

**SECTION 26 05 11**  
**REQUIREMENTS FOR ELECTRICAL INSTALLATIONS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section applies to all sections of Division 26.
- B. Furnish and install electrical wiring, systems, equipment and accessories in accordance with the specifications and drawings. Capacities and ratings of motors, cable, over current protective devices, and other items and arrangements for the specified items are shown on drawings.
- C. Wiring ampacities specified or shown on the drawings are based on copper conductors, with the conduit and raceways accordingly sized. Aluminum conductors are prohibited.
- D. Section Includes:
  - 1. Electrical project submittal requirements
  - 2. Electrical equipment coordination and installation
  - 3. Sleeves for raceways and cables
  - 4. Sleeve seals
  - 5. Grout
  - 6. Common electrical installation requirements
  - 7. Cutting and patching for electrical construction
  - 8. Touchup painting
  - 9. Electrical demolition requirements

**1.2 RELATED WORK**

- A. Sealing around penetrations to maintain the integrity of time rated construction: Section 07 84 00, FIRESTOPPING.

**1.3 MINIMUM REQUIREMENTS**

- A. References to the International Building Code (IBC), National Electrical Code (NEC), Underwriters Laboratories, Inc. (UL) and National Fire Protection Association (NFPA) are minimum installation requirement standards.
- B. Drawings and other specification sections shall govern in those instances where requirements are greater than those specified in the above standards.

**1.4 TEST STANDARDS**

- A. All materials and equipment shall be listed, labeled or certified by a nationally recognized testing laboratory to meet Underwriters

Laboratories, Inc., standards where test standards have been established. Equipment and materials which are not covered by UL Standards will be accepted provided equipment and material is listed, labeled, certified or otherwise determined to meet safety requirements of a nationally recognized testing laboratory. Equipment of a class which no nationally recognized testing laboratory accepts, certifies, lists, labels, or determines to be safe, will be considered if inspected or tested in accordance with national industrial standards, such as NEMA, or ANSI. Evidence of compliance shall include certified test reports and definitive shop drawings.

B. Definitions:

1. Listed; Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production or listed equipment or materials or periodic evaluation of services, and whose listing states that the equipment, material, or services either meets appropriate designated standards or has been tested and found suitable for a specified purpose.
2. Labeled; Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.
3. Certified; equipment or product which:
  - a. Has been tested and found by a nationally recognized testing laboratory to meet nationally recognized standards or to be safe for use in a specified manner.
  - b. Production of equipment or product is periodically inspected by a nationally recognized testing laboratory.
  - c. Bears a label, tag, or other record of certification.
4. Nationally recognized testing laboratory; laboratory which is approved, in accordance with OSHA regulations, by the Secretary of Labor.
5. Provide: The term "provide" means "to furnish and install, ready for the intended use and in complete operating condition."
6. Install: The term "install" is used to describe operations at project site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations."
7. Directed: Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean "directed by the Engineer," "requested by the Engineer," and similar phrases.
8. Approve: The term "approved," where used in conjunction with the Engineer's action on the Contractor's submittals, applications and requests, is limited to the Engineer's duties and responsibilities as stated in the Conditions of the Contracts.
9. Indicated: The term "indicated" refers to graphic representations, notes or schedules on the Drawings, or other Paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Where terms such as "shown," "noted," "scheduled" and "specified" are used, it is to help the reader locate the reference; no limitation on location is intended.

10. Contractor: The term "Contractor" shall carry the same meaning as "Electrical Contractor"
11. Or Equal: The term "Or equal" shall carry the same meaning as "approved as equal by the Engineer"
12. Owner: All references here-in and on drawings to "Owner" shall be the same as "Veterans Administration - Minneapolis".

#### **1.5 QUALIFICATIONS (PRODUCTS AND SERVICES)**

- A. Manufacturers Qualifications: The manufacturer shall regularly and presently produce, as one of the manufacturer's principal products, the equipment and material specified for this project, and shall have manufactured the item for at least three years.
- B. Product Qualification:
  1. Manufacturer's product shall have been in satisfactory operation, on three installations of similar size and type as this project, for approximately three years.
  2. The Government reserves the right to require the Contractor to submit a list of installations where the products have been in operation before approval.
- C. Service Qualifications: There shall be a permanent service organization maintained or trained by the manufacturer which will render satisfactory service to this installation within four hours of receipt of notification that service is needed. Submit name and address of service organizations.

#### **1.6 APPLICABLE PUBLICATIONS**

- A. Applicable publications listed in all Sections of Division are the latest issue, unless otherwise noted.

#### **1.7 MANUFACTURED PRODUCTS**

- A. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, for which replacement parts shall be available.
- B. When more than one unit of the same class or type of equipment is required, such units shall be the product of a single manufacturer.
- C. Equipment Assemblies and Components:
  1. Components of an assembled unit need not be products of the same manufacturer.
  2. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.
  3. Components shall be compatible with each other and with the total assembly for the intended service.
  4. Constituent parts which are similar shall be the product of a single manufacturer.

- D. Factory wiring shall be identified on the equipment being furnished and on all wiring diagrams.
- E. When Factory Testing Is Specified:
  - 1. The Government shall have the option of witnessing factory tests. The contractor shall notify the VA through the Resident Engineer a minimum of 15 working days prior to the manufacturers making the factory tests.
  - 2. Four copies of certified test reports containing all test data shall be furnished to the Resident Engineer prior to final inspection and not more than 90 days after completion of the tests.
  - 3. When equipment fails to meet factory test and re-inspection is required, the contractor shall be liable for all additional expenses, including expenses of the Government.

#### **1.8 EQUIPMENT REQUIREMENTS**

- A. Where variations from the contract requirements are requested in accordance with the GENERAL CONDITIONS and Section 01 33 23 "SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES," the connecting work and related components shall include, but not be limited to additions or changes to branch circuits, circuit protective devices, conduits, wire, feeders, controls, panels and installation methods.

#### **1.9 PROJECT CONDITIONS**

- A. Interior Environmental Conditions (fully conditioned spaces): Electrical systems shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:
  - 1. Ambient Temperature: 65 to 75 deg F
  - 2. Relative Humidity: 0 to 95 percent.
- B. Interior Environmental Conditions (heated only spaces): Electrical systems shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:
  - 1. Ambient Temperature: 55 to 95 deg F
  - 2. Relative Humidity: 0 to 95 percent.
- C. Hazardous Environment: System components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers shall be rated, listed, and installed according to NFPA 70.
- D. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
  - 1. Notify Owner/Owner's Representative no fewer than 5 working days in advance of proposed interruption of electric service.
  - 2. Do not proceed with interruption of electric service without Owner/Owner's Representative's written permission.

**1.10 EQUIPMENT PROTECTION**

- A. Equipment and materials shall be protected during shipment and storage against physical damage, vermin, dirt, corrosive substances, fumes, moisture, cold and rain.
  - 1. Store equipment indoors in clean dry space with uniform temperature to prevent condensation. Equipment shall include but not be limited to motor controllers, uninterruptible power systems, enclosures, controllers, circuit protective devices, cables, wire, light fixtures, electronic equipment, and accessories.
  - 2. During installation, equipment shall be protected against entry of foreign matter; and be vacuum-cleaned both inside and outside before testing and operating. Compressed air shall not be used to clean equipment. Remove loose packing and flammable materials from inside equipment.
  - 3. Damaged equipment shall be, as determined by the COR, placed in first class operating condition or be returned to the source of supply for repair or replacement.
  - 4. Painted surfaces shall be protected with factory installed removable heavy kraft paper, sheet vinyl or equal.
  - 5. Damaged paint on equipment and materials shall be refinished with the same quality of paint and workmanship as used by the manufacturer so repaired areas are not obvious.

**1.11 WORK PERFORMANCE**

- A. All electrical work must comply with the requirements of NFPA 70 (NEC), NFPA 70B, NFPA 70E, OSHA Part 1910 subpart J, OSHA Part 1910 subpart S and OSHA Part 1910 subpart K in addition to other references required by contract.
- B. Job site safety and worker safety is the responsibility of the contractor.
- C. Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished in this manner for the required work, the following requirements are mandatory:
  - 1. Electricians must use full protective equipment (i.e., certified and tested insulating material to cover exposed energized electrical components, certified and tested insulated tools, etc.) while working on energized systems in accordance with NFPA 70E.
  - 2. Electricians must wear personal protective equipment while working on energized systems in accordance with NFPA 70E.
  - 3. Before initiating any work, a job specific work plan must be developed by the contractor with a peer review conducted and documented by the COR and Medical Center staff. The work plan must include procedures to be used on and near the live electrical equipment, barriers to be installed, safety equipment to be used and exit pathways.
  - 4. Work on energized circuits or equipment cannot begin until prior written approval is obtained from the Resident Engineer.
- D. For work on existing stations, arrange, phase, and perform work to assure electrical service for other buildings at all times. Refer to

Article OPERATIONS AND STORAGE AREAS under Section 01 00 00 "GENERAL REQUIREMENTS."

- E. New work shall be installed and connected to existing work. Disturbed or damaged work shall be replaced or repaired to its prior conditions, as required by Section 01 00 00 "GENERAL REQUIREMENTS."
- F. Coordinate location of equipment and conduit with other trades to minimize interferences.
- G. All Electrical workmen on this project shall be thoroughly knowledgeable of all applicable codes related to all electrical systems for this project. All installations shall be performed by skilled electrician tradesmen fully aware of the latest techniques, practices, and standards of the industry. Haphazard or poor installation practice will be cause for rejection of work.
- H. Good workmanship and appearance shall be considered important. Carefully lay out all work in advance to install in a neat and good workmanship-like manner all in accordance with recognized practices and standards of the industry.

**1.12 COORDINATION**

- A. EQUIPMENT INSTALLATION AND REQUIREMENTS
  - 1. Equipment location shall be as close as practical to locations shown on the drawings.
  - 2. Working spaces shall not be less than specified in the NEC for all voltages specified.
  - 3. Inaccessible Equipment:
    - a. Where the Government determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, the equipment shall be removed and reinstalled as directed at no additional cost to the Government.
    - b. "Conveniently accessible" is defined as being capable of being reached quickly for operation, maintenance, or inspections without the use of ladders, or without climbing or crawling under or over obstacles such as, but not limited to, motors, pumps, belt guards, transformers, piping, ductwork, conduit and raceways.
- B. All drawings, specifications and documents for this project shall be taken as a whole. Before undertaking each part of the Work, the Contractor shall be familiar with this project by carefully reviewing and comparing all documents that pertain to this project.
- C. In preparation of the contract documents, a reasonable effort has been made to provide layouts and connections based on selected and specified manufacturer's equipment. Since physical space, electrical connections, equipment arrangements and other requirements may vary according to each manufacturer, the final responsibility for connections, initial access and proper fit rests with the Contractor.
- D. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.

1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.
- E. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.
- F. Provide temporary lighting accommodations throughout the facility and during the entire schedule of the project as needed. Coordinate with the general contractor and/or Owner for additional requirements.
- G. Before roughing in for electrical equipment furnished by others, verify the voltage and current characteristics and control connections of this equipment. Notify the Engineer where equipment connection requirements do not match the provisions indicated on the documents.
- H. Provide access panels and doors for electrical items that are concealed by finished surfaces. Access doors and panels are specified in Division 8 Section "Access Doors." Locations shall be coordinated with the Architectural reflected ceiling plans, and shall be approved by the Architect before installation.
- I. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.
- J. Where electrical identification markings and devices will be concealed by acoustical ceilings and similar finishes, coordinate installation of these items before ceiling installation.
- K. The drawings indicate only the approximate locations of rough-ins and may not indicate complete connection requirements. Prior to progressing with any work or rough-ins the Contractor shall obtain all equipment rough-in requirements and information from the equipment supplier, manufacturer or from the respective trades furnishing the equipment or with Architect, to complete the installation in a neat and workmanship-like manner.
- L. Scaled and figured locations are approximate only. Before proceeding with work, carefully check and verify with building dimensions on architectural drawings, and be responsible for properly fitting equipment and materials together and to the structure in spaces provided.
- M. Drawings are essentially diagrammatic and indicate the general arrangement of equipment. Many offsets, bends, pull boxes, special fittings, etc. will be required which are not indicated. Carefully study drawings and premises in order to determine best methods, exact locations, conduit routes, building obstructions, etc., to install apparatus and equipment. Install apparatus and equipment in manner and locations to avoid obstructions, preserve headroom, and keep openings and passageways clear.
- N. Where located adjacent and opposite side of the same wall, outlet boxes shall not be placed back to back, nor shall extension rings be used in place of double boxes, all to limit sound transmission between rooms. Provide short horizontal nipple between adjacent outlet boxes,

which shall have depth sufficient to maintain wall coverage in rear by masonry material.

- O. Coordinate arrangement, mounting, and support of electrical equipment:
  - 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
  - 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
  - 3. To allow right of way for piping and conduit installed at required slope.
  - 4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
- P. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- Q. Coordinate sleeve selection and application with selection and application of fire stopping specified in Division 07 Section "Penetration Fire stopping".

#### **1.13 EQUIPMENT INSTALLATION AND REQUIREMENTS**

- A. Equipment location shall be as close as practical to locations shown on the drawings.
- B. Working spaces shall not be less than specified in the NEC for all voltages specified.
- C. Inaccessible Equipment:
  - 1. Where the Government determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, the equipment shall be removed and reinstalled as directed at no additional cost to the Government.
  - 2. "Conveniently accessible" is defined as being capable of being reached quickly for operation, maintenance, or inspections without the use of ladders, or without climbing or crawling under or over obstacles such as, but not limited to, motors, pumps, belt guards, transformers, piping, ductwork, conduit and raceways.

#### **1.14 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23 "SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES."
- B. The Government's approval shall be obtained for all equipment and material before delivery to the job site. Delivery, storage or installation of equipment or material which has not had prior approval will not be permitted at the job site.
- C. All submittals shall include adequate descriptive literature, catalog cuts, shop drawings and other data necessary for the Government to ascertain that the proposed equipment and materials comply with



specification requirements. Catalog cuts submitted for approval shall be legible and clearly identify equipment being submitted.

- D. The review of shop drawings by the Architect/Engineer shall not constitute agreement of any deviations from the plans and specifications and shall not relieve the Contractor from responsibility for errors or omissions.
- E. Submittals for individual systems and equipment assemblies which consist of more than one item or component shall be made for the system or assembly as a whole. Partial submittals will not be considered for approval.
  - 1. Mark the submittals, "SUBMITTED UNDER SECTION\_\_\_\_\_".
  - 2. Submittals shall be marked to show specification reference including the section and paragraph numbers.
  - 3. Submit each section separately.
- F. The submittals shall include the following:
  - 1. Information that confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required.
  - 2. Elementary and interconnection wiring diagrams for communication and signal systems, control systems and equipment assemblies. All terminal points and wiring shall be identified on wiring diagrams.
  - 3. Parts list which shall include those replacement parts recommended by the equipment manufacturer.
  - 4. All shop drawings shall be bound neatly in separate hard cover, 3-ring binders. Submit the following and refer to each Section for specific requirements. Tab and index each Section, sequenced in order of section. The four sets of binders shall consist of the following:
    - a. Part One - Lighting Fixtures (Combined together in sequence per Lighting Fixture Schedule):
      - 1) Section 26 0923 Lighting Controls
      - 2) Section 26 5100 Interior Lighting
    - b. Part Two - Remaining Sections:
      - 1) Section 26 0533 Raceways and Boxes for Electrical Systems
      - 2) Section 26 2416 Panelboards
      - 3) Section 26 2726 Wiring Devices
  - 5. Refer to drawings for the additional required equipment that is to be submitted as part of the shop drawing submittals.
- G. Maintenance and Operation Manuals: Submit in accordance with Section 01 00 00 "GENERAL REQUIREMENTS."
  - 1. Submit as required for systems and equipment specified in the technical sections. Furnish four copies, bound in hardback binders, (manufacturer's standard binders) or an approved equivalent. Furnish one complete manual as specified in the technical section but in no case later than prior to performance of systems or equipment test, and furnish the remaining manuals prior to contract completion.
  - 2. Inscribe the following identification on the cover: the words "MAINTENANCE AND OPERATION MANUAL," the name and location of the system, equipment, building, name of Contractor, and contract number. Include in the manual the names, addresses, and telephone

- numbers of each subcontractor installing the system or equipment and the local representatives for the system or equipment.
3. Provide a "Table of Contents" and assemble the manual to conform to the table of contents, with tab sheets placed before instructions covering the subject. The instructions shall be legible and easily read, with large sheets of drawings folded in.
  4. The manuals shall include:
    - a. Internal and interconnecting wiring and control diagrams with data to explain detailed operation and control of the equipment.
    - b. A control sequence describing start-up, operation, and shutdown.
    - c. Description of the function of each principal item of equipment.
    - d. Installation instructions.
    - e. Safety precautions for operation and maintenance.
    - f. Diagrams and illustrations.
    - g. Periodic maintenance and testing procedures and frequencies, including replacement parts numbers and replacement frequencies.
    - h. Performance data.
    - i. Pictorial "exploded" parts list with part numbers. Emphasis shall be placed on the use of special tools and instruments. The list shall indicate sources of supply, recommended spare parts, and name of servicing organization.
    - j. List of factory approved or qualified permanent servicing organizations for equipment repair and periodic testing and maintenance, including addresses and factory certification qualifications.
    - k. Commissioning and Testing:
      - 1) Provide field Commissioning and testing as defined in Section 26 8000 for the following Specification Sections:
        - a) Section 26 0519 Low Voltage Cables and Conductors for Electrical Systems
        - b) Section 26 0526 Grounding and Bonding for Electrical Systems
        - c) Section 26 0923 Lighting Controls
        - d) Section 26 2416 Panelboards
        - e) Section 26 2921 Disconnect Switches
- H. Record 'As-Built' Documents:
1. Prepare and record 'as-built' documents in accordance with the requirements in Division 1 Section "Project Closeout."
  2. Maintain a separate set of electrical drawings at the job site which is not used for construction purposes. This set shall be kept updated by neatly marking all changes and deviations made during construction. Use a color that contrasts with the drawings. This same set of drawings shall be made available at all times during construction for review at any time by the Architect/Engineer.
  3. In addition to the requirements specified in Division 1, indicate actual installed and 'as-built' conditions for:
    - a. Major raceway systems, size and location, for both exterior and interior.
    - b. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
    - c. Approved changes and actual equipment and materials installed.

- d. Contract modifications, including deviation of branch circuit numbering where circuit breaker arrangements have been adjusted.
- I. Approvals will be based on complete submission of manuals together with shop drawings.
- J. After approval and prior to installation, furnish the COR with one sample of each of the following:

**1.15 SINGULAR NUMBER**

- A. Where any device or part of equipment is referred to in these specifications in the singular number (e.g., "the switch"), this reference shall be deemed to apply to as many such devices as are required to complete the installation as shown on the drawings.

**1.16 PCB EQUIPMENT (NOT USED)**

**1.17 Acceptance Checks and Tests**

- A. The contractor shall furnish the instruments, materials and labor for field tests.

**1.18 TRAINING**

- A. Training shall be provided in accordance with Article 1.25, INSTRUCTIONS, of Section 01 00 00 "GENERAL REQUIREMENTS."
- B. Training shall be provided for the particular equipment or system as required in each associated specification.
- C. A training schedule shall be developed and submitted by the contractor and approved by the Resident Engineer at least 30 days prior to the planned training.

**1.19 PERMITS**

- A. Obtain and pay for licenses and permits required, for fees and charges for use of outside services (i.e. inspecting agencies or delivery services) and use of property other than the site of the Work for storage of materials or other purposes.

**1.20 INSPECTIONS**

- A. Secure regular inspections as required by regulations. Pay charges by regulating agencies for the inspections of installations or Drawings and Specifications.

**1.21 INSURANCE**

- A. Procure and maintain such insurance required by law and/or specified in Division 0 or 1.

**PART 2 - PRODUCTS**

**2.1 SLEEVES FOR RACEWAYS AND CABLES**

- A. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- B. Sleeves for Rectangular Openings: Galvanized sheet steel.

**2.2 SLEEVE SEALS**

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Advance Products & Systems, Inc.
    - b. Calpico, Inc.
    - c. Metraflex Co.
    - d. Pipeline Seal and Insulator, Inc.
  - 2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
  - 3. Pressure Plates: Carbon steel. Include two for each sealing element.
  - 4. Connecting Bolts and Nuts: Carbon steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

**2.3 GROUT**

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, non-corrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

**PART 3 - EXECUTION**

**3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION**

- A. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

- B. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- D. Right of Way: Give to piping systems installed at a required slope.

### **3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS**

- A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Cut sleeves to length for mounting flush with both surfaces of walls.
- F. Extend sleeves installed in floors 3 inches above finished floor level.
- G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable, unless indicated otherwise.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
  - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
- I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."
- J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."

### **3.3 SLEEVE-SEAL INSTALLATION**

- A. Install to seal exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

### **3.4 FIRESTOPPING**

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

### **3.5 CUTTING AND PATCHING**

- A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled craftsmen of trades involved.
- B. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing fire stopping has been disturbed. Repair and refinish materials and other surfaces by skilled craftsmen of trades involved.

### **3.6 FIELD QUALITY CONTROL**

- A. Inspect installed components for damage and faulty work, including the following:
  - 1. Supporting devices for electrical components.
  - 2. Electrical identification.
  - 3. Cutting and patching for electrical construction.
  - 4. Touchup painting.

### **3.7 REFINISHING AND TOUCHUP PAINTING**

- A. Refinish and touch up paint. Paint materials and application requirements are specified in Division 9 Section "Painting."
  - 1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.
  - 2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.
  - 3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
  - 4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

### **3.8 CLEANING AND PROTECTION**

- A. Thoroughly clean electrical materials, equipment and apparatus to be free of dust, dirt, rust, and foreign materials before acceptance at Substantial Completion.
- B. Clean panelboards, switchboards, motor controls, etc. Take special care to remove dirt, mortar, wire scraps, etc, from equipment interiors.
- C. Clean accessible elements of disconnecting and protective devices of equipment, coils of dry type transformers, etc. with compressed air (less than 15 psi) and vacuum clean enclosure prior to being energized.
- D. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.
- E. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

### **3.9 ELECTRICAL CONTRACTOR DEMOLITION RESPONSIBILITIES**

- A. Remove accessible wiring including conduit, junction boxes, hangers, and supports for main feeders to panelboards, from panelboards to light fixtures from panelboards to wiring devices such as receptacles, switches, floor outlets, special electrical devices, etc., indicated to be removed. Existing conduit, boxes, cable, etc. indicated to remain which are presently being supported from existing ceiling or ceiling supports, which are to be removed, shall be re-supported to building structure.
- B. Where conduits are stubbed out of a surface not being removed for new construction, such as a floor slab or poured concrete column or wall, these conduits shall be cut back to a point where patching can adequately be performed.
- C. Demolition work shall be coordinated with the Owner. Should questions arise regarding the removal of a conduit and/or wiring, (i.e. Is it energized? Does it serve a load in an area not be remodeled?), confirm with the Owner before such wiring or conduit is actually demolished.
- D. Reused and Reinstalled equipment and devices: Carefully disconnect and remove items to be reused or reinstalled. Any questions regarding the quality and reusability of an item shall be brought to the attention of the Engineer/Architect prior to removal. Items shall be properly stored in a manner causing no additional damage to the item. Prior to reinstalling, clean and test item. Upon completion, the item shall be in equivalent condition as prior to its removal. Items damaged due to improper handling and storage by the Contractor shall be replaced with new items of the same type and quality as the original item. Reinstalled light fixtures shall be cleaned and re-lamped with new lamps. Non-functioning ballasts shall be replaced with new ballasts. Lamps and ballasts shall be guaranteed as new items.

- E. Demolition equipment and devices: Existing equipment, devices, and light fixtures not indicated for reuse shall become the property of this Contractor and disposed of properly.
  - 1. Light fixtures scheduled for removal on this Project may contain PCB impregnated ballasts. Remove PCB ballasts from light fixtures and place ballasts in hazardous waste disposal containers. Properly dispose of the ballasts with a registered hazardous materials disposal contractor. Provide copies of the disposal certificate(s) to the Owner and Engineer at the completion of the Project.
  - 2. Fluorescent and HID lamps removed from light fixtures shall be placed in containers, and properly disposed of with a registered disposal contractor.
- F. Disconnect and remove wiring devices and replace with devices and cover plates as shown on the Drawings or as specified in Section 26 2726 - Wiring Devices.
- G. Refer to Division 1 for hazardous material removal requirements.
- H. Rework the existing conduit and junction box system such that upon completion of the remodeling, no junction boxes are located in inaccessible locations. This includes existing junction boxes that may be rendered inaccessible due to new piping or ductwork installation. Coordinate with other trades in this effort. Provide additional conduit and connections as required.

### **3.10 EXISTING CONDITIONS**

- A. Conduits, lights, circuiting, devices, speakers, etc., shown on the Drawings as existing are based on existing plans and may not be installed as originally shown. A field survey was conducted to verify the general accuracy of the existing plans. However, no attempt has been made to find the changes which occur in concealed areas such as above inaccessible ceilings and in walls. Verify the accuracy of the "Existing Conditions" as shown on the Drawings as the demolition work progresses. Perform modifications and additions as necessary to correct for these hidden conditions and allow for the completion of the new Work.

### **3.11 CONTINUITY OF SERVICE**

- A. Schedule and carry out the Work in such a manner as to cause the Owner a minimum of inconvenience due to service interruption. Temporary services (feeder, branch circuit and signal systems) shall be installed if one area or phase of construction disrupts service to another area of the building(s) or if equipment, conduits, or feeders have to be relocated to allow construction to progress. Service interruptions shall be confined to the smallest area possible at any one time and interruptions shall be scheduled in advance with the Owner's site representative. All interruptions shall be conducted and shall be limited to after hours (9:00 pm - 6:00am) and weekends. After service has been restored following an interruption, inspect areas affected by the interruption and be responsible for returning automatically controlled equipment to the same operating condition which existed prior to the interruption.



**3.12 BUILDING STRUCTURE PENETRATIONS**

- A. Provide firestopping for all existing electrical penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping.
- B. Where existing or temporary raceway systems are being demolished, which leave openings in the existing building structure, the building structure shall be patched to match the existing construction and maintain the existing building fire ratings.

- - - E N D - - -