2. Provide new circuit breakers for installation in existing switchgear.

#### 1.14 FIRESTOPPING

A. Firestopping around electrical cable, conduit and/or boxes and firestopping within boxes shall be as specified under Section 26 05 33 to maintain fire ratings at walls, floors and ceilings. The

Contractor shall coordinate penetrations of rated surfaces with the architectural drawings and specifications to assure that the proper fire rating is achieved.

#### 1.15 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 existing campus electrical distribution system. The Contractor shall make all necessary provisions for the connection of a temporary power service.
  - 2. 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
  - 3. The Contractor shall provide temporary lighting as required to facilitate construction activities.
  - 4. All temporary electrical power and lighting shall be completely removed prior to substantial completion of the project.

#### 1.16 SUBSTANTIAL AND FINAL COMPLETION

- A. Refer to General Conditions and Supplementary Conditions.
- B. Substantial Completion shall not be considered unless all systems are tested and verified for adherence with Contract Documents and any work remaining is less than one percent of the total Contract Value of this Section.
  - 1. Record Drawings, Operation and Maintenance Manuals, Acceptance Demonstrations, Owner personnel training, spare parts or extra materials required, test reports, warranties and certifications of installation inspections shall be submitted and accepted prior to Substantial Completion.
- C. Final Completion shall be when all work under this Section is completed as defined by the Contract Documents and accepted by the Architect-Engineer.
- D. When Architect-Engineer determines Work is complete, close out submittals will be considered.

#### 1.17 COMMISSIONING

- A. Commissioning work of Division 26 shall include, but not be limited to:
  - 1. Cooperation with the Commissioning Authority.
  - 2. Providing qualified personnel for participation in commissioning tests.
  - 3. Providing equipment, materials, and labor as necessary to correct construction and/or equipment deficiencies found during the commissioning process.

4. Providing operation and maintenance manuals, shop drawings, equipment start-up reports, testing and balancing reports and as-built drawings to the Commissioning Authority.
- B. The work included in the commissioning process involves a complete and thorough evaluation, verification and documentation of the operation and performance of all components, systems, and sub-systems relating to the following electrical systems:
1. Lighting Control System as specified in Section 26 09 43
- C. Responsibilities
1. The Owner is encouraged to participate in all commissioning functions including attending meetings, scheduling commissioning activities, witnessing commissioning activities and verifying all occupancy schedules and building specific variables.
  2. Commissioning Authority:
    - a. Develop the commissioning requirements and all related testing, verification and quality control sections.
    - b. Prepare the electrical commissioning program. Include a list of all contractors for commissioning events by name, firm and trade specialty.
    - c. Execute the electrical commissioning program, through organization of all meetings, tests, demonstrations, training events and performance verifications described in the Contract Documents and approved electrical commissioning program. Organizational responsibilities include preparation of agendas, attendance lists, arrangement for facilities and timely notification to participants for each commissioning event. The Commissioning Authority shall act as chairman at all commissioning events and assure execution of all agenda items. The Commissioning Authority shall prepare minutes of every commissioning event and send copies to all attendees and the Owner within 5 work days of the event.
    - d. Witness equipment and system start-up and testing. Ensure the results are documented (including a summary of deficiencies), and incorporated in the O&M manuals.
    - e. Schedule the O&M training sessions. These training sessions are to be attended by the Owner, Commissioning Authority, and Electrical Contractor.
    - f. Submit detailed verification test procedures and data sheets for review by the Design Professional.
    - g. Submit detailed functional performance test procedures and data sheets for review and acceptance by the Design Professional.
    - h. Upon receipt of notification from the Electrical Contractor that the electrical systems have been completed and are operational, the Commissioning Authority shall proceed to verify the operation of systems.
    - i. Conduct verification tests and document results via detailed checklist data sheets.
    - j. Conduct functional performance tests. The test data shall be part of the commissioning report.
    - k. Re-test if performance deficiencies are found, corrected, and additional testing is requested.
    - l. Prepare the final commissioning report.
  3. Electrical Contractor:

- a. Include cost to complete all commissioning requirements for electrical systems in the contract price.
- b. Make available to the commissioning agent submittal data and O&M data for all equipment included in the project.
- c. Ensure cooperation and participation of specialty sub-contractors for fire alarm lighting control and telephone/intercom systems.
- d. Attend coordination meetings scheduled by the Commissioning Authority.
- e. Assist the Commissioning Authority in all verification and functional performance tests.
- f. Prepare preliminary schedule for electrical system orientation and inspections, O&M manual submission, training sessions, system testing, equipment start-up, and task completion for use by the Commissioning Authority. Update schedule as appropriate throughout the construction period.
- g. Attend initial training session.
- h. Provide written notification to the Commissioning Authority that all electrical work has been completed in accordance with the contract documents, and that the equipment, systems and sub-systems are operating as required.
- i. Provide a complete set of as-built records to the Commissioning Authority.

## PART 2 - 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 Engineer.
- C. Conduit shall be as specified under Section 26 05 33.

## PART 3 - 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 Engineer before cutting any structural members.

END OF SECTION 26 00 00