SECTION 16010 - GENERAL PROVISIONS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Distribution System Information:

1. Voltage: 480Y/277, 60 Hertz
2. Three-phase, four-wire

B. Description of System:

1. Industrial distribution system comprised of two individual main panelboards with subpanel distribution. A 208/120 Volt, 3-Phase, 4-Wire transformer and panelboard is provided to serve receptacle and general loads.
2. Source of supply is pad-mounted transformer PMT-3 as shown on the drawings.
3. Metering is performed at primary voltage and is not included within the scope of this contract.

C. Existing Condition - Service Equipment and Components Already In-Place:

1. Transformer PMT-1 (along Durham Street).
2. Primary wiring to PMT-1 from overhead via Pole #1.
3. Transformer PMT-2 (located in vault along Durham Street north of PMT-1).
4. Primary wiring to PMT-2 from overhead via Pole #2.
5. New Central Main Power Service Pole on west side of Durham Street.
6. 7’ x 13’ manhole MH1.
7. UG conduit from CMP Service Pole to manhole MH1.
8. UG conduit from manhole MH1 to PMT-1.

D. Work Performed By Electrical Contractor:

1. Provide secondary conduit, conductors, and terminations from load side of PMT-3 to New Cooler Electrical Room distribution panels as shown on Drawing E100, Single-Line Diagram and Drawing E200, Site Plan.

E. Work Performed By Central Main Power (CMP), Utility Contractor, or Owner:

1. Coordinate all outages with the Owner.
2. Deenergize service conductors to support work performed by the electrical contractor.
3. Provide underground conduit duct bank from existing manhole MH1 to new transformer PMT-3 base per Drawing E200.

4. Provide transformer base for transformer PMT-3. The transformer base shall be installed per distribution construction standards of Central Maine Power Company.
5. Provide new transformer PMT-3.
6. Coordinate work with Owner to support CMP primary (medium voltage) loop wiring from CMP Service Pole to PMT-3 then to PMT-1 and finally to PMT-2.
7. Provide all medium voltage conductors from CMP Service Pole for loop feed of PMT-1, PMT-2, and PMT-3. Perform all associated conductor terminations.
8. Provide appropriate Primary Overcurrent Protection and Disconnecting Means for PMT-1, PMT-2, and PMT-3 as governed by NESC and CMP requirements.
9. Perform the following associated with PMT-1 / PMT-2 reconnection work:
   a) Remove and replace transformer PMT-1 to support rewiring effort.
   b) Excavate UG conduit @ existing Pole #2.
   c) Cut Pole #2 conduit @ elbow to remove elbow and conduit riser without damaging medium voltage cable.
   d) Extend conduit from PMT-2 (cutoff by CMP in above item) to existing PMT-1 base with primary service conductors in place.
   e) Pull PMT-2 line-side wiring through conduit extension to PMT-1 base.
   f) Terminate PMT-2 line-side wiring to PMT-1 lugs.
   g) Remove all overhead conductors and poles that no longer serve a functional purpose.
10. Provide all electrical service and metering associated with PMT-1, PMT-2, and PMT-3.

F. Utility Company Coordination:

1. Owner shall be responsible for coordination of all electrical service details with Central Maine Power Company.
2. All service fees imposed by the utility for permanent plant electrical service shall be paid by the Owner.

1.3 DEFINITIONS

A. The following definitions apply when used in the context of these Specifications.

1. Furnish: Obtain, supply, fit out, and deliver to project site.
2. Install: Set up for use.
3. Provide: Furnish and install.
4. Approved Equal: Material manufactured by other than name or names specified which meets Specification and is reviewed favorably by the Engineer.
5. Dedicated: Means one circuit in one metal conduit between device and circuit breaker.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories:

1. Listed and labeled as defined in the National Electrical Code (NFPA 70), Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

2. Provide components meeting the following standards:
   a) National Electric Manufacturer's Association (NEMA) Standards of Construction.
   b) Underwriters' Laboratories (UL) "Listings" and "Approvals".

B. Requirements of Regulatory Agencies:

1. Comply with the 1999 National Electrical Code (NFPA 70).
2. Comply with the construction code requirements of State, County, or other political subdivision, which exceed the requirements of national codes, standards and approving bodies. Modify the electrical work to be in conformity with such laws, ordinances, rules and regulations without additional expense to the Owner.

C. Certificates and Permits: Upon completion of work, and prior to final payment, submit formal certification of final inspections to the Engineer from authorities having jurisdiction and secure required permits or certificates, from such authorities. Prepare detailed diagrams and drawings which may be required by those authorities having jurisdiction.

1. Costs associated with inspection fees shall be included in the contract price and shall be paid by the contractor.

D. Source Quality Control: Products specified herein are those of companies having established reputations in the manufacture of the particular materials, equipment or apparatus specified. Such products shall be manufactured by those companies specified, or may be the product of other companies for which the specified company assumes full responsibility and for which replacement parts are made available by the specified company.

1.5 SUBMITTALS

A. Shop Drawings:

1. Submit for review completely dimensioned Shop, Layout, or Setting Drawings and catalog cuts or other data as required and as requested by the Engineer, to render a complete description of system equipment specified in each Section of Division 16 or as scheduled on Drawings.
2. Submit Shop Drawings certified for construction by the manufacturer which includes electrical wiring diagrams, details and all necessary dimensions for assembly and installation. Apply contractor's stamp with signature or initials certifying that submittal is in accordance with requirements of the contract documents. Submittals without said information will be rejected.
3. No manufacture and/or installation shall proceed until Shop Drawings have been reviewed by the Engineer. Equipment subject to submittal review, if installed prior to the review of said submittal, will not be approved for payment and is installed at the Contractor's risk. No additional compensation will be made for changes to such installations required as a result of the submittal review.
4. Shop drawings will be reviewed a second time by the Engineer if a resubmittal is required. Any subsequent review time by the Engineer required after the second review will be charged to the Contractor.
5. Refer to Section 01300 for additional requirements regarding submittals.

B. Operation and Maintenance Manuals: Submit to the Engineer for review and approval, manuals prepared by the manufacturer/supplier of the Contractor in accordance with Section 01730. The submission and approval of each set of manuals will be considered to be an integral part of furnishing and installation of the respective equipment or system. Incomplete or inadequate manuals will be returned to the Contractor for correction and resubmission.

1. Include the following elements in each manual:
   a) Erection or installation instructions.
   b) Start-up procedures.
   c) Recommended and alternative procedures.
   d) Schedule of preventative maintenance requirements.
   e) Schedule of recommended spare parts to be stocked, complete with part number, inventory quantity and ordering information.
   f) Detailed maintenance procedures.
   g) Schedule of lubrication requirements.
   h) Data sheet listing pertinent equipment or system information, as well as the addresses and telephone numbers of the nearest sales and service representatives.
2. Operation and Maintenance Manuals are required for each of the following items of equipment or systems:
   a) Main Distribution Panel.
   b) Distribution and Branch Panelboards.
   c) Transformers
   d) Starter Enclosure Panels and associated components.
   e) Lighting.
   f) Heat Tracing

C. Overload Relays: Obtain actual horsepower, service factor and full load running current for all electrical motors furnished under other Contracts and/or Trades for the Project. Submit an "Overload Relay Schedule" for Engineer review that includes the following information:

1. Motor nameplate information: Horsepower, Service Factor and Full Load Running Current
2. The size of all heater elements contained in the overload relays.

D. Substitute Light Fixture Submission: Pursuant to Sections 165XX, the Contractor may submit comparable original "Materials" (lighting fixtures), not photo copies, for Engineer's approval. Such submissions shall incorporate the following:

1. Manufacturer's catalog cuts indicating type, design, dimensions, mounting arrangement and other industry standard lighting fixture information.
2. Manufacturer's photometric data, distribution curves, isolux charts, glare factor data, and coefficient of utilization.
3. It is the contractor’s responsibility to point out the differences in fixtures between those specified and those proposed.

E. As-Built Drawings:

1. Maintain a set of Drawings on which all changes and deviations from the original design shall be marked.

2. Maintain a copy of the Panelboard Schedules on which all changes and deviations from the original design shall be marked.
    a) Upon request, the contractor can be provided with a Microsoft Excel spreadsheet of the Panelboard schedules to be utilized for as-built documentation purposes.
3. Refer to Division 1 of these Specifications for "As-Built" Drawing requirements.

F. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.6 JOB CONDITIONS

A. Interferences:

1. The Drawings are generally diagrammatic and indicative of the work and indicate the intent of the design.
    a) The drawings shall not be used for final dimensioning unless noted on drawings.
    b) The Contractor is responsible for coordinating with others to verify equipment size, locations, associated equipment and hardware (i.e. starters, disconnect switches, control stations and etc.).
    c) The Contractor is responsible for modifying the work with offsets, bends or other fittings to avoid minor interferences and structural obstruction.
    d) Perform such modifications at no increase in Contract Price.
2. Construct "Electrical" systems when and in a manner not to delay or interfere with other Contracts' work.
3. Prior to making "Electrical" installations, coordinate "Electrical" work locations with the work of other Contracts, especially in congested areas, such as mechanical equipment rooms and above hung ceilings (if any).
4. In the event that interferences develop, the Engineer's decision will be final and no additional compensation will be allowed for relocation of "Electrical" materials.

B. Interfaces:

1. The electrical components or apparatus furnished as part of the "Materials" under other Contracts will be installed or mounted as work of those Contracts unless indicated otherwise on the Drawings. Verify equipment requirements, locations and ratings prior to final installation. No additional compensation will be allowed for relocation or modification of "Electrical" materials that have not been field coordinated with the appropriate parties.
2. Motors:
    a) All motors shown on Drawings will be provided under other Contracts for this project.
3. Motor Starters:
    a) All motor starters in MCC’s and Starter Enclosure Panels not specifically identified as Not in Contract shall be provided under this Contract. All other motor starters shall be provided by others unless noted otherwise on the drawings.

b) All motor starters in vendor control panels shall be provided under other contracts. Motor starters identified to be provided by the electrical contractor on the electrical drawings shall be provided under this contract. Coordinate interfacing controls with others as required.

4. Control Wiring:

a) HVAC Contract Interface:

1) Wiring for control of HVAC equipment shall be the responsibility of the HVAC contractor, regardless of voltage.

(a) For wiring purposes elements such as, but not limited to, thermostats, solenoid valves, and motor operated dampers shall be considered control elements to be wired by the HVAC contractor.

2) Wiring for power to HVAC equipment shall be provided by the electrical contractor.

(a) Power wiring shall include all wiring required to provide power to equipment independent of system voltage or panel source.

(b) This contract shall be responsible for power interface wiring for HVAC equipment derived from panelboards, motor control centers, starter enclosure panels, or HVAC panels as identified on the drawings.

(c) Regarding homeruns shown on drawings to motor driven equipment, the Contractor shall provide all power wiring to the associated motor starter (provided by the HVAC Contractor) and from the motor starter to the equipment. The Contractor shall coordinate precise location of HVAC equipment, including any starters provided by the HVAC Contractor, with the HVAC Contractor.

b) Refrigeration Contract Interface:

1) Wiring for control of Refrigeration equipment shall be the responsibility of the Refrigeration contractor, regardless of voltage, unless noted otherwise on the Drawings.

(a) For wiring purposes, thermostats and solenoid valves shall be considered control elements to be wired by the Refrigeration contract.

2) Wiring for power to Refrigeration equipment shall be provided by the electrical contractor.

(a) Power wiring shall include all wiring required to provide power to equipment independent of system voltage or panel source.

(b) This contract shall be responsible for power interface wiring to refrigeration equipment derived from panelboards, motor control centers, or Refrigeration control panels as identified on the drawings.

(c) Regarding homeruns shown on drawings to motor driven equipment, the Contractor shall provide all power wiring to the associated motor starter (provided by the Refrigeration Contractor) and from the motor starter to the equipment. The Contractor shall coordinate precise location of Refrigeration equipment, including any starters provided by the Refrigeration Contractor, with the Refrigeration Contractor.

c) Material Handling Contract(s) Interface:

1) Wiring for control of Material Handling equipment shall be the responsibility of the Material Handling contractor, regardless of voltage.

(a) For wiring purposes elements such as, but not limited to, limit switches, selector switches, proximity and photocell sensors, and electrically-controlled pneumatic operators shall be considered control elements to be wired by the Material Handling contractor.

2) Wiring for power to Material Handling equipment shall be provided by the electrical contractor.

(a) Power wiring shall include all wiring required to provide power to equipment independent of system voltage or panel source.

(b) This contract shall be responsible for power interface wiring for Material Handling equipment derived from panelboards, motor control centers, starter enclosure panels, or Material Handling panels as identified on the drawings.

(c) Regarding homeruns shown on drawings to motor driven equipment, the Contractor shall provide all power wiring to the associated motor starter (provided by the Material Handling Contractor) and from the motor starter to the equipment. The Contractor shall coordinate precise location of Material Handling equipment, including any panels, starter enclosure panels or starters provided by the Material Handling Contractor, with the Material Handling Contractor.

5. Disconnect Switches:

a) HVAC Contract:

1) Disconnect switches associated with HVAC equipment shall be provided by the HVAC contractor.

b) Refrigeration Contract:

1) Disconnect switches associated with Refrigeration equipment shall be provided by the electrical contractor.

c) General Equipment:

1) Disconnect switches shown on the Drawings shall be provided by the Electrical Contractor unless noted otherwise.

2) Disconnect switches furnished by general equipment suppliers shall be installed by the electrical contractor.

1.7 WARRANTIES

A. Assigned Warranties: Manufacturer's warranties on material and equipment (including internal components) exceeding the guarantee time Period as stated in the Conditions of the Contract, shall be assigned directly to the Owner.

B. Such assigned warranties shall be dated to begin at the date of the Owner's acceptance of the Work.

C. Submit warranties along with the Operation and Maintenance Manual submission.

D. Refer to Section 01600 for additional requirements regarding warranties.

1.8 EARTHWORK

A. Provide all excavation, trenching and backfilling required for underground conduit and outdoor equipment pads.

B. Backfill shall be placed in loose layers not exceeding 8" and thoroughly compacted. Remove 2" or larger stones and foreign material from backfill. Match existing grade.

1.9 CONCRETE

A. Equipment Pads: Provide concrete curbs and pads for equipment provided by this Contractor. See section 16050 for concrete requirements.

1.10 TELEPHONE AND INTERCOM SYSTEM

A. Telephone:

1. General; This contract shall provide telephone outlets and raceways as indicated on drawings and specifications.
2. Telephone outlets: Provide single gang device box with RJ11 outlet and cover.

B. Raceway:

1. Provide 3/4” conduit from each telephone outlet and data outlet to the respective telephone termination board. Provide #12 pullwire or string for future installation of telephone system.

C. Utility Fees: All service fees imposed by the Telephone Company for required improvements shall be paid by the owner.

PART 2 – PRODUCTS

2.1 DISTRIBUTION SYSTEM BASE DESIGN:

A. All distribution equipment layout and equipment details (MCC’s, Panelboards, Switchboards, etc.) has been based upon Square D Company products.

1. Contractor shall be responsible for providing products of equivalent performance when products of other manufacturer(s) are utilized as permitted by the applicable specification section.
2. Contractor shall be responsible for resolving any interferences incurred as a result of size changes in equipment when products of other manufacturer(s) are utilized.

PART 3 – EXECUTION

2.2 ELECTRICAL EQUIPMENT INSTALLATION

A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom.

B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.

C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.

D. Right of Way: Give to raceways and piping systems installed at a required slope.

E. Floor-mounted equipment, such as Motor Control Centers, Substations, etc., shall be mounted on a 4" housekeeping pad. The pad shall be constructed by the Electrical Contractor and shall extend 2" beyond the outside dimensions of the equipment on the front and sides, unless the Drawings indicate additional space for future expansion.

F. Heat Tracing: The Electrical Contractor shall provide all project heat tracing and appurtenances shown on the drawings

1. The Electrical Contractor shall provide power to heat tracing circuits as indicated on the Drawings.
2. The Electrical Contractor shall ground fault protection and thermostatic controls for each circuit in an accessible location at each structure that requires heat tracing.
3. The General Contractor will provide all pipe insulation.

2.3 FIELD QUALITY CONTROL

A. General Requirements:

1. Unless waived in writing by the Engineer, the Contractor shall be Present during the tests as outlined in this specification section.
2. Unless waived in writing by the Engineer, perform tests and trials in the presence of a duly authorized representative of the Owner/Engineer. When the presence of such representative is so waived, furnish to the Owner/Engineer sworn statements, in duplicate, of the tests made and the results thereof.
3. Include costs of tests and trials in the Contract price.
4. Troubleshoot and correct all failures in a manner satisfactory to the Engineer or his authorized representative

B. Megger Testing:

1. Megger tests are to be performed prior to the electrical systems being energized.
2. The entire installation shall be free from short circuits and improper grounds.
3. The insulation resistance of all distribution feeders shall be individually tested.
   a) The distribution system feeders shall consist of all feeders shown on the single-line diagram, as well as all conductors #2/0 or larger in size. In no case, shall the insulation resistance be less than one Megohms.
4. The Electrical Contractor shall follow approved lock-out and tag-out procedures when working with energized equipment and shall observe all safety precautions provided by the test equipment manufacturer.
   a) Test feeders disconnected from the branch with the power equipment connected for proper operation.

b) Any device (TVSS, circuit breaker, metering equipment, etc.) that has a lower voltage rating than that voltage to be applied during the test shall be removed from the circuit and safely isolated from the applied voltage.

5. Test Equipment: Use meggers with an adjustable 2.5/5.0 KV range which will permit reading of 0.05 to 100,000 Megohms.

a) Minimum testing voltage shall be obtained by adding 1000 volts to twice the rated voltage of cable, device, apparatus or equipment.

b) In no case shall the insulation resistance be less than 1 (one) Megohm. The recommended insulation resistance measurements of each test shall conform to IEEE and ANSI Standards.

END OF SECTION 16010