SECTION 16010

GENERAL REQUIREMENTS - ELECTRICAL

PART 1 - GENERAL

1.01 PROVISIONS GOVERNING WORK UNDER THIS DIVISION

A. SEE Division 1.
   1. This Section 16010 governs and is applicable to all Sections concerning Electrical.

1.02 SUBMITTALS

A. SUBMIT Shop Drawings per Part 2 of this Section.

B. SUBMIT project record Drawings upon completion of project.

1.03 WARRANTY

A. WARRANTY ALL MATERIALS AND WORK for a period of one year after acceptance of project by Owner.

1.04 DESCRIPTION

A. EXCEPT AS SPECIFICALLY INDICATED OTHERWISE, these specifications require finished work, tested out and made ready for normal operation.

B. COORDINATION WITH OTHERS: Work under this Division shall be fully coordinated with work, Drawings and Specifications for: general construction, electric operated doors, finish hardware devices, incinerators, site utilities, sprinklers, mechanical, telephone, alarms, and others as included in project.

1.05 REQUIREMENTS OF REGULATORY AGENCIES

A. CODES, INSPECTIONS AND STANDARDS:
   1. INSTALLATION SHALL CONFORM WITH THE LATEST PUBLISHED AND CURRENT EDITION OF THE FOLLOWING:
      National Electrical Code (NEC) (NFPA 70)
      City and State Electrical Code and Regulations
      National Electrical Safety Code
      Americans with Disabilities Act (ADA)
      Life Safety Code (NFPA 101) as well as with all Interim Amendments and all other applicable Regulations and Requirements of City, County, State and Federal Governments having jurisdiction over the conduct of this work or any part thereof.
   2. INSTALLATION shall be done in accordance with the latest Rules and Regulations of the Occupational Safety and Health Act (OSHA).
   3. INSTALLATION SHALL CONFORM WITH THE LATEST PUBLISHED STANDARDS OF:
      Institute of Electrical and Electronic Engineers (IEEE).
      Illuminating Engineering Society (IES).
      National Electrical Manufacturers Association (NEMA).
   4. MAKE CORRECTIONS TO INSTALLATIONS, requested by official Electrical Inspectors representing City and State Inspection Departments, so long as such corrections are necessary for compliance with official and published requirements prior to date of the Contract.
   5. REQUESTED CHANGES: See that Architect is advised and given a copy of work so requested by City, State, or Federal Inspectors, and that the work does not conflict with intended design.
   6. SERVICE STANDARDS: Service entrance, metering arrangements, and motor loading, shall be in conformity with applicable Service Standards published by the serving Utility Company.
   7. INTERIM AND FINAL INSPECTIONS: Call for and pay for inspections required by City's Inspection Department and other Governing Bodies. Keep record of such calls and submit to Architect, if requested.

1.06 QUALITY ASSURANCE

A. LABELS:
   1. MATERIALS AND EQUIPMENT furnished under this Section shall either have a UL (Underwriters' Laboratories) label affixed, or shall be listed as being approved for the application being made, by UL, where such approvals are applicable.
   2. FURNISH ETL (Electrical Testing Laboratories), CBM (Certified Ballast Manufacturers), RLM (Registered Luminaire Manufacturers) labels on items advertised as having such labels, when such items are specified, or upon items proposed as substitutions for such specified items.

B. MATERIALS AND WORKMANSHIP:
   1. SEE requirements in Division I. Materials shall be those shown on Drawings and specified herein.
   2. MATERIALS shall match and fit together in a complete and working installation.
   3. UNSIGHTLY INSTALLATIONS shall be removed and replaced, or otherwise satisfactorily reworked until acceptable, when so ordered by Architect, even though having no circuitry or operating faults.

1.07 TESTS

A. MAKE TESTS necessary to insure against concealment of defective materials and workmanship, before inspection, and again if requested in the presence of the Architect, Engineer, or official Inspector.

1.08 INSTRUCTIONS AND OPERATIONAL DATA

A. PROVIDE at least one set of instructions and maintenance data for wiring items or equipment items. Furnish complete and reasonable instructions for the operation of switches, circuits, systems, and equipment.

1.09 SUPPORT OF ELECTRICAL EQUIPMENT AND MATERIALS

A. DO NOT HANG or support electrical equipment and materials from roof decks.

1.10 SITE VISIT

A. Visit the site and become familiar with all aspects of the site and existing conditions before submitting Contract price.

B. No allowance will be made for lack of knowledge of existing conditions.

1.11 DEVIATIONS

A. No deviations from the Contract Documents shall be made without the full knowledge and written consent of the Architect.

B. If the existing conditions make it desirable to modify the Contract Documents in regard to any item, provide a written request to the Architect.

PART 2 - PRODUCTS

2.01 MATERIALS AND PRODUCTS

A. REFER to the various Sections under Division 16.

2.02 STANDARDS FOR MATERIALS AND WORKMANSHIP

A. All materials shall be new and shall be stamped with the label of Underwriters Laboratories, Inc. (UL).

B. All materials shall meet the standards of the following associations and institutes where applicable.
   1. National Fire Protection Association (NFPA)
   2. American Society of Testing Materials (ASTM)
   3. American National Standards Institute (ANSI)
   4. National Electrical Manufacturer's Association (NEMA)
   5. Institute of Electrical and Electronic Engineers (IEEE)

C. Manufacturer's names and catalog numbers specified herein are intended to describe the material and set the standard of quality. All bids shall be based on material specified. Request for approval of material not specified shall be considered if the request is written form and submitted to the Architect no later than fourteen (14) days before bid date. All requests shall conform with the provisions of the general and supplementary conditions.

2.03 SHOP DRAWING SUBMITTAL

A. The Engineer's review of shop drawings or submittals is a cursory review to check for general compliance of submittals with the design intent of the Contract Documents. The Engineer's review does not relieve the Contractor of his responsibility of complying with the contract documents. All coordination of the work in the strict compliance with the Contract Documents is the sole responsibility of the Contractor.

B. The following items shall be submitted for review:
   1. Conduit and wire
   2. Grounding system
   3. Devices
   4. Cover Plates
   5. Load Centers
   6. Overcurrent devices
   7. Lighting Fixtures
   8. Service Entrance Equipment

C. All shop drawings and submittals shall be submitted in compliance with the requirements of the general and supplementary conditions. No more than six (6) copies of submittal data will be reviewed. Any additional copies will be returned unmarked. The responsibility of copying review comments on any additional copies will rest solely with the Contractor.

D. All submittals shall bear the name of the manufacturer to be used.

E. All shop drawings and submittals shall include a stamped indication signifying that the submittal has been reviewed for compliance with the Contract Documents by the Contractor. This stamped indication also represents the fact that the Contractor has checked his submittal for it's interaction with all other Divisions and certifies by his signature or initials that all coordination has taken place. The stamp shall include the date, name of the Contracting Firm, the signature of the contractor, certification and approval. This stamp will be on the submittal before the Engineer will review it.

F. The Engineer will review an individual submittal not more than twice. If the submittal is rejected again on the second review, the contractor will bare all responsibility for paying the Engineer's time for additional reviews. Such payment to the Engineer shall be withheld from the next monthly pay application.

PART 3 - EXECUTION

3.01 INSTALLATION

A. REFER to the various Sections under Division 16.

END OF SECTION

SECTION 16050

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 CONTENTS

A. Supporting Devices for Electrical Components.

B. Electricity - Metering Components.

C. Touchup Painting.

1.02 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories:
   1. Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. NFPA Compliance:
   1. Comply with NFPA 70.

C. Code Compliance:
   1. All work to be in accordance with latest requirements of the N.E.C. and all other applicable codes and regulations of authorities having jurisdiction over the work.

1.03 SUPPORTING DEVICES

A. Performance Criteria.
   1. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.
   2. Metal Items for use Outdoors or in Damp Locations: Hot-dip galvanized steel.
   3. Slotted-Steel Channel Supports: Flange edges turned toward web, and 9/16-inch diameter slotted holes at a maximum of 2 inches o.c., in webs.
      a. Channel Thickness: Selected to suit structural loading.
      b. Fittings and Accessories: Products of the same manufacturer as channel supports.
   4. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.
   5. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.
   6. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for non-armored electrical cables in riser conduits. Plugs have number and size of conductor gripping holes as required to suit individual risers. Body constructed of malleable-iron casting with hot-dip galvanized finish.
   7. Expansion Anchors: Carbon-steel wedge or sleeve type.
   8. Toggle Bolts: All-steel springhead type.

1.04 EQUIPMENT FOR UTILITY COMPANY'S ELECTRICITY METERING

A. Performance Criteria.
   1. Meter Sockets: Comply with requirements of electrical power utility company.
      a. Housing: NEMA (Type 3R) enclosure.

PART 2 - PRODUCTS

2.01 TOUCHUP PAINT

A. Performance Criteria.
   1. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.
   2. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

END OF SECTION

SECTION 16111

CONDUIT

PART 1 - GENERAL

1.01 WORK INCLUDED

A. CONDUIT AND COUPLINGS.

B. FLEXIBLE CONDUIT.

C. NON-METALLIC DUCTS.

PART 2 - PRODUCTS

2.01 EMT (ELECTRICAL METALLIC TUBING (THIN WALL)

A. EMT shall be used above grade and indoors throughout this job, unless noted otherwise on Drawings, and as limited by NEC and as listed below.

B. EMT shall be galvanized or rust-resisting alloy.

C. EMT COUPLINGS AND CONNECTORS shall be of the compression type for 1 in. and smaller. For conduits larger than 1 in., the connectors may be either compression type or set screw type. All couplings and connectors shall be steel.

D. IF INSTALLED IN CONCRETE, couplings and connectors shall be rain tight or concrete-tight type, as required. EMT shall not be installed in slabs on grade.

E. EMT shall not be used in wet locations.

2.02 RIGID METAL CONDUIT (HEAVY WALL)

A. RIGID METAL CONDUIT shall be used in areas so indicated on Drawings and as listed below.

B. RIGID METAL CONDUIT shall be steel, hot-dip galvanized after threading.

C. RIGID METAL CONDUIT COUPLING'S CONNECTORS shall be threaded. Connections shall be made up tight.

D. RIGID METAL shall be used in wet locations.

2.03 DUCT-RIGID POLYVINYL CHLORIDE (PVC)

A. PVC CONDUIT shall be used in all areas below grade, except as limited by NEC, state and local codes and regulations. Unless noted otherwise, minimum size PVC conduit shall be 1" trade size.

B. FITTINGS for PVC conduit shall be suitable for the conduit and type of installation.

C. GROUNDING CONDUCTOR: Whenever PVC conduit is used; a separate grounding conductor shall be installed in entire length of conduit.

2.04 FLEXIBLE CONDUIT

A. FLEXIBLE PLASTIC JACKETED TYPE with liquid tight connectors.

B. CONDUIT CONNECTIONS as specifically indicated on Drawings shall be made with flexible conduit with vinyl jacket grounding type, same size as metallic conduit, equal to Sealtite as manufactured by American Brass Company.

C. ALL flexible conduit shall be UL listed.

2.05 GENERAL

A. INTERCONNECTIONS BETWEEN DIFFERENT TYPES OF RACEWAYS shall in all cases be made with manufactured fittings approved by UL.

2.06 LOCKNUTS, BUSHINGS, CONNECTORS, AND COUPLINGS

A. "DOUBLE-LOCKNUT" system (2 locknuts) shall be used throughout, each being tightened wrench-tight as to effectively bond outlet box or cabinet to conduit.

B. BUSHINGS shall be malleable, except that plastic bushings may be used in lieu of phenolic-lined malleable bushings where "insulating bushings" are required per NEC.

C. INSULATED-THROAT TYPE GROUND BUSHINGS shall be malleable type and fully equal to T & B #3802 series.

D. CONNECTORS AND/OR COUPLINGS shall be proper for conduit they are used with. They shall be watertight when required.

E. FINISH on such fittings shall be cadmium or galvanized.

F. THREADS on fittings shall be die-cut unless approved otherwise.

G. EMT CONNECTORS used with #4 and larger cable, shall have throatliners of suitable plastic insulation.

PART 3 - EXECUTION

3.01 INSTALLATION

A. SIZE RACEWAYS in accordance with NEC Tables, except that size shall not be reduced from any sizes indicated on Drawings or called out herein. The minimum size of any type of raceway except PVC shall be 1/2" trade size.

B. DO NOT exceed sizes permitted by Architect in slabs and/or walls, using multiple runs where absolutely necessary.

C. DO NOT exceed number of bends allowed in conduit by the NEC and reduce such to that indicated or specified when so done.

D. JOINTS shall be wrench-tight or otherwise with minimum resistance to the flow of fault currents.

E. PROTECT CONDUITS from damage, entrance of water or foreign objects and jog as necessary to prevent weakening walls or construction.

F. REMOVE flattened or otherwise damaged conduits from site.

G. USE FURRED SPACES AND CHASES to an advantage in concealing conduits.

H. FIELD BENDS shall be made only where needed and then carefully to minimize wire pulling tensions and for best appearance in exposed runs.

I. Cut conduit with hacksaw or with approved pipe cutting tool and ream ends before connecting.

J. ROUTES OF ALL CONDUITS shall be parallel and/or perpendicular with walls, floors, and structural elements, except as indicated and/or approved otherwise.

K. RACEWAYS shall be securely fastened in place. Conduit shall be firmly fastened within 3 ft of each outlet, junction box, cabinet or fitting. Metallic conduit, rigid (heavy wall) and EMT shall be supported at least every 10 ft. Rigid nonmetallic conduit shall be supported in strict accordance with Table 352.30 of NEC. Raceway fasteners shall be only those designed for the purpose.

L. INSTALL conduit concealed in all areas.

M. CLEAN out conduit before installation of conductor.

N. ALL empty conduit shall have a non-metallic pull cable installed for future use. Leave 4 ft of slack at both ends.

O. KEEP A RECORD of deviations from routes and locations shown on Drawings. Indicate all deviations on Project Record Drawings and submit drawings to Architect.

END OF SECTION

PRINTS ISSUED

DATE	PURPOSE	NO.
12.02.16	FOR BID	

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