

SECTION 16050
BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 General Requirements, apply to work specified in this Section.

1.02 SUMMARY OF WORK

- A. Work Included: Generally, the Electrical Subcontractor shall provide electrical work shown on the drawings and described in the specifications. Include all labor, materials, tools, equipment, transportation, supervision and incidental items essential for proper installation and operation, even though not specifically mentioned or indicated on the drawings. Electrical work includes Work specified in the following sections:
1. All Division 16 sections.
 2. Section 13850, Modifications of the Fire Alarm System
- B. Give necessary notices, obtain permits, pay governmental taxes, fees and other costs as required for the electrical work, and to file for necessary approvals with the jurisdiction under which the work is to be performed. Obtain Certificate of Inspection for the electrical work; this certificate is a prerequisite to final acceptance of and final payment for the electrical work.
- C. Connections to Architectural, HVAC, Plumbing and Owner-Furnished Equipment: Provide conduit connections to equipment provided under other Sections of the specifications as shown on the drawings, including final connections to equipment to result in a complete system, fully operational.
- D. Furnish for installation by other trades:
1. Access panels required for access to electrical controls specified in this Section.
 2. Metal counterflashing for electrical conduit which penetrates the roof.
- E. Related Work Specified in Other Sections:
1. Firestopping where electrical work penetrates fire-rated and smoke-barrier walls and floor-ceiling assemblies: Section 07840, Firestopping.
 2. Finish painting of electrical items: Section 09900, Painting.
 3. Instrumentation and control systems: Division 15.
 4. Temporary Electricity: Section 01500, Construction Facilities and Temporary Controls.
 5. Base flashing for and installation of metal counterflashing for conduit which penetrates the roof: Division 7 roofing section.
 6. Variable frequency drives : Section 15065. VFDs shall be furnished under Division 15, but installed and power wired under this Section.

1.03 REFERENCED CODES AND INDUSTRY STANDARDS

- A. Materials and workmanship shall comply with all applicable Codes, Specifications, Local and State Ordinances, Industry Standards, and Utility Company Regulations, latest editions.
- B. The "Electrical Code" is the National Electrical Code, published by the National Fire Protection Association as NFPA-70, 1999 Edition.
- C. NFPA 72 National Fire Alarm Code.
- D. NFPA 101 The Life Safety Code.
- E. The BOCA National Building Code 1999 (BOCA).
- F. In case of conflict between the Contract Documents and the requirements of the Electrical Code or any other regulations or Authorities having jurisdiction, the most stringent requirements shall govern.
- G. Should the Electrical Contractor perform any work that does not comply with the requirements of the applicable Building Codes, State Laws, Local Ordinances, Industry Standards and Utility Company Regulations, the Electrical Contractor shall bear all costs arising in correcting the deficiencies, as approved by the Architect and the Owner.
- H. Provide materials, equipment and execute the work, including test and inspections, per applicable provisions of Federal, State and Local government laws and ordinances and referenced codes and standards. Governing laws, ordinances, codes and standards constitute minimum requirements.

1.04 DESIGN AND PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Furnish and install electrical equipment to resist seismic forces in accordance with the referenced Building code.
- B. Seismic restraint shall be provided for the electrical equipment such as switchboards, panels, transformers, generators, conduits, cable trays and lighting fixtures.
 - 1. Shop drawings, certified by a professional engineer, shall be provided for the seismic restraints. The shop drawings shall include details for restraints' fabrication and installation including anchorages and attachments to the structure.
- C. Manufacturer of the seismic control products shall have the following responsibilities.
 - 1. Determine seismic restraint sizes, type and locations.
 - 2. Provide equipment seismic restraints.
 - 3. Provide installation instructions, drawings and field supervision to insure proper installation and performance.
 - 4. Certify seismic restraint design and installation upon completion of work.
 - 5. Seismic control products manufacturer: Mason Berger Northeast or equal.

1.05 SUBMITTALS

- A. **Product Data:** For each type of material and system listed in this article in the various sections, submit manufacturer's illustrated product literature, with item and options which are proposed clearly marked, and submit manufacturer's technical specifications, preparation and installation instructions. Submit additional pertinent data as required by the Architect for evaluation of the product.
- B. **Record Drawings:** Comply with requirements for record drawings specified in Section 01770, Project Closeout.
- C. **Operation and Maintenance Manual:** Submit the required typed sets, bound neatly in loose-leaf binders, of instructions for the installation, operation, care and maintenance of all equipment and systems (including instructions for the ordering and stocking of spare parts for all equipment installed under this Contract), as specified in Section 01770. The list shall include manufacturer's guarantee and warranty data.
- D. Comply with USM IDAT specified in Section 01810.

1.06 QUALITY ASSURANCE

- A. **Manufacturers:** Companies specializing in manufacturing the products specified; demonstrate a minimum 3 years documented experience.
- B. **Installers:** Companies which have been specializing in performing work of the type specified for at least three years. Foreman shall have at least 5 years experience.
- C. **Pre-Installation Conference:** Conduct conference at Project site to comply with requirements of Section 01310, "Project Management and Coordination." At least 30 days prior to start of the installation of work included in this specification, conduct a meeting to review the proposed hanging and support of work from the building structure and to discuss the required details, methods and procedures to achieve the required support. Review requirements for submittals including details for hanging or supporting the work, and the coordination of the work with other trades. Establish preliminary work progress schedule, procedures for coordination, and Contractor's quality control procedures.
 - 1. Require representatives of each trade or entity directly concerned with hanging and supporting work from the building structure attend the conference, including, but not limited to, the following:
 - a. Contractor's Superintendent.
 - b. Contractor's representative responsible for field quality control.
 - c. Representative from each trade.
 - 2. Notify the Architect and the Owner's representative at least 48 hours in advance of the meeting so that they may attend.

1.07 PROJECT/SITE CONDITIONS

- A. Field Measurements: Make necessary field measurements to ascertain space requirements, for electrical equipment and connections, and to furnish such sizes and shapes of equipment to allow for the final installation to conform to the drawings and specifications.
- B. Comply with manufacturer's directions regarding environmental conditions for storage and during installation of electrical equipment. Promptly notify the Architect in writing of any conflict between any requirements of the Contract Documents and the manufacturer's directions.

1.08 COORDINATION

- A. Coordinate electrical work with work of other trades, so that work will be completed without interruption. This shall include all adjustments necessary to conform to structural and architectural conditions.
- B. Connections to Architectural, HVAC, Plumbing and Owner-Furnished Equipment: Obtain installation diagrams and methods of installation of all equipment, from manufacturers. Follow instructions strictly. If additional information is required, obtain from the Architect.
- C. Changes in construction required for coordination, which deviate from the intent or requirements of the specifications and/or drawings, must be described and detailed in writing and submitted to the Architect for approval.
- D. The Contract Drawings are intended to show general runs and locations of conduit, equipment, terminals and specialties and not necessarily showing all required offsets, details and accessories and equipment to be connected. The work shall, therefore, be installed to fulfill the intent expressed on the Electrical Drawings, but in conformity with the dimensions indicated on the final working drawings, field layouts, and shop drawings of all trades. Lay out work accurately in coordination with other Trades to avoid conflicts in placement of the conduits, boxes, electrical panels, motor starters, disconnect switches, lighting fixtures, wiring devices, etc., and to obtain a neat installation which will afford maximum accessibility for operation, maintenance and headroom. In case of conflict between conduit sizes shown on plans, details or diagrams, allow for the largest conduit size.
- E. Require trades providing openings (except core drilling) to coordinate dimensions with actual dimensions of equipment furnished under this section. Furnish to other trades requiring them, dimensions, templates, bolts, and anchors for support or attachment of electrical work.

1.09 WARRANTY

- A. Attention is directed to the General Requirements of the Contract regarding guarantees warranties for work under this Contract.
- B. Submit manufacturers' standard warranties for equipment furnished under Division 16 sections. However, such warranties shall be in addition to and not in lieu of other rights and remedies which the Owner may have by law or by other provisions of the Contract Documents.

- C. Electrical Subcontractor's Guarantee: As a pre-requisite to final payment, provide a written guarantee, executed by the Electrical Contractor, stating that
 - 1. All elements of the systems provided under the Electrical Contract are of sufficient capacity to meet performance requirements specified in this section or shown or implied by the drawings.
 - 2. Upon receipt of notice from the General Contractor or the Owner of failure of any part of the systems or equipment during the guarantee period, the Electrical Subcontractor will promptly return to the site and repair or replace the affected part or parts and make good the Electrical Work.

PART 2 - MATERIALS

2.01. MANUFACTURERS

- A. Furnish products by one of the named manufacturers, or submit a formal, written request for Substitution in accordance with procedures described in Section 01620.
 - 1. If a substitution is accepted by the Architect, provide redesign of electrical and mechanical work which is required to accommodate the substituted product, subject to approval by Architect.
- B. Furnish all equipment of one type from a single manufacturer.

2.02 MATERIALS, GENERAL

- A. Material and equipment shall meet requirements of the latest Standards of NEMA, UL, ICEA, ANSI and IEEE. Equipment shall have components required or recommended by OSHA, applicable NFPA documents and shall be UL approved and labeled.

2.03 MISCELLANEOUS MATERIALS (NOT SPECIFIED IN OTHER DIV. 16 SECTIONS)

- A. Access Panels: Furnish panels specified in section 08305.
- B. Conduit Sleeves:
 - 1. Sleeves through unrated walls and floors: Schedule 40 galvanized steel pipe.
 - 2. Sleeves through fire-rated partitions and floors: 10 gauge galvanized steel.
- C. Steel Channels (for equipment supports): Mild steel channels as manufactured by Unistrut, Kindorf or Husky Products Company; equal to Unistrut "P1000."

PART 3 - EXECUTION

3.01 PREPARATION

- A. Relocate or reroute existing equipment and systems to accommodate new work or new connections, as indicated on the drawings and in the specification Section 16090, as required by job conditions, and as determined by the Architect in the field.

- B. Maintain existing electrical systems in continuous operation during demolition and construction. Consult with Owner's representative and schedule necessary outages at a mutually agreeable time, and obtain Owner's approval before shutting off any service. Limit duration of outages to the shortest practical period of time, and promptly restore service after tie in is made, or at the end of the agreed-upon time period. Repeat this procedure as many times as required to suit the Owner's working schedule until all work is completed.
- C. The Owner reserves the right to inspect the material scheduled for removal and salvage any items he deems usable as spare parts.

3.02 GENERAL INSTALLATION REQUIREMENTS

- A. Coordination: The electrical work shall be carried on under the usual construction conditions, in conjunction with all other work at the site. Coordinate electrical work with general conditions work and with other Contractors working at the site. The Owner will not reimburse the Contractor for overtime hours worked or additional costs incurred due to lack of or improper coordination with other Trades.
- B. Protect electrical equipment from damage during construction, including protection from moisture and contamination.
- C. Prior to installation, coordinate the exact mounting arrangement and location of equipment indicated on the drawings to allow proper space requirements as indicated in the Electrical Code. Pay particular attention in the field to group installations. If it is questionable that sufficient space, conflict with the work of other Contractors, architectural or structural obstructions will result in an arrangement which will prevent proper access, operation or maintenance of the indicated equipment, the Electrical Contractor shall immediately notify the Architect and not proceed with this part of the Contract work until definite instructions have been given to him by the Architect.
- D. Arrange for chases, slots and openings in other building components during progress of construction, to allow for electrical installations.
- E. Equipment Supports: Provide adequate supports wherever required, whether or not indicated. Fabricate supports from steel channels 1-5/8 inch minimum width, 0.105 inch minimum wall thickness. Use larger size or gauge if required to support weight.

3.03 CORING AND SLEEVES

- A. Electrical Contractor shall be responsible for all core drilling required for his work, but in no case shall the Contractor cut into any structural elements without the written approval of the Architect.
 - 1. Cutting, rough patching, and finish patching are specified in a Division 1 Section, to be the responsibility of the General Contractor.

3.04 CLEANING, TOUCH-UP AND REPAIR

- A. Remove waste materials from the premises promptly as the work progresses.

- B. At the completion of the work, thoroughly clean and polish equipment and materials installed under this section. Turn the electrical work over to the Owner in a condition satisfactory to the Architect.
- C. Touch-up damaged finishes on equipment; use same paint as applied in the shop and prepare surfaces and apply paint in accordance with paint manufacturers instructions.
- D. Repair damage which electrical work causes to the work of other Trades. Contractor may charge such repairs to the electrical subcontractor.

3.05 TESTING AND INSPECTION

- A. Test and inspect all parts of the work provided under this Contract, and as required by codes, standards or authorities having jurisdiction. Conduct all tests and inspections to the complete satisfaction of the Architect and the authorities. Notify the Architect and the authorities at least 48 hours prior to testing or inspection. Do not cover work prior to testing or inspection.
- B. Prior to the date of acceptance, furnish the Architect with certificates of testing and inspection for all electrical systems, indicating the approval of authorities having jurisdiction and conformance with the requirements of the Contract Documents.
- C. All systems shall test free from short circuits and grounds, shall be free from mechanical and electrical defects, and shall show an insulation resistance between phase conductors and ground of not less than the values recommended by the manufacturers.
- D. Promptly correct failures and defects in workmanship or materials revealed by tests or inspection, and retest. Replace defective material at no additional expense to the Owner.
- E. Prepare systems for testing and protect from damage during testing. Provide all temporary connections, necessary testing equipment, labor and materials, required for the testing of the systems and equipment.
- F. Verify and correct as necessary the following: Voltages, tap settings, trip settings, and phasing on all equipment from the secondary distribution system to points of utilization. Test secondary voltages at the bus in the main switchboard, at panelboards, and at such other locations on the distribution systems as necessary. Test secondary voltages under no-load and full-load conditions.
- G. Comply with USM IDAT specified in Section 01810.

END OF SECTION 16050